Organik Farming
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Soil organic matter and biological soil quality indicators after 21 years of organic and conventional farming/Andreas Flie[ss]bach, Hans-Rudolf Oberholzer, Lucie Gunst, Paul Mader

Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 273-284, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.05.022. (http://www.sciencedirect.com/science/article/pii/S0167880906001794)

Abstract:
Organic farming systems often comprise crops and livestock, recycle farmyard manure for fertilization, and preventive or biocontrol measures are used for plant protection. We determined indicators for soil quality changes in the DOK long-term comparison trial that was initiated in 1978. This replicated field trial comprises organic and integrated (conventional) farming systems that are typical for Swiss agriculture. Livestock based bio-organic (BIOORG), bio-dynamic (BIODYN) and integrated farming systems (CONFYM) were compared at reduced and normal fertilization intensity (0.7 and 1.4 livestock units, LU) in a 7 year crop rotation. A stockless integrated system is fertilized with mineral fertilizers exclusively (CONMIN) and one control treatment remained unfertilized (NOFERT). The CONFYM system is amended with stacked manure, supplemental mineral fertilizers, as well as chemical pesticides. Manure of the BIOORG system is slightly rotted and in BIODYN it is composted aerobically with some herbal additives. In the third crop rotation period at normal fertiliser intensity soil organic carbon (Corg, w/w) in the plough layer (0-20 cm) of the BIODYN system remained constant and decreased by 7% in CONFYM and 9% in BIOORG as compared to the starting values. With no manure application Corg-loss was severest in NOFERT (22%), followed by CONMIN together with the systems at reduced fertiliser intensity (14-16%). Soil pH tended to increase in the organic systems, whereas the integrated systems had the lowest pH values. At the end of the third crop rotation period in 1998 biological soil quality indicators were determined. Compared to soil microbial biomass in the BIODYN systems the CONFYM soils showed 25% lower values and the systems without manure application were lower by 34%. Relative to the BIODYN soils at the same fertilization intensity dehydrogenase activity was 39-42% lower in CONFYM soils and even 62% lower in soils of CONMIN. Soil basal respiration did not differ between farming systems at the same intensity, but when related to microbial biomass (qCO2) it was 20% higher in CONFYM soils and 52% higher in CONMIN as compared to BIODYN, suggesting a higher maintenance requirement of microbial biomass in soils of the integrated systems. The manure based farming systems of the DOK trial are likely to favour an active and fertile soil. Both, Corg and biological soil quality indicators were clearly depending on the quantity and quality of the applied manure types, but soil microbial biomass and activities were much more affected than Corg.

Keywords: Soil organic matter; Soil microbial biomass; Soil enzymes; Soil basal respiration; Organic farming; Long-term experiment

ROTOR, a tool for generating and evaluating crop rotations for organic farming systems/Johann Bachinger, Peter Zander

European Journal of Agronomy, Volume 26, Issue 2, February 2007, Pages 130-143, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.09.002. (http://www.sciencedirect.com/science/article/pii/S1161030106001249)

Abstract:
As with conventional farming, the improvement of organic farming systems requires agronomic planning tools to enhance economic performance. Crop rotation planning plays a crucial role in organic arable farming systems due to the renunciation of mineral nitrogen fertilisers and pesticides. Our objective was to develop a tool for generating and evaluating site-specific and agronomically sustainable crop rotations for organic farming systems in central Europe. The resulting static rule-based model, called ROTOR, consists of two basic steps: (A) A set of annual crop production activities (CPAs) is assembled semi-automatically from single site and crop-specific field operations using a relational data base. The database includes all relevant crops recorded separately with inputs and outputs, machinery and timing. Starting from stubble tillage and ending with the last harvest measure, the CPAs describe the current best cropping practices. Different CPAs are included for each crop according to (i) the type of crop preceding and (ii) the field operations following: whether ploughing or non-inverting tillage, undersowing crops, using catch crops, manuring, straw harvesting, or mechanical weed control. The former allows for the modelling of all possible positions of a crop within a crop rotation and the consequential effects of preceding crops. The CPAs are evaluated using rule-based assessment modules for yield, economic performance, N balance, nitrate leaching, and weed infestation risks. These modules have been developed using data from field experiments, farm trials and surveys, expert knowledge and a soil-crop simulation model. (B) Within the crop generation module, all possible sequences of CPAs are linked to 3-8-year preliminary crop rotations. Agronomically sustainable crop rotations are selected according to exclusion criteria (i.e., thresholds for N balance, weed infestation risks, phytosanitary and chronological restrictions) and ranked, e.g. by economic performance. The model was tested by comparing (i) estimated with observed yields and (ii) generated with existing rotations. These comparisons, based on data obtained from two farm surveys from North Eastern Germany, indicate the validity and usability of the model approach. ROTOR was found to support the complex crop rotation planning in organic farming systems requiring rotations with overlapping undersown main and cover crops. ROTOR is able to reduce the risk of planning failures by offering a quantitative method of optimisation of weed and site-specific N management.
Keywords: Modelling; N balance; N supply; Organic farming; Phytosanitary restriction; Weed management

Modelling farm-level economic potential for conversion to organic farming/Eva Kerselaers, Lieve De Cock, Ludwig Lauwers, Guido Van Huylenbroeck
Agricultural Systems, Volume 94, Issue 3, Special Section: sustainable resource management and policy options for rice ecosystems, International symposium on sustainable resource management and policy options for rice ecosystems, June 2007, Pages 671-682, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.02.007.
(http://www.sciencedirect.com/science/article/pii/S0308521X07000388)
Abstract:
This paper discusses linear programming simulations at individual farm-level of potential income changes that may result from conversion to organic farming. The model is based on both conventional farm accountancy data and additional conventional and organic farm data from sector expertise and literature. The model is applied for Belgian

agriculture. Simulations show that economic potential for conversion is higher than generally perceived, provided that farmers are willing to change farm management practices. However, the economic conversion potential (ECP) is not positive for all farms, not even when an optimal conversion process is assumed and it depends on farm type and farm characteristics. Additionally, due to higher risk and liquidity problems during the transition period, the positive results need to be put into perspective. Nevertheless, the differentiated ECP calculations can give new insights supporting farm-level policy choices with respect to conversion to organic farming.

Keywords: Organic farming; Economic potential; Transition period; Farm model; Linear programming; Simulation

Conversion to organic arable farming in The Netherlands: A dynamic linear programming analysis/S. Acs, P.B.M. Berentsen, R.B.M. Huirne,
Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 405-415, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.11.002.
(http://www.sciencedirect.com/science/article/pii/S0308521X06001697)

Abstract:

Several studies show that organic farming is more profitable than conventional farming. However, in reality not many farmers convert to organic farming. Policy makers and farmers do not have clear insight into factors which hamper or stimulate the conversion to organic farming. The objective of this paper is to develop a dynamic linear programming model to analyse the effects of different limiting factors on the conversion process of farms over time. The model is developed for a typical arable farm in The Netherlands central clay region, and is based on two static liner programming models (conventional and organic). The objective of the model is to maximise the net present value over a 10-year planning horizon. The results of the analysis of a basic scenario show that conversion to organic farming is more profitable than staying conventional. In order to arrive at the actual profitable phase of organic farming, the farmer has to pass through the economically difficult 2-year conversion period. Sensitivity analysis shows that if depreciation is 25% higher than conventional fixed costs due to machinery made superfluous by conversion, conversion is less profitable than staying conventional. Also the availability of hired labour, which can be constrained in peak periods, has a strong effect on the cropping plan and the amount of area converted. Further analysis shows that a slight drop (2%) in organic prices lowers the labour income of the farmer and makes conversion less profitable than conventional farming. For farmers, a minimum labour income can be required to `survive'. The analysis shows that constraint on minimum labour income makes stepwise conversion the best way for farmers to overcome economic difficulties during conversion.

Keywords: Organic farming; Arable farming; Conversion; Dynamic linear programming

Temporal and spatial variability of soil organic matter and total nitrogen in an agricultural ecosystem as affected by farming practices/ Biao Huang, Weixia Sun, Yongcun Zhao, Jing Zhu, Rongqing Yang, Zhong Zou, Feng Ding, Jianping Su
Geoderma, Volume 139, Issues 3-4, 15 May 2007, Pages 336-345, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.02.012.
(http://www.sciencedirect.com/science/article/pii/S0016706107000584)

Abstract:

In agricultural ecosystem, soil organic matter (SOM) and soil total nitrogen (STN) are important indexes in estimating the soil carbon stock, soil fertility and soil quality. This paper examines the temporal and spatial variation of SOM and STN in Rugao city, Jiangsu Province, an agricultural area in Yangtze River Delta region, China, as affected by farming practices using the data from 1982 through 1997 to 2002. Spatially, loamy Stagnic Anthrosols (Baipu) in the eastern area and clay Aquic Cambosols (Changqingsha) in the southern area had high contents of SOM and STN, whereas sandy Ustic Cambosols (Guoyuan) and Aquic Cambosols (Motou) in the mid-western areas had low SOM and STN contents, and loamy Aquic Cambosols (Banjing, Dongchen, etc.) in the northern or southern areas had medium SOM and STN contents. Temporally, SOM had shown a tendency to constantly increase in the past 20 years. During the period 1982-1997, the SOM and STN in the mid-western areas rapidly increased due to the effect of farming practices such as incorporating crop residues in soils and shifting from corn-wheat rotation to rice-wheat rotation. From 1997 to 2002, the soils in the eastern and southern areas had a rapid increase in SOM owing to the adjustment of agricultural and cropping structures and/or application of more organic fertilizers, whereas those in the mid-western areas increased slowly or even decreased because of reduced incorporation of crop residues in soils. Accordingly, STN content in the eastern and southern areas increased slightly, but soil STN content in the mid-western areas did not change or decreased in some areas. In conclusion, the incorporation of crop residues in soils and the application of organic fertilizers were effective in increasing SOM, whereas the application of organic fertilizers in combining with chemical fertilizers were effective for accumulating STN. As regards to the implementation of these sustainable measures under rapid economic development, the government must be liable for guiding or supporting farmers so that the sparse soil resources in the densely populated area can be appropriately utilized.
Keywords: Agricultural ecosystem; Farming practices; Soil organic matter and total nitrogen; Temporal-spatial variability

Relationships between Danish organic farming and landscape composition/ Gregor Levin

Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 330-344, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.10.018. (http://www.sciencedirect.com/science/article/pii/S016788090600380X)

Abstract:
This article presents an investigation of relationships between organic farming and landscape composition in Denmark. Landscape composition was analysed in terms of density of uncultivated landscape elements (I), number of land uses per hectare (II), diversity of land use (III) and mean field size (IV). Two analytical approaches were used. The first was based on an examination of the national agricultural registers for 1998, 2001 and 2004. The second approach used aerial photo interpretation for an analysis of 72 conventional and 40 organic farms within three sample areas for 1982, 1995 and 2002. The national analysis indicated that organic farming has a direct effect on landscape composition. In 2001, organic farms were characterised by a higher number of land uses per ha, a higher land use diversity and smaller mean field sizes. From 1998 to 2004, conversion to organic farming was related to an increasing number of land uses per ha, increasing land-use diversity and decreasing mean field sizes. Relationships between organic farming and landscape composition were

independent of variations in regional location, farm size or farm size change. At the level of sample areas, a significant relationship between organic farming and landscape composition was only found for densities of small biotopes. However, when differences in farm size and physical geographical conditions between conventional and organic farms were taken into account, several significant differences in landscape composition were clarified in two of the three sample areas. Furthermore, changes in landscape composition following conversion to organic farming were largely biased by the characteristics of the sample areas. Thus, in contrast to the national level, the sample area study indicated that differences in landscape composition between organic and conventional farms were not a direct implication of organic farming practices, but were related to variations within other parameters and to the location of organically farmed land.
Keywords: Organic farming; Conventional farming; Landscape composition; Landscape change; Farm properties

Value of catch crops and organic manures for spring barley in organic arable farming/Jorgen E. Olesen, Elly M. Hansen, Margrethe Askegaard, Ilse A. Rasmussen
Field Crops Research, Volume 100, Issues 2-3, 1 February 2007, Pages 168-178, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.07.001.
(http://www.sciencedirect.com/science/article/pii/S0378429006001468)
Abstract:
The effect of nitrogen (N) supply and weeds on grain yield of spring barley was investigated from 1997 to 2004 in an organic farming crop rotation experiment in Denmark on three different soil types varying from coarse sand to sandy loam. Two experimental factors were included in the experiment in a factorial design: (1) catch crop (with and without), and (2) manure (with and without). The crop rotation included grass-clover as a green manure crop. Animal manure was applied as slurry in rates corresponding to 40% of the N demand of the cereal crops.
Application of 50 kg NH4-N ha-1 in manure (slurry) increased average barley grain DM yield by 1.0-1.3 Mg DM ha-1, whereas the use of catch crops (primarily perennial ryegrass) increased grain DM yield by 0.2-0.4 Mg DM ha-1 with the smallest effect on the loamy sand and sandy loam soils and the greatest effect on the coarse sandy soil. Model estimations showed that the average yield reduction from weeds varied from 0.2 to 0.4 Mg DM ha-1 depending on weed species and density. The yield effects of N supply were more predictable and less variable than the effects of weed infestation. The infestation level of leaf diseases was low and not a significant source of yield variation.
The apparent recovery efficiency of N in grains (N use efficiency, NUE) from NH4-N in applied manure varied from 29 to 38%. The NUE of above-ground N in catch crops sampled in November prior to the spring barley varied from 16 to 52% with the largest value on the coarse sandy soil and the smallest value on the sandy loam soil. A comparison of grain yield levels obtained at the different locations with changes in soil organic matter indicated a NUE of 21-26% for soil N mineralisation, which is smaller than that for the mineral N applied in manure. However, this estimate is uncertain and further studies are needed to quantify differences in NUE from various sources of N.
The proportion of perennial weeds in total biomass increased during the experiment, particularly in treatments without manure application. The results show that manure application is a key factor in maintaining good crop yields in arable organic farming on sandy soils, and in

securing crops that are sufficiently competitive against perennial weeds.

Keywords: Organic farming; Nitrogen; Nitrogen use efficiency; Weeds; Grain yield; Catch crop; Cover crop; Crop residues

Subsoil loosening in a crop rotation for organic farming eliminated plough pan with mixed effects on crop yield/Jorgen E. Olesen, Lars J. Munkholm

Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 376-385, ISSN 0167-1987, DOI: 10.1016/j.still.2006.08.015.
(http://www.sciencedirect.com/science/article/pii/S0167198706002005)

Abstract:
Compacted subsoil may reduce plant root growth with resulting effects on plant uptake of water and nutrients. In organic farming systems subsoil loosening may therefore be considered an option to increase nutrient use. We investigated the effect of subsoil loosening with a paraplow to ca. 35 cm depth within a four-crop rotation in an organic farming experiment at Foulum (loamy sand) and Flakkebjerg (sandy loam) in Denmark. In each of the years 2000-2003, half of four plots per site were loosened in the autumn bearing a young grass-clover crop (mixture of Lolium perenne L., Trifolium repens L. and Trifolium pratense L.) established by undersowing in spring barley (Hordeum vulgare L.). The grass-clover was grown for another year as a green manure crop and was followed by winter wheat (Triticum aestivum L.), lupin (Lupinus angustifolius L.):barley and spring barley in the following 3 years. On-land ploughing was used for all cereal and pulse crops. Penetration resistance was recorded in all crops, and the results clearly showed that subsoil loosening had effectively reduced the plough pan and that the effect lasted at least for 3.5 years. Measurements of wheat root growth using minirhizotrons at Foulum in 2002/2003 did not show marked effects of subsoil loosening on root frequency in the subsoil. Subsoil loosening resulted in reduced growth and less N uptake of the grass-clover crop in which the subsoil loosening was carried out, probably due to a reduced biological nitrogen (N) fixation resulting from a smaller clover proportion. This had a marked effect on the growth of the succeeding winter wheat. Negative effect of subsoil loosening on yield of winter wheat and spring barley was observed without manure application, whereas small positive yield effect of subsoil loosening was observed in crops with a higher N supply from manure. Yield decrease in winter wheat was observed in years with high winter rainfall. There was no significant effect of subsoiling on grain yield of the lupin:barley crops, although subsoiling had a tendency to increase crop growth and yield during dry summers. Our results suggest that subsoil loosening should not be recommended in general under Danish conditions as a measure to ameliorate subsoil compaction.

Keywords: Subsoil loosening; Subsoiling; Root growth; Yield; Nitrogen uptake; Organic farming

Can conversion to organic farming restore the species composition of arable weed communities?/Terho Hyvonen

Biological Conservation, Volume 137, Issue 3, July 2007, Pages 382-390, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.02.021.
(http://www.sciencedirect.com/science/article/pii/S0006320707000894)

Abstract:
Benefits of organic cropping for biodiversity have usually been demonstrated in relation to modern conventional cropping. In this study, the ability of organic cropping to restore species composition

of weed communities was explored by comparing weed communities of present day organic cropping with weed communities at the beginning of the application of modern cropping measures in the 1960s. The data of two weed surveys of spring cereals (conducted in 1961-1964 and 1997-1999) in Finland were utilized for a comparison. Frequency of occurrence and density (plants m-2) of 41 weed species were compared between decades. Partial canonical correspondence analysis (pCCA) was applied to explore the relationship between species composition, management and non-management variables. Eight species had lower and 30 species higher or similar frequency of occurrence in the 1990s' organically cropped fields than in the fields of the 1960s. However, 18 species had lower and 20 species had higher or similar density in the organically cropped fields than in the fields of the 1960s. Three species were not detected at all in the organically cropped fields. Crop and under-sown grass explained more of the variation in species composition in the 1990s than in the 1960s. The role of drainage and pre-crop was more important in the 1960s than in the 1990s. The most immediate benefit was gained by nitrophilous species that had suffered from herbicide application. The recovery of perennials and non-nitrophilous species will take a longer time. The results suggest that despite some benefits for biodiversity, organic farming at early phase cannot recover weed populations to the same level as before application of intensive cropping measures.

Keywords: Agricultural intensification; Agro-biodiversity; Canonical correspondence analysis; Common agricultural policy; Farming systems; Herbicide

Modelling worker physical health and societal sustainability at farm level: An application to conventional and organic dairy farming/K.J. van Calker, P.B.M. Berentsen, I.J.M. de Boer, G.W.J. Giesen, R.B.M. Huirne

Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 205-219, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.08.006.
(http://www.sciencedirect.com/science/article/pii/S0308521X06001181)

Abstract:
Farm-level modelling can be used to determine how farming systems and individual farm-management measures influence different sustainability indicators. Until now however, worker physical health and societal sustainability have been lacking in farm models. For this paper, we first selected attributes of physical health (working conditions) and societal sustainability (food safety, animal welfare and health, and landscape quality). Second, possible sustainability indicators for these attributes were identified, and those selected were included in an existing dairy farm LP-model that was subsequently used to analyse possible differences in societal sustainability within and between a conventional and organic dairy farming system. Results for physical health and societal sustainability were similar for conventional and organic dairy farming systems in the basis situation, as well as in the situation where additional management measures were applied to improve societal sustainability, but improved animal welfare did result in the organic system due to prescribed grazing, and due to assumed summer feeding in the conventional system. Results show that additional management measures considerably improved societal sustainability of the conventional as well as the organic system. LP-modelling appeared to be a suitable method for comparing farming systems and determining the effect of management measures on physical health and societal sustainability. The level of societal sustainability is determined

mainly by applied management measures, and is related to the particular farming system in only a very limited way. This implies that societal sustainability is mainly dependent on the cost-effectiveness of management measures and on the attitude of the dairy farmer.
Keywords: Dairy farming; Sustainability; Modelling; Economic sustainability; Societal sustainability; Physical health

Insect pollinated plants benefit from organic farming/Doreen Gabriel, Teja Tscharntke
Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 43-48, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.04.005. (http://www.sciencedirect.com/science/article/pii/S0167880906001484)
Abstract:
Organic farming is predicted to enhance diversity in agroecosystems. This study addresses the question of whether the often observed positive effect of organic farming on arable weed and pollinator diversity results in a significant shift in arable weed community structure towards a higher proportion of insect pollinated species in organic crop fields. To examine whether plant community patterns were consistent with this hypothesis, arable weed communities were compared with respect to the type of pollination (i.e. insect pollination versus non-insect pollination) in the edges and centres of 20 organic and 20 conventional wheat fields. Plant species numbers of both pollination types were much higher in organic than in conventional fields and higher in the field edge than in the field centre. A comparison of the proportions of both pollination types to all plant species revealed that the relative number of insect pollinated species was higher in organic than in conventional fields and higher at the field edge than in the field centre, whereas the relative number of non-insect pollinated species was higher in conventional fields and in the field centre. Our results show that insect pollinated plants benefit disproportionately from organic farming, which appeared to be related to higher pollinator densities in organic fields, whereas in the centres of conventional fields non-insect pollinated plants dominate presumably due to a limitation of pollinators. Hence, disruption of plant-pollinator interactions due to agricultural intensification may cause important shifts in plant community structure.
Keywords: Arable weeds; Conventional farming; Feed-back; Plant fitness; Pollination

Management regimes and farming practices enhancing plant species richness on ditch banks/A.G.E. Manhoudt, A.J. Visser, G.R. de Snoo,
Agriculture, Ecosystems & Environment, Volume 119, Issues 3-4, March 2007, Pages 353-358, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.08.004. (http://www.sciencedirect.com/science/article/pii/S0167880906002970)
Abstract:
Plant species richness of ditch banks under different farming practices and management regimes was compared. To this end, species richness was inventoried on ditch banks on Dutch conventional and organic farms and on a number of experimental farms.
Plant species richness was significantly higher on organic than conventional farms. On farms that had converted to organic agriculture more than 5 years ago, even more species were found. On all farms, including the experimental farms, higher plant species numbers as well as a higher share of nitrogen poor plant species were found on sandy soils than on clay soils. Also a change in plant species composition was found based on the rarity index and the Ellenberg nitrogen values

which was most marked in ecologically managed ditch banks on the experimental farms. The results, therefore, indicated that the ecological management might enhance plant species richness more than organic farming alone in a 6-year period. In the context of environmental label, criteria designed to enhance on-farm biodiversity should therefore specify an ecological management on ditch banks buffered with a pesticide and nutrient free zone.
Keywords: Plant species richness; Ellenberg values; Organic and conventional arable farming; Ditch bank management

F. Madrid, R. Lopez, F. Cabrera, Metal accumulation in soil after application of municipal solid waste compost under intensive farming conditions, Agriculture, Ecosystems & Environment, Volume 119, Issues 3-4, March 2007, Pages 249-256, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.07.006.
(http://www.sciencedirect.com/science/article/pii/S0167880906002799)
Abstract:
Intensive farming generally needs large additions of organic matter (OM) to avoid losses of fertility or low yields. Application of compost is a common source of OM for agricultural soils. Metal accumulation and DTPA-extractability in a sandy soil after three successive applications of municipal solid waste compost (MSWC) under intensive farming conditions are described in this paper. MSWC was applied for three consecutive crops in a plot of the soil in a greenhouse at a rate of 2.1, 2.1, and 1.8 kg m-2 on a dry matter basis, respectively. One more crop was planted, but no compost was applied to monitor residual effects of the treatment. A control plot did not receive any compost during the experiment. As is done in actual agricultural practice, a rotation of crops was used during the experiment. Tomato (Lycopersicon esculentum) was the first crop, followed by zucchini (Cucurbita pepo var. melopepo), green pepper (Capsicum annuum), and finally tomato again. The experiment lasted 2 years and 7 months.
Although moderate rates of MSWC were used and metal content of the compost was below the legal limits in Spain, increases in metal contents were observed in the soil, compared with the control treatment without the MSWC. After the second application of compost, increases in aqua regia-extractable (pseudo-total content) Zn and Pb were found in the 0-25 cm layer, and after the third application, Cu and Ni contents were also increased. Furthermore, increases in DTPA-extractable (available content) concentrations of metal contents were observed at higher rates than in aqua-regia extractable contents, suggesting that metals added with compost were more available than native metals in soils. In the 25-50 cm depth in the soil, increases due to MSWC also were found for aqua regia- and DTPA-extractable Zn and Pb after three applications of MSWC. The increases in the available fraction of the metal after MSWC application, the sandy characteristics of the soil, and the high irrigation rate could have favoured metal leaching through the soil profile. The results suggest that Spanish legislation for allowable limits of metals in MSWC is not protective enough, and lower limits in compost are necessary.
Keywords: Urban compost; Intensive farming; Trace metal; DTPA extraction; Aqua regia extraction

Kevin M. Murphy, Kimberly G. Campbell, Steven R. Lyon, Stephen S. Jones, Evidence of varietal adaptation to organic farming systems, Field Crops Research, Volume 102, Issue 3, 20 June 2007, Pages 172-177, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.011.

(http://www.sciencedirect.com/science/article/pii/S0378429007000408)
Abstract:
Consumer demand regarding the impacts of conventional agriculture on the environment and human health have spurred the growth of organic farming systems; however, organic agriculture is often criticized as low-yielding and unable to produce enough food to supply the world's population. Using wheat as a model crop species, we show that poorly adapted cultivars are partially responsible for the lower yields often found in organic farming systems when compared with conventional farming systems. Our results demonstrate that the highest yielding soft white winter wheat genotypes in conventional systems are not the highest yielding genotypes in organic systems. An analysis of variance for yield among 35 genotypes between paired organic and conventional systems showed highly significant ($P < 0.001$) genotype x system interactions in four of five locations. Genotypic ranking analysis using Spearman's rank correlation coefficient (RS) showed no correlation between genotypic rankings for yield in four of five locations; however, the ranks were correlated for test weight at all five locations. This indicates that increasing yield in organic systems through breeding will require direct selection within organic systems rather than indirect selection in conventional systems. Direct selection in organic systems produced yields 15%, 7%, 31% and 5% higher than the yields resulting from indirect selection for locations 1-4, respectively. With crop cultivars bred in and adapted to the unique conditions inherent in organic systems, organic agriculture will be better able to realize its full potential as a high-yielding alternative to conventional agriculture.
Keywords: Plant breeding; Genotype x system interaction; Organic agriculture; Wheat; Indirect selection

P.K. Farage, J. Ardo, L. Olsson, E.A. Rienzi, A.S. Ball, J.N. Pretty, The potential for soil carbon sequestration in three tropical dryland farming systems of Africa and Latin America: A modelling approach, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 457-472, ISSN 0167-1987, DOI: 10.1016/j.still.2006.09.006.
(http://www.sciencedirect.com/science/article/pii/S0167198706002236)
Abstract:
Historically, agriculturally induced CO_2 release from soils has contributed to rising levels in the atmosphere. However, by using appropriate management, soils can be turned into carbon sinks. Many of the dryland regions of the world are characterised by degraded soils, a high incidence of poverty and a low capacity to invest in agriculture. Two well-proven soil organic matter models (CENTURY 4.0 and RothC-26 3) were used two explore the effects of modifying agricultural practices to increase soil carbon stocks. The changes to land management were chosen to avoid any significant increase in energy input whilst using technologies that would be available without radically altering the current agricultural methodology. Case studies were selected from dryland farming systems in Nigeria, Sudan and Argentina. Modelling showed that it would be possible to make alterations within the structure of the current farming systems to convert these soils from carbon sources to net sinks. Annual rates of carbon sequestration in the range 0.08-0.17 Mg ha-1 year-1 averaged over the next 50 years could be obtained. The most effective practices were those that maximised the input of organic matter, particularly farmyard manure (up to 0.09 Mg ha-1 year-1), maintaining trees (up to 0.15 Mg ha-1 year-1) and adopting zero tillage (up to 0.04 Mg ha-1 year-1). Verification of

these predictions will require experimental data collected from field studies.
Keywords: Carbon sequestration; Drylands; Modelling; Soil carbon; Farming systems; Tropics; Global warming

Joan Romanya, Pere Rovira, Labile phosphorus forms in irrigated and rainfed semiarid Mediterranean grassy crops with long-term organic or conventional farming practices, European Journal of Agronomy, Volume 27, Issue 1, July 2007, Pages 62-71, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.02.001.
(http://www.sciencedirect.com/science/article/pii/S1161030107000159)
Abstract:
The availability of organic fertilisers plays a major role in organic farming systems. Such systems exclude the use of synthetic fertilisers, whilst aiming to optimise internal nutrient cycling. The low availability of manures, particularly in dry areas, can lead to negative nutrient balances in many organic farming systems. Such negative nutrient balances are mainly found for P and K. In this paper, we aim to study the availability of P in irrigated and rainfed semiarid Mediterranean grassy crops with long-term organic and conventional farming practices. NaHCO3 extracts were prepared from an array of soils from 16 plots, covering organic and conventional management in rainfed and irrigated conditions. Inorganic (NaHCO3-Pi) and organic P (NaHCO3-Po) were analysed in the extracts and related to soil properties (carbonate content, pH, organic C and N content). Rainfed, organically managed soils showed low P availability compared to conventionally managed soils. However, organically managed irrigated soils showed slightly higher NaHCO3-Pi than conventional soils. This is due to the fertilisation regime applied to the irrigated, organically managed systems. Such systems received four-fold the amount of manure applied to organically managed rainfed soils. In soils with low P availability, NaHCO3-Pi was largely depleted while NaHCO3-Po remained nearly unchanged. In soils with good or moderate P availability, NaHCO3-Pi appeared mainly to be regulated by soil organic matter (organic C and N). In conditions of low P availability, NaHCO3-Pi was mainly regulated by chemical processes related to soil pH and carbonate content. The regulation of NaHCO3-Po was less clear. Under low P availability, NaHCO3-Pi depletion occurred mainly in soils with high organic C and N and low pH. In low P soils with a high pH and carbonate content, NaHCO3-Pi appeared to be geochemically protected. In calcareous soils, management practices need to increase or maintain the level of soil organic C to facilitate mobilisation of the P reserve.
Keywords: P availability; Organic P; NaHCO3-P; Soil fertility

Per Schjonning, Lars J. Munkholm, Susanne Elmholt, Jorgen E. Olesen, Organic matter and soil tilth in arable farming: Management makes a difference within 5-6 years, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 157-172, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.12.029.
(http://www.sciencedirect.com/science/article/pii/S0167880907000242)
Abstract:
Management-induced depletion in soil organic carbon (SOC) may create critical tilth conditions for arable farming. We investigated the short-term effect of crop rotation and addition of animal manure on SOC fractions, the dispersibility of soil clay, the length of fungal hyphae, wet aggregate stability, tensile strength of dry aggregates, and the pore size distribution, gas diffusivity and permeability of

undisturbed bulk soil. SOC fractions were measured in whole-soil samples and in 1-2 mm air-dried aggregates. Plough layer soil was sampled 5 and 6 years after the start of a field experiment with different cropping systems at two loamy sand soils (Foulum, ~9% clay and Flakkebjerg, ~14% clay). A soil drop test was performed in the field to evaluate in situ soil friability. A system dominated by small grain cereals not receiving animal manure served as a reference treatment (`CEREAL'). This system was compared to the same crop sequence but with application of animal manure (`CEREAL + MANURE', only at one location), and to a diversified crop rotation including grass/clover but without addition of animal manure (`CEREAL + GRASS'). A part of each field plot was compacted by a medium-sized tractor. The content of SOC was lowest for the CEREAL system at both locations. Hot-water extractable SOC displayed the same pattern. The carbon fractions in aggregates responded similarly to cropping systems as those in whole-soil samples. Clay dispersibility was highest in the CEREAL system. The length of fungal hyphae was enhanced by the versatile crop rotation. Soil compaction tended to increase clay dispersibility. Our results confirmed agronomic observations that the tilth in the Flakkebjerg soil was problematic and worse than in the Foulum soil, but generally only trends were found in amelioration of the poor mechanical tilth characteristics. In contrast, soil (macro)porosity was significantly higher for the CEREAL + GRASS system compared to the other two systems, and the CEREAL + MANURE and CEREAL + GRASS systems had more tortuous pore systems compared to the CEREAL system and better resisted compaction than the latter. We conclude that only 5-6 years of differentiated soil management significantly affected SOC fractions, the dispersibility of clay, and the growth of fungal hyphae. As only trends were found in the mechanical aspects of soil tilth, the tilth-forming agents may serve as early indicators of changes in soil tilth. Our results also indicate that soil pore characteristics are affected by short-term management and probably provide the basis for later significant changes also in mechanical tilth characteristics.
Keywords: Soil tilth; Soil organic carbon; Labile carbon; Fungal hyphae; Clay dispersibility; Aggregation; Soil pores; Cropping system; Manure; Compaction

Eugenia T. Apostolaki, Tatiana Tsagaraki, Manolis Tsapakis, Ioannis Karakassis, Fish farming impact on sediments and macrofauna associated with seagrass meadows in the Mediterranean, Estuarine, Coastal and Shelf Science, Volume 75, Issue 3, Hydrodynamic control of aquatic ecosystem processes, November 2007, Pages 408-416, ISSN 0272-7714, DOI: 10.1016/j.ecss.2007.05.024.
(http://www.sciencedirect.com/science/article/pii/S0272771407002090)
Abstract:
The fish farming impact on sediment and macrofauna associated with Posidonia oceanica meadows has been studied in three coastal areas (Spain, Italy and Greece) of the Mediterranean Sea. The stations were characterized by coarse sediment with a low percentage of silt/clay and oxic conditions. Chlorophyll a and organic carbon were occasionally enhanced in the vicinity of the cages and nitrogen remained almost constant between the stations. Phosphorus consistently showed a decreasing trend towards the reference station. Macrofaunal biomass peaked at an intermediate distance from the fish cages. Diversity indices were quite high at all stations, implying that the specific sites were not under severe stress due to aquaculture. A tenuous clustering of stations with distance from the farm was encountered,

which was mainly attributed to abundance shifts rather than presence/absence of typical species. It is suggested that oxic conditions induced by intense currents and supported by coarse sediments at the study sites allow the existence of diversified communities with high abundance and biomass.
Keywords: sediment; macrofauna; diversity; Posidonia oceanica; Mediterranean; fish farming

Dawn C. Parker, Darla K. Munroe, The geography of market failure: Edge-effect externalities and the location and production patterns of organic farming, Ecological Economics, Volume 60, Issue 4, 1 February 2007, Pages 821-833, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2006.02.002.
(http://www.sciencedirect.com/science/article/pii/S0921800906000796)
Abstract:
Perceptions of increasing land scarcity and negative impacts of chemical-based agriculture have led to increasing concern regarding the sustainability of food systems. Incompatible production processes among farming systems may lead to spatial conflicts and production losses between neighboring farms, and the magnitude of such losses may depend not only on the scale of each activity, but also on patterns of land use. Such conflicts can be classified as 'edge-effect externalities'--spatial externalities whose marginal impacts decrease as distance from the border generating the negative impact increases. This paper tests the hypothesis that edge-effect externalities have influenced the location and production patterns of certified organic farms, using data from California Central Valley certified organic farmers. Using concepts from landscape ecology and spatial statistics, we investigate difference in parcel geometry and surrounding land uses between organic and non-organic parcels. Using a generalized method of moments (GMM) spatially autoregressive econometric model, we demonstrate that both parcel geometry and surrounding land uses influence the probability of a given parcel being certified organic. We conclude with suggestions for policies to encourage development of organic farming regions.
Keywords: Spatial externalities; Organic agriculture; Edge effects; Spatial econometrics; Landscape fragmentation

Rashmi Srivastava, David Roseti, A.K. Sharma, The evaluation of microbial diversity in a vegetable based cropping system under organic farming practices, Applied Soil Ecology, Volume 36, Issues 2-3, June 2007, Pages 116-123, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.01.008.
(http://www.sciencedirect.com/science/article/pii/S0929139307000352)
Abstract:
Organic farming is becoming a major tool for sustaining the soil quality degraded by intensive use of synthetic chemicals for increasing crop production and therefore, use of bio-agents as biofertilizers or biopesticides is an integral part of organic farming especially in vegetable cultivation. An effort was, therefore, made to see the effect of arbuscular mycorrhizal fungi (AMF) and pseudomonads as the microbial inoculants in vegetable based cropping systems under organic farming practices. Three crops taken in rotation were okra, pea and cowpea in a year. The inoculants used were Glomus intraradices, an arbuscular mycorrhizal fungus, and four isolates of Pseudomonas fluorescens singly and in combinations. No chemical/organic fertilizer was added during two rotations of chosen vegetables except the crop residues, which was chopped and distributed equally onto the each plot after the harvest of the fruits. A significant increase in yield was observed in the

inoculated plots over the control. Culturable microbial diversity was increased compared with the start of the experiment. Total microbial diversity as assessed by Denaturing Gradient Gel Electrophoresis confirmed the results of culturable total and functional diversity analysed using Shannon Weaver's diversity indices (H'). Functional diversity assessed in terms of cellulase, xylanase, amylase, protease producers and P-solubilizers showed that the inoculants worked beneficially for maintaining soil health. The mycorrhizal inoculation followed by combination of AMF and pseudomonads proved to be better. Present findings indicated that microbial gene pool especially the key helpers for the maintenance of soil health residing in the vicinity of roots, was positively affected by using pseudomonads and AMF. Under organic farming management practices, inoculated bioagents and crop residues increased the yield of vegetables.
Keywords: Microbial diversity; Vegetable; Organic farming; Arbuscular mycorrhizal fungi; Pseudomonas fluorescens; Soil enzymes; Denaturing gradient gel electrophoresis

Yuji Oka, Nurit Shapira, Pinchas Fine, Control of root-knot nematodes in organic farming systems by organic amendments and soil solarization, Crop Protection, Volume 26, Issue 10, October 2007, Pages 1556-1565, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.01.003.
(http://www.sciencedirect.com/science/article/pii/S0261219407000385)
Abstract:
The efficacy of organic amendments, with or without soil solarization, for the control of the root-knot nematodes Meloidogyne incognita and M. javanica in organic farming systems was tested in pot, container and greenhouse experiments. Broiler litter, cottonseed meal, feather meal or soybean oilcake, which had been effective in reduction of galling caused by M. javanica on tomato plants in pot experiments, were applied to a field at 0.75-2.0 kg m-2. In three experiments, soil solarization alone reduced nematode populations in the soil and galling indices on tomato and pepper plants, whereas the amendments alone were not effective. Combinations of the amendments with soil solarization were more effective than the amendments or soil solarization alone in reducing nematode populations and galling indices in most cases. High soil temperatures and accumulation of ammonium/ammonia in these treatments seemed to be involved in controlling root-knot nematodes. Nematode control efficacy on the edges of solarized beds, with or without amendments, was lower than that in the middle of beds. Soil solarization in combination with organic amendments could be used for root-knot nematode control in organic farms.
Keywords: Ammonia; Ammonium; Chicken litter; Meloidogyne incognita; Meloidogyne javanica; Soil pH; Solarization

E. Metzger, C. Simonucci, E. Viollier, G. Sarazin, F. Prevot, D. Jezequel, Benthic response to shellfish farming in Thau lagoon: Pore water signature, Estuarine, Coastal and Shelf Science, Volume 72, Issue 3, Biogeochemical and contaminant cycling in sediments from a human-impacted coastal lagoon, April 2007, Pages 406-419, ISSN 0272-7714, DOI: 10.1016/j.ecss.2006.11.011.
(http://www.sciencedirect.com/science/article/pii/S0272771406005282)
Abstract:
Vertical distributions of dissolved species across the sediment-water interface (SWI), including major cations (sodium, potassium, magnesium, calcium), minor cations (lithium, strontium, barium), redox sensitive species (dissolved manganese, iron, sulfate, sulfide, ammonium) and

other chemical parameters (pH, alkalinity, soluble reactive phosphorous, dissolved silica) were studied in a Mediterranean lagoon used for intensive shellfish farming. In order to quantify the impact of this activity on diagenetic processes and the influence of seasonal changes, two stations contrasted with respect to organic carbon fluxes were sampled in Thau lagoon from March 2001 to August 2002 during four field campaigns in winter, spring, summer and fall. Well-defined layers enriched with redox sensitive species were observed following the conventional sequence of early diagenetic reactions. However, differences were observed between both stations in depths and thickness layers. Concentration gradients extended down to more than 92 cm depth at the central position of the lagoon (station C4 - 8 m depth) and down to 40 cm depth inside shellfish farming zones (station C5 - 9 m depth). Station C4 showed an unusual diagenetic signature: sharp dissolved oxygen, iron, nitrate and manganese gradients existed at the SWI but gradients of dissolved sulfide and alkalinity as well as other parameters (dissolved silica, Ba, etc.) were recorded only from 25 to 30 cm depth downward. Seasonal changes were observed in pore water composition as deep as 30-50 cm in station C4 (only 15 cm in station C5). The center of the lagoon is not directly subjected to biodeposits deriving from shellfish activity. Isotopic and bioturbation data allowed to rule out a reworking of the sediment deeper than a few centimeters. In addition to organic content of the sediment, physical parameters were likely to induce the 10-20 cm gap between dissolved iron and sulfide profile as well as the higher vertical extent of diagenetic sequence observed at station C4. Conversely to station C5, station C4 underwent stronger currents and wave effect probably generating advective transport of water through the sediment, but no permeability data were available to confirm this hypothesis. During summer, climatic conditions generated vertical stratification of the water column and transient suboxic conditions at the bottom. Such conditions drove the upward shift of redox fronts, compacting the diagenetic sequence. These effects were reinforced at station C5 by shellfish and its farm structures (mainly attenuation of current and increased heat absorption).
Keywords: early diagenesis; redox; sulfide; pore water; advection; shellfish farming; Thau lagoon

F.J. Salazar, R.C. Saldana, Characterization of manures from fish cage farming in Chile, Bioresource Technology, Volume 98, Issue 17, December 2007, Pages 3322-3327, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.07.003.
(http://www.sciencedirect.com/science/article/pii/S0960852406002975)
Abstract:
This study aims to characterize salmonid manures and to determine their potential use in agricultural soils. Sampling was carried out below salmon and trout cages in farms located in lakes and in the sea in the South of Chile during 2002-2003. Manure was analyzed for macronutrients, micronutrients and heavy metals. Results showed a high variability between samples and differences between sea and lake manure. Dry matter contents were low averaging c. 12-15%. Manures showed low OM contents with values <c. 15% and a neutral pH (c. 7.0). Both manures had low total N contents with values of <0.9%, more than 75% of which was in the organic form. Lake manure showed high contents of P (1.56%), Ca (3.89%), Fe (27,948 ppm), Mn (446 ppm), Al (31,789 ppm), As (5.13 ppm), Cd (1.04 ppm), Cr (18.8 ppm), Ni (12.3 ppm), Pb (3.5 ppm) and Zn (393 ppm). Sea manure had high contents of Mg (1.65%

ppm), K (0.63%), Na (11.8%) and Cu (89 ppm). Salmonid manure had low nutrients and heavy metal contents and a potential use in agricultural soils, which could reduce the risks of water pollution on water from fish farming.
Keywords: Salmonid manure; Nutrient contents; Fish farming wastes

Yann Clough, Andreas Kruess, Teja Tscharntke, Organic versus conventional arable farming systems: Functional grouping helps understand staphylinid response, Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 285-290, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.05.028.
(http://www.sciencedirect.com/science/article/pii/S0167880906001824)
Abstract:
The response of different feeding groups of staphylinid beetles to organic management, distance to perennial boundary and landscape context was studied in 42 paired organic and conventional winter wheat fields. Management effects were found to strongly depend on feeding group. While the activity-density of predators was higher in the conventional fields, both activity-density and species richness of detritivores were higher in the organic fields. Activity-density and species richness of detritivores were positively correlated to crop yield in the conventional but not in the organic fields. Unexpectedly, species richness as high as in the less productive organic fields was thus found in intensified conventional systems. No significant effects of landscape context could be found on activity-density or species richness of the different feeding groups. More species were caught near the field edge than in the middle, showing the importance of spill-over from field boundaries into arable crops for diversity. In conclusion, separation of species into feeding groups revealed patterns that have not been shown before. Decomposer diversity (but not that of predators and fungivores) was higher in organic fields, but reached similar levels in high-yielding conventional fields. Thus resource quality (purely organic or organic/synthetic fertiliser) and quantity appear to play a major role for this functional group.
Keywords: Staphylinidae; Functional diversity; Landscape context; Detritivores; Predators

Lukas Pfiffner, Henryk Luka, Earthworm populations in two low-input cereal farming systems, Applied Soil Ecology, Volume 37, Issue 3, November 2007, Pages 184-191, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.06.005.
(http://www.sciencedirect.com/science/article/pii/S0929139307000789)
Abstract:
Earthworm populations in low-input integrated crop management (ICM: no application of insecticides, fungicides and growth regulators) and organic farming systems were compared. The study was performed as a 3-year field survey using a paired-farm approach in six different locations in northwestern Switzerland. Earthworms were extracted from soils sampled from 24 winter cereal fields using a combined method of extraction by mustard flour solution and handsorting.
Earthworm communities differed between these farming systems. Over all sites, the mean biomass, abundance and species richness of earthworms found in the low-input ICM fields were significantly lower than in the organic fields. Adult earthworms in organic fields were 114% more abundant than in ICM fields, but the frequencies of most species within the respective systems were similar in both farming systems. The numbers of earthworm species and juveniles were higher in organic

fields. Five species - Lumbricus terrestris (L.), Nicodrilus longus (Ude), Nicodrilus nocturnus (Evans), Nicodrilus caliginosus (Sav.) and Allolobophora rosea (Sav.) - were significantly more numerous in the organic fields than in the ICM fields.
Multivariate analysis showed that the farming system explained most of the variance and was found to be the key factor in altering the earthworm fauna. Late ploughing in autumn was found to have a major negative effect on earthworm abundance, irrespective of the farming system. Farming practices that differ between these farming systems and may considerably influence earthworm populations and diversity are discussed.
Keywords: Integrated crop management; Organic agriculture; Sustainable agriculture; Earthworms; Agri-environmental programme; Soil management

Stanislas Dubois, Julio Cesar Marin-Leal, Michel Ropert, Sebastien Lefebvre, Effects of oyster farming on macrofaunal assemblages associated with Lanice conchilega tubeworm populations: A trophic analysis using natural stable isotopes, Aquaculture, Volume 271, Issues 1-4, 3 October 2007, Pages 336-349, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.03.023.
(http://www.sciencedirect.com/science/article/pii/S0044848607002797)
Abstract:
The macrobenthic assemblages associated with aggregations of Lanice conchilega polychaetes under and near oyster culture tables were investigated with regard to the food web. Samples were collected from a reference site without oyster influence and from a site beneath oyster tables. While no changes in species diversity were observed, we showed a profound effect of shellfish structures both on the composition of macrobenthic assemblages, and on the trophic structure of the food web. Predators predominated in sediments beneath oyster tables, both in number of individuals and in biomass, and other suspension-feeders were excluded. Oysters are seen here as key species in exerting a top-down control on water quality and food resources. Stable isotopic analysis allowed calculation of trophic position for organisms and provided an in-depth understanding of interspecific relationships, especially among polychaetes. We showed two distinct trophic pathways, one dominated by Nephtys hombergii in reference sediments, and the other dominated by Lumbrineris tetraura beneath oyster tables. Microphytobenthos and detritus of macroalgae seemed to contribute most to the suspension-feeders' diets, but we observed high [delta]15N values in surface and sub-surface deposit-feeders, which indicated they utilized sedimentary organic matter after bacterial processing and subsequent isotopic fractionation.
Keywords: Diversity; Trophic pathway; [delta]13C and [delta]15N; Polychaetes; Feeding guilds; Shellfish farming; English Channel

Gudbrand Lien, J. Brian Hardaker, Ola Flaten, Risk and economic sustainability of crop farming systems, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 541-552, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.01.006.
(http://www.sciencedirect.com/science/article/pii/S0308521X07000078)
Abstract:
In economic terms, resilience in farming has to do with the capacity of a farm business to survive various risks and other shocks. Despite its importance, resilience has seldom been directly considered in evaluations of economic sustainability. A whole-farm stochastic simulation model over a 6-year planning horizon was used to analyse

organic and conventional cropping systems using a model of a representative farm in Eastern Norway. The relative economic sustainability of alternative systems under changing assumptions about future technology and price regimes was examined in terms of financial survival to the end of the planning period. The same alternatives were also compared in terms of stochastic efficiency. To model the risk of business failure adequately there is a need to deal with the risk of bankruptcy, and a modification of traditional analysis was used for that purpose. The organic farming system was found to be somewhat less economically sustainable than the conventional system, especially if the organic price premiums and the organic area payments were to be phased out. The results illustrate possible conflicts between pursuit of risk efficiency and economic sustainability. The model developed could be used to support farmers' choices between farming systems as well as to help policy makers develop more sharply targeted policies.
Keywords: Sustainability; Resilience; Risk assessment; Whole-farm stochastic simulation; Stochastic efficiency

Valerie Mesnage, Sylvie Ogier, Gabriel Bally, Jean-Robert Disnar, Nathalie Lottier, Karine Dedieu, Christophe Rabouille, Yoann Copard, Nutrient dynamics at the sediment-water interface in a Mediterranean lagoon (Thau, France): Influence of biodeposition by shellfish farming activities, Marine Environmental Research, Volume 63, Issue 3, April 2007, Pages 257-277, ISSN 0141-1136, DOI: 10.1016/j.marenvres.2006.10.001.
(http://www.sciencedirect.com/science/article/pii/S0141113606001887)
Abstract:
The Thau Lagoon, a French Mediterranean shallow lagoon, is a site where extensive shellfish farming occurs. The aim of the present work is to evaluate the role of this activity on nutrient exchange at the sediment-water interface in relation to organic matter (OM) sedimentation and degradation. Two stations inside (C5) and outside (C4) of the shellfish farming areas were sampled at three seasons. Porewater chemistry surveys and calculated diffusive fluxes were used to evaluate the trophic status of the Thau lagoon. Quantitative (Particulate Organic Carbon) as well as qualitative OM (Hydrogen Index, Carbohydrates) analyses were performed on sediments to assess OM characteristics. Results emphasized that surficial sediments at C5 are always more enriched in OM. Porewater nutrient concentrations are 10-20 times higher at C5 than at C4. In June 2003, the porewater profiles exhibit a sharp gradient at the bottom waters, indicating a hypereutrophic status, leading to an anoxic crisis.
Keywords: Nutrients; Dissolved organic matter; Nutrient fluxes; Neutral carbohydrate; Sediment-water interface; Coastal waters; Eutrophication

Hua Zhang, Gan-Lin Zhang, Yu-Guo Zhao, Wen-Jun Zhao, Zhi-Ping Qi, Chemical degradation of a Ferralsol (Oxisol) under intensive rubber (Hevea brasiliensis) farming in tropical China, Soil and Tillage Research, Volume 93, Issue 1, March 2007, Pages 109-116, ISSN 0167-1987, DOI: 10.1016/j.still.2006.03.013.
(http://www.sciencedirect.com/science/article/pii/S0167198706000717)
Abstract:
Impacts of intensive management practices on rubber (Hevea brasiliensis) farms (e.g., land clearance, fertilization, and rubber tapping) have not been adequately investigated. In this study, soil was taken from fields of grass (before rubber plantation), immature rubber (before tapping), and mature rubber (after tapping) at a tropical farm

in Hainan, China. Soil organic matter, plant nutrients, cations, and soil pH were determined. Rubber cultivation resulted in significant decline of soil organic C and microbial biomass C. Available P was extremely low for all soils, resulting from the naturally low P content and the high sorption capacity of highly weathered Ferralsol. Furthermore, soil pH decreased by about 0.5 units, accompanied by an increase of exchangeable Al by more than one-fold. Regression analysis demonstrated that soil acidification was characterized by the depletion of base cations and release of Al. To maintain tropical soil quality, farming practices such as liming and organic amendment should be included in the best management practices of rubber farm.
Keywords: Ferralsols; Oxisols; Hevea brasiliensis; Sustainable management; Soil quality; Soil acidification; Tropics

Nguyen Manh Khai, Pham Quang Ha, Ingrid Oborn, Nutrient flows in small-scale peri-urban vegetable farming systems in Southeast Asia--A case study in Hanoi, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 192-202, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.01.003.
(http://www.sciencedirect.com/science/article/pii/S0167880907000291)
Abstract:
In many peri-urban areas of Southeast Asia, land use has been transformed from rice-based to more profitable vegetable-based systems in order to meet the increasing market demand. The major management related flows of nitrogen (N), phosphorus (P), potassium (K), copper (Cu) and zinc (Zn) were quantified over a 1-year period for intensive small-scale aquatic and terrestrial vegetable systems situated in two peri-urban areas of Hanoi City, Vietnam. The two areas have different sources of irrigation water; wastewater from Hanoi City and water from the Red River upstream of Hanoi. The first nutrient balances for this region and farming systems are presented. The main sources of individual elements were quantified and the nutrient use efficiency estimated. The environmental risks for losses and/or soil accumulation were also assessed and discussed in relation to long-term sustainability and health aspects.
The primary source of nutrient input involved a combination of chemical fertilisers, manure (chicken) and irrigation water. A variable composition and availability of the latter two sources greatly influenced the relative magnitude of the final total loads for individual elements. Despite relatively good nutrient use efficiencies being demonstrated for N (46-86%) and K (66-94%), and to some extent also for P (19-46%), high inputs still resulted in substantial annual surpluses causing risks for losses to surface and ground waters. The surplus for N ranged from 85 to 882 kg ha-1 year-1, compared to P and K which were 109-196 and 20-306 kg ha-1 year-1, respectively. Those for Cu and Zn varied from 0.2 to 2.7 and from 0.6 to 7.7 kg ha-1 year-1, respectively, indicating high risk for soil accumulation and associated transfers through the food chain.
Wastewater irrigation contributed to high inputs, and excess use of organic and chemical fertilisers represent a major threat to the soil and water environment. Management options that improve nutrient use efficiency represent an important objective that will help reduce annual surpluses. A sustainable reuse of wastewater for irrigation in peri-urban farming systems can contribute significantly to the nutrient supply (assuming low concentrations of potential toxic or hazardous substances in the water). Nutrient inputs need to be better related to the crop need, e.g. through better knowledge about the nutrient

concentrations in the wastewater and improved management of the amount of irrigation water being applied.
Keywords: Element balance; Nutrients; Copper; Zinc; Peri-urban; Southeast Asia

Apostolos M. Kaltsas, Andreas P. Mamolos, Constantinos A. Tsatsarelis, George D. Nanos, Kiriaki L. Kalburtji, Energy budget in organic and conventional olive groves, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 243-251, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.01.017.
(http://www.sciencedirect.com/science/article/pii/S0167880907000473)
Abstract:
An energy analysis, combined with an economic one, in conventional and organic olive groves is useful in evaluating present situation and deciding best management strategies. The objective of this study was to evaluate the differences in the energy budget between organic and conventional olive groves in three locations in the island of Thasos and to calculate CO2-emissions based on the used fossil energy. The data were collected through personal interviews with farmers during 2000-2003. Twenty-four farmers, who owned olive groves about 1 ha each, were randomly selected to participate in this study [(4 conventional and 4 organic) x 3 locations]. The means averaged over all locations for fertilizer application energy was significantly higher in conventional than in organic olive groves, while the opposite occurs for insect trapping energy. Means averaged over the two farming systems for weed control energy were significantly higher in the northeastern part of the island, followed by the northwestern and southern part. The means averaged over all locations for labor and fertilizers energy were significantly higher in conventional than in organic olive groves, while the opposite was observed for tools energy. Means averaged over the two farming systems for labor and tools energy were significantly higher in the northwestern part of the island. Means averaged over the two farming systems for electric and pesticides energy were significantly higher in the northwestern part of the island. Total energy inputs were not affected by any of the studied parameters, while outputs were affected by the location, by the farming system and their interaction. Outputs in the northeastern part of the island and production in all parts of the island were significantly lower in organic than in conventional olive groves. Outputs and production were lower in the southern part of the island than in the other parts, since olive groves in southern Thasos are located in slopes with less productive soils. The results show a clear response of energy inputs to energy outputs that resulted from the farming system and location. Global warming potential and CO2-emissions were not affected by the farming system and location. Organic olive groves tended to have lower CO2-emissions caused by the different uses of fossil energy.
Keywords: Energy budget; Greece; Land-use; Olive; Organic farming

P.S. Valle, G. Lien, O. Flaten, M. Koesling, M. Ebbesvik, Herd health and health management in organic versus conventional dairy herds in Norway, Livestock Science, Volume 112, Issues 1-2, Special section: Non-Ruminant Nutrition Symposium, October 2007, Pages 123-132, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.02.005.
(http://www.sciencedirect.com/science/article/pii/S1871141307001977)
Abstract:
Earlier studies from Norway indicate that organic dairy farms enjoy better animal health than conventional dairy farms. However, these

studies use veterinary treatment records and may not reflect the true health status since animal health may be handled differently, i.e. there might be different treatment schemes on organic versus in conventional farms.
A study of animal health and health handling on both organic (n = 149) and conventional (n = 159) farms was performed based on information gathered from a mailed questionnaire merged with information from the Norwegian Cattle Health Services and the Norwegian Dairy Herd Recording System.
Based on the original health records, there appeared to be many and large differences in herd health (veterinary) treatment parameters between the two production systems. However, after looking closer into the major diseases problems of mastitis, ketosis, and milk fever and converting from treatment to estimated case load based on questionnaire information about the observed differences in health handling, all that remained was a lower level of acute mastitis in organic dairy herds relative to conventional. When controlling for production level -- milk yield being lower in organic herds -- no difference between the two groups remained.
We conclude that, based on official health records, there is an apparent difference in animal health performance which is mainly related to an observed difference in health management. The remaining difference in acute mastitis which is not explained by disease handling appears, at least in part, to be associated with a lower intensity of milk production. The impact of these findings in relation to animal welfare as a central issue in organic farming needs further investigations. Finally, the study demonstrates the need for a critical assessment of routinely collected health-related data used in research, in order to make valid inferences regarding animal health performance.
Keywords: Organic farming; Dairy cattle; Health; Management; Health records

Shabeg S. Briar, Parwinder S. Grewal, Nethi Somasekhar, D. Stinner, Sally A. Miller, Soil nematode community, organic matter, microbial biomass and nitrogen dynamics in field plots transitioning from conventional to organic management, Applied Soil Ecology, Volume 37, Issue 3, November 2007, Pages 256-266, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.08.004.
(http://www.sciencedirect.com/science/article/pii/S0929139307000893)
Abstract:
Dynamics of soil bulk density, organic matter, microbial biomass, nitrogen, and nematode communities were assessed for a period of 4 years in field plots transitioning from conventional to organic farming practices. A rotation of soybeans, corn, oats and hay was used as an organic transitioning strategy and the conventional farming system had a corn and soybean rotation for comparison. Organic corn received raw straw pack beef manure and poultry compost at the rate of 27 and 28 Mg/h, respectively, and organic oats received raw straw pack beef manure and poultry compost at the rate of 18 and 1.8 Mg/h, respectively, while conventional plots received synthetic fertilizers. All crops in the organic system received primary tillage (chisel plow, disked and tined) whereas only corn received primary tillage in the conventional system but soybeans were no-till. Weed control was mechanical (twice diskings, rotary hoeings and row cultivation) in the organic system whereas herbicides were used in the conventional system. Soil bulk density did not differ in the two systems over a 4-year period but organic farming had slightly higher organic matter, mineral

associated organic matter and particulate organic matter. Conventional system had more N in the mineral pools as indicated by higher NO3--N whereas organic system had higher N in the microbial biomass indicating shifts in nitrogen pools between the two systems. Bacterivore nematodes were more abundant in the organic than the conventional system for most of the study period. In contrast, the conventional system had significantly higher populations of the root lesion nematode, Pratylenchus crenatus, than the organic system after completion of the rotation cycle (transition period) in spring 2004. The organic hay plots had the lowest populations of P. crenatus compared to corn, soybeans and oats. Nematode faunal profile estimates showed that the food webs were highly enriched and moderately to highly structured and the decomposition channels were bacterial in both systems. The lack of differences in structure index between the organic and conventional systems is probably due to the excessive tillage in the organic farming system, which may have prevented the build up of tillage-sensitive omnivorous and predatory nematodes that contribute to the structure index. We conclude that transition from conventional to organic farming can increase soil microbial biomass-N and populations of beneficial bacterivore nematodes while simultaneously reducing the populations of predominant plant-parasitic nematode, P. crenatus. Our findings also underscore the potential benefits of reducing tillage for the development of a more mature soil food web.
Keywords: Organic farming; Conventional farming; Nematode communities; Soil food web

M. Vaarst, T.B. Nissen, S. Ostergaard, I.C. Klaas, T.W. Bennedsgaard, J. Christensen, Danish Stable Schools for Experiential Common Learning in Groups of Organic Dairy Farmers, Journal of Dairy Science, Volume 90, Issue 5, May 2007, Pages 2543-2554, ISSN 0022-0302, DOI: 10.3168/jds.2006-607.
(http://www.sciencedirect.com/science/article/pii/S0022030207717526)
Abstract:
The farmer field school (FFS) is a concept for farmers' learning, knowledge exchange, and empowerment that has been developed and used in developing countries. In Denmark, a research project focusing on explicit non-antibiotic strategies involves farmers who have actively expressed an interest in phasing out antibiotics from their herds through promotion of animal health. One way of reaching this goal was to form participatory focused farmer groups in an FFS approach, which was adapted to Danish conditions and named 'stable schools.' Four stable schools were established and went through a 1-yr cycle with 2 visits at each of the 5 or 6 farms connected to each group. A facilitator was connected to each group whose role was to write the meeting agenda together with the host farmer, direct the meeting, and write the minutes to send to the group members after the meeting. Through group focus interviews and individual semistructured qualitative interviews of all participants, the approach of the farmers' goal-directed work toward a common goal was judged to be very valuable and fruitful and based on a common learning process. Complex farming situations were the focus of all groups and in this context, problems were identified and solutions proposed based on each farmer's individual goals. In this article, we describe the experiences of 4 stable school groups (each comprising farmers and a facilitator), and the common process of building a concept that is suitable for Danish organic dairy farming.

Keywords: organic dairy farming; animal health planning; farmer empowerment; common experiential learning

Markus Piha, Juha Tiainen, Jyrki Holopainen, Ville Vepsalainen, Effects of land-use and landscape characteristics on avian diversity and abundance in a boreal agricultural landscape with organic and conventional farms, Biological Conservation, Volume 140, Issues 1-2, November 2007, Pages 50-61, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.07.021.
(http://www.sciencedirect.com/science/article/pii/S0006320707003023)
Abstract:
Organic farming has been shown to be beneficial to many taxa associated with farmland habitats, but its importance in mosaic farmland landscapes is poorly understood. The impacts of organic farming have been suggested to be more pronounced in large-scaled homogeneous landscapes than in more heterogeneous mosaic ones, but studies conducted in wider landscape scale have remained scarce. We studied the effects of organic farming, landscape structure and agricultural land-use on field-dwelling farmland birds (14 spp.) at the species and assemblage level in a boreal farmland mosaic landscape (arable area ca. 20 km2), where organic farming comprises ca. 10% of the arable area. The analysis was conducted in a landscape scale using spatial regression methodology that incorporates spatial autocorrelation into models. Landscape structure and agricultural land-use were the principal determinants of the bird assemblage, whereas organic farming was favourable only to skylark and lapwing, but not to overall bird density, species richness, diversity or biomass. The species differed significantly in their habitat associations; however, agricultural grasslands strongly and positively determined the majority of the studied variables describing the bird assemblage. Since landscape structure and crop types are not necessarily included in organic regimes, we propose that considerable attention should be paid to make various crop and landscape types represented in organic regimes, particularly in mosaic landscapes.
Keywords: Farmland birds; Spatial autocorrelation; Organic farming; Common agricultural policy; Agri-environment scheme

Fidel Payan, Davey L. Jones, John Beer, Dynamics of size-density fractions of soil organic matter following the addition of tree litter to organic coffee farms, Geoderma, Volume 141, Issues 1-2, 15 September 2007, Pages 15-22, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.02.017.
(http://www.sciencedirect.com/science/article/pii/S0016706107000638)
Abstract:
The addition of organic matter to soil is frequently viewed as a vital intervention to maintain soil quality. The aim of this study was to investigate the temporal response of the soil macroorganic fraction to different organic coffee farming practices (e.g., plant residue, earthworm and microbial inocula addition). Three density fractions of macroorganic matter (> 150 [mu]m) were studied during 1 year after adding shade tree (Erythrina poeppigiana) pruning residues to the soil (5 t ha- 1 twice at 6 monthly intervals). Soil macroorganic matter represented only a small proportion of total soil organic matter (SOM) (3-6% of total). Even though the total amount of SOM did not change over time, significant temporal changes in the size of the macroorganic fraction were observed that appeared to be largely independent of the management regime. The light density fraction seemed to be the most responsive fraction and this study suggests that it may provide a

qualitative indicator of the `active' fraction of SOM; the size of the macroorganic fraction did not provide a reliable indicator of the rate of litter decomposition or nutrient release. The addition of microbial inoculants and earthworms had only a small and inconsistent effect on macroorganic matter dynamics and these practices appeared to offer little agronomic benefit. This study highlights the need for continued organic matter inputs to maintain soil C reserves and preserve soil organic quality in tropical organic farming systems.
Keywords: Coffea arabica; Litter decomposition; Mineralization; Organic farming; Shade trees; Soil organic matter; Soil quality

Guido Haas, Christine Deittert, Ulrich Kopke, Impact of feeding pattern and feed purchase on area- and cow-related dairy performance of organic farms, Livestock Science, Volume 106, Issues 2-3, February 2007, Pages 132-144, ISSN 1871-1413, DOI: 10.1016/j.livsci.2006.07.007.
(http://www.sciencedirect.com/science/article/pii/S187114130600271X)
Abstract:
Livestock production and ruminants in particular are an integral part of the organic mixed farming concept. In this paper, the feeding patterns of 26 organic dairy farms in two different regions in Germany are analysed, with particular emphasis on the amount and proportion of concentrates and purchased feed related to the dairy performance expressed per cow and hectare. Calculated on an energy basis (MJ NEL), the annual average milk yield of 6737 kg cow- 1 is derived from roughage (74%), concentrates and cobs (23%), and commercial processing by-products (e.g., spent grains) (3%). Per cow and year, 937 kg dry matter (DM) (range: 0-2724 kg) of concentrates are fed with an intensity of 135 g kg- 1 milk (range: 0-378 g kg- 1). Approximately 65% of the concentrates and commercial processing by-products are purchased. The area-related milk yield is almost 7000 kg ha- 1. For fodder production, 0.96 ha per cow is needed, of which 0.85 ha is farm land. The equivalent production area for purchased fodder is 0.11 ha. In the analysed region in northwestern Germany, most correlations between milk yield and analysed feeding parameters are close and significant. This is in contrast to the region in the south, where the variability of amount and proportion of the different feed types is predominantly independent of the milk yield. Intensification of dairy production to increase milk performance using a higher proportion of concentrates and purchased feed at some of the analysed farms needs to be carefully assessed according to the organic farming profile.
Keywords: Dairy; Milk yield; Productivity; Concentrates; Roughage; Feed type; Feed purchase; Organic farming

Maren Metzke, Martin Potthoff, Michael Quintern, Jurgen He[ss], Rainer Georg Joergensen, Effect of reduced tillage systems on earthworm communities in a 6-year organic rotation, European Journal of Soil Biology, Volume 43, Supplement 1, November 2007, Pages S209-S215, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2007.08.056.
(http://www.sciencedirect.com/science/article/pii/S1164556307000775)
Abstract:
Chisel plough or no-till practises are clearly attributed to sustainable farming for the support of soil organisms and soil biological functioning. However, in organic farming these techniques are only applied to a very small extent since there is a need for cultivation to control weeds. In organic farming it is important to develop and establish less destructive soil tillage practises to benefit from the support of soil organisms, especially from ecosystem

engineers like earthworms. In this study three tillage systems were compared on a silty, loess' derived soil in a 6 crop rotation. The tillage systems established were: (1) 'ecomat' shallow (10 cm) inversive ploughing; (2) a ridge culture system; and (3) conventional tillage (inversion tillage) down to 30 cm. In fall 2005, three years after establishment of the field plots earthworm communities were investigated using formalin extraction. In total 6 species were detected. The earthworm abundance was low, ranging from 0 to 84 individuals m-2. Shallow ploughing using the 'ecomat' technique was not different than conventional ploughing in its effects on earthworm populations, while the ridge culture system was significantly reduced in earthworm numbers and biomass compared to conventional ploughing. We conclude that both 'ecomat' and 'ridge culture' do not support earthworms and significantly reduce earthworm densities. The reductions in tillage depth alone are not effective for improving the habitat quality for earthworms in soil.
Keywords: Organic farming; Earthworms; Tillage; Formalin extraction; Ecosystem engineers

Gabriele Pietsch, Jurgen K. Friedel, Bernhard Freyer, Lucerne management in an organic farming system under dry site conditions, Field Crops Research, Volume 102, Issue 2, 5 June 2007, Pages 104-118, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.003.
(http://www.sciencedirect.com/science/article/pii/S0378429007000317)
Abstract:
Biological nitrogen fixation (BNF) as a result of the legumes-rhizobia symbioses is the main source of nitrogen in organic farming systems. Lucerne (Medicago sativa L.), used as green manure or as forage legume, is important on arable farms under dry site conditions. In a field experiment on organically managed agricultural fields, we examined the impacts of the utilisation system (harvested = forage production versus mulched = green manure) and the crop composition (pure lucerne crops versus lucerne-grass mixtures) on yield, biological nitrogen fixation (BNF), soil inorganic N content, N balance and water consumption of autumn-cultivated lucerne crops. The study was conducted at the University of Natural Resources and Applied Life Sciences, Vienna, in eastern Austria--a region characterized by pannonian site conditions (9.8 [degree sign]C mean annual temperature, 545 mm average total precipitation) and stockless farming systems. Our results indicate that the utilisation system and the crop composition had no marked influence on above- and below-ground dry matter (DM) and N yield, soil inorganic N contents, BNF, or water use efficiency of lucerne. The level of symbiotically fixed N2 in harvested lucerne was 89-125 kg N ha-1 (27-33% Ndfa = nitrogen derived from atmosphere) in the first year and 161-175 kg N ha-1 (47-49% Ndfa) in the second year of the study. The high soil inorganic N supply in the first year increased the N uptake from soil by lucerne and led to a reduced BNF. Under the dry and unfavourable conditions in both study years, the nitrogen release from the legume mulch was retarded and BNF in mulched lucerne was not reduced. Assuming low gaseous N losses by mulching (15-30 kg N ha-1), the green manure system reached a positive N balance (+137 to +186 kg N ha-1) for the subsequent crops because abundant residues remained on the field.
Keywords: Forage legumes; Green manure; Lucerne; Nitrogen fixation; Medicago sativa; Water use efficiency

Tina Kutti, Arne Ervik, Pia Kupka Hansen, Effects of organic effluents from a salmon farm on a fjord system. I. Vertical export and dispersal processes, Aquaculture, Volume 262, Issues 2-4, 28 February 2007, Pages 367-381, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2006.10.010. (http://www.sciencedirect.com/science/article/pii/S0044848606007393)
Abstract:
Vertical flux of organic waste from a Norwegian salmon farm (which produced 2910 tonnes of fish in 19 months) located in 230-m-deep water was measured nine times in the course of 2 years by sediment traps along a transect stretching from the farm and 3 km out towards the sea. The chemical composition of the trapped material and the sediment below the traps were analyzed. The results showed that when the fish farm was empty, sedimentation rates of organic matter were similar all along the transect. Throughout the production cycle high and very variable sedimentation rates of particulate organic matter, particulate organic carbon and particulate organic nitrogen were measured within 250 m from the farm, while between 550 and 3000 m away from the farm sedimentation rates were lower and constant throughout the cycle. During the second year of production, the annual vertical flux of particulate organic carbon to the bottom adjacent to the farm was 365 g m- 2, nine times as high as what was found 3 km away from the farm. While the sedimentation rates showed that most of the waste matter settled within 250 m of the farm, the fatty acid composition and [delta]13C isotope ratio of the material in the bottom traps indicate that some components of the organic waste were transported as far as 550 to 900 m, probably due to resuspension of surface sediment. Despite the high sedimentation rates the content of sedimentary organic matter, total organic carbon and total organic nitrogen was not elevated in the sediment around the farm. However, phosphorus was found in higher concentrations in the sediments close to the farm, indicating that organic matter had settled on the sediment and been decomposed. The unchanged content of organic matter in the sediment during the production cycle showed that at this site the local resuspension and dispersal conditions and the decomposition capacity of the benthos were sufficient to prevent overloading of the locality.
Keywords: Salmon farming; Organic waste; Sedimentation rates

C. Stark, L.M. Condron, A. Stewart, H.J. Di, M. O'Callaghan, Influence of organic and mineral amendments on microbial soil properties and processes, Applied Soil Ecology, Volume 35, Issue 1, January 2007, Pages 79-93, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2006.05.001. (http://www.sciencedirect.com/science/article/pii/S0929139306001168)
Abstract:
Microbial diversity in soils is considered important for maintaining sustainability of agricultural production systems. However, the links between microbial diversity and ecosystem processes are not well understood. This study was designed to gain better understanding of the effects of short-term management practices on the microbial community and how changes in the microbial community affect key soil processes. The effects of different forms of nitrogen (N) on soil biology and N dynamics was determined in two soils with organic and conventional management histories that varied in soil microbial properties but had the same fertility. The soils were amended with equal amounts of N (100 kg ha-1) in organic (lupin, Lupinus angustifolius L.) and mineral form (urea), respectively. Over a 91-day period, microbial biomass C and N, dehydrogenase enzyme activity, community structure of pseudomondas (sensu stricto), actinomycetes and [alpha] proteobacteria (by

denaturing gradient gel electrophoresis (DGGE) following PCR amplification of 16S rDNA fragments) and N mineralisation were measured. Lupin amendment resulted in a two- to five-fold increase in microbial biomass and enzyme activity, while these parameters did not differ significantly between the urea and control treatments. The PCR-DGGE analysis showed that the addition of mineral and organic compounds had an influence on the microbial community composition in the short term (up to 10 days) but the effects were not sustained over the 91-day incubation period. Microbial community structure was strongly influenced by the presence or lack of substrate, while the type of amendment (organic or mineral) had an effect on microbial biomass size and activity. These findings show that the addition of green manures improved soil biology by increasing microbial biomass and activity irrespective of management history, that no direct relationship existed among microbial structure, enzyme activity and N mineralisation, and that microbial community structure (by PCR-DGGE) was more strongly influenced by inherent soil and environmental factors than by short-term management practices.
Keywords: Microbial community structure; DGGE; Nitrogen mineralisation; Organic and conventional farming practices; Lupin (Lupinus angustifolius L.) green manure; Urea

M.C. Rufino, P. Tittonell, M.T. van Wijk, A. Castellanos-Navarrete, R.J. Delve, N. de Ridder, K.E. Giller, Manure as a key resource within smallholder farming systems: Analysing farm-scale nutrient cycling efficiencies with the NUANCES framework, Livestock Science, Volume 112, Issue 3, Recycling of Livestock Manure in a Whole-Farm Perspective, December 2007, Pages 273-287, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.09.011.
(http://www.sciencedirect.com/science/article/pii/S1871141307004775)
Abstract:
Smallholder farmers in Africa recognise the important role of manure in maintaining soil fertility. For smallholder farmers who use little fertiliser, efficient management of nutrients in manure is key for crop production. We describe a simple model to analyse the effect of manure management on the efficiency of mass and nutrient retention. We used on-farm data on manure excreted and manure management, experimental results, literature and fuzzy logic to model losses during manure storage. The model was used to analyse N cycling efficiency (NCE) within smallholder farms in western Kenya. Simulations showed that manure management during collection and storage had a large effect on the efficiency of C and nutrient retention. Differences in NCE between farmers of different wealth classes arose due to differences in resource endowment. For poorer farmers, large N losses occur at all stages of manure recycling. Urinary-N losses occurred on all farms but their impact on NCE for poor and medium-class farmers was larger due to the smaller amount of N recycled. With current management the poor farmer recovered < 1 kg N y- 1 in composted manure from 15 kg N y- 1 excreted. Improved manure storage had little effect on increasing overall NCE for the poor farmer due to large losses before storage. For the wealthier farmer improvement of manure storage increased NCE and allowed recycling of 30% of N excreted (ca. 30 kg N y- 1) with small investment in infrastructure. Covering manure heaps with a polythene film reduced mass and N losses considerably. For the poor to increase overall NCE, investment in cattle housing and recycling of urinary-N is required. Increasing cattle numbers or improved feeding would have a larger effect on manure availability but this is constrained by feed

scarcity and investment capacity. The absolute amounts of N recycled (1-6, 4-17 and 7-18 kg N y- 1 for poor, medium and wealthier farmers) were small compared with maize N demand (> 50 kg N ha- 1), but significant given the small farm sizes (0.1-1.1 ha). Although absolute amounts of N recycled with improved manure management may have little immediate impact on crop productivity, manure is often the only input available. Manure provides other nutrients for crops and maintains soil organic matter -- both vital to guarantee efficient use of fertiliser N -- which justifies the search for interventions to assist farmers make better use of manure.
Keywords: Sub-Saharan Africa; NCE; Fuzzy logic modelling; FARMSIM; HEAPSIM

N. Farella, R. Davidson, M. Lucotte, S. Daigle, Nutrient and mercury variations in soils from family farms of the Tapajos region (Brazilian Amazon): Recommendations for better farming, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 449-462, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.11.003.
(http://www.sciencedirect.com/science/article/pii/S0167880906004038)
Abstract:
In the Brazilian Amazon, colonization is modifying the landscape at an exceedingly fast pace. Recently established households practice slash-and-burn agriculture and participate in the overall deforestation of the Amazon. Near the Transamazon highway, these family agricultural practices are the main cause of deforestation. The study presented here is oriented toward a better understanding of the impacts of farming practices on soil chemical composition. This study used a sampling design based on soil samples taken on farm plots, which had been submitted to a wide range of spatial and temporal sequential land-uses, including soils that were only recently denuded. The data shows that soil responses (organic matter (OM) content, fertility and mercury (Hg) retention) to these varied land-uses were relatively similar, suggesting that the most important event determining the responses was deforestation itself. This is well illustrated by the Hg content of soils, which changed immediately after deforestation and then only slightly thereafter. This phenomenon could also be seen in the base cation (calcium (Ca), potassium (K) and magnesium (Mg)) content which rose drastically after deforestation and tended to stay high for a period up to 10 years of cropping and pasture. This lasting cation rise is reflected by ammonium (NH4) displacement from surface soils. Indeed, inorganic nitrogen (N) is the most important nutrient loss upon deforestation. Nonetheless, when time spent in fallow was greater than 15 years, base cations (Ca, Mg, K), available N and phosphorus (P) contents tended to go back to initial forest soil values and in some cases to exceed them. Soil type was seen to mediate responses to land-use. Clay-sandy soils showed a lower content of available N and carbon (C) than clayey soils at the soil surface, a difference that was accentuated by deforestation. Conversely, the higher initial content of Hg in clayey soils was associated with a more important Hg loss from the soil's surface. By shedding light on the consequences of family practices for OM, nutrient status and Hg depletion, this paper gives a new perspective on soil responses to agricultural practices. These conclusions need to be addressed in a strategy plan to limit family land-use impacts on soils and the surrounding ecosystems. Recommendations for more sustainable land uses are proposed based on what has been learned about soil responses to local agricultural practices.

Keywords: Deforestation; Amazon; Agriculture; Land use; Mercury; Cations; Phosphorus; Nitrogen

Erika Styger, Harivelo M. Rakotondramasy, Max J. Pfeffer, Erick C.M. Fernandes, David M. Bates, Influence of slash-and-burn farming practices on fallow succession and land degradation in the rainforest region of Madagascar, Agriculture, Ecosystems & Environment, Volume 119, Issues 3-4, March 2007, Pages 257-269, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.07.012.
(http://www.sciencedirect.com/science/article/pii/S0167880906002866)
Abstract:
Slash-and-burn agriculture (tavy) is the major cause of upland degradation and deforestation in eastern Madagascar. Upland degradation studies are largely based on floristic loss and have ignored the link to agriculture, the main activity on the uplands. The objectives were to analyze jointly with the Betsimisaraka farmers how slash-and-burn practices influence fallow species succession, and how current fallow/cropping regimes influence agricultural productivity and upland degradation dynamics. The study was conducted in the Vohidrazana/Beforona area, located at the margins of the Ankeniheny-Zahamena rainforest corridor. Semi-structured interviews were conducted in 9 villages resulting in 96 individual and 22 group interviews. These were complemented by 212 historical field plot inventories on 32 farms. The researchers' and farmers' knowledge systems were treated equally and complemented each other in the joint analysis. Over the last 30 years, fallow periods decreased from 8-15 years to 3-5 years. Hence, fallow vegetation is changing within 5-7 fallow/cropping cycles after deforestation from tree (Trema orientalis) to shrub (Psiadia altissima, Rubus moluccanus, Lantana camara) to herbaceous fallows (Imperata cylindrica and ferns) and grasslands (Aristida sp.), when land falls out of crop production. This sequence is 5-12 times faster than previously reported. The frequent use of fire is replacing native species with exotic, aggressive ones and favors grasses over woody species, creating treeless landscapes that are of minimal productive and ecological value. Unlike most discussions during the past 20-30 years that refer to fallow duration per se as a measure to soil recovery, our results show that fallow periods need to increase in length with each additional fallow/cropping cycle after deforestation in order to restore the soils to a similar level of productivity. Already with the third cycle after deforestation, vegetation starts to degrade quickly in parallel with agricultural productivity decline. The Betsimisaraka's fallow knowledge is very rich. Fallows are characterized by species life form, species composition, vegetation appearance, cycles after deforestation, and agricultural potential. Distinct fallow types are easily identifiable in the field and inform on the critical threshold, below which soils are lost to farming. Clear management guidelines go along with each fallow type. We recommend upland agricultural intensification and diversification based on improved soil fertility through optimized organic and inorganic inputs and fire-less land management that encourages the re-establishment of nutrient stocks. If young farmers perceive a real opportunity in agricultural intensification, the migration towards the forest borders to pursue tavy might be halted.
Keywords: Tavy; Betsimisaraka; Vegetation succession; Agricultural productivity; Biodiversity; Upland rice

Tina Kutti, Pia Kupka Hansen, Arne Ervik, Tore Hoisaeter, Per Johannessen, Effects of organic effluents from a salmon farm on a fjord system. II. Temporal and spatial patterns in infauna community composition, Aquaculture, Volume 262, Issues 2-4, 28 February 2007, Pages 355-366, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2006.10.008. (http://www.sciencedirect.com/science/article/pii/S004484860600737X)
Abstract:
This study examined spatial and temporal variations in infaunal community composition in a gradient away from a large salmon farm (producing 2910 tonnes during each production cycle) in Uggdalsfjorden, western Norway. The farm is located at a water depth of 230 m, is moored at a single point and moves with prevailing currents and winds. The study showed that the large-scale effects on the benthos were restricted to the nearest 250 m of the farm. This zone was dominated by the polychaetes Paramphinome jeffreysii, Prionospio steenstrupi, Capitella capitata and Heteromastus filiformis, the bivalves Thyasira sarsii and Abra nitida and the echinoderm Brissopsis lyrifera for the duration of the two-year study. Highest abundance and biomass were recorded at peak production at the farm, with 30 000 individuals m- 2 and 60 g ash-free dry weight (AFDW) m- 2. At this time abundance was 10 and biomass was 35 times higher within 250 m from the farm than 3 km away. Highest species richness was found 550-900 m from the farm, where, at peak production, the number of species doubled from 20 to 40 species per 0.1 m- 2. The study showed that at deep sites organic waste affects benthos on a spatial scale much larger than at shallow water sites, and although the infauna community composition varied over time, the consistency in the spatial pattern in the relationship between species richness, abundance and biomass in the course of the study indicates that the observed patterns were temporally stable. The loadings of organic matter from the farm did not exceed the capacity of the benthic community for decomposition, as indicated by the low and stable content of organic matter in the sediment around the farm.
Keywords: Organic waste; Infauna; Environmental impact; Salmon farming

P.R. Samson, Farming practices for managing Inopus rubriceps (Macquart) (Diptera: Stratiomyidae) in sugarcane in Australia, Crop Protection, Volume 26, Issue 7, July 2007, Pages 983-990, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.09.006.
(http://www.sciencedirect.com/science/article/pii/S0261219406002833)
Abstract:
Larvae of the sugarcane soldier fly, Inopus rubriceps (Macquart), attack the roots of sugarcane in Australia, reducing crop yields and forcing the premature removal of crops. Manipulation of farming practices may help to manage this pest, by affecting its population dynamics directly, or indirectly via natural enemies. Six different crop management procedures were applied in large unreplicated plots on six farms. Numbers of larval I. rubriceps and other large soil fauna were assessed in soil cores in each of 4 years, while surface-active predators were collected in pitfall traps in one year. Numbers of I. rubriceps in newly planted sugarcane crops were reduced when crops were planted after a long break (up to 1 year) compared with a short break of about 3 months, and this difference was maintained into the first ratoon in the 2nd year after planting. Long breaks managed with herbicide or that included a soybean rotation were equally as effective as a fallow maintained bare by cultivation. The addition of organic matter as mill mud (mill waste) or cane trash did not affect numbers of I. rubriceps. Numbers of predatory beetles (Carabidae, Staphylinidae

and Elateridae) were not affected by the different practices, numbers of ants were greater in short-break plots in one of the study years, and numbers of earthworms were greater in plots with mill mud. The significance of factors that might increase mortality of I. rubriceps was examined by correlation between annual inter-generational mortality and densities of other faunal groups. There was evidence for an association between an increase in mortality of the pest and densities of ants and of predatory Coleoptera, particularly the staphylinid Thyreocephalus chalcopterus (Erichson), in some datasets. Soil concentrations of spores of the entomopathogenic fungus Metarhizium anisopliae (Metschnikoff) Sorokin in the root zone of new plant crops were higher after minimum tillage planting back into the old cane rows than after conventional soil preparation and planting. Sugar yields were lower when cane was planted after a long break than when cane was planted sooner, perhaps because of the shorter growing time of the crop but perhaps also because of the use of experimental planting equipment that might not have been optimal. Despite this, a long break is likely to reduce the risk of damaging I. rubriceps infestations in subsequent cane crops, with either a rotation with soybeans or spraying out the old crop with herbicide being the preferred options. These practices have been adopted by many affected cane farmers when replacing crops damaged by I. rubriceps.
Keywords: Soil insects; Soldier fly; Metarhizium anisopliae; Minimum tillage; Conservation biological control; Cultural control; Break crops

P. Rozzi, F. Miglior, K.J. Hand, A Total Merit Selection Index for Ontario Organic Dairy Farmers, Journal of Dairy Science, Volume 90, Issue 3, March 2007, Pages 1584-1593, ISSN 0022-0302, DOI: 10.3168/jds.S0022-0302(07)71644-2.
(http://www.sciencedirect.com/science/article/pii/S0022030207716442)
Abstract:
Organic standards require changes in management practices so that health, fertility, and overall fitness are more important than on conventional dairy farms and require different selection objectives. A survey involving 18 (40%) Ontario organic dairy farms was carried out to collect data on their production systems, breeding policies, and concerns. Compared with conventional farms, organic farms had lower milk production, lower replacement rate, higher somatic cell count, and a much higher rate of crossbreeding. Actual culling rate was 21%, and the main causes were fertility, mastitis, feet and legs, production, and old age. The major areas of concern expressed by organic dairy farmers were related to grazing traits, fertility, health, and longevity. An organic total merit index was developed based on the subjective scores for traits with a genetic evaluation in Canada. The relative weights of production to fitness traits (28:72) were substantially different from those in the Canadian Lifetime Profit Index (54:46), but similar to those used in conventional indices in Sweden and Denmark and in the Swiss organic index. The overall weight on health traits was 2.5 times higher in the organic index and, among fitness traits, the emphasis was substantially higher for lactation persistency, somatic cell score, and body capacity. Correlations between the organic index and Lifetime Profit Index were 0.88 for all bulls proven in Canada, 0.70 for the top 1,000, and 0.65 for the top 100, indicating that a different group of bulls would rank at the top of these 2 indices. When the top 100 bulls for either index were compared, those selected for the organic index were about 0.5 standard deviations lower for all yield traits, but were much better for body

capacity and somatic cell score, and 0.25 standard deviations higher for herd life, feet and legs, udder conformation, and lactation persistency. Given the small population size, a separate breeding program for an organic management system is not viable in the foreseeable future. However, the organic index would allow producers to rank proven bulls in accordance with their perceived needs.
Keywords: organic farming; survey; total merit index

Ke Jin, Wim M. Cornelis, Wouter Schiettecatte, Junjie Lu, Yuqing Yao, Huijun Wu, Donald Gabriels, Stefaan De Neve, Dianxiong Cai, Jiyun Jin, Roger Hartmann, Effects of different management practices on the soil-water balance and crop yield for improved dryland farming in the Chinese Loess Plateau, Soil and Tillage Research, Volume 96, Issues 1-2, October 2007, Pages 131-144, ISSN 0167-1987, DOI: 10.1016/j.still.2007.05.002.
(http://www.sciencedirect.com/science/article/pii/S0167198707000992)
Abstract:
Field experiments were carried out to study the effects of different soil management practices on the water balance, precipitation use efficiency (PUE), and crop yield (i.e. winter wheat and peanut) on a loess soil near Luoyang (east edge of the Chinese Loess Plateau, Henan Province, China). Field plots were set up in 1999 including following soil management practices: subsoiling with mulch (SS), no-till with mulch (NT), reduced tillage (RT), two crops per year (i.e. winter wheat and peanut, TC), and a conventional tillage control (CT). The field plots were equipped to monitor all components of the soil-water balance except evapotranspiration, which was computed by solving the water balance equation. The results showed that although soil management had smaller influence on the magnitude of the water balance components than did precipitation variations, small influences of the applied soil management practices on water conservation during the fallow period can greatly affect winter wheat yield. SS increased consistently precipitation storage efficiency (PSE) and PUE over the 5 years compared to CT except during the wettest year. NT also had a noticeable effect on postharvest water storage during the fallow period; however, the influence on yield of NT depended on the amount of precipitation. TC lowered the winter wheat yield mainly due to the unfavorable soil moisture conditions after growing peanut in summer; however, the harvested peanut gained an extra profit for the local farmer. No matter which kind of soil management practices was adapted, PSE never exceeded 41.6%, which was primarily attributed to high evapotranspiration. From data of five consecutive agricultural years between 2000 and 2005, it could be concluded that SS resulted in the highest PSE, PUE and crop yield. TC also showed promising results considering the economic value of the second crop. NT performed slightly less as SS. CT gave intermediate results, whereas RT was the worst alternative.
Keywords: Dryland; Rainfed agriculture; Soil management practices; Water balance; Water conservation; Winter wheat

P.-A.Hansson, A. Baky, S. Ahlgren, S. Bernesson, A. Nordberg, O. Noren, O. Pettersson, Self-sufficiency of motor fuels on organic farms - Evaluation of systems based on fuels produced in industrial-scale plants, Agricultural Systems, Volume 94, Issue 3, Special Section: sustainable resource management and policy options for rice ecosystems, International symposium on sustainable resource management and policy options for rice ecosystems, June 2007, Pages 704-714, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.02.010.

(http://www.sciencedirect.com/science/article/pii/S0308521X07000418)
Abstract:
The aim of the present work was to evaluate systems for making organic farms self-sufficient in bio-based fuels. The energy efficiency and environmental load for systems based on rape methyl ester (RME), ethanol and biogas produced by processing raw material from the farm in industrial-scale plants were evaluated using a life cycle perspective. Eventual constraints when implementing the systems in practice were also identified and the farmer's costs for the systems estimated.
The RME scenario showed some good characteristics; the energy efficiency and potential effects on global warming were favourable, the technology well known and no engine modifications were necessary. However, the high price of the organically produced rapeseed made the fuel expensive. The ethanol scenario provided fuel at a comparatively low cost, but the energy efficiency was low and existing engines would have to be modified. The biogas scenario was not as economically advantageous, due to high costs for storage and transport of the biogas and the extensive tractor modifications needed.
The calculations further showed that systems based on so-called exchange of fuels, i.e. when the farm produces raw material for one type of biofuel, but instead uses another type of biofuel more suitable for its own tractors, were an economically favourable way of supplying the organic farms with `self-produced' bio-based fuels. The exchange scenario based on delivery of organic wheat to a large-scale plant and use of RME at the farm was somewhat more expensive than scenarios based on production of biogas raw material at the farm. However, the wheat/RME system has the advantage of being possible to put into practice immediately, since industrial-scale wheat ethanol plants are in operation and RME fuel is available on the market.
Keywords: Organic farming; RME; Ethanol; Biogas; Biofuel; Life cycle perspective

M. Valantin-Morison, J.-M. Meynard, T. Dore, Effects of crop management and surrounding field environment on insect incidence in organic winter oilseed rape (Brassica napus L.), Crop Protection, Volume 26, Issue 8, August 2007, Pages 1108-1120, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.005.
(http://www.sciencedirect.com/science/article/pii/S0261219406003152)
Abstract:
Many organic farmers hesitate to grow winter oilseed rape (WOSR), despite its usefulness for crop rotations and animal fodder, because it is attacked by many insects, which are difficult to control without chemical treatments. In a geographically broad network of farmer's fields, we analysed the effect of various crop management factors and of the surrounding field environment on a large range of insects known to damage WOSR: root maggot (Delia radicum L.), cabbage stem flea beetle (Psylliodes chrysocephala L.), rape stem weevil (Ceuthorhynchus napi Gyl) and pollen beetle (Meligethes aeneus F.). Our results confirm the effect of sowing date, plant density and soil tillage regime on root maggot attacks and cabbage stem flea beetle larva infestation. Early sowing tended to increase root maggot damage whereas it was associated with a lower level of attack of cabbage stem flea beetle. High plant density tended to decrease the damage or the attack of all insects. We show that nitrogen availability in the soil affect cabbage stem flea beetle, stem weevil levels and pollen beetle damage: the negative effect of soil nitrogen content on pollen beetle damage may be related to the significant effect of nitrogen on plant vigour and,

therefore, to the compensation of pollen beetle damage on new racemes. If all insects were considered together, the proportion of land under WOSR in the region and the surrounding environment had a significant effect on pest occurrence. In regions with a high proportion of land under WOSR, the proportion of plants attacked by root maggot and pollen beetle tended to increase. Conversely, regions with high proportions of land under WOSR tended to have a smaller proportion of plants with cabbage stem flea beetle larvae or damage, whatever the environment surrounding the field. For almost all the pests considered, the fields displaying the most severe pest attacks in regions with more than 1.2% WOSR were bounded by trees, hedges and bushes. Conversely, in regions with a lower percentage of land under WOSR, woodland around the field reduced the occurrence of pest attacks.
Keywords: Winter oilseed rape; Organic farming; Crop management; Insects; Field boundaries

Tadej Dolenec, Sonja Lojen, Goran Kniewald, Matej Dolenec, Nastja Rogan, Nitrogen stable isotope composition as a tracer of fish farming in invertebrates Aplysina aerophoba, Balanus perforatus and Anemonia sulcata in central Adriatic, Aquaculture, Volume 262, Issues 2-4, 28 February 2007, Pages 237-249, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2006.11.029.
(http://www.sciencedirect.com/science/article/pii/S0044848606008830)
Abstract:
Information on aquaculture-related environmental impact along the eastern Adriatic coast is very scarce. In this paper, the area affected by fish farm and sewage derived particulate nitrogen in the Murter Sea and semi-enclosed Pirovac Bay (central Adriatic, Croatia) was assessed using the stable nitrogen isotopic composition ([delta]15N) in particulate organic matter (POM) and benthic sessile invertebrates (Aplysina aerophoba, Balanus perforatus and Anemonia sulcata) in the exposed areas compared to an unpolluted reference site. The results suggest that increased [delta]15N values in the POM and biota in the impacted areas are predominantly due to nitrogen losses through feed wastage and fish excretion (faeces), but also due to the sewage discharge into the marine coastal ecosystems. The [delta]15N values of the selected organisms were significantly higher around fish cages, as well as at sites polluted by urban waste, compared to the reference site and some other pristine offshore locations. The 15N enrichments of A. aerophoba, A. sulcata and B. perforatus collected around fish cages compared to the reference location were up to 6.8, 6.5 and 5.2[per mille sign], respectively, which exceeds the natural variability. While the [delta]15N values of A. sulcata and B. perforatus showed an excellent linear correlation with those of the POM, a weaker correlation was found between [delta]15N of A. aerophoba and the POM, although its [delta]15N values consistently increased with the increased [delta]15N values of POM. This is attributed to the presence of different bacterial populations hosting in the sponge. A geochemical map of the [delta]15N values in the POM and organisms was created, which could be used for tracing the dispersion of 15N loading generated by aquaculture and sewage in the receiving environment, and their transfer into biota in the adjacent coastal ecosystem. Sponges or other organisms, although known as non-selective suspension feeders, but hosting abundant bacterial populations, may have [delta]15N values lower than the POM, but still reflecting the overall enrichment of the environment in 15N due to the presence of enriched effluents from aquaculture operation or municipal discharges.

Keywords: Aquaculture; Sponge; Barnacle; Sea anemone; Particulate organic matter; Stable isotope

Brandon A. Yoza, Renee M. Harada, Gerard C. Nihous, Qing X. Li, Stephen M. Masutani, Impact of mariculture on microbial diversity in sediments near open ocean farming of Polydactylus sexfilis, Ecological Indicators, Volume 7, Issue 1, January 2007, Pages 108-122, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2005.11.001.
(http://www.sciencedirect.com/science/article/pii/S1470160X05001135)
Abstract:
A chemical and microbiological investigation was performed to determine ecological impact in sediments below a new offshore mariculture operation on the southwest coast of Oahu, Hawaii. Sediment samples collected directly below the fish enclosures were compared with sediment collected 300 m upcurrent. Total organic carbon was 25-37% higher in the control compared with cage samples and ammonia was 30-46% higher in cage samples. Sulfate reducing bacteria (SRB) counts were 36% higher in cage sample sediments.
Genomic 16S rDNA was PCR amplified from total DNA extracted from sediments and analyzed by denaturing gradient gel electrophoresis (DGGE). Similar gradient profiles for control and cage samples were observed. Cloned 16S rDNA libraries for species sampling and determination indicate similar and diverse bacterial communities. Bacteria belonging to the [gamma]-Proteobacteria class were frequently represented and atypical or pathogenic bacterial species were not detected.
A mathematical model developed for prediction of organic material deposition suggests that while currents will reduce fecal loading and feed deposition beneath a cage, there is expected to be sufficient nutrient addition to impact those sediments. Time series or statistical information on the current field beneath the fish cages are needed to apply the model for predicting locations of high deposition. This would contribute to the development of a comprehensive monitoring program that would sample multiple locations over time to generate an accurate and comprehensive depiction of the environmental impacts of this new and expanding commercial endeavor.
Keywords: Deposition modeling; Environmental impact; Mariculture; Microbial diversity; Polydactylus sexfilis; Seastation

Anna-Karin Modin-Edman, Ingrid Oborn, Harald Sverdrup, FARMFLOW--A dynamic model for phosphorus mass flow, simulating conventional and organic management of a Swedish dairy farm, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 431-444, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.11.007.
(http://www.sciencedirect.com/science/article/pii/S0308521X06001818)
Abstract:
A farm systems mass-balance calculation model, FARMFLOW, was applied to a case study comparing organic and conventional management of a Swedish experimental dairy farm, Ojebyn. Parameterisation of the model is implemented using detailed field data from the Ojebyn farm where the two management systems have been run parallel for more than 11 years. Simulations were made to compare the stocks, flows and resulting balances of phosphorus (P) in the two systems during six crop rotations (36 years). In addition, a maximum animal density scenario was tested, in order to analyse the effects of increased production intensity. Results show that FARMFLOW can be a useful tool for analysing the impact of management on internal farm P dynamics, as well as imports

and exports. The organic management results in a higher proportion of internal P flows whereas the conventional system relies more on imports of P in feed and mineral fertilisers. In both management systems, the crop rotation cause large temporal and spatial variation in the application of manure P to the soil system. The resulting field specific soil P accumulation can indicate which fields to target with changed fertilisation management. In the maximum animal density scenario, both management systems led to an application rate of manure P in excess of crop demands.
Keywords: Mass-balances; Dairy farming; Phosphorus (P); Management

Jurg Hiltbrunner, Markus Liedgens, Lucia Bloch, Peter Stamp, Bernhard Streit, Legume cover crops as living mulches for winter wheat: Components of biomass and the control of weeds, European Journal of Agronomy, Volume 26, Issue 1, January 2007, Pages 21-29, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.08.002.
(http://www.sciencedirect.com/science/article/pii/S1161030106001018)
Abstract:
To gain information about the possible use of legume cover crops as an alternative and sustainable weed-control strategy for winter wheat (Triticum aestivum L.), an experiment was conducted at two sites in the Swiss Midlands in 2001/2002. Under organic farming conditions winter wheat was direct-drilled into living mulches established with four different legume genotypes or into control plots without cover crops. Compared to NAT (control plots without cover crops but with a naturally establishing weed community), white clover (Trifolium repens L.), subclover (Trifolium subterraneum L.), and birdsfoot trefoil (Lotus corniculatus L.) reduced the density of monocotyledonous, dicotyledonous, spring-germinating, and annual weeds by the time of wheat anthesis. Strong-spined medick (Medicago truncatula Gaertner) was less efficient in this regard. While the grain yield was reduced by 60% or more for all legumes when compared to NOWEED (control plots kept weed-free), a significant negative correlation between the dry matter of the cover crop and weeds as well as between the cover crop and the winter wheat was observed by the time of wheat anthesis. The effect of manuring (60 m3 ha-1 liquid farmyard manure) was marginal for weeds and cover crops but the additional nutrients significantly increased total winter wheat dry matter and grain yields. The suppression achieved by some legumes clearly demonstrates their potential for the control of weeds in such cropping systems. However, before living legume cover crops can be considered a viable alternative for integrated weed management under organic farming conditions, management strategies need to be identified which maximise the positive effect in terms of weed control at the same time as they minimise the negative impact on growth and yield of winter wheat.
Keywords: Cover crop; Legume; Living mulch; Organic farming; Weed; Winter wheat

P.C.J. van Vliet, J.W. Reijs, J. Bloem, J. Dijkstra, R.G.M. de Goede, Effects of Cow Diet on the Microbial Community and Organic Matter and Nitrogen Content of Feces, Journal of Dairy Science, Volume 90, Issue 11, November 2007, Pages 5146-5158, ISSN 0022-0302, DOI: 10.3168/jds.2007-0065.
(http://www.sciencedirect.com/science/article/pii/S0022030207719847)
Abstract:
Knowledge of the effects of cow diet on manure composition is required to improve nutrient use efficiency and to decrease emissions of N to

the environment. Therefore, we performed an experiment with nonlactating cows to determine the consequences of changes in cow rations for the chemical characteristics and the traits of the microbial community in the feces. In this experiment, 16 cows were fed 8 diets, differing in crude protein, neutral detergent fiber, starch, and net energy content. These differences were achieved by changing dietary ingredients or roughage to concentrate ratio. After an adaptation period of 3 wk, fecal material was collected and analyzed. Observed results were compared with simulated values using a mechanistic model that provides insight into the mechanisms involved in the effect of dietary variation on fecal composition. Feces produced on a high-fiber, low-protein diet had a high C:N ratio (>16) and had lower concentrations of both organic and inorganic N than feces on a low-fiber, high-protein diet. Fecal bacterial biomass concentration was highest in high-protein, high-energy diets. The fraction of inorganic N in the feces was not significantly different between the different feces. Microbial biomass in the feces ranged from 1,200 to 8,000 [mu]g of C/g of dry matter (average: 3,700 [mu]g of C/g of dry matter). Bacterial diversity was similar for all fecal materials, but the different protein levels in the feeding regimens induced changes in the community structure present in the different feces. The simulated total N content (Ntotal) in the feces ranged from 1.0 to 1.5 times the observed concentrations, whereas the simulated C:Ntotal of the feces ranged from 0.7 to 0.9 times the observed C:Ntotal. However, bacterial biomass C was not predicted satisfactorily (simulated values being on average 3 times higher than observed), giving rise to further discussion on the definition of microbial C in feces. Based on these observations, it was concluded that diet composition affected fecal chemical composition and microbial biomass. These changes may affect the nutrient use and efficiency of the manure. Because the present experiment used a limited number of dry cows and extreme diet regimens, extrapolation of results to other dairy cow situations should be done with care.
Keywords: DNA fingerprinting; manure composition; bacterial diversity; dairy farming

J.C.J. Groot, J.D. Van Der Ploeg, F.P.M. Verhoeven, E.A. Lantinga, Interpretation of results from on-farm experiments: manure-nitrogen recovery on grassland as affected by manure quality and application technique. 1. An agronomic analysis, NJAS - Wageningen Journal of Life Sciences, Volume 54, Issue 3, 2007, Pages 235-254, ISSN 1573-5214, DOI: 10.1016/S1573-5214(07)80017-0.
(http://www.sciencedirect.com/science/article/pii/S1573521407800170)
Abstract:
In a 5-year field experiment, a comparison was made between the manure application practices of two adjacent dairy farms in the north of the Netherlands. Grassland management systems at Drogeham and Harkema contrasted in manure application technique (surface application versus shallow injection, respectively), quality of applied manure (slurry + MX: slurry with Euromestmix(R) clay mineral additive versus regular slurry), and some relevant site characteristics (high versus low soil organic matter content and soil moisture supply). Effects of manure types and application techniques, and treatment of the soil with a micro-organism supplement, were tested in a factorial experiment at the two sites, two blocks per site, one with and one without additional application of 157 kg N ha-1 year-1 inorganic fertilizer. Apparent N recovery was higher after shallow injection than after surface

application. For plots receiving no additional inorganic fertilizer, this difference was largest for slurry + MX applied at site Harkema, since this slurry-site combination resulted in the highest observed average apparent N recovery following shallow injection (47%) and the lowest N recovery following surface application (20%). For plots receiving additional inorganic fertilizer N the contrasts between treatments were less pronounced. Year effects on N uptake and dry matter production could be related to cumulative temperature and precipitation surplus over the growing season. A simple comparison between the grassland management systems was carried out based on the response curves derived from the experiment. This demonstrated that the grassland system where slurry was applied by shallow injection is not necessarily the lowest in actual amount of N not accounted for (i.e., potentially lost). The efficiency of the Harkema system strongly depended on high N recovery, but showed high potential losses in some years and a high herbage crude protein content in other years, due to the low DM production capacity. On the other hand, the Drogeham system was tuned to high DM production and was characterized by higher system stability, as reflected by more stable relationships between DM production and N not accounted for and herbage crude protein content. These differences between the systems were probably to a large extent caused by differences in water balance and soil organic matter content.
Keywords: dairy farming system; nutrient use efficiency; soil organic matter; stability; Monte Carlo simulation

Mari Ivask, Annely Kuu, Eduard Sizov, Abundance of earthworm species in Estonian arable soils, European Journal of Soil Biology, Volume 43, Supplement 1, November 2007, Pages S39-S42, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2007.08.006.
(http://www.sciencedirect.com/science/article/pii/S116455630700088X)
Abstract:
Specific composition of earthworm community has indicative value for evaluating the impact of agricultural practice on soil. The occurrence of species only like Aporrectodea caliginosa, Aporrectodea rosea, Lumbricus rubellus tolerant to disturbance is the result of intensive tillage and agricultural practice or the influence of strong limiting ecological factor. A community including more sensitive species Lumbricus terrestris and Aporrectodea longa, or the most sensitive species Allolobophora chlorotica and Lumbricus castaneus, indicates more favourable conditions of habitat.
Keywords: Earthworms; Species; Bioindication; Hydrolytical activity of microbial community; Organic farming

G.B.M. Pedroli, Th. Van Elsen, J.D. Van Mansvelt, Values of rural landscapes in Europe: inspiration or by-product?, NJAS - Wageningen Journal of Life Sciences, Volume 54, Issue 4, 2007, Pages 431-447, ISSN 1573-5214, DOI: 10.1016/S1573-5214(07)80014-5.
(http://www.sciencedirect.com/science/article/pii/S1573521407800145)
Abstract:
European landscapes are facing a deep crisis. As a consequence of globalization and the economical change associated with it, traditional functions like production agriculture are becoming less important. After the self-evident but inspired landscapes of numerous generations of peasants, monks and landlords, landscape has now largely become a nameless by-product of the global economy. This paper shows that the key to developing new living landscapes lies in a participatory process of landscape development with respect for their inherent values. Today,

even in traditionally small-scale farming systems like organic farming, diverse and sustainable landscapes only develop if they are consciously wanted and when landscape development is integrated into the objectives of farming. The work that is needed to achieve such landscapes we call `landscape work'. This paper describes a phenomenological approach to identifying landscape values and finding new inspiration for landscape management. It gives examples of the application of this approach in organic farming in Germany. It is concluded that a living, sustainable landscape combines the functional effects of producing economic and social benefits with the intertwined effects of providing identity and inspiration for getting actively involved in it, in accordance with its dynamic character. Living landscapes will enhance the well being, also of the predominantly urban European population. In other words: landscape works.
Keywords: landscape identity; landscape work; organic farming; participation; phenomenology; social farming; sustainable landscape

Christian Bugge Henriksen, Jens Peter Molgaard, Jesper Rasmussen, The effect of autumn ridging and inter-row subsoiling on potato tuber yield and quality on a sandy soil in Denmark, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 309-315, ISSN 0167-1987, DOI: 10.1016/j.still.2006.05.003.
(http://www.sciencedirect.com/science/article/pii/S016719870600122X)
Abstract:
Autumn ridging is a modified version of the ridge tillage system. Instead of setting up ridges during the growing season, they are established in autumn and left for the winter. Previous studies have documented positive effects of autumn ridging on potato yield and we hypothesized that subsoiling could enhance these effects. To determine the effect of autumn ridging and inter-row subsoiling on potato yield and quality a field experiment was conducted on sandy soil from 2001 to 2003. Autumn ridging resulted in an average total and marketable tuber yield of 25.6 and 9.2 t ha-1, which was not significantly different from the average total and marketable yield of 25.6 and 8.9 t ha-1 with ploughing. However, autumn ridging significantly reduced the incidence of black scurf from 2.5% to 2.2%. Inter-row subsoiling in the growing season significantly increased marketable potato tuber yield from 8.4 to 9.6 t ha-1 and reduced the occurrence of malformed potatoes from 9.3% to 7.5%, irrespective of tillage treatment and irrigation level. There was no significant interaction between autumn ridging and subsoiling. The beneficial effect of subsoiling on marketable yield was driven by a 48.5% increase in the dry year of 2001. Subsoiling reduced the incidence of common scab from 7.8% to 6.9% when irrigation was reduced. It is concluded that at least three factors may modify the effects of subsoiling: Soil water status in the growing season, precipitation immediately before and after the subsoiling operation, and crop growth stage at the time of subsoiling.
Keywords: Autumn ridging; Inter-row subsoiling; Reduced irrigation; Solanum tuberosum; Black scurf; Common scab; Organic farming

Manfred Sager, Trace and nutrient elements in manure, dung and compost samples in Austria, Soil Biology and Biochemistry, Volume 39, Issue 6, Organic Wastes in Soils: Biochemical and Environmental Aspects - Biochemical and Environmental Aspects, Second General Annual Conference of European Geosciences Union, Soil System Sciences Division, Session SSS12, Recycling of Organic Wastes in Soils: Biochemical and

Environmental Issues, June 2007, Pages 1383-1390, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2006.12.015.
(http://www.sciencedirect.com/science/article/pii/S0038071706005190)
Abstract:
In Austria, farm animals are estimated to produce about 20x106 ton of excrements annually. In order to predict possible changes of the inorganic compositions of the target soils from various organic fertilizers, mean compositions of excrements, composts and sewage sludges have been compiled on a dry weight basis. Although the high amounts of K and P were beneficial, there were some high concentrations of Na in biogas residues and pig manures. Intense additions of Cu, Zn, and Se are reflected in high loads in the respective excrements, and these amounts in some instances exceeded the threshold limits for soil contamination. Selenium addition to arable soils can be regarded as beneficial, however, as Austria is a low Se area. Composts and sewage sludges were higher in Al and lithophilic trace elements than were the excrements. Factor analysis traced phosphates as the main source of Cd. Cr in processed matrices was significantly higher, and abrasion from tools should be considered in future investigations. Other unwanted trace elements, like Ni, Pb, As and Hg, were found at a rather low concentration.
Keywords: Organic fertilizers; Excrements; Composts; Microelements; Animal farming

Andre Bationo, Job Kihara, Bernard Vanlauwe, Boaz Waswa, Joseph Kimetu, Soil organic carbon dynamics, functions and management in West African agro-ecosystems, Agricultural Systems, Volume 94, Issue 1, Making Carbon Sequestration Work for Africa's Rural Poor - Opportunities and Constraints, April 2007, Pages 13-25, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.08.011.
(http://www.sciencedirect.com/science/article/pii/S0308521X06001065)
Abstract:
Soil fertility depletion has been described as the single most important constraint to food security in West Africa. Over half of the African population is rural and directly dependent on locally grown crops. Further, 28% of the population is chronically hungry and over half of people are living on less than US$ 1 per day as a result of soil fertility depletion.
Soil organic carbon (SOC) is simultaneously a source and sink for nutrients and plays a vital role in soil fertility maintenance. In most parts of West Africa agro-ecosystems (except the forest zone), the soils are inherently low in SOC. The low SOC content is due to the low shoot and root growth of crops and natural vegetation, the rapid turnover rates of organic material as a result of high soil temperatures and fauna activity particularly termites and the low soil clay content. With kaolinite as the main clay type, the cation exchange capacity of the soils in this region, often less that 1 cmol kg-1, depends heavily on the SOC. There is a rapid decline of SOC levels with continuous cultivation. For the sandy soils, average annual losses may be as high as 4.7% whereas with sandy loam soils, losses are lower, with an average of 2%. To maintain food production for a rapidly growing population, application of mineral fertilizers and the effective recycling of organic amendments such as crop residues and manures are essential especially in the smallholder farming systems that rely predominantly on organic residues to maintain soil fertility. There is need to increase crop biomass at farm level and future research should focus on improvement of nutrient use efficiency in

order to increase crop biomass. Research should also focus on ways of alleviating socio-economic constraints in order to increase the legume component in the cropping systems. This will produce higher quality fodder for the livestock and also increase biomass at farm-level. This paper reviews various strategies and lessons learnt in improving soil organic carbon status in West Africa soils.
Keywords: Nutrient use efficiency; Organic residues; Soil fertility; Soil organic carbon; West Africa

J. Hiltbrunner, B. Streit, M. Liedgens, Are seeding densities an opportunity to increase grain yield of winter wheat in a living mulch of white clover?, Field Crops Research, Volume 102, Issue 3, 20 June 2007, Pages 163-171, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.009. (http://www.sciencedirect.com/science/article/pii/S037842900700038X)
Abstract:
Optimum plant densities are a key to maximise yields in most crops. However, such information is often lacking for more environmentally sound cropping systems, such as living mulches (LM) for small grains. In 2004 and 2005, three trials were conducted in the Swiss Midlands on fields managed in accordance with the Swiss organic farming guidelines. The objective of the study was to determine whether seeding density of winter wheat (Triticum aestivum L.) is a relevant factor for determining grain yield in a white clover (Trifolium repens L.) living mulch. The winter wheat cv. Titlis was directly sown in wide spaced rows (0.375 m) at densities of 300 (LM300), 450 (LM450) or 600 (LM600) viable grains m-2 in a white clover living mulch established at a seeding rate of 15 kg ha-1. A bare soil control treatment with a wheat density of 450 viable grains m-2 (BS450) was also included in the trials. Mean grain yields of LM300, LM450, and LM600 never reached the values observed in BS450. This was mainly due to a lower ear density, which, nevertheless, increased linearly with the seeding density within the living mulch in all trials, but the rate of increase depended on the environment. The decrease of the grain weight brought about by the increasing seeding density had only a marginal impact on the grain yield, which was increased from 1.31, 1.98, and 4.09 Mg ha-1 (LM300) to 1.97, 2.64, and 4.75 Mg ha-1 (LM600) for each of the three trials in the study. Significantly higher protein contents were observed for LM300 compared to the higher densities in the living mulch and to BS450. Our research showed that an increase of the seeding density is an effective mean to increase the grain yield in living mulch systems with white clover. However, it is likely that the control of the living mulch to reduce competition with the main crop is a more relevant factor.
Keywords: Winter wheat; Triticum aestivum L.; White clover; Trifolium repens L.; Living mulch; Yield components; Organic farming

Agustin Arino, Gloria Estopanan, Teresa Juan, Antonio Herrera, Estimation of dietary intakes of fumonisins B1 and B2 from conventional and organic corn, Food Control, Volume 18, Issue 9, September 2007, Pages 1058-1062, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.07.002. (http://www.sciencedirect.com/science/article/pii/S0956713506001824)
Abstract:
The dietary intakes of fumonisins from 60 samples of conventional and organic corn were assessed. A 13.3% of the conventional corn samples contained fumonisin B1 and B2 at mean levels of 43 and 22 ng/g, respectively, while 10% of the organic corn samples contained fumonisins at somewhat lower levels of 35 ng/g (FB1) and 19 ng/g (FB2).

Overall, the fumonisin levels in the corn samples were much lower than the maximum level of 2000 ng/g (as the sum of FB1 and FB2) proposed for unprocessed maize in a recent EU regulation. The fumonisins present in conventional and organic maize are estimated to contribute with very low percentages of 0.21% and 0.17%, respectively, to the level considered at risk for human health. Based on the data exposed in this paper, the farming system is probably not of decisive importance for the final contamination of agricultural products with these mycotoxins.
Keywords: Fumonisins; Organic corn; Daily intakes

Zhong-pei LI, Xiao-chen WU, Bi-yun CHEN, Changes in Transformation of Soil Organic C and Functional Diversity of Soil Microbial Community Under Different Land Uses, Agricultural Sciences in China, Volume 6, Issue 10, October 2007, Pages 1235-1245, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60168-0.
(http://www.sciencedirect.com/science/article/pii/S1671292707601680)
Abstract:
Changes in soil biological and biochemical properties under different land uses in the subtropical region of China were investigated in order to develop rational cultivation and fertilization management. A small watershed of subtropical region of China was selected for this study. Land uses covered paddy fields, vegetable farming, fruit trees, upland crops, bamboo stands, and forestry. Soil biological and biochemical properties included soil organic C and nutrient contents, mineralization of soil organic C, and soil microbial biomass and community functional diversity. Soil organic C and total N contents, microbial biomass C and N, and respiration intensity under different land uses were changed in the following order: paddy fields (and vegetable farming) > bamboo stands > fruit trees (and upland). The top surface (0-15 cm) paddy fields (and vegetable farming) were 76.4 and 80.8% higher in soil organic C and total N contents than fruit trees (and upland) soils, respectively. Subsurface paddy soils (15-30 cm) were 59.8 and 67.3% higher in organic C and total N than upland soils, respectively. Soil microbial C, N and respiration intensity in paddy soils (0-15 cm) were 6.36, 3.63 and 3.20 times those in fruit tree (and upland) soils respectively. Soil microbial metabolic quotient was in the order: fruit trees (and upland) > forestry > paddy fields. Metabolic quotient in paddy soils was only 47.7% of that in fruit tree (and upland) soils. Rates of soil organic C mineralization during incubation changed in the order: paddy fields > bamboo stands > fruit trees (and upland) and soil bacteria population: paddy fields > fruit trees (and upland) > forestry. No significant difference was found for fungi and actinomycetes populations. BIOLOG analysis indicated a changing order of paddy fields > fruit trees (and upland) > forestry in values of the average well cell development (AWCD) and functional diversity indexes of microbial community. Results also showed that the conversion from paddy fields to vegetable farming for 5 years resulted in a dramatic increase in soil available phosphorus content while insignificant changes in soil organic C and total N content due to a large inputs of phosphate fertilizers. This conversion caused 53, 41.5, and 41.3% decreases in soil microbial biomass C, N, and respiration intensity, respectively, while 23.6% increase in metabolic quotient and a decrease in soil organic C mineralization rate. Moreover, soil bacteria and actinomycetes populations were increased slightly, while fungi population increased dramatically. Functional diversity indexes of soil microbial community decreased significantly. It was concluded that land uses in the subtropical region of China strongly affected

soil biological and biochemical properties. Soil organic C and nutrient contents, mineralization of organic C and functional diversity of microbial community in paddy fields were higher than those in upland and forestry. Overuse of chemical fertilizers in paddy fields with high fertility might degrade soil biological properties and biochemical function, resulting in deterioration of soil biological quality.
Keywords: land use patterns; transformation of soil organic carbon; functional diversity of soil microbial community

Yong He, Min Huang, Annia Garcia, Antihus Hernandez, Haiyan Song, Prediction of soil macronutrients content using near-infrared spectroscopy, Computers and Electronics in Agriculture, Volume 58, Issue 2, September 2007, Pages 144-153, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.03.011.
(http://www.sciencedirect.com/science/article/pii/S0168169907001019)
Abstract:
Near-infrared reflectance (NIR) spectroscopy is a technique that shows many possibilities in the field of testing chemical and physical properties of materials. Soil and agricultural products are not excluded of this practical application. The objective of this study was to investigate the potential of NIR spectroscopy to estimate nitrogen (N), phosphorus (P), potassium (K), organic matter (OM) and pH content in a loamy mixed soil. A 165 soil samples were taken from the field, 135 samples spectra were used during the calibration and validation stage, and 30 samples spectra were used for the prediction of N, P, K, OM and pH content. Principal component analysis/partial least square (PCA/PLS) was used as multivariate analysis technique to correlate wavelength information with each constituent concentration. The correlation coefficient (r) between measured and predicted values of N, OM and pH were 0.93, 0.93 and 0.91, and standard error of prediction (SEP) were 3.28, 0.06 and 0.07, respectively, which showed that NIR had potential to accurately predict these constituents in this soil. Unfortunately, it showed that NIR was not a good tool for P and K prediction with r, 0.47 and 0.68, and SEP, 33.70 and 26.54, respectively. The results showed that NIR could be a good tool for precision farming application.
Keywords: NIR spectroscopy; Soil nutrient content; Precision farming; Soil spatial variability

Kelin Hu, Hong Li, Baoguo Li, Yuanfang Huang, Spatial and temporal patterns of soil organic matter in the urban-rural transition zone of Beijing, Geoderma, Volume 141, Issues 3-4, 15 October 2007, Pages 302-310, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.06.010.
(http://www.sciencedirect.com/science/article/pii/S001670610700184X)
Abstract:
The objective of this study was to explore the spatio-temporal variability of soil organic matter (SOM) in the urban-rural transition zone of Beijing. SOM content in agricultural soils were measured in 1980, 1990 and 2000 in Daxing County of Beijing in-situ and data of 1980 and 1990 were obtained from the National Soil Survey (NSS). Descriptive statistics and geostatistics were used to analyze the data and the kriging method was applied to map the spatial patterns of SOM. The results showed that mean SOM was 9.95g kg- 1 in 1980, 12.76g kg- 1 in 1990 and 12.89g kg- 1 in 2000. SOM was spatially correlated at a larger distance of 32.0km in the E-W direction for the three years, and at a shorter distance of 24.6, 23.3 and 19.0km in the N-S direction in 1980, 1990 and 2000, respectively, which showed that there was more

variability in SOM in the N-S areas across the period of 20years. The mapping showed a decreasing trend of SOM from north to south across the county. SOM levels were classified into six levels (< 6, 6-10, 10-12, 12-15, 15-20 and > 20g kg- 1) based on the standards set by the NSS. The SOM slightly increased from low to high levels from 1980 to 2000. The main factors affecting SOM levels were the soil texture, land use and farming practices. The increasing trend might be attributed to the widespread practices of mulching and organic manure applications.
Keywords: Soil organic matter; Geostatistics; Spatio-temporal variability; Land use; Soil texture

Gunnela M. Gustafson, Eva Salomon, Simon Jonsson, Barn balance calculations of Ca, Cu, K, Mg, Mn, N, P, S and Zn in a conventional and organic dairy farm in Sweden, Agriculture, Ecosystems & Environment, Volume 119, Issues 1-2, February 2007, Pages 160-170, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.07.003.
(http://www.sciencedirect.com/science/article/pii/S0167880906002738)
Abstract:
Calculations of flows and balances of plant nutrients in agricultural production systems provide some basic information for the assessment of their long-term sustainability. The objectives of this study were to assess the possible impacts of variations in element concentrations between years and of undefined sinks and sources of elements on the accuracy of balance calculations. A 3-year study was conducted on Ca, Cu, K, Mg, Mn, N, P, S, and Zn fluxes in the barns (subsystem) of a Swedish farm with separate conventional and organic milk production. Our main focus in this subproject was on barn balance calculations, the barn housing only cows. Barn balance for an element was defined as amount of that element in [feeds, heifers, bedding, water] - [milk, manure, urine, calves, culled cows]. The focus was on: (1) variations in element concentrations in the main flow carriers [feeds, milk, manure, urine]; (2) information about element dynamics and flows of dairy farming systems obtained from internal flows of elements in the barn balance compared with that obtained from the flows associated with milk production in a farm gate balance; (3) differences in element flows and concentrations between the organic and conventional farming systems on this farm.
Our conclusions were: (1) the sampling methods used had low coefficients of variation and thus pooled samples can reduce the costs of element analyses. However, urine must be thoroughly mixed if less water-soluble elements are to be monitored. Magnesium differed significantly in concentrations between years in all feedstuffs; (2) year-to-year fluctuations in harvest can influence a calculation negatively if calculations are based on annual harvest and not on feed supplied. The barn balance calculation showed a source of Cu, Mn and Zn that would not have been obvious in a farm gate balance. The element content of manure and urine calculated as [inputs - milk] would have underestimated the amount of Cu, Mn and Zn in manure and overestimated the amount of K and N. The Cu analysis showed an example of conflicting goals between short-term welfare of the cows and long-term soil fertility. EU legislation regarding land for spreading of manure is not a guarantee against soil contamination by heavy metals; (3) the differences between the organic and conventional system related more to differences in forage: concentrate and home-grown: purchased ratios, which were typical for the average Swedish farm of each type, and less to differences in element concentrations of the feed ingredients.

Keywords: Concentrations; Feeds; Manure; Milk; Plant nutrient flows; Sinks; Soil accumulation; Sources; Urine

Sebastiana Melero, Engracia Madejon, Juan Carlos Ruiz, Juan Francisco Herencia, Chemical and biochemical properties of a clay soil under dryland agriculture system as affected by organic fertilization, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 327-334, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.11.004. (http://www.sciencedirect.com/science/article/pii/S1161030106001614)
Abstract:
Understanding of microbial processes in soil is important for the management of farming systems, particularly those that imply organic inputs of nutrients. In this work the effect of consecutive addition of two mature composts (vegetal and animal compost) at rates of 30 tm ha-1 over a 4-year period under a dryland system on the chemical and biochemical properties of a clay soil (Chromic Haploxeret) was investigated and compared to that of an inorganic fertilization. Soil chemical and biological status was evaluated by measuring the total organic carbon (TOC), humic acids, Kjeldahl-N, bicarbonate-extractable P (Olsen-P), ammonium acetate extractable-K (AAE-K), microbial biomass carbon (Cmic), enzymatic activities (dehydrogenase, protease, glucosidase, alkaline phosphatase) and Cmic/TOC ratio.
At the end of the study, soils fertilised with composts showed increases in quantity (TOC) and quality (humic acids) of organic matter compared to inorganically fertilised soil. The nutrient content (Olsen-P and Kjeldahl-N) also showed an increase in the plots fertilised with composts. From the fourth crop cycle the plots fertilised with compost showed more clearly the increase in microbial biomass and enzymatic activities, which can have been related both with leguminous pre-crop and with the organic fertilization.
In general, under a dryland system, an improvement of soil fertility was achieved in organically fertilised soils, confirming the positive effect of organic fertilization.
Keywords: Compost; Humic acids; Cmic/TOC ratio; Soil enzymes; Soil microbial biomass

S.K. Singh, A.K. Singh, B.K. Sharma, J.C. Tarafdar, Carbon stock and organic carbon dynamics in soils of Rajasthan, India, Journal of Arid Environments, Volume 68, Issue 3, February 2007, Pages 408-421, ISSN 0140-1963, DOI: 10.1016/j.jaridenv.2006.06.005. (http://www.sciencedirect.com/science/article/pii/S0140196306002254)
Abstract:
Soil carbon stock (CS), was estimated in the 0-25 and 0-100 cm soil depths of arid and semi-arid regions of Rajasthan. Carbon stock was 2.13 Pg in the 0-100 cm soil depth, of which 1.23 Pg was soil organic carbon and 0.90 Pg was soil inorganic carbon. The surface horizon (0-25 cm) stored 31% of the soil carbon stock. Soil carbon stocks were higher in Entisols (0.72 Pg or 33.6% of CS on 43.6% of the land area) and Aridisols (0.70 Pg or 32.7% of CS on 28.9% of the land area) than in Inceptisols (0.61 Pg or 28.6% of CS on 24.01% of the land area), Alfisols (0.015 Pg or 0.007% of CS on 0.76% of the land area) and Verisols (0.105 Pg or 0.005% of the CS on the 3.2% of the land area). Torripsamments, Haplocambids and Haplustepts together held 80% of CS and 86.9% of soil organic carbon stock, whereas Haplocambids, Petrocalcids and Haplustepts comprised 72% inorganic carbon stock. Soil organic carbon density (SOC) ranged from 4000 to 7000 kg/km2 in Haplustalfs, Haplusterts, Haplustepts and Torripsamments, while its

inorganic counterpart (SIC) was of higher range (10,000-19,000 kg/km2) in Petrocalcids, Haplocalcids, Halpogypsids and Torrifluents. Under scrub vegetation of semi-arid Rajasthan the mean SOC in the 0-25 cm and 0-100 cm depths were 170 and 203.9 kg/km2, respectively. In the arid region with similar situation the mean SOC was 5.5 and 14.0 kg/km2, respectively. Excessive tillage and intensive cultivation in semi-arid region reduced soil organic carbon density from 60 kg/km2 under single cropping to 10.5 kg/km2 under double cropping. Subsistence farming in the arid region maintained 47 kg/km2 SOC under croplands. SOC declined regularly from 1975 to 2002 in the arid region. A multiple linear regression model that includes rainfall together with tillage, silt, clay, available water capacity (AWC) and period of canopy cover accounted for 97% of the variation in soil organic carbon density for arid regions. The regression model further pointed out that a 4200-4600 kg/km2/year SOC could be sequestered in untilled soils of the arid region, which have year-round canopy cover.
Keywords: Multiple linear regression model; Soil organic and inorganic carbon density; Soil organic carbon dynamics

N. Pelletier, P. Tyedmers, Feeding farmed salmon: Is organic better?, Aquaculture, Volume 272, Issues 1-4, 26 November 2007, Pages 399-416, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.06.024.
(http://www.sciencedirect.com/science/article/pii/S0044848607005169)
Abstract:
Feed provision accounts for the majority of material and energetic inputs and emissions associated with net-pen salmon farming. Understanding and reducing the environmental impacts of feed production is therefore central to improving the biophysical sustainability of salmon farming as a whole. We used life cycle assessment (with co-product allocation by gross energy content) to compare the cradle-to-mill gate life cycle energy use, biotic resource use, and global warming, acidifying, eutrophying and aquatic ecotoxiticy impacts associated with producing ingredients for four hypothetical feeds for conventional and organic salmon aquaculture in order to assess the benefits, if any, associated with a transition to organic feed use. Fish and poultry-derived ingredients generated substantially greater impacts than crop-derived ingredients. Despite the fact that organic crop ingredients had markedly lower life cycle impacts compared to equivalent conventional ingredients, substituting organic for conventional crop ingredients therefore resulted in only minor reductions to the total impacts of feed production because the benefits of this substitution were effectively overwhelmed by the much larger impacts associated with animal-derived ingredients. Replacing fish meals/oils from dedicated reduction fisheries with fisheries by-product meals/oils markedly increased the environmental impacts of feed production, largely due to the higher energy intensity of fisheries for human consumption, and low meal/oil yield rates of fisheries by-products. Environmental impacts were considerably lower when feeds contained reduced proportions of fish and poultry-derived ingredients. These results indicate that current standards for organic salmon aquaculture, which stipulate the use of organic crop ingredients and fisheries by-product meals and oils, fail to reduce the environmental impacts of feed production for the suite of impact categories considered in this study. This information should be of interest to feed producers and aquaculturists concerned with improving the biophysical sustainability of their products, and bodies responsible

for aquaculture certification, eco-labeling, and consumer awareness programs.
Keywords: Organic; Salmon aquaculture; Feed; Substitution; Life cycle assessment; Sustainability

Iwona Kihlberg, Einar Risvik, Consumers of organic foods - value segments and liking of bread, Food Quality and Preference, Volume 18, Issue 3, April 2007, Pages 471-481, ISSN 0950-3293, DOI: 10.1016/j.foodqual.2006.03.023.
(http://www.sciencedirect.com/science/article/pii/S0950329306000826)
Abstract:
Five, quite different white pan breads were chosen from twelve samples using Principal Component Analysis. Milling, baking, sensory assessment and sample preparation are described in [Kihlberg, I., Ostrom, A., Johansson, L., & Risvik, E. (2006). Sensory qualities of plain white pan bread - influence of farming system, year of harvest and baking technique. Journal of Cereal Science, 43(1), 15-30]. A consumer acceptance test was conducted on 184 consumers of organic products in two age groups, [less-than-or-equals, slant]30 and >30 years. The selected breads were tasted and scored for liking. Subsequent to the tasting, the consumers responded to a questionnaire including a complete set of the 56 Schwartz values and 10 statements related to issues of specific interest. Results confirmed the main groups of the near universal structure of values suggested by Schwartz and revealed different segments among organic consumers. Consumption frequency was also related to the values. Consumer groups differed significantly in values and in liking of breads. Among the most liked breads were both organic and conventional breads. The majority of consumers considered that organic food tastes better than conventional and that consumption of organic bread should increase. Moreover, about 50% declared that they would not buy an organic food product that was appreciably higher in price than a corresponding conventional food product.
Keywords: Organic consumers; Values; Food acceptance; Liking of food; Wheat; Bread; Consumer test

N.R. Hulugalle, T.B. Weaver, L.A. Finlay, J. Hare, P.C. Entwistle, Soil properties and crop yields in a dryland Vertisol sown with cotton-based crop rotations, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 356-369, ISSN 0167-1987, DOI: 10.1016/j.still.2006.05.008.
(http://www.sciencedirect.com/science/article/pii/S0167198706001371)
Abstract:
Information on the effects of growing cotton (Gossypium hirsutum L.)-based crop rotations on soil quality of dryland Vertisols is sparse. The objective of this study was to quantify the effects of growing cereal and leguminous crops in rotation with dryland cotton on physical and chemical properties of a grey Vertisol near Warra, SE Queensland, Australia. The experimental treatments, selected after consultations with local cotton growers, were continuous cotton (T1), cotton-sorghum (Sorghum bicolor (L.) Moench.) (T2), cotton-wheat (Triticum aestivum L.) double cropped (T3), cotton-chickpea (Cicer arietinum L.) double cropped followed by wheat (T4) and cotton-wheat (T5). From 1993 to 1996 land preparation was by chisel ploughing to about 0.2 m followed by two to four cultivations with a Gyral tyne cultivator. Thereafter all crops were sown with zero tillage except for cultivation with a chisel plough to about 0.07-0.1 m after cotton picking to control heliothis moth pupae. Soil was sampled from 1996 to 2004 and physical (air-filled porosity of oven-dried soil, an indicator of soil compaction; plastic

limit; linear shrinkage; dispersion index) and chemical (pH in 0.01 M CaCl2, organic carbon, exchangeable Ca, Mg, K and Na contents) properties measured. Crop rotation affected soil properties only with respect to exchangeable Na content and air-filled porosity. In the surface 0.15 m during 2000 and 2001 lowest air-filled porosity occurred with T1 (average of 34.6 m3/100 m3) and the highest with T3 (average of 38.9 m3/100 m3). Air-filled porosity decreased in the same depth between 1997 and 1998 from 45.0 to 36.1 m3/100 m3, presumably due to smearing and compaction caused by shallow cultivation in wet soil. In the subsoil, T1 and T2 frequently had lower air-filled porosity values in comparison with T3, T4 and T5, particularly during the early stages of the experiment, although values under T1 increased subsequently. In general, compaction was less under rotations which included a wheat crop (T3, T4, T5). For example, average air-filled porosity (in m3/100 m3) in the 0.15-0.30 m depth from 1996 to 1999 was 19.8 with both T1 and T2, and 21.2 with T3, 21.1 with T4 and 21.5 with T5. From 2000 to 2004, average air-filled porosity (in m3/100 m3) in the same depth was 21.3 with T1, 19.0 with T2, 19.8 with T3, 20.0 with T4 and 20.5 with T5. The rotation which included chickpea (T4) resulted in the lowest exchangeable Na content, although differences among rotations were small. Where only a cereal crop with a fibrous root system was sown in rotation with cotton (T2, T3, T5) linear shrinkage in the 0.45-0.60 m depth was lower than in rotations, which included tap-rooted crops such as chickpea (T4) or continuous cotton (T1). Dispersion index and organic carbon decreased, and plastic limit increased with time. Soil organic carbon stocks decreased at a rate of 1.2 Mg/ha/year. Lowest average cotton lint yield occurred with T2 (0.54 Mg/ha) and highest wheat yield with T3 (2.8 Mg/ha). Rotations which include a wheat crop are more likely to result in better soil structure and cotton lint yield than cotton-sorghum or continuous cotton.
Keywords: Farming system; Cropping system; Soil quality; Clay; Dryland; Wheat; Sorghum; Chickpea; Halpustert; Compaction

Maria-Soledad Benitez, Fulya Baysal Tustas, Dorith Rotenberg, Mathew D. Kleinhenz, John Cardina, Deborah Stinner, Sally A. Miller, Brian B. McSpadden Gardener, Multiple statistical approaches of community fingerprint data reveal bacterial populations associated with general disease suppression arising from the application of different organic field management strategies, Soil Biology and Biochemistry, Volume 39, Issue 9, September 2007, Pages 2289-2301, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.03.028.
(http://www.sciencedirect.com/science/article/pii/S0038071707001356)
Abstract:
Multiple statistical analyses of terminal restriction fragment length polymorphism (T-RFLP) data were used to screen and identify bacterial populations involved in general disease suppression in an organically managed soil. Prior to sampling three different management strategies (i.e. mixed hay (H), tilled fallowing and open-field vegetables production) were used during the transition from conventional to organic farming, with and without compost amendment. The H transition strategy consistently led to the lowest damping-off disease incidence on two different crops in separate greenhouse and field experiments. Bacterial population structure in bulk soil and the rhizosphere of both crops was characterized using T-RFLP analyses of amplified 16S rDNA sequences. First, principal component analysis (PCA) revealed changes in the relative abundance of bacterial terminal restriction fragments (TRF) in response to transition strategy and/or compost amendment in

eight different experimental contexts. In each context, a different subset of TRF substantially contributed to the variation along the first two principal components. However, terminal restriction fragment M148 contributed significantly to the observed variation in 6 out of the 8 experiments, and moderately in the remaining 2 experiments. As a second approach, nonparametric analyses of variance revealed that the relative abundance of TRF differed among treatments. While the responsive subsets identified varied somewhat by experimental context, M137, M139 and M141 were more abundant in samples from the H transition strategy in multiple experimental contexts. Subsequent correlation analyses revealed that TRF associated with disease suppressive treatments (i.e. H with and without compost) were frequently negatively correlated with damping-off disease incidence. As a group, these TRF were disproportionately associated with lower disease levels further indicating their role in disease suppression. Interestingly, in silico analysis of the bacterial 16S rDNA sequence database revealed that the TRF identified in this study (e.g. M137, M139, M141, and M148) might correspond to well-characterized genera of bacterial biological control agents.
Keywords: Bacterial communities; Damping-off; Disease suppression; Terminal restriction fragment length polymorphism; Transition strategy

Esther Goidts, Bas van Wesemael, Regional assessment of soil organic carbon changes under agriculture in Southern Belgium (1955-2005), Geoderma, Volume 141, Issues 3-4, 15 October 2007, Pages 341-354, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.06.013.
(http://www.sciencedirect.com/science/article/pii/S0016706107001863)
Abstract:
The evolution of SOC stock over time is difficult to assess at a regional scale due to the small magnitude of the changes, to the important spatial variability of SOC and the lack of detailed information on present and past management practices. This paper aimed to detect changes in SOC stocks of agricultural soils of southern Belgium over a long time period (1955-2005), and to determine the driving forces of SOC evolution. The stratification of the study area into homogeneous units (based on land use, soil type, climate and agricultural region) and the re-sampling of soil profiles from the 1950s allowed detection of significant changes in SOC stocks. The use of equivalent masses for SOC stock comparisons based on the plough depth of 2005 allowed excluding dilution effect from changes in plough depth or in bulk density. For units under cropland, an average decrease of 5.8 t C ha- 1 was measured in the plough layer (from an initial equivalent SOC stock of 46.4 t C ha- 1), while for units under grassland, an average increase of 21.9 t C ha- 1 was observed in the 0-30 cm depth (from an initial equivalent SOC stock of 61.2 t C ha- 1). Explanatory factors include human driving forces (land management) and inherent soil properties. The decrease in mass of farmyard manure and slurry applied on cropland along with the change in the types of crops cultivated (progressive replacement of cereals by root crops and fodder) could explain the decrease in SOC stocks observed for cropland, while the increase in livestock density per grazing area has lead to an increase in the SOC stocks of grassland. The increase in plough depth for cropland (+ 1.5 cm) was slightly correlated to the silt content (r = - 0.14) but not to the decrease in SOC content. The impact of erosion or climate on SOC changes remained uncertain. Soil texture was not highlighted as a driving force in the SOC changes, while a strong negative relationship existed between the initial SOC content and the

change in SOC content. Therefore, any attempt to increase SOC content in agricultural soils should mainly focus on farming practices through adapted regulations and policies.
Keywords: Soil organic carbon; Long term evolution; Regional scale; Agricultural management; Belgium

C. Resgalla Jr., E.S. Brasil, K.S. Laitano, R.W. Reis Filho, Physioecology of the mussel Perna perna (Mytilidae) in Southern Brazil, Aquaculture, Volume 270, Issues 1-4, 28 September 2007, Pages 464-474, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.05.019.
(http://www.sciencedirect.com/science/article/pii/S0044848607004516)
Abstract:
The energy budget or scope for growth in bivalves has been applied to economically important species, in studies on the limits of climactic adjustment for a particular ecological niche. This paper presents the physiological rates of respiration, clearance and absorption efficiency of the marine mussel Perna perna, determined during the years 1997-2001, for mussels collected on the Santa Catarina coast, southern Brazil. These physiological parameters were achieved under static, laboratory controlled conditions. A total of 153 experiments were carried out, grouped in 2-month periods, performed seasonally in order to estimate the scope for growth and its probable sources of variation, using biotic and abiotic environmental parameters. Temperature directly influences respiration. Absorption efficiency is directly related to the organic content of the seston. Clearance rates didn't show relationship with the environmental parameters, but a tendency of being low in high temperatures. The scope for growth is negative during the hot months (January-February) reflecting the high respiration and low clearance rates, and reaches its highest positive values during the winter months and early spring, due to the high organic content of the seston and its higher absorption efficiency. Scope for growth showing a strong relationship with the biological condition index of the organisms.
Keywords: Perna perna; Farming; Scope for growth; Physioecology; Santa Catarina, Brazil

I.K. Okore, H. Tijani-Eniola, A.A. Agboola, E.A. Aiyelari, Impact of land clearing methods and cropping systems on labile soil C and N pools in the humid zone Forest of Nigeria, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 250-258, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.09.011.
(http://www.sciencedirect.com/science/article/pii/S0167880906003379)
Abstract:
Labile soil C and N play vital roles in soil-plant nutrient dynamics, especially in the low input cropping system and are vulnerable to perturbation. Surface (0-0.15 m) soils from three land clearing methods (slash and burn, bulldozed non-windrowed and bulldozed windrowed) and each with two cropping systems (5-and 4-year cropping/2-year cassava fallow) were collected in the humid forest ecosystem of Nigeria.
The soils were analysed for total C and N, microbial biomass C and N (SMB C and N), particulate organic matter C and N (POM C and N), water-soluble C, potentially mineralizable N (PMN) and mineral N. The size of the labile C and N and their relative contributions to the organic C and total N differed significantly among land clearing methods, irrespective of the cropping system. Soils under slash and burn had a significantly ($p > 0.05$) higher particulate organic matter C, N (10.80 and 0.16 g kg-1, respectively) and microbial biomass C and N (1.07 and

0.12 g kg-1) compared to the bulldozed windrow, regardless of the cropping system. Four years cropping/2-year cassava fallow resulted in a significant higher labile C and N, relative to 5-year cropped plots across the land clearing methods. Effect of the treatments on the concentration of PMN and mineral N mirrored the SMB N and POM N. However, the quantity of most of the labile C and N pool and crop yield obtained from the slash and burn and bulldozed non-windrowed treatment did not differ significantly. Hence, bulldozed non-windrowed clearing could be a viable alternative to slash and burn in the case of large-scale farming in ensuring reduced losses of soil organic matter and nutrient during land clearing in the humid tropics.
Keywords: Soil fertility; Cropping system; Deforestation; Soil organic matter; Cassava fallow; Particulate organic matter

D.J. Hatch, G. Goodlass, A. Joynes, M.A. Shepherd, The effect of cutting, mulching and applications of farmyard manure on nitrogen fixation in a red clover/grass sward, Bioresource Technology, Volume 98, Issue 17, December 2007, Pages 3243-3248, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.07.017.
(http://www.sciencedirect.com/science/article/pii/S0960852406003063)
Abstract:
In organic farming, maximising the amount of nitrogen (N) which is fixed and retained within the soil is of paramount importance for the yield of the following crop. The aim of this study was to establish the extent to which increased soil fertility, farmyard manure (FYM) applications and/or mulching, could adversely affect fixation. At two sites, situated in the South West (SW) and North East (NE) of England, N2 fixation was estimated in `organically' managed red clover/grass plots, both with and without green manure (i.e. surface mulched) and/or the addition of FYM. The FYM was incorporated into the seedbeds at both sites in autumn 2002 at the rate of 170 kg total N ha-1, as either well-composted (SW site), or not actively-composted (NE site) manures. The same FYM application rate was repeated as top-dressings to both sites in autumn 2003. The plots were cut three or four times each year over two growing seasons. In the first harvest year (2003), incorporation of FYM had beneficial effects of increasing dry matter and N yields significantly at the first cut, but there were no significant differences in subsequent cuts. The same pattern was found in the second harvest year (2004) after the top dressings of FYM, suggesting that most of the N in both types of FYM was in recalcitrant forms. Over the two growing seasons, mulching did not affect red clover/grass dry matter or N yields, but did reduce the proportion of N2 fixed, by up to 60 kg N ha-1 when compared with plots from which the clover/grass herbage was cut and removed. Thus, the gain in N from FYM or green manure tended to be offset by a similar reduction in N2 fixation. These results demonstrate the close association between the availability of soil N and the feed-back system which operates on N2 fixation by red clover.
Keywords: Nitrogen fixation; Cutting; Mulching; Manure

Marko Debeljak, Jerome Cortet, Damjan Demsar, Paul H. Krogh, Saso Dzeroski, Hierarchical classification of environmental factors and agricultural practices affecting soil fauna under cropping systems using Bt maize, Pedobiologia, Volume 51, Issue 3, SOIL ECOLOGICAL AND ECONOMIC EVALUATION OF GENETICALLY MODIFIED CROPS - ECOGEN, 15 August 2007, Pages 229-238, ISSN 0031-4056, DOI: 10.1016/j.pedobi.2007.04.009.
(http://www.sciencedirect.com/science/article/pii/S0031405607000443)

Abstract: Summary
The population dynamics of soil organisms under agricultural field conditions are influenced by many factors, such as pedology and climate, but also farming practices such as crop type, tillage and the use of pesticides. To assess the real effects of farming practices on soil organisms it is necessary to rank the influence of all of these parameters. Bt maize (Zea mays L.), as a crop recently introduced into farming practices, is a genetically modified maize with the Cry1Ab gene which produces a protein toxic to specific lepidopteran insect pests. To assess the effects of Bt maize on non-target soil organisms, we conducted research at a field site in Foulum (Denmark) with a loamy sand soil containing 6.4% organic matter. The study focused on populations of springtails (Collembola) and earthworms (Oligochaeta) from samples taken at the beginning and at the end of the maize crop-growing season during 2 consecutive years. Farming practices, soil parameters, the biological structure of soil communities, and the type and age of the crop at the time of sampling, were used as attributes to predict the total abundance of springtails and biomass of earthworms in general and the abundance or biomass for specific functional groups (epigeic, endogeic and anecic groups for earthworms, and eu-, eu to hemi-, hemi-, hemi to epi- and epiedaphic groups for Collembola). Predictive models were built with data mining tools, such as regression trees that predict the value of a dependent variable from a set of independent variables. Regression trees were constructed with the data mining system M5'. The models were evaluated by qualitative and quantitative measures of performance and two models were selected for further interpretation: anecic worms and hemi-epiedaphic Collembola. The anecic worms (r2=0.83) showed preferences for less clay and more silt soil with medium pH but were not influenced directly by farming practices. The biomass of earthworms was greater in early autumn than in spring or late autumn. Biomass of hemi-epiedaphic Collembola (r2=0.59) increased at the end of the maize growing season, while higher organic matter content and pH tended to increase their biomass in spring. Greater abundance of Collembola was also noted in early autumn if the crop was non-Bt maize. The models assessed by this research did not find any effects of the Bt maize cropping system on functional groups of soil fauna.
Keywords: Bt maize; Collembola; Earthworms; Crop systems; Data mining; Hierarchical prediction models

M. Biaggini, R. Consorti, L. Dapporto, M. Dellacasa, E. Paggetti, C. Corti, The taxonomic level order as a possible tool for rapid assessment of Arthropod diversity in agricultural landscapes, Agriculture, Ecosystems & Environment, Volume 122, Issue 2, October 2007, Pages 183-191, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.12.032. (http://www.sciencedirect.com/science/article/pii/S0167880907000278)
Abstract:
Increasingly intensive agriculture production methods, involving a widespread use of agro-chemicals and the progressive loss of many natural and semi-natural habitats have led to an impoverished wildlife in agro-ecosystems. The awareness of the necessity to conserve, enhance or restore biodiversity in depleted agricultural landscapes has increased in the last decades. Recently new agro-environment schemes and biological compensation programmes have been proposed and they need biodiversity assessment to verify the efficacy of the planned agricultural practices. However, biodiversity assessments often require much effort in terms of time and economical resources. In particular,

when analysing Arthropods, one of the groups most commonly used to assess biodiversity in agro-ecosystems, the employment of taxonomists is required for species identification. In this paper we have tried to develop a rapid procedure to assess Arthropod biodiversity in agro-ecosystems. In particular we tested the reliability of two higher taxa as surrogates for Arthropod diversity: order for all the specimens and family for Coleoptera. We collected Arthropods by pitfall traps, both in cultivated and semi-natural micro-habitats, mainly focusing on two different agricultural managements: an intensive wheat field and an experimental one with organic farming and semi-natural habitat conservation. Higher taxa results were compared to those obtained from analysing Carabidae at species level. The use of order level allowed us to clearly distinguish among main land uses on the basis of their faunal composition and diversity. Most prominent, order level analyses gave outcomes comparable to those obtained considering Carabidae species. Conversely, analyses conducted at family level for Coleoptera did not reveal any distinction among land uses. Furthermore, we tested the possibility of shortening the sampling period: about 4 months of surveys seemed to give results very similar to those obtained in a whole year of field activity. We propose our methodology as a possible useful short-cut to assess biodiversity in agricultural landscapes at a local scale. Order surrogacy together with the sampling procedure that we adopted could be seen as a preliminary approach, at least in a first phase of an investigation. This method could be particularly useful when results are required rapidly and in a context of limited financial resources.
Keywords: Higher taxa; Quick surveys; Biodiversity; Agro-ecosystems; Arthropods; Coleoptera; Carabidae

Angelique Lamour, Lambertus A.P. Lotz, The importance of tillage depth in relation to seedling emergence in stale seedbeds, Ecological Modelling, Volume 201, Issues 3-4, 10 March 2007, Pages 536-546, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2006.10.015.
(http://www.sciencedirect.com/science/article/pii/S0304380006005266)
Abstract:
Stale seedbeds can be used in arable farming to reduce the density of weeds in the crop. This type of tillage before crop sowing can contribute to a successful weed management in systems where no herbicides are used, e.g. organic farming. The population dynamics of weeds in response to stale seedbeds is, however, hardly understood, and therefore possibly not optimised. The relevance of tillage depth in relation to seedling emergence is explored with a simple, deterministic model. We systematically examined the effect of seedling emergence and subsequent weed control on weed population dynamics, starting by considering the seed bank as one soil layer, and continued by considering a depth-structured seed bank. Whether the widely used tillage regime consisting of shallow tillage, again shallow tillage, and ultimately deep tillage, is preferred above the regime we propose (i.e. deep, shallow and ultimately shallow tillage) depends on the proportion emergence specific for each soil layer, the proportion of seeds that is moved from one layer to the other, and the seed distribution in the soil. A case study based on characteristics of the population dynamics of the weed Polygonum persicaria showed that the proposed tillage regime could give reductions in weed density of up to 32% compared to the conventional tillage regime of stale seedbeds. The tillage regime that we propose requires techniques that restrict soil compaction to fixed traffic lanes, giving large zones favourable for

crop growth. Because of ongoing processes in precision farming technology with respect to controlled traffic systems, this regime has realistic opportunities to become widely used in the future.
Keywords: Weeds; Seed bank; Seed distribution; Seedling emergence; Seed production; Mechanical weeding; Tillage; Soil disturbance; Stale seedbed

Magnus Simonsson, Stefan Andersson, Ylva Andrist-Rangel, Stephen Hillier, Lennart Mattsson, Ingrid Oborn, Potassium release and fixation as a function of fertilizer application rate and soil parent material, Geoderma, Volume 140, Issues 1-2, 15 June 2007, Pages 188-198, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.04.002.
(http://www.sciencedirect.com/science/article/pii/S0016706107001000)
Abstract:
The issue of sustainable soil K management has partly been ignored during the last decades when the potential environmental impact from agricultural use of nitrogen and phosphorus has been considered a more important problem. It has become evident that mixed systems, especially under organic farming practices, commonly suffer from negative K field balances, which may deplete the soil in exchangeable K if release of K from soil minerals does not replace the amount of K that is harvested. In this study, release and fixation rates of K (kg ha- 1 yr- 1) were estimated in five long-term field experiments located on varying parent materials in South and Central Sweden, each having an array of K fertilizer application rates. The calculations were based on (i) accumulated K inputs and outputs from the soil during ca 30 yr, and on (ii) changes in topsoil and subsoil exchangeable K. The estimates ranged from ca 65 +/- 7 kg ha- 1 yr- 1 of K released from soil reserves, to 85 +/- 10 kg ha- 1 yr- 1 of K trapped by fixation. Release and fixation rates were highly dependent on the soil K balance, confirming that these are reversible processes that depend on plant uptake and fertilizer input. When receiving no K fertilizer, a loamy sand soil released 8 +/- 10 kg ha- 1 yr- 1, which was less than the annual net K removal from this soil, 25 +/- 4 kg ha- 1 yr- 1. Soils, with a texture from sandy loam to clay, showed release rates approaching the net K output, when not K fertilized. According to previous results, the pool of K extractable with 2 M HCl (KHCl) consists mainly of a fraction of the K in dioctahedral phyllosilicates. In the present investigation KHCl, corrected for exchangeable K, showed a significant response to soil K balance. More work is needed to yield a precise understanding of the mineralogical nature of this pool and how its measurement might be used to predict potential K release rates in soils.
Keywords: Fixation; Mineralogy; Potassium; Release; Soil balance; Weathering

G.L. Szanto, H.V.M. Hamelers, W.H. Rulkens, A.H.M. Veeken, NH3, N2O and CH4 emissions during passively aerated composting of straw-rich pig manure, Bioresource Technology, Volume 98, Issue 14, October 2007, Pages 2659-2670, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.09.021.
(http://www.sciencedirect.com/science/article/pii/S0960852406004810)
Abstract:
Straw-rich manure from organic pig farming systems was composted in passively aerated static piles to estimate the effect of monthly turning on organic matter degradation and NH3, N2O and CH4 emissions. Turning enhanced the rate of drying and degradation. The four-month treatment degraded 57 +/- 3% of the initial organic matter in the

turned piles, while only 40 +/- 5% in the static piles. The turned piles showed low ammonia and N2O emissions, 3.9 +/- 0.2% and 2.5 +/- 0.1% of total initial nitrogen, respectively. Static piles gave low ammonia (2.4 +/- 0.1% Ninitial), but high (9.9 +/- 0.5% Ninitial) N2O emissions. Prevalence of anaerobic regions in the static system was supported by the higher CH4 emissions, 12.6 +/- 0.6% VSdegraded for the static vs. 0.4 +/- 0.0% VSdegraded for the turned system. It was shown, that straw-rich pig manure with very low C/N ratios could be composted directly without significant NH3 and N2O emissions if turned on a monthly basis.
Keywords: Composting; Mixing; Ammonia; Methane; Pig manure; Permeability

G. Vesco, W. Buffolano, S. La Chiusa, G. Mancuso, S. Caracappa, A. Chianca, S. Villari, V. Curro, F. Liga, E. Petersen, Toxoplasma gondii infections in sheep in Sicily, southern Italy, Veterinary Parasitology, Volume 146, Issues 1-2, 15 May 2007, Pages 3-8, ISSN 0304-4017, DOI: 10.1016/j.vetpar.2007.02.019.
(http://www.sciencedirect.com/science/article/pii/S0304401707000933)
Abstract:
The aim of the study was to determine the burden of Toxoplasma gondii-infections in sheep in Sicily, southern Italy and the risk factors for infection.
Sera from 1961 sheep were collected just before slaughtering from 62 farms located in 8 out of 9 Sicilian administrative districts. The sera were analysed for Toxoplasma-specific IgG antibodies using commercially available enzyme-linked immunosorbent assay. Sheep less than 4 weeks old were further analysed by ELISA for Toxoplasma-specific IgM-antibodies. Data on farm size and location were obtained from slaughterhouse sanitary reports and through structured telephone interviews of the veterinary officers from public health districts.
The overall seroprevalence of Toxoplasma-specific IgG-antibodies were 49.9% (937/1876) by ELISA. Eighty-seven (54/62) percent of the farms had at least one Toxoplasma-positive animal. All the farms fed the animals outdoor on pasture and only one was claiming organic farming. Having cats on the farm, age of the animals, farm size and the use of surface water sources for drinking were all significantly associated with T. gondii-infected animals on the farm.
T. gondii infection in mutton used for human consumption is very prevalent, and eating unprocessed sheep and lamb meat has a high risk of transmitting infections to humans. The presence of cats on the farm, farm size and using surface water as drinking water for the animals were risk factors for infection in sheep, with age as a significant confounder.
Keywords: Toxoplasma gondii; Sheep; Sicily; Italy

W.J.C. Swinkels, J. Post, J.B. Cornelissen, B. Engel, W.J.A. Boersma, J.M.J. Rebel, Immune responses to an Eimeria acervulina infection in different broilers lines, Veterinary Immunology and Immunopathology, Volume 117, Issues 1-2, 15 May 2007, Pages 26-34, ISSN 0165-2427, DOI: 10.1016/j.vetimm.2007.01.020.
(http://www.sciencedirect.com/science/article/pii/S0165242707000451)
Abstract:
The (T-cell) immune responses of two different broiler lines to a primary Eimeria acervulina infection were investigated. The lines used were a commercial fast-growing broiler line and a slow-growing type of broiler as used in organic farming.

Seven-day-old broilers of both lines were infected with 5 x 104 oocysts of E. acervulina. The animals were weighed and a species-specific real-time PCR was used to quantify the total amount of parasites in the duodenum. In the fast-growing line, a lower parasite load was seen from day 4 onwards compared to the slow-growing line. In both lines the intestinal peak of Eimeria DNA was observed at day 5 post infection (p.i.). In the duodenum no increase in CD4+ T-cells was found in both infected lines, but a fast increase in CD8+ T-cells was observed in the fast-growing line. At day 3 p.i. in the slow-growing broilers an IL-18 mRNA response was observed. At day 4 p.i. strong IFN-[gamma] and IL-8 mRNA responses were found in both lines. No IL-4 mRNA responses were found in the duodenum.
In conclusion, both lines have different growth rates and control and infected conditions. Based on the kinetics of observed phenomena a primary infection with E. acervulina in 7-day-old broilers seems to generate an early CD8[alpha]+ response in fast-growing broilers compared to the slow-growing broilers. This difference in immune reaction after an E. acervulina infection could result in a different Eimeria load in the duodenum.
Keywords: Eimeria acervulina; Immunology; Real-time PCR; Cytokines; T-cells; Broilers

Daphne Munroe, R. Scott McKinley, Commercial Manila clam (Tapes philippinarum) culture in British Columbia, Canada: The effects of predator netting on intertidal sediment characteristics, Estuarine, Coastal and Shelf Science, Volume 72, Issues 1-2, March 2007, Pages 319-328, ISSN 0272-7714, DOI: 10.1016/j.ecss.2006.10.025. (http://www.sciencedirect.com/science/article/pii/S0272771406005105)
Abstract:
Quantifying risks posed by aquaculture to adjacent coastal ecosystems is necessary to ensure long term stability of coastal systems and the sustainability of industries that exist therein. Research has demonstrated that the use of predator netting in shellfish aquaculture increases sedimentation rates and productivity; here we examine the influence of netting on the west coast of Canada. Changes in percent silt (sediment particles <63 [mu]m), percent gravel (sediment particles >2 mm), organic and inorganic carbon levels and temperature, and differences in clam populations were monitored on paired netted and non-netted Manila clam (Tapes philippinarum) plots on four farmed beaches at Baynes Sound, British Columbia in 2003 and 2004. There were no significant differences in the levels of silt ($p = 0.129$, $n = 8$), gravel ($p = 0.723$, $n = 8$), or inorganic carbon ($p = 0.070$, $n = 8$) between netted and non-netted plots. However, the level of organic carbon was significantly higher on netted plots ($p = 0.014$, $n = 8$) and a slight temperature buffering effect of the netting during low-tide events over the period of study. There were significantly more T. philippinarum on netted plots compared to non-netted plots ($p = 0.001$, $n = 8$) and the length frequency distribution of the populations also differed ($p < 0.00001$) with non-netted plots containing slightly smaller clams. The observed increase in organic carbon levels beneath netting is possibly due to biodeposition by T. philippinarum beneath nets and removal of organics by the deposit feeding Nuttallia obsurata on non-netted plots; however that was not tested here. For the locations and parameters monitored in this study, it appears that netting and clam farming in Baynes Sound British Columbia, has limited effect on the sediment.

Keywords: clam culture; Tapes philippinarum; predator netting; intertidal sedimentation; organic carbon; grain size

K. Dedieu, C. Rabouille, G. Thouzeau, F. Jean, L. Chauvaud, J. Clavier, V. Mesnage, S. Ogier, Benthic O2 distribution and dynamics in a Mediterranean lagoon (Thau, France): An in situ microelectrode study, Estuarine, Coastal and Shelf Science, Volume 72, Issue 3, Biogeochemical and contaminant cycling in sediments from a human-impacted coastal lagoon, April 2007, Pages 393-405, ISSN 0272-7714, DOI: 10.1016/j.ecss.2006.11.010.
(http://www.sciencedirect.com/science/article/pii/S0272771406005270)
Abstract:
Benthic oxygen profiles were acquired using microsensors over two seasonal cycles (December 2001, April and August 2002, January and May 2003) at two stations differently affected by shellfish farming activity in the Thau lagoon (French Mediterranean coast). This study was part of the Microbent-PNEC Program on the study of biogeochemical processes at the sediment-water interface in an eutrophicated environment. We explored seasonal and spatial heterogeneity as well as the biogeochemical drivers of oxygen uptake, such as in situ temperature, bottom water oxygenation and organic matter deposition. O2 consumption rates were determined by using a transport-reaction model. Maximum rates were reached in August and May and minimum rates in December, April or January. The effect of oyster farming on oxygen fluxes was clearly identified with higher diffusive oxygen uptake in the station inside the oyster parks (C5; 36.8 +/- 18.5-87.7 +/- 40.8 mmol m-2 d-1), compared with the station lying outside the oyster parks (C4; 8.6 +/- 2.1-30.7 +/- 8.3 mmol m-2 d-1). At C5, the large spatial heterogeneity was statistically concealing temporal variation, whereas a clear statistical difference between cold and warm periods appeared at C4. In these lagoon sediments, the seasonal dynamics of diffusive oxygen demand and consumption rates were mainly driven by seasonal temperature variation at both stations, as well as by seasonal organic matter delivery to the sediment at the station located outside the oyster parks. In the station located below the oyster parks, seasonal variation of organic matter deposition was dampened by oyster filtering activity. Seasonal temperature variation thus appeared as the major driver of oxygen dynamics in this station. Measurements of total O2 uptake rates indicated a significant fraction of microbial recycling and diffusive transport in oxygen uptake at the station located close to the oyster parks. In the open water site, fauna-mediated O2 transport prevailed in April 2002 (cold conditions), whereas the microbial recycling seemed to dominate in May 2003 (warm conditions).
Keywords: oxygen; sediment-water exchange; organic carbon mineralization; microelectrode; benthic recycling; coastal ocean

Michael J. Bell, Graham R. Stirling, Clive E. Pankhurst, Management impacts on health of soils supporting Australian grain and sugarcane industries, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 256-271, ISSN 0167-1987, DOI: 10.1016/j.still.2006.06.013.
(http://www.sciencedirect.com/science/article/pii/S016719870600153X)
Abstract:
The grain and sugarcane industries are the dominant cropping enterprises in Australia. Both are facing similar problems in maintaining productivity and profitability, although the management practices employed to achieve these objectives in the two industries differ markedly. The farming systems of both industries have evolved in

recent years as our understanding of the physical and chemical benefits of practices like residue retention, reduced tillage and controlled traffic have improved. However the impact of such practices is often evaluated in terms of cost savings, operational efficiencies and efficient capture and use of water.
Soil health has not always been an important consideration in system change in either industry, with the exception that crop rotation has always been recognised as important in minimising the impact of soil-borne pathogens. Rotations have been a key feature of grain cropping systems and short duration legume fallows are becoming more prevalent in the sugar industry after more than 25 years of monocultures. However, intensification of cropping in recent years has meant that the pasture leys that were once a dominant component of the grain rotation systems are increasingly being supplanted by short duration cropping breaks with grain legume or other non-cereal crops.
Soil organic C has generally been recognised as an important component of soil fertility, but more for the role it plays in soil physical and chemical fertility. Links between organic matter status and soil biological health, and particularly to farming system viability and sustainability, have proven difficult to quantify. This has been partly due to a lack of tools or criteria for monitoring relevant soil properties and also to our limited understanding of the interactions between soil health and other system components. However recent studies are suggesting that the amount and quality of organic matter returned as roots and residues, and the placement of that residue relative to areas of future crop root activity, may be significant factors in the sustainable farming systems of the future.
This paper identifies key issues associated with current and developing farming systems in the grain and sugar industries in Australia, and assesses the impact of management practices employed in those systems on soil health. It also identifies some key challenges facing soil biologists and farming systems researchers who are trying to achieve improvements in soil health and sustainability.
Keywords: Sugarcane; Cereal grain; Tillage; Residue management; Rotation; Soil health

Deborah A.L. Holtham, G. Peter Matthews, David S. Scholefield, Measurement and simulation of void structure and hydraulic changes caused by root-induced soil structuring under white clover compared to ryegrass, Geoderma, Volume 142, Issues 1-2, 15 November 2007, Pages 142-151, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.08.018. (http://www.sciencedirect.com/science/article/pii/S0016706107002352)
Abstract:
Re-packed soil columns of the Crediton series were sown with white clover or perennial ryegrass, with nitrate managed according to organic and conventional farming regimes respectively. Visual observations revealed a rapid enhancement in soil structure beneath white clover compared to ryegrass and unplanted soil. Enhanced structural differentiation beneath white clover was supported by greater permeability to air and freer drainage to water. Differences in soil structure were verified by water retention measurements over a range of tensions between the wilting and gravity drainage points. The void structure was simulated with the Pore-Cor network model, which verified larger pores beneath clover, a difference in local structuring and a saturated hydraulic conductivity which was four times greater than ryegrass. The study highlighted inadequacies in current approaches to the measurement and interpretation of water retention.

Keywords: Soil structure; Void structure; Water retention; Hydraulic conductivity; Network model; White clover; Pore-Cor

William F. Schillinger, Ann C. Kennedy, Douglas L. Young, Eight years of annual no-till cropping in Washington's winter wheat-summer fallow region, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 345-358, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.10.017.
(http://www.sciencedirect.com/science/article/pii/S0167880906003811)
Abstract:
The tillage-based winter wheat (Triticum aestivum L.)-summer fallow (WW-SF) cropping system has dominated dryland farming in the Pacific Northwest USA for 125 years. We conducted a large-scale multidisciplinary 8-year study of annual (i.e., no summer fallow) no-till cropping systems as an alternative to WW-SF. Soft white and hard white classes of winter and spring wheat, spring barley (Hordeum vulgare L.), yellow mustard (Brassica hirta Moench), and safflower (Carthamus tinctorius L.) were grown in various rotation combinations. Annual precipitation was less than the long-term average of 301 mm in 7 out of 8 years. Rhizoctonia bare patch disease caused by the fungus Rhizoctonia solani AG-8 appeared in year 3 and continued through year 8 in all no-till plots. All crops were susceptible to rhizoctonia, but bare patch area in wheat was reduced, and grain yield increased, when wheat was grown in rotation with barley every other year. Remnant downy brome (Bromus tectorum L.) weed seeds remained dormant for 6 years and longer to heavily infest recrop winter wheat. There were few quantifiable changes in soil quality due to crop rotation, but soil organic carbon (SOC) increased in the surface 0-5 cm depth with no-till during the 8 years to approach that found in undisturbed native soil. Annual no-till crop rotations experienced lower average profitability and greater income variability compared to WW-SF. Yellow mustard and safflower were not economically viable. Continuous annual cropping using no-till provides excellent protection against wind erosion and shows potential to increase soil quality, but the practice involves high economic risk compared to WW-SF. This paper provides the first comprehensive multidisciplinary report of long-term alternative annual no-till cropping systems research in the low-precipitation region of the Pacific Northwest.
Keywords: Annual cropping; Bromus tectorum L.; Drought; Dryland cropping systems; Farm economics; Increased cropping intensity; No-till; Salsola iberica; Soil quality; Wind erosion; Winter wheat-summer fallow

R. Ordonez Fernandez, P. Gonzalez Fernandez, J.V. Giraldez Cervera, F. Perea Torres, Soil properties and crop yields after 21 years of direct drilling trials in southern Spain, Soil and Tillage Research, Volume 94, Issue 1, May 2007, Pages 47-54, ISSN 0167-1987, DOI: 10.1016/j.still.2006.07.003.
(http://www.sciencedirect.com/science/article/pii/S0167198706001589)
Abstract:
A long-term experiment to study the influence of management systems on fertility-related soil properties has been carried out in southern Spain since 1982. The experiment introduced conservation tillage systems in dry-farming agriculture in the clay soils region. Two tillage systems were compared: conventional tillage (CT), and direct drilling (DD), in a wheat-sunflower-legume rotation.

Conservation tillage systems appreciably improved the fertility level of the soil in the organic matter as compared to conventional tillage, increasing the organic matter of the profile 18 Mg ha-1 down to 0.52 m in the profile, in the DD treatment. Nitrogen, and available phosphorus and potassium contents, are greater in conservation tillage too, from 7 to 24 ppm and from 400 to 760 ppm, respectively. In the two different samplings the increasing trend of the direct drilling treatments was maintained.
A stratification of the nutrient contents in the soil profile under direct drilling has been observed, possibly due to the natural compaction of the soil and to the absence of mixing mechanisms other than the swelling-shrinkage due to changes in moisture content between dry and rainy seasons. Organic matter and nutrient concentrations tend to accumulate in the surface horizons of the soil under DD and they are uniformly distributed under CT.
The mean yields obtained with the different treatments are not significantly different to each other. It has been detected that DD have greater sunflower yields than CT in dry years where the annual rainfall is below 490 mm. There are no appreciable differences in years in which the annual rainfall is higher than that amount.
Keywords: Conventional tillage; Direct drilling; Organic matter content; Soil nutrients; Crop yields; Vertisols

Ambekar E. Eknath, Hans B. Bentsen, Raul W. Ponzoni, Morten Rye, Nguyen Hong Nguyen, Jorn Thodesen, Bjarne Gjerde, Genetic improvement of farmed tilapias: Composition and genetic parameters of a synthetic base population of Oreochromis niloticus for selective breeding, Aquaculture, Volume 273, Issue 1, 30 November 2007, Pages 1-14, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2007.09.015.
(http://www.sciencedirect.com/science/article/pii/S0044848607009209)
Abstract:
The present study is based on data recorded from fish of the third generation of the GIFT project (Genetic Improvement of Farmed Tilapias). The objective of the study was to compose a synthetic base population of Nile tilapia for further selective breeding, and to estimate phenotypic and genetic parameters in that population. The base population was formed by choosing parent stock among the best performing animals within the best strain combinations resulting from a full diallel cross design (8 x 8) involving four African wild strains and four Asian farmed strains (64 strain combination cells altogether). The grandparent ancestors of the base population were mainly representing the three strains originating from Egypt, Kenya and Thailand (20.2, 27.3 and 19.6%, respectively). The proportion of ancestors from the Senegal strain was medium (12.2%) whereas the proportion of ancestors from Ghana, Israel, Singapore and Taiwan strains was low (3 to 8%) and mainly due to a restriction that all parent strains should be represented in the synthetic base. Statistical analyses using a mixed animal model were carried out on records from 13,570 individually tagged and surviving progeny of 50 sires and 123 dams. The growth performance of the fish was tested in seven diverse environments. The test environments covered a wide range of tilapia farming systems, namely, earthen ponds fertilized with inorganic fertilizer and organic manure or on-farm agricultural residues, cage culture, and test stations located in different agro-climatic regions. The model fitted included the fixed effect of test environment and sex and the linear and quadratic covariate of age at stocking. The random terms were the additive genetic effect of individual fish and the

additional effects common to full-sib groups. The estimates of heritability for body weight at harvest in different test environments ranged from moderate to high (0.12 to 0.56) and the estimate across test environments was 0.15. The variances due to other effects common to full-sib families were significant, accounting for 8 to 16% of total variation in body weight. The genetic correlations among body weights recorded in similar environments were high (mostly > 0.80, i.e. among the earthen ponds in experimental locations). By contrast, the genetic correlations between harvest weight in earthen pond and in cage environments were more variable (0.36-0.82). Overall, the results suggested that the genotype by environment interactions were of limited importance, at least for the target pond farming systems in the Philippines. It was concluded that as the additive genetic variation in the base population was large, the harvest weight of the GIFT fish could be effectively improved by selective breeding, and that there was no immediate need to develop separate strains for different environments.
Keywords: GIFT; Base population; Population parameters; Genotype by environment interaction; Nile tilapia (Oreochromis niloticus)

Susanne Iost, Dirk Landgraf, Franz Makeschin, Chemical soil properties of reclaimed marsh soil from Zhejiang Province P.R. China, Geoderma, Volume 142, Issues 3-4, 15 December 2007, Pages 245-250, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.08.001.
(http://www.sciencedirect.com/science/article/pii/S0016706107002273)
Abstract:
Initial pedogenesis of reclaimed saline marsh soils was studied along a chronosequence of reclaimed land at Hangzhou Bay, Zhejiang Province, P.R. China. The objective was to compare soil development of these soils with processes known for natural saline marsh soil development and to evaluate the presented form of artificial land recovery against the background of increasing population densities in China. Electrical conductivity (water) and exchangeable sodium percentage decreased rapidly after reclamation started. The decrease in pH and carbonate content suggest an incipient decalcification. Soil organic carbon decreased in the first 30 cm within 20 years, caused by mineralization of the organic sea sediments. After this process an accumulation of soil organic carbon due to organic matter input as a result of farming was observed. At all sites total contents of calcium, magnesium and potassium were classified as elevated to high and decreased slightly within 31 years after reclamation and commencement of agricultural use. Only total phosphorus increased after construction of embankments, attributed to the application of fertilizer phosphorus. Available nutrient contents developed differently but none showed significant trends. Calcium slightly decreased as an effect of reclamation. Processes of pedogenesis were comparable to those known for natural marshes, but had an initial character. The reclamation of land in the presented manner is considered important to support high and growing population densities in China. However, agricultural management and fertilizer application has to be carefully evaluated.
Keywords: Marsh soil genesis; Yangtze

Mehari Tekeste, Desale H. Habtzghi, Leo Stroosnijder, Soil strength assessment using threshold probability approach on soils from three agro-ecological zones in Eritrea, Biosystems Engineering, Volume 98, Issue 4, December 2007, Pages 470-478, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.09.004.

(http://www.sciencedirect.com/science/article/pii/S1537511007002255)
Abstract:
Soils in many agro-ecological zones in Eritrea, a country in sub-Saharan Africa, are low in productivity due to erosion, low organic matter and poor soil management. Recently, mechanised farming has been intensively practiced to increase agricultural food production. However, the use of heavy machinery and vehicles can cause soil compaction that reduces soil productivity and crop yield. A study was conducted to determine the in-situ soil compaction and the probability of exceeding a root restricting threshold penetration resistance (PR) value of 2 MPa in three agro-ecological zones that varied in soil type, topography and climate. Soil cone penetration resistance measurements were taken up to a depth of 600 mm in 30 m by 30 m field plots with three replicates located in the three agro-ecological zones. Simultaneously, core samples were collected to determine soil moisture and bulk density from surface and subsurface soil layers. In all the soils, moisture contents during soil penetration resistance measurements were nearly the same as the field capacity soil moisture content (-10 kPa soil moisture suction). Penetration resistance values measured from 0 to 600 mm were averaged in depth increments of 100 mm. For clay loam (Adiguadad) and loam (Sheeb) soils, the penetration resistance values up to a soil depth class of 0-300 mm were statistically insignificant and categorised as minimum mechanical impedance to root growth (<1.0 MPa). In the sandy loam soils (Western lowland soil) the penetration resistance reached 2 MPa at 250 mm depth implying strong mechanical impedance to roots. Logistic regression analysis indicated that the probability of exceeding 2 MPa was significantly affected by soil moisture, bulk density and soil type. The probability increased with bulk density and decreased with soil moisture for clay loam, loam and sandy loam soils.

Celine Morilhat, Nadine Bernard, Corentin Bournais, Caroline Meyer, Celine Lamboley, Patrick Giraudoux, Responses of Arvicola terrestris scherman populations to agricultural practices, and to Talpa europaea abundance in eastern France, Agriculture, Ecosystems & Environment, Volume 122, Issue 3, November 2007, Pages 392-398, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.02.005.
(http://www.sciencedirect.com/science/article/pii/S0167880907000795)
Abstract:
The impact of farming practices (fertilization, mowing, grazing, ploughing, etc.) on Arvicola terrestris scherman population dynamics was investigated using index methods during the increase and the high density phase of a population cycle taking into account Talpa europaea population abundance. Farming practices significantly impacted A. terrestris populations. More intensive production indicators such as organic fertilisation and mowing correlated with the early growth of vole population. In contrast, disturbances such as grazing and soil cultivation correlated with lower vole population abundance during the high density phase. Furthermore, this study indicates that A. terrestris population dynamics patterns was governed by multifactorial processes. The way those results may help to rethink population outbreak control through farming practices complementary to other methods is discussed.
Keywords: Grassland management; Landscape ecology; Population outbreaks; Talpa europaea

E. Metzger, C. Simonucci, E. Viollier, G. Sarazin, F. Prevot, F. Elbaz-Poulichet, J.-L. Seidel, D. Jezequel, Influence of diagenetic processes in Thau lagoon on cadmium behavior and benthic fluxes, Estuarine, Coastal and Shelf Science, Volume 72, Issue 3, Biogeochemical and contaminant cycling in sediments from a human-impacted coastal lagoon, April 2007, Pages 497-510, ISSN 0272-7714, DOI: 10.1016/j.ecss.2006.11.016.
(http://www.sciencedirect.com/science/article/pii/S027277140600535X)
Abstract:
DGT (Diffusive Gradient in Thin-films) and DET (Diffusive Equilibration in Thin-films) combined probes were used in Thau lagoon sediments to describe variations of dissolved concentrations of metals such as cadmium, manganese and iron, through the sediment-water interface. Two contrasted stations regarding organic carbon fluxes were studied from December 2001 to May 2003 during four field campaigns: station C4 in the middle of the lagoon, and station C5 in a shellfish-farming zone. Laboratory experiments and field deployments in such environment showed that DGT sampled pore water labile cadmium whereas iron and manganese concentrations were underestimated. These results suggest that no steady state in the flux of metals onto the gel was established for Fe and Mn. Kinetics of metal sulfide dissolution-precipitation may control metal fluxes onto the gel probe in marine sedimentary environments. Analysis of sediment and water column samples showed cadmium concentrations above natural background (3.3 and 7.6 nmol kg-1 for station C4 and station C5 sediments, respectively; between 40 and 800 pmol L-1 for the water column), suggesting contamination. Spatial and temporal patterns of cadmium behavior were observed. The sediment at station C4 was generally a source of cadmium whereas at station C5 it was a sink. The vertical extension of the diagenetic series was more important at station C4 with deeper oxygen penetration and lack of dissolved sulfide whereas station C5 showed steep [summation operator]H2S gradients at the same depths. The data suggested that cadmium source was more likely organic matter. Cadmium mobility was probably controlled by aerobic mineralization at station C4 and by dissolution-precipitation of sulfides at station C5. Seasonal variations were observed in the depth of oxygen penetration and sulfide diffusion generating important remobilization of cadmium during December 2001. Conversely in May 2003 at station C5, bottom water suboxic conditions (i.e. %O2 = 60) enhanced reductive conditions in the sediment favoring uptake of cadmium by the sediment from the water column.
Keywords: cadmium; early diagenesis; sediment; pore water; DGT; DET; Thau lagoon

B.M. Forrest, G.A. Hopkins, T.J. Dodgshun, J.P.A. Gardner, Efficacy of acetic acid treatments in the management of marine biofouling, Aquaculture, Volume 262, Issues 2-4, 28 February 2007, Pages 319-332, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2006.11.006.
(http://www.sciencedirect.com/science/article/pii/S0044848606008684)
Abstract:
The expansion of artificial habitats and aquaculture activities in coastal environments has been accompanied by an increased demand for tools to mitigate the effects of biofouling pests. One approach is to manage anthropogenic pathways to prevent the spread of established pest organisms to uninfected localities that are beyond their natural dispersal capacity. This paper describes the efficacy of acetic acid treatments against a variety of cosmopolitan fouling taxa, and

evaluates a potential application in the treatment of foulers transported with movements of shellfish seedstock between mussel farming areas in New Zealand. Laboratory and field experiments demonstrated that immersion in 4% acetic acid (in seawater) for as little as 1 min can eliminate many soft-bodied fouling organisms, with lower concentrations requiring longer immersion times. The effects of immersion treatment were enhanced when combined with a 24-h air exposure phase to simulate the inter-regional transport of mussel seedstock. We demonstrate that it is possible to cost-effectively treat mussels to eliminate the majority of problematical foulers without resulting in significant adverse effects to the stock either by: (i) a 4% treatment followed by a rinse to remove the acetic acid residue before transport, or (ii) application of the 4% treatment at the end of the transport phase. A concentration of 4% is equivalent to the acetic acid content of domestic vinegar, hence does not represent a significant environmental or occupational risk provided appropriate measures are put in place for handling and waste disposal. Acetic acid concentrations remain stable over time in the presence of organic matter, but may change during repeated use of treatment solutions. To ensure treatment criteria are being achieved, field determination of acetic acid levels can be made using simple titration-based approaches. Because of an apparent buffering effect in the case of sequential shellfish seedstock immersion, pH could not be used to estimate acetic acid concentrations in this instance, but may provide a simple and reliable field-based indicator for other fouling treatments. Further work to refine the treatment method should seek to maximise the `window' between pest mortality and mussel survival, to provide assurance that high-risk species can be eliminated with minimal risk of adverse effects on seedstock. Where treatments that are completely effective against all pest organisms result in unavoidable mussel mortality, decisions about whether or not to apply them must balance treatment costs and benefits against the unmanaged risks and consequences of pest incursion.
Keywords: Marine bioinvasion; Biofouling; Artificial structures; Vector management; Mussel aquaculture; New Zealand; Acetic acid

A. Romero Diaz, P. Marin Sanleandro, A. Sanchez Soriano, F. Belmonte Serrato, H. Faulkner, The causes of piping in a set of abandoned agricultural terraces in southeast Spain, CATENA, Volume 69, Issue 3, 15 April 2007, Pages 282-293, ISSN 0341-8162, DOI: 10.1016/j.catena.2006.07.008.
(http://www.sciencedirect.com/science/article/pii/S0341816206001500)
Abstract:
This study aims to identify some of the factors contributing to the piping process in abandoned terraces in seven sites located in the Murcia Region (southeast Spain). The local landscape has the appearance of badland geomorphology, possessing deep valleys which until the 1970s were terraced and cultivated. The terraces have now been abandoned to the piping process. The research focuses on the relationship between the size and position of pipes and the physical and geochemistry properties of the local highly dispersive marl lithology; and the extent to which the reworking of the materials for terrace cultivation has exacerbated piping erosion.
Morphologically, the terracing in the stream beds has resulted in a series of gentle benches separated by steeper risers with variable `drop', (riser height). A series of flat infiltration surfaces result, and because the resculpting produces a reduced bulk density infill with

enhanced throughflow, infiltrating water is forced along steep hydraulic gradients to a low outfall at the base of the riser. Paralleling studies of land levelling and terrace abandonment in similar materials elsewhere, piping in the study area is shown to be closely related to the physical and chemical characteristics of the materials its sodicity and dispersive character. Considerable differences in structure, texture, mineralogical composition and material's surface crust and subsoil geochemical properties emerged from `site signature' plots, and these results suggest that agricultural processes affect the dispersive character of the crust materials, presumably because agricultural activity increases the buffering effect of organic acids on the dispersed clay. This is supported by the observation that on the one site that was levelled but not used for agriculture, a stable organically-distinct crust like the abandoned agricultural sites has not formed. The changes to the material's aggregate stability and bulk density properties when terracing occurs is examined, but insufficient evidence is available from the data collected to unpick the causes of aggregate stability changes in the study plots. The way in which differences between crust and subsoil enhance infiltration is discussed, and the role of the terrace `drop' in influencing hydraulic gradients and pipe development is illustrated. A possible index to describe the relationship between evacuated material volumes and the controlling parameters discussed above is tested.
It is concluded that terracing which is intended as a conservation practice has, in dispersive materials, actually enhanced piping, leading to the abandonment of farming.
Keywords: Piping; Erosion; Abandonment; Dispersive soils; Physical and chemical properties; Semi-arid environment

Ha-Lin Zhao, Jian-Yuan Cui, Rui-Lian Zhou, Tong-Hui Zhang, Xue-Yong Zhao, Sam Drake, Soil properties, crop productivity and irrigation effects on five croplands of Inner Mongolia, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 346-355, ISSN 0167-1987, DOI: 10.1016/j.still.2006.05.009.
(http://www.sciencedirect.com/science/article/pii/S0167198706001383)
Abstract:
In the Horqin Sand Land, more than half of the original pasture area has been converted to farmland over the last century. A field experiment was conducted from 2000 to 2001 on five croplands in the Horqin Sand Land of Inner Mongolia to examine differences in soil properties, crop productivity and irrigation effects across different soils in the region to assess their relative suitability for cultivation, in the face of continued pressure for conversion of these generally fragile, sandy soils to agriculture.
Two irrigated croplands studied were originally sandy meadow (ISM) and sandy grassland (ISG), and three dry croplands were from sandy meadow (DSM), sandy grassland (DSG) and fixed sand dunes (DFD). Results showed that most measured properties of soils, and crop productivity, differed among the five croplands. The silt + clay fraction, bulk density, organic matter content, total N and P, available N and P, average soil moisture and temperature, plant height and aboveground biomass were as follows in the DSMDSGDFD soils: 51.1%47.5%24.3%; 1.44 g/cm31.49 g/cm31.58 g/cm3; 6.3 g/kg4.6 g/kg3.4 g/kg; 0.55 g/kg0.33 g/kg0.21 g/kg; 0.21 g/kg0.17 g/kg0.13 g/kg; 27.0 mg/kg13.7 mg/kg7.7 mg/kg; 2.9 mg/kg2.9 mg/kg3.0 mg/kg; 9.4%7.0%6.2%; 21.4 [degree sign]C21.7 [degree sign]C22.0 [degree sign]C; 225 cm220 cm181 cm; and 2116 g/m21864

g/m21338 g/m2. Corresponding values for ISMISG soils were: 54.3%47.9%; 1.42 g/cm31.49 g/cm3; 8.5 g/kg6.4 g/kg; 0.58 g/kg0.42 g/kg; 0.20 g/kg0.19 g/kg; 29.0 mg/kg23.3 mg/kg; 4.7 mg/kg7.9 mg/kg; 13.0%10.1%; 21.0 [degree sign]C21.1 [degree sign]C; 266 cm245 cm; and 2958 g/m22702 g/m2.
In general, the ecological origin of a cropland was a stronger determinant of its current characteristics than was irrigation history, although irrigation was correlated with significantly increased organic matter content, some soil nutrient levels, and aboveground biomass productivity. Results indicate that fixed sand dunes should not be converted to cropland because of their very sandy and poorer soil, lower biomass productivity and greater wind-erosion risk. Although both the sandy meadow and sandy grassland may be reclaimed for farming, the cropland derived from the sandy meadow had higher resistance to wind erosion and higher crop productivity, so is somewhat more suitable than sandy grassland.
Keywords: Soil properties; Irrigation; Crop productivity; Inner Mongolia

M.L. Daumer, F. Beline, F. Guiziou, M. Sperandio, Influence of pH and Biological Metabolism on Dissolved Phosphorus during Biological Treatment of Piggery Wastewater, Biosystems Engineering, Volume 96, Issue 3, March 2007, Pages 379-386, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.11.011.
(http://www.sciencedirect.com/science/article/pii/S1537511006004028)
Abstract:
In areas with intensive animal farming, phosphorus from livestock waste contributes to the eutrophication of surface water. To increase the phosphorus recycling potential, mineral phosphorus products have to be obtained not only from the liquid but also from the solid phase of piggery wastewater needing new physico-chemical processes to be investigated. Discarding phosphorus from organic matter by a previous solubilisation of phosphorus improves the potential recycling yield. In this aim, evolution of dissolved phosphorus was studied during a simplified sequencing batch reactor process. Two slurries were tested in a sequencing batch reactor pilot plant to see if the biological phosphorus metabolism could be used to obtain a phosphorus-enriched effluent suitable for chemically recycling phosphorus. Dissolved phosphorus, calcium, magnesium and intracellular carbon storage as polyhydroxybutyrate were measured. When available carbon was sufficient both biological and chemical mechanisms were involved in phosphorus evolution. Dissolved P concentration was increased by up to seven fold by the biological treatment. However, the precipitation/dissolution of phosphate driven by the pH was dominant to explain the changes during one treatment cycle. Higher dissolved phosphorus concentration was obtained at the end of the acidification step due to nitrification. This result was discussed in the perspective to develop alternative strategies to obtain an enriched effluent suitable for a side-stream phosphorus recycling process.

C.S. Pinares-Patino, P. D'Hour, J.-P. Jouany, C. Martin, Effects of stocking rate on methane and carbon dioxide emissions from grazing cattle, Agriculture, Ecosystems & Environment, Volume 121, Issues 1-2, The Greenhouse Gas Balance of Grasslands in Europe, June 2007, Pages 30-46, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.03.024.
(http://www.sciencedirect.com/science/article/pii/S0167880906001319)
Abstract:

Pastoral farming contributes significantly to total agricultural emissions of greenhouse gases, and stocking rate is the simplest grassland management decision. A study was conducted during the 2002 and 2003 grazing seasons on a semi-natural grassland in the French Massif Central in order to measure enteric methane (CH4) and total carbon dioxide (CO2) emissions from Holstein-Friesian heifers (initial liveweight (LW) 455 +/- 29 and 451 +/- 28 kg in 2002 and 2003, respectively) managed at low (LSR) and high (HSR) stocking rates (1.1 LU ha-1 versus 2.2 LU ha-1, respectively) under a continuous grazing system. Measurements took place in late spring, mid summer, late summer and early autumn. Daily CH4 and CO2 emissions by individual heifers were measured during 7 consecutive days in each period using the sulphur hexafluoride (SF6) tracer technique. In both grazing seasons, the herbage in the LSR system had higher mass (HM) than in the HSR system, especially in mid and late summer. In both grazing seasons, herbages offered in the LSR system were of lower quality than those in the HSR system, and consequently feed organic matter (OM) digestibilities (OMD) and intakes (OMI) in the LSR system were lower ($P < 0.01$) than in the HSR system. In both grazing seasons, heifer LW increased as the seasons progressed ($P < 0.001$), and heifers in the HSR system tended to be heavier than those in the LSR system. Systems did not differ ($P > 0.05$) in mean absolute CH4 emission (223 g d-1 versus 242 g d-1 and 203 g d-1 versus 200 g d-1 for LSR and HSR in the 2002 and 2003 seasons, respectively), but as the seasons progressed, CH4 emission per unit of digestible feed intake was higher ($P < 0.05$) in the LSR than in the HSR treatment. Both absolute CH4 emission (g d-1) and CH4 yield (CH4 energy loss as a percentage of gross energy intake, % of GEI) were consistently related ($P < 0.05$) to OM intake (both gross and digestible). The SF6 tracer technique appeared to overestimate total CO2 emission from heifers. Nevertheless, significant ($P < 0.01$) coefficients of correlation were found between measured CO2 emissions and LW ($r = 0.68$ and 0.41 in season 2002 and 2003, respectively), and these correlations were stronger for HSR-managed heifers than LSR-managed heifers. This study found no effect of SR system on enteric CH4 emissions from heifers. The study also found that the SF6 tracer technique seemed to overestimate CO2 emission.
Keywords: Methane; Carbon dioxide; Greenhouse gases; Cattle; Grassland; Stocking rate; SF6

D. Sola-Oriol, E. Roura, D. Torrallardona, Pig preference for cereal based diets, relationship with their digestibility and physical properties, Livestock Science, Volume 108, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 1, 1 May 2007, Pages 190-193, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.052.
(http://www.sciencedirect.com/science/article/pii/S1871141307000571)
Abstract:
One of the most important challenges in pig farming is to overcome the initial anorexia of the pig at weaning. Since the use of palatable ingredients should facilitate the initiation of feeding at weaning, we have previously conducted a series of trials to measure the preference of pigs for different cereals. Preference is driven by odour and taste, but the physical and post-ingestive properties of the cereals could also have an effect. The present trial aims to study the relationship between the preferences for diets with 60% of rice, barley, sorghum or oats and their digestibility and physical properties. We measured the ileal and faecal digestibilities of dry matter, organic matter, and

crude protein, and the proximal GIT emptying (from the flow of digesta through the ileal cannula) for 12 h after feeding. Particle size profile, viscosity, swelling and water retention capacity and texture (hardness, fragility, chewing effort and stickiness) of the four diets, were also measured. Pearson's correlation coefficients with feed preference were statistically significant ($P < 0.05$) for particle size profile and texture of the feeds. They tended to be significant ($P < 0.1$) for ileal digesta viscosity, faecal dry matter digestibility and proximal GIT emptying rate. Additional studies of palatability for cereals should consider these parameters in order to confirm this.
Keywords: Cereal; Palatability; Texture; Digestibility; Pigs

M.S. Castellazzi, J.N. Perry, N. Colbach, H. Monod, K. Adamczyk, V. Viaud, K.F. Conrad, New measures and tests of temporal and spatial pattern of crops in agricultural landscapes, Agriculture, Ecosystems & Environment, Volume 118, Issues 1-4, January 2007, Pages 339-349, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.06.003.
(http://www.sciencedirect.com/science/article/pii/S0167880906002532)
Abstract:
Crops are allocated to their fields by growers according to rotational principles and such rotations may be defined and classified. Rotations evolve through the aggregate choices of crops by growers over time which create the characteristic agricultural landscapes for a given region. As agriculture becomes ever more competitive, growers increasingly should use such rotational principles to maximise efficiency. Their choices of crop allocations alter the observed temporal heterogeneity and spatial pattern of cropped landscapes. Within the European Union the forms of heterogeneity studied here are increasingly evident at the landscape scale. We present techniques to study these patterns of crops in time and space. This is essential in order to build realistic simulators of large-scale cropped landscapes within which farming practices may be studied across national boundaries. Simulation is required to provide realistic arenas to extend current models of gene flow from the field to the landscape scale, in furtherance of studies of coexistence between genetically modified and conventional and organic crops. We provide simple, empirical descriptors of cropped landscapes in terms of the degree of the non-randomness of the allocation. Non-randomness of fields is assessed in terms of (i) spatial pattern, (ii) temporal heterogeneity, and (iii) spatio-temporal heterogeneity. Four formal statistical tests of significance are presented: one of spatial pattern, two of temporal heterogeneity and one of spatio-temporal heterogeneity that may also be used to test for spatial pattern. The tests were exemplified using data taken from a study landscape of 72 arable fields farmed by 10 different growers in Burgundy, France, from 1994 to 1997. Two of the tests were based on simple [chi]2-statistics; two were randomisation tests. The [chi]2-test of spatial pattern demonstrated clustering in the distribution of set aside fields. The [chi]2-test of temporal heterogeneity demonstrated non-randomness for eight growers who employed 15 rotations. The randomisation test of temporal heterogeneity found significant non-randomness for one grower in three of the five crops examined. The common 3-year rotation of oilseed rape, wheat, winter barley was employed by one grower on 10 of their fields, for which significant spatio-temporal heterogeneity was shown by the proposed randomisation test. It is possible to extend the analysis of these test-statistics between - and within - units in a hierarchy, so

that the methods could be used to study pattern at larger scales than landscapes, say at regional or national scales.
Keywords: Rotations; Spatial; Temporal; Heterogeneity; Crops; Agronomy; Landscape; Pattern; Spatio-temporal

Laurence Poirier, Francoise Quiniou, Nicolas Ruiz, Monique Montagu, Jean-Claude Amiard, Yves Francois Pouchus, Toxicity assessment of peptaibols and contaminated sediments on Crassostrea gigas embryos, Aquatic Toxicology, Volume 83, Issue 4, 1 August 2007, Pages 254-262, ISSN 0166-445X, DOI: 10.1016/j.aquatox.2007.04.009.
(http://www.sciencedirect.com/science/article/pii/S0166445X07001828)
Abstract:
Peptaibols are known membrane-modifying peptides that were recently detected in marine sediments and mussels collected from a shellfish farming area (Fier d'Ars, Atlantic coast, France). In this investigation, embryotoxicity bioassays with oysters (Crassostrea gigas) were performed to assess acute toxicity of alamethicin and different groups of peptaibols produced by a Trichoderma longibrachiatum strain isolated from marine environment. C. gigas embryos appeared very sensitive to all the metabolites examined with higher toxic effects for long-sequence peptides (EC50 ranging from 10 to 64 nM). D-shaped larvae with mantle abnormality were particularly noticed when peptaibol concentrations increased. Disturbances of embryogenesis were also observed following exposure to organic and aqueous extract of sediments from Fier d'Ars (EC50 = 42.4 and 6.6 g L-1 dry weight, respectively). Although peptaibol concentrations measured in these sediments could explain only a part of the toxic effects observed, this study suggests that these mycotoxins can induce larval abnormalities in a population of exposed animals at environmentally realistic concentrations. Their detection in coastal areas devoted to bivalve culture should be taken into account.
Keywords: Marine fungi; Mycotoxins; Bivalve bioassay; Embryotoxicity; Risk assessment

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S. Deike, B. Pallutt, O. Christen, Investigations on the energy efficiency of organic and integrated farming with specific emphasis on pesticide use intensity, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 461-470, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.009.
(http://www.sciencedirect.com/science/article/pii/S1161030107001232)
Abstract:
One organic farming treatment (OF) and two integrated farming treatments (IF) with (i) situation-related pesticide use (100% HF), and (ii) application rates reduced by 50% in relation to (i), (50% HF), were compared with regard to energy efficiency. Data were used from a long-term field experiment (1997-2006) conducted on a sandy soil with moderate soil fertility and continental climate in the Federal State of Brandenburg, Germany. Net energy output, energy intensity (i.e. energy input per unit grain equivalent (GE), which makes possible comparisons between different crops related to their contributions to human or

animal nutrition), and output/input ratio were used as indicators to determine the energy efficiency. Owing to different rates of mineral nitrogen (N) fertilizers in the two IF treatments from 1997 to 2001, all calculations were split for the periods 1997-2001 and 2002-2006, respectively.
Energy efficiency tended to be lower in winter wheat compared with winter rye in OF and IF because of higher yields obtained while less energy was required for rye cropping. Averaged across all years and crops, the fossil energy inputs in OF (8.1 GJ ha-1) were 35% lower than in the IF treatment 100% HF (12.4 GJ ha-1). The largest shares of energy input in IF were diesel fuel (29%) and mineral fertilizers (37%). Mineral nitrogen (N) fertilizers represented 28% of the total energy input in IF. Pesticide use was attributable for 5% of the total energy input in 100% HF. In OF, most energy was needed for diesel fuel (46%). Significantly higher net energy outputs were recorded for 100% HF compared with OF in winter rye and winter wheat as well as in the entire crop rotation. However, no significant differences in net energy output were found between 100% HF and 50% HF. The energy intensity was significantly lower and the output/input ratio higher in OF compared with IF in the period from 1997 to 2001, whilst no significant differences between both farming systems concerning the two indicators were recorded from 2002 to 2006.
Keywords: Fossil energy input; Farming system; Integrated farming; Organic farming; Pesticide use; Long-term experiment

Harpinder S. Sandhu, Stephen D. Wratten, Ross Cullen, Brad Case, The future of farming: The value of ecosystem services in conventional and organic arable land. An experimental approach, Ecological Economics, Volume 64, Issue 4, 1 February 2008, Pages 835-848, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2007.05.007.
(http://www.sciencedirect.com/science/article/pii/S0921800907002790)
Abstract:
In the current work, a novel, experimental `bottom-up' approach is used to quantify the economic value of ecosystem services (ES) associated with highly modified arable landscapes in Canterbury, New Zealand. First, the role of land management practices in the maintenance and enhancement of ES in agricultural land was investigated by quantifying the economic value of ES at the field level under organic and conventional arable systems. This quantification was based on an experimental approach in contrast with earlier value transfer methods. Total economic value of ES in organic fields ranged from US $1610 to US $19,420 ha- 1 yr- 1 and that of conventional fields from US $1270 to US $14,570 ha- 1 yr- 1. The non-market value of ES in organic fields ranged from US $460 to US $5240 ha- 1 yr- 1. The range of non-market values of ES in conventional fields was US $50 -- 1240 ha- 1 yr- 1. There were significant differences between organic and conventional fields for the economic values of some ES. Next, this economic information was used to extrapolate and to calculate the total and non-market value of ES in Canterbury arable land. The total annual economic and non-market values of ES for the conventional arable area in Canterbury (125,000 ha) were US $332 million and US $71 million, respectively. If half the arable area under conventional farming shifted to organic practices, the total economic value of ES would be US $192 million and US $166 million annually for organic and conventional arable area, respectively. In this case, the non-market value of ES for the organic area was US $65 million and that of conventional area was US $35 million annually. This study demonstrated

that arable farming provides a range of ES which can be measured using field experiments based on ecological principles by incorporating a `bottom-up' approach. The work also showed that conventional New Zealand arable farming practices can severely reduce the financial contribution of some of these services in agriculture whereas organic agricultural practices enhance their economic value.
Keywords: Arable land; Avoided cost; Economic value; Ecosystem services; Engineered ecosystems; Organic farming

Walter Stinner, Kurt Moller, Gunter Leithold, Effects of biogas digestion of clover/grass-leys, cover crops and crop residues on nitrogen cycle and crop yield in organic stockless farming systems, European Journal of Agronomy, Volume 29, Issues 2-3, August 2008, Pages 125-134, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.04.006.
(http://www.sciencedirect.com/science/article/pii/S1161030108000506)
Abstract:
The trend towards specialization in conventional farming led to large agricultural areas in Germany and in Europe lacking livestock. Also stockless organic farming has increased during recent years. In organic farming clover/grass-ley (CG) provides nitrogen (N) to the whole cropping system via symbiotic N2 fixation and also controls certain weeds. A common practice in organic farming, when ruminants are not present, is to leave the biomass from CG in the field for their residual fertility effect. CG biomass, crop residues (CR) and cover crops (CC) represent a large unexploited energy potential. It could be used by anaerobic digestion to produce biogas. A field experiment was carried out by implementing a whole cropping system with a typical crop rotation for such farming systems on the research station Gladbacherhof from 2002 to 2005. The crop rotation consisted of six crops (two legumes and four non-legume crops). The aim was to evaluate whether the use of N could be improved by processing biomass from CG, CR and CC in a biogas digester and using the effluents as a fertilizer, compared to common practice. In the control treatment, represented by the usual stockless system, the CG, CR and CC biomass were left on the ground for green manure purposes. In the biogas systems these substrates were harvested for digestion in a biogas plant. The effluents of digestion were used to manure the non-legumes in the same crop rotation. Results indicate that digestion of CG, CR and CC can increase the crop dry matter and N yields and the N content of wheat grains in organic stockless systems. Harvesting and digestion of residues and their reallocation after digestion resulted in a better and more even allocation of N within the whole crop rotation, in a higher N input via N2 fixation and lower N losses due to emissions and probably in a higher N availability of digested manures in comparison to the same amounts of undigested biomass.
Keywords: Biogas digestion; Organic stockless farming; Nitrogen; Biogas effluent; Clover/grass-ley; Cover crop; Crop residue

Anneli Lundkvist, Lennart Salomonsson, Lennart Karlsson, Ann-Marie Dock Gustavsson, Effects of organic farming on weed flora composition in a long term perspective, European Journal of Agronomy, Volume 28, Issue 4, May 2008, Pages 570-578, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.01.001.
(http://www.sciencedirect.com/science/article/pii/S1161030108000026)
Abstract:
In 1987, the Ekhaga Experimental Farm in Sweden was established on a site that previously had been subjected to conventional farming, and

has been managed since then as an organic farm. To study the effects of organic farming on weed population development and crop yields, two different crop rotations were designed, one adapted for animals (six fields) and one without animals (six fields). Each field contained a fixed 1 m2 reference plot in which all the weed observations were done each year. During the period 1988-2002, number of weed plants in spring and weed biomass at harvest were recorded in the reference plots. No differences in these two parameters were observed between the crop rotations. Number of weed plants in spring did not differ between annual crops and did not increase over the 15-year period. Neither did weed biomass at harvest nor weed species diversity change over the 15 years. The two crop rotations kept weed pressure at the same level as under the previous conventional farming practice. General field observations suggest that invasion of Cirsium arvense (L.) Scop. is occurring along the field borders. Competitive ability of the crop showed to be important in weed regulation. Peas, a weak competitor, had significantly higher weed biomass at harvest compared with oats and winter wheat. Weather conditions during the period from April to September caused weed occurrence and development through the season to vary between years. To improve weed management in organic farming, advisors and farmers should recognise the importance of individual field and farm analyses to design location-specific, farm-adapted crop rotations.
Keywords: Crop rotation; Organic farming; Weed biomass; Weed diversity; Weed management; Weed plants

Chong-sheng GAO, Jian-guo WANG, Xing-yi ZHANG, Yue-yu SUI, The Evolution of Organic Carbon in Chinese Mollisol Under Different Farming Systems: Validation and Prediction by Using Century Model, Agricultural Sciences in China, Volume 7, Issue 12, December 2008, Pages 1490-1496, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60407-1.
(http://www.sciencedirect.com/science/article/pii/S1671292708604071)
Abstract:
Soil organic carbon (SOC) is an important indicator of soil degradation process. In this study, the long-term SOC evolution in Chinese mollisol farmland was simulated and predicted by validating, analyzing, processing and assorting concerning data, based on clarifying parameters of Century model need, combined with best use of recorded data of field management, observed data of long-term experiments, climate, soil, and biology, and achieved results from Hailun Agro-Ecological Experimental Station, Chinese Academy of Sciences. The results were showed as follows: Before reclamation, SOC content was around 58.00 g kg-1. SOC content dropped quickly in early years, and then decreased slowly after reclamation. SOC content was around 34.00 g kg-1 with a yearly average rate of 8.91% decrease before long-term experiments was established. After a long-term experiment, SOC would change under different farming systems. Shift farming system changed as follows: By 20-year model simulation, SOC content decreased from 34.03 to 30.19 g kg-1, with a yearly average rate of 5.97%; by 100-year model simulation, SOC content decreased to 24.31 g kg-1, with a yearly average rate of 3.36%. Organic farming system changed as follows: By 20-year model simulation, SOC content decreased slowly from 34.03 to 33.39 g kg-1, with a yearly average rate of 0.95%, 5% less than that of shift farming system; by 100-year model simulation, SOC content decreased to 32.21 g kg-1, with a yearly average rate of 0.55%. 'Petroleum' farming system changed as follows: By 20-year model simulation, SOC content decreased from 34.03 to 32.88 g kg-1, with a

yearly average rate of 1.72%, much more than that of organic farming system; by 100-year model simulation, SOC content decreased to 30.89 g kg-1, with a yearly average rate of 0.96%. Combined 'petroleum'-organic farming system changed as follows: By 20-year model simulation, SOC content was increased slightly; by 100-year model simulation, SOC content increased from 34.03 to 34.41g kg-1, with a yearly average rate of 0.11%. The above results provided an optimal way for maintaining SOC in Chinese mollisol farmland: To increase, as much as possible within agro-ecosystem, soil organic matter returns such as crop stubble, crop litter, crop straw or stalk, and manure, besides applying chemical nitrogen and phosphorous, which increased system productivity and maintained SOC content as well. Also, the results provided a valuable methodology both for a study of CO2 sequestration capacity and for a target fertility determination in Chinese mollisol.
Keywords: Century model; Chinese mollisol farmland; soil organic carbon; various farming systems; prediction

Inger Hansen, Vibeke Lind, Are double bunks used by indoor wintering sheep?: Testing a proposal for organic farming in Norway, Applied Animal Behaviour Science, Volume 115, Issues 1-2, 15 December 2008, Pages 37-43, ISSN 0168-1591, DOI: 10.1016/j.applanim.2008.05.002.
(http://www.sciencedirect.com/science/article/pii/S0168159108001433)
Abstract:
The frequency with which ewe lambs lay on wooden surfaces at two levels, called 'double bunks,' was documented by video recording at 6, 11 and 18 months of age: the number in each of 4 pens (n = 4) lying either on double bunks (DBs) or on the expanded metal floor (EMF) was recorded. At 6 months, lambs were sheared half way through the research period and DBs of two different heights (50/60 cm) and depths (60/75 cm) were tested. At other ages the lambs were sheared before testing and all DBs were the 60 cm x 60 cm design.
Fully fleeced lambs aged 6 months preferred to lie on EMF rather than DB ($P < 0.001$). After shearing, the use of EMF for resting declined ($P < 0.05$) and no significant preference between EMF and DB was found. The lambs tended to lie less when newly sheared ($P = 0.06$). At 11 months, sheared lambs used DB just as much as EMF, whereas 18 month old sheared ewe lambs tended to choose DB to lie on ($P = 0.09$). At 6 months, there was a tendency for more lambs to rest at ground level in the DB when headroom was higher at 60 cm ($P = 0.1$). No other preferences between DB designs were found.
The results are discussed according to the regulations for organic sheep farming in Norway. The lambs showed little preference for resting on a DB compared to EMF, so there is insufficient evidence to recommend a two-level, wooden lying area for sheep.
Keywords: Floor; Lying behaviour; Organic farming; Preference; Sheep

Klaus Birkhofer, T. Martijn Bezemer, Jaap Bloem, Michael Bonkowski, Soren Christensen, David Dubois, Fleming Ekelund, Andreas Flie[ss]bach, Lucie Gunst, Katarina Hedlund, Paul Mader, Juha Mikola, Christophe Robin, Heikki Setala, Fabienne Tatin-Froux, Wim H. Van der Putten, Stefan Scheu, Long-term organic farming fosters below and aboveground biota: Implications for soil quality, biological control and productivity, Soil Biology and Biochemistry, Volume 40, Issue 9, Special Section: Enzymes in the Environment, Enzymes in the Environment III, September 2008, Pages 2297-2308, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.05.007.
(http://www.sciencedirect.com/science/article/pii/S0038071708001624)

Abstract:
Organic farming may contribute substantially to future agricultural production worldwide by improving soil quality and pest control, thereby reducing environmental impacts of conventional farming. We investigated in a comprehensive way soil chemical, as well as below and aboveground biological parameters of two organic and two conventional wheat farming systems that primarily differed in fertilization and weed management strategies. Contrast analyses identified management related differences between 'herbicide-free' bioorganic (BIOORG) and biodynamic (BIODYN) systems and conventional systems with (CONFYM) or without manure (CONMIN) and herbicide application within a long-term agricultural experiment (DOK trial, Switzerland). Soil carbon content was significantly higher in systems receiving farmyard manure and concomitantly microbial biomass (fungi and bacteria) was increased. Microbial activity parameters, such as microbial basal respiration and nitrogen mineralization, showed an opposite pattern, suggesting that soil carbon in the conventional system (CONFYM) was more easily accessible to microorganisms than in organic systems. Bacterivorous nematodes and earthworms were most abundant in systems that received farmyard manure, which is in line with the responses of their potential food sources (microbes and organic matter). Mineral fertilizer application detrimentally affected enchytraeids and Diptera larvae, whereas aphids benefited. Spider abundance was favoured by organic management, most likely a response to increased prey availability from the belowground subsystem or increased weed coverage. In contrast to most soil-based, bottom-up controlled interactions, the twofold higher abundance of this generalist predator group in organic systems likely contributed to the significantly lower abundance of aboveground herbivore pests (aphids) in these systems. Long-term organic farming and the application of farmyard manure promoted soil quality, microbial biomass and fostered natural enemies and ecosystem engineers, suggesting enhanced nutrient cycling and pest control. Mineral fertilizers and herbicide application, in contrast, affected the potential for top-down control of aboveground pests negatively and reduced the organic carbon levels. Our study indicates that the use of synthetic fertilizers and herbicide application changes interactions within and between below and aboveground components, ultimately promoting negative environmental impacts of agriculture by reducing internal biological cycles and pest control. On the contrary, organic farming fosters microbial and faunal decomposers and this propagates into the aboveground system via generalist predators thereby increasing conservation biological control. However, grain and straw yields were 23% higher in systems receiving mineral fertilizers and herbicides reflecting the trade-off between productivity and environmental responsibility.
Keywords: DOK trial; Ecosystem functioning; Farming system; Fertilization; Generalist predators; Microbial community; Nutrient cycling; Natural enemies; Soil fauna; Soil quality; Sustainability

Maj Rundlof, Helena Nilsson, Henrik G. Smith, Interacting effects of farming practice and landscape context on bumble bees, Biological Conservation, Volume 141, Issue 2, February 2008, Pages 417-426, ISSN 0006-3207, DOI: 10.1016/j.biocon.2007.10.011.
(http://www.sciencedirect.com/science/article/pii/S0006320707004168)
Abstract:
Organic farming has been suggested to counteract declines in farmland biodiversity, but comparisons to conventional farming have produced

variable outcomes. To examine whether this is due to the landscape context farms are situated in and traits of the studied organisms, we surveyed bumble bees in cereal field borders and margins at 12 pairs of matched organic and conventional farms, with half the pairs located in heterogeneous farmland and the remaining in homogeneous plains. Species richness and abundance of bumble bees were significantly positively related to both organic farming and landscape heterogeneity. However, there was an interaction effect between farming practice and landscape context so that species richness and abundance were only significantly higher on organic farms in homogeneous landscapes. The higher abundance of bumble bees on organic farms was partly related to higher flower abundance on these sites. The effect of landscape context on bumble bee abundance was stronger for species with medium sized colonies than for those with smaller and larger colony sizes. These patterns may reflect that species with medium sized foraging ranges are most affected by fragmentation of foraging habitat, because colony size reflects the spatial scale at which bumble bees utilize resources. We conclude that both organic farming and landscape heterogeneity can be used to increase bumble bee species richness and abundance, but that organic farming has a larger effect in homogeneous landscapes and landscape heterogeneity a larger effect on conventional farms. The effects differed between species, suggesting that a single prescription to increase pollinator abundance may not be valid.
Keywords: Agri-environment schemes; Bombus; Conservation; Landscape heterogeneity; Organic farming; Spatial scale

Theresa Selfa, Raymond A. Jussaume, Michael Winter, Envisioning agricultural sustainability from field to plate: Comparing producer and consumer attitudes and practices toward `environmentally friendly' food and farming in Washington State, USA, Journal of Rural Studies, Volume 24, Issue 3, July 2008, Pages 262-276, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2007.09.001.
(http://www.sciencedirect.com/science/article/pii/S0743016707000605)
Abstract:
A substantial body of sociological research has examined the relationship between farmers' environmental attitudes and their conservation behaviors, but little research has compared the attitudes of producers and consumers toward the environment with their behaviors or practices in support of sustainable agri-food systems. This paper addresses these shortcomings by analyzing the intersection between producer and consumer attitudes toward environmental sustainability with their actual practices, drawing data from focus group interviews and surveys with producers and consumers in Washington State, USA. We compare farmers' attitudes toward several agricultural and environmental policies with their self-reported practices to examine whether support for environmental policies aligns with sustainable farming practices. For consumers, we investigate the relationship between their attitudes toward the same agricultural and environmental policy issues with their interest in purchasing food produced in an environmentally sustainable manner. Through our analyses, we find that consumers' and producers' practices are not always consistently correlated with their environmental attitudes, but that support for agricultural land preservation is one policy area in which the interests of producers and consumers intersect with their interest in sustainable farming and food. Findings from our individual and focus group interviews assist us in understanding the multiple, sometimes

competing, factors that consumers and producers must weigh in making decisions about environmentally sustainable food and farming.
Keywords: Sustainable farming; Sustainable consumption; Alternative agri-food networks; Organic agriculture; Farmer behavior; Environmental attitudes

K.J. van Calker, P.B.M. Berentsen, G.W.J. Giesen, R.B.M. Huirne, Maximising sustainability of Dutch dairy farming systems for different stakeholders: A modelling approach, Ecological Economics, Volume 65, Issue 2, 1 April 2008, Pages 407-419, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2007.07.010.
(http://www.sciencedirect.com/science/article/pii/S0921800907004028)
Abstract:
A multi-attribute sustainability function is included into a dairy farm LP-model by using Weighted Goal Programming. The created Weighted Linear Goal Programming (WLGP)-model is used to maximise sustainability of different Dutch dairy farming systems and to analyse the impact of: (1) maximisation of individual sustainability aspects (economic, social and ecological sustainability) and (2) maximisation of overall sustainability using stakeholder preferences. Maximising the individual aspects of both dairy farming systems, i.e. conventional and organic, shows the trade-offs between different aspects of sustainability. For conventional as well as organic dairy farming maximum scores are highest for external social sustainability. The conventional dairy farm achieves a slightly higher score for overall sustainability than the organic dairy farm for all stakeholders (i.e. consumers and producers). This shows that it is possible for conventional dairy farms, similar to the conventional farm used in the analysis especially regarding the stocking density and under Dutch policy conditions, to achieve equal sustainability scores in comparison with organic dairy farms. It is concluded that the WLGP model is a suitable tool to analyse the sustainability of different dairy farming systems.
Keywords: Dairy farming; Sustainability; Modelling; Weighted Goal Programming; Stakeholders; Multi-Attribute Utility Theory

Qin-Feng Gao, Paul K.S. Shin, W.Z. Xu, S.G. Cheung, Amelioration of marine farming impact on the benthic environment using artificial reefs as biofilters, Marine Pollution Bulletin, Volume 57, Issues 6-12, 5th International Conference on Marine Pollution and Ecotoxicology, 2008, Pages 652-661, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.02.033.
(http://www.sciencedirect.com/science/article/pii/S0025326X08001240)
Abstract:
An in situ monitoring of the sediment characteristics and macrobenthic communities was undertaken at a marine fish culture site in subtropical waters of Hong Kong before and after the deployment of biofilters which were made of cement concrete artificial reef (AR) structures. According to the distance to the boundary of the fish cages, 6 points were selected as sampling stations: 2 at the fish cages, 2 near the boundary of the fish culture area, and 2 reference sites further away from the culture area. Bimonthly sediment samples were collected for analysis of silt-clay fraction (SCF), moisture content (MC), total organic carbon (TOC), total Kjeldahl nitrogen (TKN) and total phosphorus (TP). The macrobenthos (>0.5 mm) present in the sediment were sorted, identified and enumerated. TOC, TKN and TP levels at the fish cage stations were consistently higher than those at the reference stations over the 1-year pre-AR and 2-year post-AR deployment monitoring period. The diversity of macrofauna was significantly reduced at the fish cage

stations relative to the reference sites. The intermediary stations near the fish culture area showed a transitional state of disturbance. Over the 2-year post-AR deployment period, TOC, TKN and TP showed a decreasing trend at the fish cage and intermediary stations. More diverse macrofaunal communities were recorded at the fish cage stations, with species diversity H'increasing from 0-1 at the beginning of the AR deployment to H' > 2 at the end of the study. The present results demonstrated that artificial reefs can improve the benthic abiotic environment and biotic conditions beneath fish rafts which are deteriorated due to farming activities.
Keywords: Fish farming; Artificial reef; Nutrient enrichment; Benthic community; Biofiltration

Slavica Matijevic, Grozdan Kuspilic, Zorana Kljakovic-Gaspic, Danijela Bogner, Impact of fish farming on the distribution of phosphorus in sediments in the middle Adriatic area, Marine Pollution Bulletin, Volume 56, Issue 3, March 2008, Pages 535-548, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2007.11.017.
(http://www.sciencedirect.com/science/article/pii/S0025326X07004572)
Abstract:
During the last decade, intensive fish farming developed along the central Croatian coast, creating a need to study and evaluate its potential influence on unaffected sites. We considered phosphorus as an indicator of the influence of fish farming and investigated the distribution of phosphorus forms in sediment from several fish farms and marine areas of different trophic status in the middle Adriatic. Analyses of samples were performed with modified SEDEX techniques. Our results indicated that authigenic apatite phosphorus showed no significant differences among the investigated stations, while organic phosphorus concentrations reflected the trophic status of the station area. Below-cage sediment was characterized by enhanced fish debris phosphorus and low detrital apatite phosphorus concentrations, while sediment from an anthropogenically influenced bay showed the highest values of iron bound phosphorus species. Among the different P fractions, fish debris phosphorus proved to be the most sensitive indicator of the influence of fish farming on marine sediment.
Keywords: Fish farming; Phosphorus; Sediment; SEDEX method; Adriatic Sea

Nathalie Malet, Pierre-Guy Sauriau, Mireille Ryckaert, Pascale Malestroit, Gael Guillou, Dynamics and sources of suspended particulate organic matter in the Marennes-Oleron oyster farming bay: Insights from stable isotopes and microalgae ecology, Estuarine, Coastal and Shelf Science, Volume 78, Issue 3, 10 July 2008, Pages 576-586, ISSN 0272-7714, DOI: 10.1016/j.ecss.2007.11.001.
(http://www.sciencedirect.com/science/article/pii/S0272771407004957)
Abstract:
The aim of this study was to distinguish between sources of the complex variety of Marennes-Oleron Bay suspended particulate organic matter (SPOM) contributing to the tropho-dynamics of the Marennes-Oleron oyster farming bay. Basic biomarkers (Chl a, C/N and POC/Chl a ratios), carbon and nitrogen stable isotopes from SPOM were analyzed and the microalgae community was characterized. The sampling strategy was bimonthly from March 2002 to December 2003; samples were taken from an intertidal mudflat. Four main sources contributed to the SPOM pool: terrigenous input from rivers, neritic phytoplankton, resuspended microphytobenthos and periodic inputs from intertidal Zostera noltii

meadows. Seasonal fluctuations were observed in both years of the study period: (1) SPOM collected in the spring of 2002 ([delta]13C = -25[per mille sign] to -23[per mille sign]) was mainly composed of fresh estuarine inputs; (2) SPOM from the summer and fall of 2002 and 2003 was predominantly neritic phytoplankton ([delta]13C = - 22[per mille sign] to -19[per mille sign]); (3) SPOM from the winter of 2002, spring of 2003 and winter of 2003 ([delta]13C = -21 to -23[per mille sign]) was composed of a mixture of decayed terrigenous river inputs and pelagic phytoplankton, which was predominantly resuspended microphytobenthos. In the summer of 2003--the warmest summer on record in southern France and Europe--SPOM was particularly enriched for 13C, with [delta]13C values ranging from -14[per mille sign] to -12[per mille sign]. Pulses in [delta]13C values, indicative of 13C-enriched decaying materials, extended into the fall. These were attributed to benthic intertidal inputs, including both resuspended microphytobenthos and Z. noltii detritus. Changes in SPOM sources in Marennes-Oleron Bay may lead to differences in the quality of the trophic environment available for reared oysters.
Keywords: Marennes-Oleron Bay; suspended particulate organic matter; phytoplankton; microphytobenthos; mudflat; Zostera noltii; heatwave

Albino Maggio, Petronia Carillo, Giovanni Serafino Bulmetti, Amodio Fuggi, Giancarlo Barbieri, Stefania De Pascale, Potato yield and metabolic profiling under conventional and organic farming, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 343-350, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.10.003.
(http://www.sciencedirect.com/science/article/pii/S1161030107001062)
Abstract:
Consumers interest for organic agriculture and environmental-friendly agricultural products is increasing. Nevertheless, cultivation protocols in organic farming are not sufficiently standardized to guarantee product quality stability, a parameter which is critical for further expansion of this niche market. Variable responses in terms of quality and quantity of the harvested product often arise from complex interactions between agronomic and environmental factors. Here we report on the effects of different levels of nitrogen fertilization (0, 50, 150, 200 kg N ha-1) and irrigation regime (50% and 100% replenishment of the evaporation determined using a Class A pan, plus a non-irrigated control) on yield and accumulation of primary metabolites of two potato cultivars (Agria and Merit) grown under conventional and organic farming systems. Organic farming caused a 25% marketable yield reduction with a higher percentage of large tubers under conventional farming, whereas irrigation increased the marketable yield and the percentage of large tubers. Nitrogen fertilization affected the marketable yield and significantly interacted with the irrigation regime in modifying potato yield and quality. Farming protocol, cultivar, irrigation and nitrogen fertilization all affected both amino acid contents and composition with a significant decrease of most essential amino acids in coincidence with highest nitrogen levels. An increased water availability caused an accumulation of reducing sugars in potato tubers only in organic farming, whereas such accumulation was not observed under conventional farming. These results indicate that cultivar-specific genetic determinants and cultivation factors, including the farming system, may strongly and specifically interact to affect important quality parameters of potato tubers. This should be considered to improve quality standards in organic farming.

Keywords: Solanum tuberosum L.; Nitrogen fertilization; Irrigation; Carbohydrates; Protein content; Amino acid profile

A.S.F. Araujo, V.B. Santos, R.T.R. Monteiro, Responses of soil microbial biomass and activity for practices of organic and conventional farming systems in Piaui state, Brazil, European Journal of Soil Biology, Volume 44, Issue 2, March-April 2008, Pages 225-230, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2007.06.001.
(http://www.sciencedirect.com/science/article/pii/S1164556307000660)
Abstract:
The aim of this work was to investigate the response of soil microbial biomass and activity to practices in organic and conventional farming systems. The study was carried out at the Irrigation District of Piaui, Brazil. Five different plots planted with 'acerola' orchard (Malpighia glaba) and established at the following management were evaluated: (1) under 12 months of soil conventional management (CNV); (2) under six months of soil organic management (ORG6); (3) under 12 months of soil organic management (ORG12); (4) under 18 months of soil organic management (ORG18); and (5) under 24 months of soil organic management (ORG24). Soil microbial biomass C (Cmic), basal respiration, organic carbon (Corg), Cmic-to-Corg ratio and metabolic quotient (qCO2) were evaluated in soil samples collected at 0-10 cm depth. The highest Corg and Cmic levels occurred in organic system plots ORG18 and ORG24 compared to the conventional system. Soil respiration and Cmic-to-Corg ratio were significantly enhanced by the organic system plots. The qCO2 was greater in conventional than in organic system. These results indicate that the organic practices rapidly improved soil microbial characteristics and slowly increase soil organic C.
Keywords: Microorganisms; Metabolic quotient; Cmic-to-Corg ratio; Soil quality; Sustainability

Marius Collomb, Walter Bisig, Ueli Butikofer, Robert Sieber, Mirjam Bregy, Luzi Etter, Fatty acid composition of mountain milk from Switzerland: Comparison of organic and integrated farming systems, International Dairy Journal, Volume 18, Issues 10-11, October-November 2008, Pages 976-982, ISSN 0958-6946, DOI: 10.1016/j.idairyj.2008.05.010.
(http://www.sciencedirect.com/science/article/pii/S0958694608001003)
Abstract:
During a 12-month study, bulk-tank milk was collected monthly from 3 dairies each of which collected both organic and conventional milks (from integrated farming) in the mountain regions of Switzerland. All milk samples were analyzed for fatty acid (FA) composition. Organic and conventional milks did not significantly differ with respect to saturated FA (SFA) nor trans FA contents, but organic milk had significantly higher contents of polyunsaturated FA (PUFA) (+5.5%; $P <= 0.001$), conjugated linonenic acid (CLA) (+14.9%; $P <= 0.001$), n-3 FA (+12.3%; $P <= 0.001$) and branched FA (+4.7%; $P <= 0.001$). Conventional milk had higher contents of monounsaturated FA (MUFA) (+2.3%; $P <= 0.05$) and n-6 FA (+4.2%; $P <= 0.01$). Significantly higher levels of grasses and lower levels of cereal concentrates in the fodder of organic farming could well explain these results. The differences in the fatty acid composition of milk between the two farming systems were nevertheless small because of low differences in the fodder composition.

Joeke Postma, Mirjam T. Schilder, Jaap Bloem, Wiepie K. van Leeuwen-Haagsma, Soil suppressiveness and functional diversity of the soil microflora in organic farming systems, Soil Biology and Biochemistry, Volume 40, Issue 9, Special Section: Enzymes in the Environment, Enzymes in the Environment III, September 2008, Pages 2394-2406, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.05.023.
(http://www.sciencedirect.com/science/article/pii/S0038071708001740)
Abstract:
Arable fields of 10 organic farms from different locations in The Netherlands were sampled in three subsequent years. The soil samples were analysed for disease suppressiveness against Rhizoctonia solani AG2.2IIIB in sugar beet, Streptomyces scabies in radish and Verticillium longisporum in oilseed rape. In addition, a variety of microbial, chemical and physical soil characteristics were assessed. All data were correlated by multiple regression and multivariate analyses with the objective to find correlations between soil suppressiveness and biotic or abiotic soil characteristics. Significant differences in soil suppressiveness were found between the fields for all three diseases. Multiple regression indicated a significant correlation between suppressiveness against Rhizoctonia and the number of antagonistic Lysobacter spp., as well as with % active fungi and bacterial diversity. Grass-clover stimulated Rhizoctonia suppression as well as the presence of antagonistic Lysobacter spp. (mainly L. antibioticus and L. gummosus) in clay soils. Streptomyces suppression correlated with the number of antagonistic Streptomyces spp., % of active fungi and bacterial population size. The presence of antagonistic Streptomyces spp. correlated with a high fungal/bacterial biomass ratio. Verticillium suppression was only measured in 2004 and 2005, due to the inconsistent suppressiveness along the years. Nevertheless, a significant correlation with pH, potential nitrogen mineralization and bacterial biomass was found. Bacterial and fungal PCR-denaturing gel electrophoresis fingerprinting of bacterial and fungal communities, in general, did not significantly correlate with disease suppression. Highly significant explanatory factors of the composition of the dominating bacterial and fungal populations were % lutum, pH, C/N quotient, biomass and growth rate of bacteria. Additionally, the % of organic matter and years of organic farming were explaining significantly the composition of the bacterial population. Thus, significant correlations between several soil characteristics and suppressiveness of different soil-borne pathogens were found. For two of the three pathogens, suppression correlated with biotic soil characteristics combined with the presence of specific bacterial antagonists. Probably the soil suppressiveness measured in the organic fields is a combined effect of general and specific disease suppression.
Keywords: Disease suppression; Rhizoctonia solani AG2.2IIIB; Streptomyces scabies; Verticillium longisporum; Soil communities; Soil characteristics; PCR-DGGE; Antagonistic Streptomyces; Lysobacter

D. Roux-Michollet, S. Czarnes, B. Adam, D. Berry, C. Commeaux, N. Guillaumaud, X. Le Roux, A. Clays-Josserand, Effects of steam disinfestation on community structure, abundance and activity of heterotrophic, denitrifying and nitrifying bacteria in an organic farming soil, Soil Biology and Biochemistry, Volume 40, Issue 7, July 2008, Pages 1836-1845, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.03.007.
(http://www.sciencedirect.com/science/article/pii/S0038071708001144)

Abstract:
Steam disinfestation is an ecologically less harmful alternative to synthetic chemical fumigants such as methyl bromide, which is being phased out of use due to its ozone-depleting properties. Although previous studies have characterized the effects of steaming on targeted pests, soil microorganisms, including beneficial ones, may be strongly influenced by this agricultural practice, since: (1) high temperature disturbs most soil microorganisms; and (2) disinfestation-induced changes in the soil environment can indirectly affect soil microbiota. The impact of soil disinfestation on functional bacterial communities was evaluated particularly in view of their role in nitrogen cycling. The short-term effects of steam disinfestation on heterotrophic bacteria, denitrifying and nitrifying bacteria, and their ability to recover after this disturbance were examined by surveying the enzyme activity, size and genetic structure of each community. Our results show that: (1) steaming immediately induced significant decrease in community activity and size, and changes in community composition, nitrifying bacteria being mostly affected; (2) abundances of each community reached values equal or higher than those observed in control soil within 15-60 days after steaming, but community structures remained very different as compared to those in control soil; and (3) for each activity, no complete recovery was observed after the disturbance: substrate induced respiration and denitrification increased but remained lower in steamed soil, whereas nitrification was not detectable after 62 days. Our results show that these effects of steaming on key soil functional communities can have important, long-lasting implications for nitrogen cycle that should be taken into account when evaluating the influence of such an agricultural practice.
Keywords: Ammonia oxidizing bacteria; Nitrite oxidizing bacteria; Denitrifying bacteria; Heterotrophic bacteria; Substrate Induced Respiration; Denitrification; Nitrification; Microbial community structure; Denaturing Gradient Gel Electrophoresis

Qingjie Wang, Yuhua Bai, Huanwen Gao, Jin He, Hao Chen, R.C. Chesney, N.J. Kuhn, Hongwen Li, Soil chemical properties and microbial biomass after 16 years of no-tillage farming on the Loess Plateau, China, Geoderma, Volume 144, Issues 3-4, 15 April 2008, Pages 502-508, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.01.003.
(http://www.sciencedirect.com/science/article/pii/S0016706108000098)
Abstract:
Data from a 16-year field experiment conducted in Shanxi, on the Chinese Loess Plateau, were used to compare the long-term effects of no-tillage with straw cover (NTSC) and traditional tillage with straw removal (TTSR) in a winter wheat (Triticum aestivum L.) monoculture. Long-term no-tillage with straw cover increased SOM by 21.7% and TN by 51.0% at 0-10 cm depth and available P by 97.3% at 0-5 cm depth compared to traditional tillage. Soil microbial biomass C and N increased by 135.3% and 104.4% with NTSC compared to TTSR for 0-10 cm depth, respectively. Under NTSC, the metabolic quotient (CO_2 evolved per unit of MBC) decreased by 45.1% on average in the top 10 cm soil layer, which suggests that TTSR produced a microbial pool that was more metabolically active than under NTSC. Consequently, winter wheat yield was about 15.5% higher under NTSC than under TTSR. The data collected from our 16-year experiment show that NTSC is a more sustainable farming system which can improve soil chemical properties, microbial biomass and activity, and thus increase crop yield in the rainfed dryland farming areas of northern China. The soil processes responsible

for the improved yields and soil quality, in particular soil organic matter, require further research.
Keywords: No-tillage; Soil organic matter; Total nitrogen; Available phosphorus; Soil microbial biomass; Metabolic quotient

Johan Ekroos, Markus Piha, Juha Tiainen, Role of organic and conventional field boundaries on boreal bumblebees and butterflies, Agriculture, Ecosystems & Environment, Volume 124, Issues 3-4, April 2008, Pages 155-159, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.09.003.
(http://www.sciencedirect.com/science/article/pii/S0167880907002320)
Abstract:
This study examined how field boundary habitat quality and farming system (organic or conventional) affect species richness and abundance of diurnal lepidopterans and bumblebees in boreal agricultural landscapes. The results showed positive effects of field boundary area on lepidopteran diversity, as well as positive effects of nectar flower abundance on lepidopterans and bumblebee abundance. Organic farming did not show any significant effects on lepidopteran diversity. The results suggested that a successful conservation strategy for lepidopterans occurring in boreal agroecosystems depend on proper management of field boundaries, irrespective of farming regime. As bumblebee diversity tended to be higher at organic plots it is concluded that these important pollinators might be able to react on even small changes in habitat quality of cultivated lands. The results concord with a general hypothesis that effects of organic farming might be overpowered by effects of landscape structure in heterogeneous landscapes.
Keywords: Boreal agroecosystem; Bumblebee; Butterfly; Diurnal lepidopterans; Habitat area; Flower abundance; Organic farming

A. Berner, I. Hildermann, A. Flie[ss]bach, L. Pfiffner, U. Niggli, P. Mader, Crop yield and soil fertility response to reduced tillage under organic management, Soil and Tillage Research, Volume 101, Issues 1-2, September-October 2008, Pages 89-96, ISSN 0167-1987, DOI: 10.1016/j.still.2008.07.012.
(http://www.sciencedirect.com/science/article/pii/S0167198708001141)
Abstract:
Conservation tillage (no-till and reduced tillage) brings many benefits with respect to soil fertility and energy use, but it also has drawbacks regarding the need for synthetic fertilizers and herbicides. Our objective was to adapt reduced tillage to organic farming by quantifying effects of tillage (plough versus chisel), fertilization (slurry versus manure compost) and biodynamic preparations (with versus without) on soil fertility indicators and crop yield. The experiment was initiated in 2002 on a Stagnic Eutric Cambisol (45% clay content) near Frick (Switzerland) where the average annual precipitation is 1000 mm. This report focuses on the conversion period and examines changes as tillage intensity was reduced. Soil samples were taken from the 0-10 and 10-20 cm depths and analysed for soil organic carbon (Corg), microbial biomass (Cmic), dehydrogenase activity (DHA) and earthworm density and biomass. Among the components tested, only tillage had any influence on these soil fertility indicators. Corg in the 0-10 cm soil layer increased by 7.4% (1.5 g Corg kg-1 soil, $p < 0.001$) with reduced tillage between 2002 and 2005, but remained constant with conventional tillage. Similarly, Cmic was 28% higher and DHA 27% ($p < 0.001$) higher with reduced than with conventional tillage in the soil layer 0-10 cm. In the 10-20 cm layer, there were no significant differences for these soil parameters between the tillage treatments. Tillage had no

significant effect on total earthworm density and biomass. The abundance of endogeic, horizontally burrowing adult earthworms was 70% higher under reduced than conventional tillage but their biomass was 53% lower with reduced tillage. Wheat (Triticum aestivum L.) and spelt (Triticum spelta L.) yield decreased by 14% ($p < 0.001$) and 8% ($p < 0.05$), respectively, with reduced tillage, but sunflower (Helianthus annuus L.) yield was slightly higher with reduced tillage. Slurry fertilization enhanced wheat yield by 5% ($p < 0.001$) compared to compost fertilization. Overall, Corg, Cmic, and DHA improved and yields showed only a small reduction with reduced tillage under organic management, but long-term effects such as weed competition remain unknown.
Keywords: Reduced tillage; Organic farming; Soil organic carbon; Soil microbial activity; Soil microbial biomass

Steven Kragten, Geert R. de Snoo, Field-breeding birds on organic and conventional arable farms in the Netherlands, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 270-274, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.02.006.
(http://www.sciencedirect.com/science/article/pii/S0167880908000492)
Abstract:
In this study territory densities of field-breeding farmland birds were compared on pairwise-selected organic and conventional arable farms for two years. Differences in territory densities between the two farm types were explained examining the effects of three factors on territory densities: (1) non-crop habitats, (2) crop types and (3) within-crop factors. In both years, densities of most species did not differ between organic and conventional farms. Only skylark and lapwing were more abundant on organic farms, but only skylarks showed a consistent pattern over both years. Differences in crop types grown between the two systems were the only explaining factor for differences in densities of skylark. For lapwing, the difference was only partly due to differences in crop type, but differences in within-crop factors (probably as a result of crop management) were likely to have had an effect as well. There were no significant differences in abundance of non-crop habitats between the two farming systems, so this could not explain differences in territory densities.
Keywords: Organic farming; Farmland birds; Habitat preference; Non-crop habitats; Crops; Landscape composition

C. Boutin, A. Baril, P.A. Martin, Plant diversity in crop fields and woody hedgerows of organic and conventional farms in contrasting landscapes, Agriculture, Ecosystems & Environment, Volume 123, Issues 1-3, January 2008, Pages 185-193, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.05.010.
(http://www.sciencedirect.com/science/article/pii/S0167880907001685)
Abstract:
The purpose of this study was to determine the effects of contrasting agricultural practices in organic and conventional farming (local factors), and to evaluate the influence of surrounding landscape features (regional factors) on plant assemblages, taking into account habitat structure. Plants were inventoried in crop fields and woody hedgerows (boundary and centre) of 16 conventional and 14 organic sites. Habitat structure, agricultural practices and landscape characteristics were quantified for each habitat. Hedgerow boundaries contained a higher number of plant species than adjacent habitats although many of them were exotics. However, exotics comprised a

decreasing proportion of species richness from field to hedgerow centre. Many of the exotic species were shared between crop fields and adjacent boundaries. There was a clear difference in species richness and composition between the organic and conventional study sites. Fields and woody hedgerows situated in organic sites consistently harboured more native and exotic plant species than those in conventional systems. Numerous species were only found in organic hedgerows and included several long-lived herbaceous forest species. At the larger scale level, old-fields (areas with sparse shrubs and trees re-colonizing cleared land) were the only habitats that significantly influenced the species composition of hedgerows, particularly exotic species. Conversely, farm type was a significant predictor of native species richness.
Keywords: Plant species richness and composition; Organic farming; Non-crop habitats; Woody hedgerows; Landscape features

Steven Kragten, Krijn B. Trimbos, Geert R. de Snoo, Breeding skylarks (Alauda arvensis) on organic and conventional arable farms in The Netherlands, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 163-167, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.021.
(http://www.sciencedirect.com/science/article/pii/S0167880908000352)
Abstract:
The aim of this study was to analyse the effects of differences in cropping pattern between organic and conventional arable farms on the breeding activity of skylarks and to assess the effects of arable crop management on skylark nest survival. Skylark nest density was seven times higher on organic farms than on conventional farms (0.63 vs. 0.09 nest per 10 ha). Skylarks showed a strong preference for spring cereals, lucerne and grass leys, all of which were mainly or exclusively grown on organic farms. On organic farms nests were initiated during the entire breeding season, but on conventional farms no nesting activity was found during the peak of the season (early May to early June). On organic farms 27% of all nests was successful. Increasing the availability of suitable breeding habitat during the peak of the breeding season on conventional farms might provide one means of enhancing breeding skylark populations. On organic farms, crop management should focus on reducing nest loss due to farming operations.
Keywords: Organic farming; Alauda arvensis; Habitat preference; Arable crops; Reproductive success; Mechanical weeding

Marianne Holmer, Anna Cecelie Heilskov, Distribution and bioturbation effects of the tropical alpheid shrimp Alpheus macellarius in sediments impacted by milkfish farming, Estuarine, Coastal and Shelf Science, Volume 76, Issue 3, Submarine groundwater discharge studies along the Ubatuba coastal area in south-eastern Brazil, 10 February 2008, Pages 657-667, ISSN 0272-7714, DOI: 10.1016/j.ecss.2007.07.033.
(http://www.sciencedirect.com/science/article/pii/S0272771407003587)
Abstract:
The impact of milkfish fish pens on the distribution of the alpheid shrimp Alpheus macellarius was studied in the Bolinao area, Philippines. In addition, the impact of the alpheid shrimp on sediment biogeochemistry, including organic matter mineralization, nutrient and sulfur cycling was compared in sediments affected and unaffected by fish farming. The fish farming activity had negative impact on the distribution of shrimps by reducing the abundance up to 60% in the

vicinity of the net pens, and to almost absence inside the net pens. At a farm site abandoned seven month prior to sampling the abundance of shrimps was still low and sediment pools of reduced sulfur high, indicating a slow benthic recovery. The shrimp had large physical impact on the sediments, and the mineralization rates were stimulated by the presence of the shrimp in pristine sediments, whereas the fish farm impacted sites showed high mineralization rates both in sediments with and without the presence of the shrimp suggesting that the organic matter enrichment stimulated the mineralization in these low-organic sediments, whereas the shrimp had less impact. Sulfate reduction rates and in particular pools of sulfides increased in the farm impacted sediments, and sulfate reduction was an important process for organic matter mineralization (>67%) in all sediments. Although the shrimp had minor effect on the organic matter mineralization and nutrient fluxes in the farm impacted sediments, they appeared to increase the oxidation of sulfides by increasing the zone of oxidized surface sediment and thereby improving the sediment conditions for recolonization after fish farming has ceased.
Keywords: bioturbation; tropical; nutrient fluxes; oxygen uptake; sulfate reduction

Ligang Wang, Jianjun Qiu, Huajun Tang, Hu Li, Changsheng Li, Eric Van Ranst, Modelling soil organic carbon dynamics in the major agricultural regions of China, Geoderma, Volume 147, Issues 1-2, 30 September 2008, Pages 47-55, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.07.009.
(http://www.sciencedirect.com/science/article/pii/S0016706108002097)
Abstract:
This paper reports a modelling study on long-term (20 years) impacts of present and alternative farming management practices on (SOC) dynamics. A well documented, process-based model, DNDC, was employed, depending on the local climate, soil and management conditions in the six regions. Modelled results indicated that, under the present management conditions, the SOC status in the three northern sites (i.e., Qiqihar, Miyun and Pingliang) where upland crops dominated appeared more dynamic than that in the three southern sites (i.e., Zhijiang, Jiangning and Yantin) where paddy rice dominated. During the simulated 20 years, the northern sites were either losing or gaining SOC at relatively high rates from - 1000 to 200 kg C/ha/yr; and the southern sites had relatively stable SOC contents with deviations ranging from - 70 to 26 kg C/ha/yr. Increase in the fraction of above-ground crop residue incorporated in soil or application of manure effectively converted most of the tested sites into sinks of atmospheric carbon. Since crop residue and manure resources are available in most of the agricultural regions, adaptation of the management alternatives should be feasible in China.
Keywords: Soil organic carbon; Chinese agriculture; Farming practices; Crop yield; DNDC model

Xiu-Zhen HAO, Dong-Mei ZHOU, Huai-Man CHEN, Yuan-Hua DONG, Leaching of Copper and Zinc in a Garden Soil Receiving Poultry and Livestock Manures from Intensive Farming, Pedosphere, Volume 18, Issue 1, February 2008, Pages 69-76, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60104-0.
(http://www.sciencedirect.com/science/article/pii/S1002016007601040)
Abstract:
The leaching characteristics of a garden soil may be greatly affected by application of poultry and livestock manures from intensive farming.

Packed soil columns of a garden soil (CK) and the soils after respectively receiving 2% pig manure (PM), chicken manure (CM), and commercial organic manure (OM) were leached with 0.05 mol L-1 Ca(NO3)2 and 0.01 mol L-1 EDTA solutions. The leachate EC (electric conductivity) values gradually increased at the beginning and then reached a stable value when the soil columns were leached with 0.05 mol L-1 Ca(NO3)2 solution. The leachate EC values showed a peak-shape when leached with 0.01 mol L-1 EDTA solution. In all the soil columns, the pH values of the leachates decreased with increase of displacement volumes when the Ca(NO3)2 solution was used. The total amounts of Cu and Zn eluted from the four soil columns were significantly correlated with the extracted soil Cu and Zn concentrations by 1.0 mol L-1 NH4NO3, but were not correlated with the leachate dissolved organic carbon (DOC) contents. The Zn concentration in the leachate of the PM-treated soil column with 0.05 mol L-1 Ca(NO3)2 solution was above the Quality Standard III for Ground Water of China (GB/T 14848-93, Zn < 1.0 mg L-1). When compared with 0.05 mol L-1 Ca(NO3)2, the EDTA solution significantly accelerated Cu and Zn elutions in the manure-treated columns. This suggested that applying poultry and livestock manures from intensive farming to farmland might pose a threat to the groundwater quality.
Keywords: copper; garden soil; leaching; manures; zinc

M.A. Thomassen, K.J. van Calker, M.C.J. Smits, G.L. Iepema, I.J.M. de Boer, Life cycle assessment of conventional and organic milk production in the Netherlands, Agricultural Systems, Volume 96, Issues 1-3, March 2008, Pages 95-107, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.06.001. (http://www.sciencedirect.com/science/article/pii/S0308521X07000819)
Abstract:
Production of milk causes environmental side effects, such as emission of greenhouse gases and nutrient enrichment in surface water. Scientific evidence that shows differences in integral environmental impact between milk production systems in the Netherlands was underexposed. In this paper, two Dutch milk production systems, i.e. a conventional and an organic, were compared on their integral environmental impact and hotspots were identified in the conventional and organic milk production chains. Identification of a hotspot provides insight into mitigation options for conventional and organic milk production. Data of commercial farms that participated in two pilot-studies were used and refer to the year 2003. For each farm, a detailed cradle-to-farm-gate life cycle assessment, including on and off farm pollution was performed. Results showed better environmental performance concerning energy use and eutrophication potential per kilogram of milk for organic farms than for conventional farms. Furthermore, higher on-farm acidification potential and global warming potential per kilogram organic milk implies that higher ammonia, methane, and nitrous oxide emissions occur on farm per kilogram organic milk than for conventional milk. Total acidification potential and global warming potential per kilogram milk did not differ between the selected conventional and organic farms. In addition, results showed lower land use per kilogram conventional milk compared with organic milk. In the selected conventional farms, purchased concentrates was found to be the hotspot in off farm and total impact for all impact categories, whereas in the selected organic farms, both purchased concentrates and roughage were found to be the hotspots in off farm impact.

We recommend to improve integral environmental performance of milk production by: (1) reducing the use of concentrates ingredients with a high environmental impact, (2) decreasing the use of concentrates per kilogram of milk, and (3) reducing nutrient surpluses by improving farm nutrient flows.
Keywords: Life cycle assessment; Integral environmental impact; Milk production system; Organic; Conventional; Hotspot identification; Dairy farming

Goddert von Oheimb, Werner Hardtle, Pascale S. Naumann, Christina Westphal, Thorsten Assmann, Hartmut Meyer, Long-term effects of historical heathland farming on soil properties of forest ecosystems, Forest Ecology and Management, Volume 255, Issues 5-6, 5 April 2008, Pages 1984-1993, ISSN 0378-1127, DOI: 10.1016/j.foreco.2007.12.021. (http://www.sciencedirect.com/science/article/pii/S0378112707009620)
Abstract:
Much of Europe's landscape has been converted from agricultural land to forest over the last 150 years. Previous land-use activities may have persistent effects on forest ecosystem properties, yet there is scant information on the long-term recovery of forest soils from agriculture. In this study we examined the effects of historical heathland farming on forest soil properties by comparing (i) ancient oak forests with oak stands afforested more than 115 years ago on (ii) former heaths and (iii) formerly cultivated fields in NW Germany. Our results showed that former fields had significantly lower C, N, and P stores and lower C/N- and C/P-ratios in the organic layer than former heaths and ancient oak forests, but revealed more plant-available P, higher total P contents and low C/P-ratios in the A-horizon. We concluded that higher plant-available P and P stores in the A-horizon reflected well the former manuring of fields, while lower C, N, and P stores in the O-horizon were related to the age of the forest floor. Differences between former heaths and ancient forests were less pronounced and characterized by a low base saturation (BS) and high C/N-ratio in the organic layer of ancient forests, attributable to nutrient sequestration in forest biomass and to changes in microbial communities, respectively. In our study, organic layer and A-horizon served as complementary tracers for land-use legacies, since some of the effects of historical heathland farming were only detectable by means of properties of one of the humus horizons. Our findings demonstrate that heathland farming needs to be considered as a 'historical site factor' when analysing forest ecosystem processes, since soil legacies resulting from heathland farming may still impact present-day patterns of biodiversity and tree growth in lowland forest ecosystems.
Keywords: Afforestation; Ancient forests; Carbon; Nitrogen; Phosphorus; Quercus petraea

Christine H. Stark, Leo M. Condron, Maureen O'Callaghan, Alison Stewart, Hong J. Di, Differences in soil enzyme activities, microbial community structure and short-term nitrogen mineralisation resulting from farm management history and organic matter amendments, Soil Biology and Biochemistry, Volume 40, Issue 6, Special Section: Functional Microbial Ecology: Molecular Approaches to Microbial Ecology and Microbial Habitats, 18th World Congress of Soil Science, June 2008, Pages 1352-1363, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.09.025. (http://www.sciencedirect.com/science/article/pii/S003807170700394X)
Abstract:

Changes in soil microbial biomass, enzyme activities, microbial community structure and nitrogen (N) dynamics resulting from organic matter amendments were determined in soils with different management histories to gain better understanding of the effects of long- and short-term management practices on soil microbial properties and key soil processes. Two soils that had been under either long-term organic or conventional management and that varied in microbial biomass and enzyme activity levels but had similar fertility levels were amended with organic material (dried lupin residue, Lupinus angustifolius L.) at amounts equivalent to 0, 4 and 8 t dry matter lupin ha-1. Microbial biomass C and N, arginine deaminase activity, fluorescein diacetate hydrolysis, dehydrogenase enzyme activity and gross N mineralisation were measured in intervals over an 81-day period. The community structure of eubacteria and actinomycetes was examined using PCR-DGGE of 16S rDNA fragments. Results suggested that no direct relationships existed between microbial community structure, enzyme activities and N mineralisation. Microbial biomass and activity changed as a result of lupin amendment whereas the microbial community structure was more strongly influenced by farm management history. The addition of 4 t ha-1 of lupin was sufficient to stimulate the microbial community in both soils, resulting in microbial biomass growth and increased enzyme activities and N mineralisation regardless of past management. Amendment with 8 t lupin ha-1 did not result in an increase proportional to the extra amount added; levels of soil microbial properties were only 1.1-1.7 times higher than in the 4 t ha-1 treatment. Microbial community structure differed significantly between the two soils, while no changes were detected in response to lupin amendment at either level during the short-term incubation. Correlation analyses for each treatment separately, however, revealed differences that were inconsistent with results obtained for soil biological properties suggesting that differences might exist in the structure or physiological properties of a microbial component that was not assessed in this study.
Keywords: Microbial community structure; DGGE; Microbial biomass; Nitrogen mineralisation; Enzyme activity; Green manure amendment; Lupin (Lupinus angustifolius L.); Organic and conventional farming practices

Birgit Roitner-Schobesberger, Ika Darnhofer, Suthichai Somsook, Christian R. Vogl, Consumer perceptions of organic foods in Bangkok, Thailand, Food Policy, Volume 33, Issue 2, April 2008, Pages 112-121, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2007.09.004.
(http://www.sciencedirect.com/science/article/pii/S0306919207000516)
Abstract:
In response to food scares related to high levels of pesticide residues sometimes found on vegetables and fruits, consumers in Thailand increasingly demand `safe' foods. This has resulted in a number of initiatives and labels indicating `pesticide safe' vegetables. However, the pesticide-residue problem has proved enduring. This opens a market opportunity for organic foods, which are produced entirely without using synthetic chemicals. As little is known on consumer perception of organic foods in Thailand, a survey was conducted in Bangkok. More than a third of the 848 respondents reported having purchased organic vegetables or fruits in the past. The main reasons for purchasing organic products are that consumers expect them to be healthier, that organic products are environmentally friendly. The respondents who have bought organic vegetables tend to be older, have a higher education level and a higher family income than those who have not bought them.

The main barrier to increasing the market share of organic vegetables is that consumers do not clearly differentiate between the various `pesticide safe' labels and the organic labels. Informing consumers about unique characteristics of organic production methods, the strict inspection and required third party certification might be a promising strategy to develop the market for organic vegetables in Thailand's urban centers.
Keywords: Asia; Organic agriculture; Organic farming; Consumer survey; Urban; Food safety; Food labels

Albert Romero, Lourdes Chamorro, Francesc Xavier Sans, Weed diversity in crop edges and inner fields of organic and conventional dryland winter cereal crops in NE Spain, Agriculture, Ecosystems & Environment, Volume 124, Issues 1-2, Special Section: Problems and Prospects of Grassland Agroecosystems in Western China, March 2008, Pages 97-104, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.08.002.
(http://www.sciencedirect.com/science/article/pii/S0167880907002009)
Abstract:
A comparative survey of weed vegetation in organic and conventional dryland winter cereal fields was performed in central Catalonia (NE Spain) in order to assess the effects of agricultural intensification on the diversity, structure and composition of weed communities. A total of 36 cereal fields were surveyed in nine agricultural sites, where a pair of one long-established organic and one conventional farms were selected. Weed surveys were carried out before harvest in 2003 and 2004, taking into account the spatial pattern. Organic practices produced an increase in weed cover, species richness and Hill's first order diversity (but not in equitability), as well as a shift in weed vegetation composition, which favoured potentially rare arable, broad-leaved, insect-pollinated and legume weeds. Weed diversity was concentrated in the crop edges, especially in the weed communities of conventional cereal fields, which were found to be more spatially heterogeneous than the organic ones.
Keywords: Weed diversity; Organic farming; Crop management; Crop edges; Dryland winter cereals

Tina Kutti, Arne Ervik, Tore Hoisaeter, Effects of organic effluents from a salmon farm on a fjord system. III. Linking deposition rates of organic matter and benthic productivity, Aquaculture, Volume 282, Issues 1-4, 30 September 2008, Pages 47-53, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2008.06.032.
(http://www.sciencedirect.com/science/article/pii/S0044848608004596)
Abstract:
The vertical flux of organic matter and infauna production, biomass and abundance at six stations along a gradient away from a salmon farm, located in a western Norwegian fjord at a depth of 230 m and which produced 2910 tonnes of fish in 19 months, was measured repeatedly during an entire on-growth cycle. The study showed that large increases in benthic secondary production can result from the loading of organic waste in nutrient-poor systems like fjords and a strong correlation between annual sedimentation rates of particulate organic matter (carbon and nitrogen) and annual benthic secondary production was found. At the stations that received the bulk of the waste matter (stations situated within 250 m from the mooring point of the farm) infauna production followed feeding regimes at the farm and in 2004 annual benthic secondary production was 40 g ash-free dry weight m- 2, 50 times as high as the production 550 to 3000 m away from the farm.

Production close to the farm was mainly due to the polychaete Heteromastus filiformis and the bivalve Abra nitida in periods with moderate loadings of organic matter, and by the polychaete Capitella capitata in periods with high loadings. The results of the study further indicate that the threshold for increased infauna production in this deep benthic ecosystem had been reached at an annual flux of 500 g C m- 2 and that continuous loadings at this magnitude over time might cause overloading of fish farm localities.
Keywords: Organic matter; Secondary production; Infauna; Salmon farming; Environmental impact

Carlos Parra-Lopez, Javier Calatrava-Requena, Tomas de-Haro-Gimenez, A systemic comparative assessment of the multifunctional performance of alternative olive systems in Spain within an AHP-extended framework, Ecological Economics, Volume 64, Issue 4, 1 February 2008, Pages 820-834, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2007.05.004.
(http://www.sciencedirect.com/science/article/pii/S0921800907002777)
Abstract:
The concept of sustainable agriculture is strongly related to the multifunctional role, either explicitly or implicitly, recognized to the primary sector. When assessing the performance and value to society of particular agricultural systems, the multifunctional nature of agriculture requires an approach based on multicriteria. Amongst others, these include economic, environmental, social, cultural and technical criteria. Like other complex multicriteria analyses, this evaluation of agricultural systems is characterized by the existence of not only many, but often conflicting criteria, multiple stakeholders and decision-makers who have competing interests, lack of information and a consideration of the high risks involved.
The Analytic Hierarchy Process (AHP) is a methodology that deals with problems of this sort in a relatively easy, flexible and economical manner. Therefore it is a potentially useful tool for the practical resolution of complex problems, often an object of Ecological Economics. One such problem is the analysis of the sustainability of economic activities.
This article has three aims. The first is to present AHP as a powerful methodology for assessing multifunctional performances of different agricultural systems in a comparative way. AHP can also be applied to other multifunctional economic activities. The second aim is to propose an extension of AHP for improving the decision-making processes when different groups of decision agents are involved. A final aim is to illustrate the AHP-extended methodology in a particular case study. This is done by using it to compare the multifunctional performance of alternative olive growing systems in Andalusia, a region located in the south of Spain, on the basis of the assessments of different groups of experts. This tests the hypothetically greater sustainability of organic and integrated farming over conventional farming systems in the medium/long term under average conditions for this region. Results for this case study show a greater global performance of organic and integrated agriculture despite differences in the ideological tendencies of the experts, thus providing a scientific basis for endorsing institutional and social support for the promotion and implementation of these farming techniques. Some conflictive issues, however, have been detected, especially in areas related to environmental performance. Further research on the controversial topics is desirable for clarification.

Keywords: Sustainable agriculture; Multifunctionality; Multicriteria analysis; Group decision-making; Analytic Hierarchy Process (AHP); Conventional, organic and integrated olive farming

Havard Steinshamn, Erling Thuen, White or red clover-grass silage in organic dairy milk production: Grassland productivity and milk production responses with different levels of concentrate, Livestock Science, Volume 119, Issues 1-3, December 2008, Pages 202-215, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.04.004.
(http://www.sciencedirect.com/science/article/pii/S1871141308001145)
Abstract:
Red (RC) or white (WC) clover were grown in mixture with grasses, ensiled and offered to dairy cows in early lactation over two successive years (48 cows per year) to compare grassland yield, feed intake, milk production and milk quality. The crops were ensiled in round bales and proportional mixtures of the second and third cut prepared each year were used to ensure that the silage treatments were representative of the crop. In addition to silage type, concentrate supplementation, without and with (10 kg/day), was included as a factor in a 2 x 2 factorial, continuous experiment. Total dry matter (DM) yield, silage chemical composition and total DM intake was hardly affected by silage type. There was no effect of silage type on milk yield and milk constituents either, except for higher milk protein content ($P < 0.05$) on WC and higher milk fat content of C18:3n-3 ($P < 0.001$), C18:2n-6 ($P < 0.05$) fatty acids (FAs) and sum of polyunsaturated FA ($P < 0.001$) and lower n-6/n-3 FA ratio ($P < 0.01$) on RC. Concentrate supplementation increased total DM, N and net energy intakes ($P < 0.001$), milk yield ($P < 0.001$), milk fat ($P < 0.01$) and protein ($P < 0.001$) content, decreased the milk urea content ($P < 0.001$), and increased the milk fat content of short- and medium-chained FAs (< C16, $P < 0.001$), C18:0 ($P < 0.01$) and C18:2n-6 ($P < 0.001$), decreased the content of C16:0 ($P < 0.05$), C18:1t11 ($P < 0.001$) and C18:3n-3 ($P < 0.001$), and increased the n-6/n-3 FA ratio ($P < 0.001$). The effect of concentrate supplementation was not affected by silage type, except for milk protein content where the positive effect of supplementation was stronger on WC than on RC diets ($P < 0.05$). This study illustrates that the white- and red clover-grass mixtures investigated were widely similar with regard to their effects on grassland yield, silage intake and milk production and milk constituents, except for a higher milk fat content of C18:3n-3 and C18:2n-6 and lower n-6/n-3 FA ratio on red clover diets. Our findings also show that N conversion efficiency from feed to milk on pure forage diets is more sensitive to changes in dietary protein intake than silage diets containing cereal based concentrates.
Keywords: Organic farming; Legumes; Silage; Concentrate supplementation; Milk production; Fatty acids

Maria Lourdes San Diego-McGlone, Rhodora V. Azanza, Cesar L. Villanoy, Gil S. Jacinto, Eutrophic waters, algal bloom and fish kill in fish farming areas in Bolinao, Pangasinan, Philippines, Marine Pollution Bulletin, Volume 57, Issues 6-12, 5th International Conference on Marine Pollution and Ecotoxicology, 2008, Pages 295-301, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.03.028.
(http://www.sciencedirect.com/science/article/pii/S0025326X08001811)
Abstract:
The coastal waters of Bolinao, Pangasinan, Philippines experienced environmental changes over a 10-year period (1995-2005), the most

significant effect of which was the major fish kill event in 2002 that coincided with the first reported Philippine bloom of a dinoflagellate Prorocentrum minimum. Days before the bloom, dissolved oxygen was <2.0 mg/l in the waters that were stratified. These conditions may be linked to the uncontrolled proliferation of fish pens and cages to more than double the allowable limit of 544 units for Bolinao waters. Mariculture activities release organic matter from unconsumed feed and fecal material that accumulate in the water and sediments. In over 10 years, water quality conditions have become eutrophic with ammonia increasing by 56%, nitrite by 35%, nitrate by 90%, and phosphate by 67%. The addition of more fish pens and cages placed additional stress to this poorly flushed, shallow area that affected water quality due to changes in the water residence time.
Keywords: Eutrophication; Algal bloom; Fish kill; Residence time; Bolinao, Pangasinan; Chanos chanos (milkfish); Prorocentrum minimum

Gloria I. Guzman, Antonio M. Alonso, A comparison of energy use in conventional and organic olive oil production in Spain, Agricultural Systems, Volume 98, Issue 3, October 2008, Pages 167-176, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.06.004.
(http://www.sciencedirect.com/science/article/pii/S0308521X08000747)
Abstract:
The current situation of worldwide concern over the emission of greenhouse gases and its effect on the climate demands an evaluation, from the perspective of energy efficiency and more specifically of non-renewable energy sources, of tendencies for change in the management of agricultural systems which have arisen in recent years. This article uses energy balances to evaluate the contribution of organic olive growing to the increase in the energy efficiency of Mediterranean agriculture, distinguished according to type of watering regime and intensiveness of cultivation. The results show, on one side, the lower energy efficiency of irrigated land as opposed to dryland (i.e. non-irrigated) regardless of their style of management and, on the other, the greater non-renewable energy efficiency of organic olive growing in comparison with the conventional production. Nevertheless, organic management could still improve its energy efficiency if it further adjusts and internalizes the flows of nutrients needed in order to achieve greater sustainability.
Keywords: Sustainable agriculture; Energy efficiency; Olive; Organic farming; Agroecology; Spain

S. Elmholt, P. Schjonning, L.J. Munkholm, K. Debosz, Soil management effects on aggregate stability and biological binding, Geoderma, Volume 144, Issues 3-4, 15 April 2008, Pages 455-467, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.12.016.
(http://www.sciencedirect.com/science/article/pii/S0016706108000025)
Abstract:
In order to improve our understanding of soil aggregation, we have studied the relative importance of bonding and binding mechanisms, especially how they scale according to aggregate size and how they are influenced by farming system and different management options. Topsoil samples were collected from four arable sandy loam soils found as two pairs (FP1 and FP2) of neighbouring fields. One of the fields in FP2 had been grown for decades with annual cash crops without application of organic manures, while the other three fields had been managed with diversified crop rotations and manure dressings. Aggregates were segregated from the bulk soil by promoting brittle failure. The samples

of soil structural units were fractionated to 4-8 mm, 0.5-1 mm and 0.063-0.25 mm aggregates during a process of air-drying with minimum energy input (e.g. short sieving times). We measured microbial biomass, ergosterol, clay dispersibility, hot-water extractable carbohydrates, and hyphal length. Generally, all four soils showed no significant differences among aggregate size classes in the content of microbial biomass, hot-water extractable carbohydrates and hyphal length. The FP2 soil grown with annual cash crops had significantly lower values for all soil attributes than its neighbouring soil, while a more complex pattern was observed for the FP1 soils. Our results do not indicate scaling according to aggregate size of the binding and bonding mechanisms studied. Results from the three fields with diversified crop rotations indicate satisfactory levels of bonding and binding agents for creation of stable aggregates. Exhaustion of soil organic matter as found in the cash crop system seems to change the way that clay particles interact with the biotic agents in aggregation.
Keywords: Soil structure; Aggregates; Organic farming; Carbohydrates; Clay; Hyphal length

Inger Elisabeth Maren, Vigdis Vandvik, Kristine Ekelund, Restoration of bracken-invaded Calluna vulgaris heathlands: Effects on vegetation dynamics and non-target species, Biological Conservation, Volume 141, Issue 4, April 2008, Pages 1032-1042, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.01.012.
(http://www.sciencedirect.com/science/article/pii/S0006320708000505)
Abstract:
The coastal heathlands of north-western Europe are endangered habitats of great conservation value. Invasion by bracken Pteridium aquilinum is a major challenge for conservation and restoration of these heathlands, including the under-studied northern regions. Today, the herbicide asulam is the most widely applied bracken control measure, but increasing focus on organic farming and nature conservation calls for alternative, preferably mechanical, approaches. In a 7-year replicated field experiment in western Norway, we investigated efficiencies of the four bracken control measures asulam, Gratil, annual cutting and biannual cutting, in restoring the characteristic heathland vegetation structure and species composition. We specifically tested herbicide effects on diversity and composition of non-target species. Effects of treatments over time were evaluated by repeated measures ANOVA, and for multivariate data, Principal Response Curves. Our results show that UK based control methods are largely applicable to bracken at its northern limit in the European heathland habitat. Asulam resulted in the fastest reduction in cover but cutting proved equally efficient long-term. Community compositions progressed towards desired heathland vegetation, but successional trajectories differed. Asulam had unintended effects on a number of heathland species not predictable by species characteristics or functional groups. Gratil failed to have any long-term effects. In summary, cutting is as efficient as herbicide application in reducing bracken, and more so in restoring northern heathland vegetation over time.
Keywords: Asulam; Conservation management; Gratil; Northern heathlands; Organic farming; Pteridium aquilinum

E.M. Papatheodorou, E. Efthimiadou, G.P. Stamou, Functional diversity of soil bacteria as affected by management practices and phenological stage of Phaseolus vulgaris, European Journal of Soil Biology, Volume

44, Issue 4, July-August 2008, Pages 429-436, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.06.002.
(http://www.sciencedirect.com/science/article/pii/S1164556308000654)
Abstract:
This study focused on the effect of management regime and crop developmental stage on soil bacterial functional diversity by using GN Biolog plates. The fields examined were: a grazed grassland (Gr), 2 conventional cultivations differing in the amount and the quality of chemical inputs (C-1 and C-2) and 5 fields cultivated organically for 14, 10, 8, 5 and 2 years respectively. All agricultural lands were cultivated with Phaseolus vulgaris L. Sampling was conducted at seedling emergence, in the mid-growth and after harvest. Low values of diversity were recorded in grassland and conventional fields with the lowest ones in C-2 field. In organic fields, diversity was not related to the age of organic cultivation. However, despite diversity similarities a gradual evolution in community functionality was recorded that parallel changes in the rate of substrate consumption. Increased catabolic activity and diversity followed by changes in the composition of consumed wells occurred in the middle of the phaseolus growth period. Finally, the effect on catabolic profiles of crop developmental stage in conjunction with seasonally varying abiotic conditions was of greater magnitude than that of management regime. The temporal changes in bacterial functionality were totally absent at the C-2 field.
Keywords: BIOLOG; Conventional vs organic farming; Phaseolus vulgaris; Kinetic parameters; Chemical inputs

F. Bernatchez, R. Jeannotte, C.B.M. Begg, C. Hamel, J.K. Whalen, Soil fertility and arbuscular mycorrhizal fungi related to trees growing on smallholder farms in Senegal, Journal of Arid Environments, Volume 72, Issue 7, July 2008, Pages 1247-1256, ISSN 0140-1963, DOI: 10.1016/j.jaridenv.2007.12.014.
(http://www.sciencedirect.com/science/article/pii/S0140196307003448)
Abstract:
Tree cultivation in the dryland agroecosystems is increasingly advocated as a strategy to protect and reverse soil fertility decline, thus sustaining agricultural production. Woody legumes trees like the Ana tree Faidherbia albida (Del.) Chev. host N2-fixing bacteria as well as arbuscular mycorrhizal fungi (AMF), which may contribute to the soil organic carbon pool and soil fertility. The objective of this work was to determine how trees influenced AMF and soil fertility in the agroecosystems of two rural communities (Palmarin and Fimela) of the Saloum Agricultural Eco-Region of Senegal. Smallholder farmers typically cultivated 3-4 fields ranging in size from 0.5 to 2.0 ha with the major crop being millet (Pennisetum glaucum L.). Soil fertility was low to medium, with about 1% soil organic matter (SOM), 17+/-2.2 mg Bray-1 P kg-1 and 65+/-5.8 mg extractable K kg-1 in the fields studied. There were seven times more trees per hectare and greater tree diversity in fields around Palmarin, where the smallholder farmers resided, than in the fields they cultivated in Fimela. Social norms appeared to protect trees inside the residential village, while trees farther away are prone to being cut. The relationships between trees, AMF and soil fertility were examined using exploratory path analysis, a structural equation modeling technique. The path analysis model revealed a direct and significant ($P<0.05$) impact of trees on SOM and pH, which in turn affected the plant-available nitrogen and phosphorus

concentrations. The hypothesized relationships between trees, AMF and soil fertility were not supported.
Keywords: Agroforestry; Dryland farming systems; Glomalin; Soil organic matter; West Africa

Sarah Ann Wheeler, What influences agricultural professionals' views towards organic agriculture?, Ecological Economics, Volume 65, Issue 1, 15 March 2008, Pages 145-154, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2007.05.014.
(http://www.sciencedirect.com/science/article/pii/S0921800907003382)
Abstract:
Organic agriculture is a farming system that is considered by some to have beneficial impacts on the future sustainability of agriculture. Although some research has studied the attitudes of consumers and farmers, in particular what factors influence the willingness of consumers to pay organic premiums and what factors influence farmers to adopt organic farming, no studies have considered what influences the attitudes of agricultural professionals (extension officers, scientists, academics and researchers). Given the key role that agricultural professionals play in influencing farmer adoption of agricultural innovations and conducting research, their views on farming systems may be critical for overall adoption. This study reports the results of a telephone survey conducted in 2004, with 185 agricultural professionals surveyed for their views towards organic farming. A particular aim was to study how increased knowledge and experience influenced attitudes towards organic agriculture. Using an ordered probit regression framework, some of the significant key influences on attitudes towards organic farming were: knowledge; experience; education; informational; occupational effects; and attitudes on the individual aspects of organic agriculture. The study finds support for the hypothesis that professionals with increased organic knowledge and experience are more likely to think favourably about organic agriculture.
Keywords: Organic agriculture; Attitudes; Knowledge; Agricultural professionals

G.H.R. Osler, L. Harrison, D.K. Kanashiro, M.J. Clapperton, Soil microarthropod assemblages under different arable crop rotations in Alberta, Canada, Applied Soil Ecology, Volume 38, Issue 1, January 2008, Pages 71-78, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.09.003.
(http://www.sciencedirect.com/science/article/pii/S092913930700114X)
Abstract:
We examined the effect of increasing crop diversity on the soil microarthropod assemblage within organic and low-input cropping systems in Alberta, Canada. Microarthropod assemblages were contrasted in rotations of either one or three crop species (low-input system) or two or four crop species (organic system), over 2 years. Mites were sorted to family level and oribatid mites to species level. The abundance of microarthropods and the species richness of oribatid mites in the second year were extremely low in comparison with the first year in both cropping systems. In the organic system, there was a greater number of individuals and mite taxonomic richness per core in the four-species rotation than in the two-species rotation in the first year. There were no differences in the microarthropod assemblages between the two organic rotations in the second year. In the low-input system, the dominance of mite families differed between the one- and three-species rotations in the first year. Species richness was strikingly different

between the two cropping systems in the first year, with 23 oribatid species found in the organic rotations compared with only 12 found in the low-input rotations. Far fewer species were recovered in the second year and differences in species richness between cropping systems were not as marked. Whilst our study shows that cropping systems can affect microarthropod assemblages, the results suggest that year to year variation in mite assemblage structure is extremely large relative to the effects imposed by cropping systems. The richness of oribatid species (27 in total in this study) is amongst the highest recorded in arable agricultural soils anywhere in the world. The oribatid assemblages were dominated by Brachychthoniidae species which appeared to be able to tolerate arable agricultural practices such as tillage. The dominance of this group may be unique to Canadian prairie soils.
Keywords: Organic farming; Oribatid mites; Species richness

Marianne Holmer, Marina Argyrou, Tage Dalsgaard, Roberto Danovaro, Elena Diaz-Almela, Carlos M. Duarte, Morten Frederiksen, Antoni Grau, Ioannis Karakassis, Nuria Marba, Simone Mirto, Marta Perez, Antonio Pusceddu, Manolis Tsapakis, Effects of fish farm waste on Posidonia oceanica meadows: Synthesis and provision of monitoring and management tools, Marine Pollution Bulletin, Volume 56, Issue 9, September 2008, Pages 1618-1629, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.05.020. (http://www.sciencedirect.com/science/article/pii/S0025326X08003160)
Abstract:
This paper provides a synthesis of the EU project MedVeg addressing the fate of nutrients released from fish farming in the Mediterranean with particular focus on the endemic seagrass Posidonia oceanica habitat. The objectives were to identify the main drivers of seagrass decline linked to fish farming and to provide sensitive indicators of environmental change, which can be used for monitoring purposes. The sedimentation of waste particles in the farm vicinities emerges as the main driver of benthic deterioration, such as accumulation of organic matter, sediment anoxia as well as seagrass decline. The effects of fish farming on P. oceanica meadows are diverse and complex and detected through various metrics and indicators. A safety distance of 400 m is suggested for management of P. oceanica near fish farms followed by establishment of permanent seagrass plots revisited annually for monitoring the health of the meadows.
Keywords: Environmental impacts; Fish farming; Seagrass; Sediment; Management; Monitoring; Mediterranean

Valentina Niccolucci, Alessandro Galli, Justin Kitzes, Riccardo M. Pulselli, Stefano Borsa, Nadia Marchettini, Ecological Footprint analysis applied to the production of two Italian wines, Agriculture, Ecosystems & Environment, Volume 128, Issue 3, November 2008, Pages 162-166, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.05.015. (http://www.sciencedirect.com/science/article/pii/S0167880908001771)
Abstract:
This paper compares the Ecological Footprint of two typical Tuscan wines, one conventional and one organic, to determine which type of wine production, under which circumstances, places a greater demand for ecosystem goods and services. All inputs of the agricultural, winery and packing phases were converted into an area of biologically productive land (in global hectares) as a measure of the demand for natural capital. In order to consider the process in its entirety, wine distribution, from the production to the consumption site, was also included. The conventional production system was found to have a

Footprint value almost double than the organic production, mainly due to the agricultural and packing phases. These examples suggest that viable means of reducing the Ecological Footprint of wine production could include organic procedures, a decrease in the consumption of fuels and chemicals, and an increase in the use of recycled materials in the packing phase.
Keywords: Ecological Footprint; Wine; Organic production; Sustainable farming; Sensitivity; Actual vs. global hectare

Esther Zeltner, Helen Hirt, Factors involved in the improvement of the use of hen runs, Applied Animal Behaviour Science, Volume 114, Issues 3-4, 1 December 2008, Pages 395-408, ISSN 0168-1591, DOI: 10.1016/j.applanim.2008.04.007.
(http://www.sciencedirect.com/science/article/pii/S0168159108001160)
Abstract:
Free-range systems improve the welfare of laying hens. However, hen runs are often used only close to the poultry house and only a small proportion of hens are outside. Several studies indicate that structuring elements in the hen run improve the frequency and distribution of hens in the run. In our experiments we studied the characteristics of structures which have effects on the use of the free-range area. In two choice experiments we investigated whether hens prefer a greater amount of covered area or a greater diversity of structuring elements. Following this, we investigated whether hens have a better distribution in the range area when they first have to go through a corridor before reaching the grass-covered part of the run. In the final experiment in this series we tried to optimise hen runs, using the results from the previous experiments, on several farms to validate these results under practical conditions.
During the choice experiment investigating the number of structures, hens showed no preference for being on the part with 5% of area covered with structures, compared to only 1%. However, more hens preferred the part containing different structures, compared to the part containing only one kind of structuring element. The hens were better distributed in the hen run when they had direct access to the run, rather than having to go through a corridor. During the on-farm experiment, more hens were outside in the optimised hen runs and were found more frequently in the part farther away from the poultry house. The hens preferred to stay close to structures providing shelter and shade. However, diverse structures attracted the hens more for foraging.
A hen run should contain different structuring elements, equally distributed around the whole area.
Keywords: Laying hens; Free-range system; Use of hen runs; Shelters; Organic farming

Eva Klimankova, Katerina Holadova, Jana Hajslova, Tomas Cajka, Jan Poustka, Martin Koudela, Aroma profiles of five basil (Ocimum basilicum L.) cultivars grown under conventional and organic conditions, Food Chemistry, Volume 107, Issue 1, 1 March 2008, Pages 464-472, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.07.062.
(http://www.sciencedirect.com/science/article/pii/S0308814607007182)
Abstract:
A headspace solid-phase microextraction (HS-SPME) method coupled to gas chromatography-ion trap mass spectrometry (GC-ITMS) has been developed and applied for profiling of volatile compounds released from five Ocimum basilicum L. cultivars grown under both organic and conventional conditions. Comprehensive two-dimensional gas chromatography coupled to

time-of-flight mass spectrometry (GCxGC-TOFMS) was employed for confirmation of identity of volatiles extracted from the basil headspace by SPME.
Linalool, methyl chavicol, eugenol, bergamotene, and methyl cinnamate were the dominant volatile components, the relative content of which was found to enable differentiating between the cultivars examined. The relative content of some sesquiterpenes, hydrocarbons benzenoid compounds, and monoterpene hydrocarbons was lower in dried and frozen leaves as compared to fresh basil leaves.
A sensory analysis of the all examined samples proved the differences between evaluated cultivars.
Keywords: Solid-phase microextraction (SPME); Basil; Ocimum basilicum L.; Ecological farming; Volatiles; Terpenes; Gas chromatography (GC); Ion trap mass spectrometry (ITMS); Comprehensive two-dimensional gas chromatography (GCxGC); Time-of-flight mass spectrometry (TOFMS)

N. Monokrousos, E.M. Papatheodorou, G.P. Stamou, The response of soil biochemical variables to organic and conventional cultivation of Asparagus sp., Soil Biology and Biochemistry, Volume 40, Issue 1, January 2008, Pages 198-206, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.08.001.
(http://www.sciencedirect.com/science/article/pii/S0038071707003343)
Abstract:
In this paper we aim to examine long-term effects caused by applying alternative management regimes to soil system, such as organic farming, and to compare them with short-term effects represented by seasonal agricultural steps such as fertilizing, harvesting, etc. To complete this task we focus on soil quality in organic and conventional fields. We compared soil biochemical variables among fields with different durations of organic cultivation (2, 3, 5 and 6 years) and one with conventional cultivation (CV). All fields were planted with a common perennial plant (Asparagus officinalis L.) and were subject to the same seasonal management cycle (fertilizing, crop harvest, incorporation of above-ground residues, etc.). Soil samples were collected four times throughout a year (March, May, September, December) corresponding to the main phases of the management cycle. The questions explored in this study were the following: (a) Do long-term changes due to the management regime (organic vs. conventional) have a greater effect upon soil variables than the seasonal (short-term) changes within the management cycle itself? (b) On the basis of soil biochemical status, can we distinguish between fields that have been under organic cultivation for different durations? (c) Do the importance of variables in fields' distinction related to specific management phases? According to principal component analysis, we found that the soil biochemical status owed far more to the phase within the management cycle than to the management regime. Among sampling periods, December was characterized by greater heterogeneity of soil variables, which could be attributed to biomass laying on the soil surface which stimulated the microbial community with consequent changes in NH_4^+, NO_3^-, N-mineralization and C-mineralization rate. The importance of soil variables in fields' distinction was related to the specific management phase. The differences among fields, even in the cases of extractable P and organic N were not systematic. In addition, 10% of samples of the oldest organic field, shared common soil features with samples belonging to the newest organically cultivated field. This high intra-variability showed that none of the examined fields has developed systematically different soil characteristics. Therefore, our data

show, at least for some crops, that indicators of soil quality (e.g. organic C and microbial biomass C) need not always improve with the duration of organic cultivation in a simple manner.
Keywords: Organic and conventional cultivation; Classification trees; Neural networks; Non-linear statistical approaches; Microbial community; Soil quality

S.M. Smukler, L.E. Jackson, L. Murphree, R. Yokota, S.T. Koike, R.F. Smith, Transition to large-scale organic vegetable production in the Salinas Valley, California, Agriculture, Ecosystems & Environment, Volume 126, Issues 3-4, July 2008, Pages 168-188, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.028.
(http://www.sciencedirect.com/science/article/pii/S016788090800039X)
Abstract:
Studying the management strategies suited to large-scale organic production, particularly during the mandated 3-year transition period from conventional management, is a unique research challenge. Organic production traditionally relies on small, diverse plantings and complex management responses to cope with soil fertility and pest pressures, so research should represent decision-making options of an organic grower at the farm scale. This study analyzes crop, soil, pest and management changes during the organic transition period on two ranches (40 and 47 ha) in the Salinas Valley, California in cooperation with a large conventional vegetable producer, Tanimura and Antle, Inc. Permanent transects were established across the two ranches at the onset of adoption of organic practices, and soil and plants were sampled at harvest of almost all crops, while all management operations were recorded by the co-operator. The ~10 ha blocks were divided into many small plantings, and 17 different cash crop and cover crop species were planted during the transition period. Management inputs consisted of a range of organic fertilizers and amendments, sprinkler and drip irrigation, cultivation and hand-hoeing, and several types of organic pesticides. Results from the 3-year period followed these general trends: increase in soil biological indicators (microbial biomass and arbuscular mycorrhizae), low soil nitrate pools, adequate crop nutrients, minor disease and weed problems, and sporadic mild insect damage. Multivariate statistical analyses indicated that some crops and cultivars consistently produced higher yields than others, relative to the maximum yield for a given crop. Multi-factor contingency tables showed clear differences in insect and disease damage between crop taxa. Although Tanimura and Antle, Inc. used some of the principles of organic farming (e.g., crop diversity, crop rotation, and organic matter (OM) management), they also relied on substitution-based management, such as fertigation with soluble nutrients, initially heavy applications of organic pesticides, and use of inputs derived from off-farm sources. Their initial production of a large number of crop taxa in small plantings at staggered intervals proved to be an effective strategy for avoiding risks from low yields or crop failure and allowed them to move towards a smaller number of select, successful crops towards the end of the transition. This study demonstrates the feasibility of large-scale producers to transition to organic practices in a manner that was conducive to both production goals and environmental quality, i.e., increased soil C pools, low soil nitrate, and absence of synthetic pesticides.
Keywords: Organic; Transition; Soil; Cropping systems; Regression trees; Canonical correspondence analysis

N. Fall, K. Forslund, U. Emanuelson, Reproductive performance, general health, and longevity of dairy cows at a Swedish research farm with both organic and conventional production, Livestock Science, Volume 118, Issues 1-2, October 2008, Pages 11-19, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.01.017.
(http://www.sciencedirect.com/science/article/pii/S187114130800019X)
Abstract:
Data from a 12-year longitudinal study was used to compare reproductive performance (RP), general animal health, and longevity in conventionally managed dairy cows and organically managed dairy cows. All cows were held at the same farm and managed by the same personnel. The management of the groups was basically alike, with the main exception being differences in feed composition and feeding regimes. Management of the organic group was done according to the Swedish standards for organic farming, which are certified by the International Federation of Agricultural Movements. The data for this study included all cows calving from September 1, 1990 to August 31, 2001; in total 154 organically and 156 conventionally managed animals. Calving-to-first insemination and calving interval were recorded to characterize RP. Animal health was studied by recording the number of veterinary treated cases of disease. Finally, we studied the length of productive life, from 1st calving to removal. Multivariable models were applied in the analyses to account for variables such as milk yield, parity, breed, calving season, and year of calving. Conventionally managed dairy cows in 3rd lactation or more were found to have longer time from calving-to-first service than organically managed dairy cows. Beside that difference, the groups did not differ in any aspect of RP. Comparisons of number of veterinary treated cases of disease per lactation and the length of productive life revealed no significant differences or trends. With this unique study design, applied in a well managed herd, we were not able to demonstrate any obvious differences in RP, general health or longevity between organically and conventionally managed dairy cows.
Keywords: Organic dairy cow; Reproduction; Health; Longevity

Gregory Evanylo, Caroline Sherony, John Spargo, David Starner, Michael Brosius, Kathryn Haering, Soil and water environmental effects of fertilizer-, manure-, and compost-based fertility practices in an organic vegetable cropping system, Agriculture, Ecosystems & Environment, Volume 127, Issues 1-2, August 2008, Pages 50-58, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.02.014.
(http://www.sciencedirect.com/science/article/pii/S0167880908000662)
Abstract:
Degraded soil quality, which decreases agricultural productivity and increases nonpoint source pollution of surface water, may be ameliorated by employing soil organic matter enhancing management, such as practiced by compost use in organic farming. The value of compost applied at rates lower than those required to supply crop nutrient needs requires investigation because applying compost at agronomic nitrogen rates may not be economically feasible for organic vegetable producers. We conducted field research during 2000-2002 on a Luvisol to compare the nutrient and non-nutrient effects of various rates and timings of mixed poultry litter-yard waste compost with a traditional organic fertilizer (poultry litter) and inorganic fertilizer on environmental soil attributes and water quality in an organic vegetable crop rotation. Soil organic C, total N, and available P increased 60%, 68%, and 225%, respectively, above the control with the application of

144 Mg ha-1 compost (dry wt.) during the 3-year study, but the low rate of compost (31 Mg ha-1) did not affect soil C or N. Compost N mineralization was not synchronous with sweet corn N assimilation, resulting in excess root zone nitrate that would have posed a leaching risk without the use of a winter rye N-scavenging cover crop. The concentrations of nitrate N that leached below the tillage zone occasionally exceeded the 10 mg L-1 health standard but were not different among the agronomic rates of compost, poultry litter, fertilizer, and control treatments for nearly every sampling event. Despite increasing runoff water concentrations of N and P, the high compost rate reduced the amounts of N and P that were transported from the soil surface by five-fold and four-fold, respectively, compared to the inorganic fertilizer due to a four-fold reduction in runoff volume. Crop yields did not benefit from low compost rates during the 3-year duration of the study; however, improvements in some bulk density and porosity indicated that benefits of longer term, low compost rate additions may accrue over time.
Keywords: Carbon (C); Compost; Infiltration; Nitrogen (N); Organic matter; Phosphorus (P); Poultry litter; Runoff; Soil quality; Water quality

J.M. Miranda, M. Guarddon, B.I. Vazquez, C.A. Fente, J. Barros-Velazquez, A. Cepeda, C.M. Franco, Antimicrobial resistance in Enterobacteriaceae strains isolated from organic chicken, conventional chicken and conventional turkey meat: A comparative survey, Food Control, Volume 19, Issue 4, April 2008, Pages 412-416, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2007.05.002.
(http://www.sciencedirect.com/science/article/pii/S0956713507001041)
Abstract:
Mean counts of Enterobacteriaceae were determined for 30 samples each of organic chicken meat, conventional chicken meat and conventional turkey meat to assess differences in contamination. Two strains from each sample were isolated to obtain a total of 180 strains, which were examined for resistance to ampicillin, chloramphenicol, cephalothin, doxycycline, ciprofloxacin, gentamicin, nitrofurantoin, and sulfisoxazole. The mean counts of Enterobacteriaceae from organic chicken meat were significantly higher than those obtained from conventional chicken ($P < 0.0001$) or conventional turkey ($P < 0.0001$) meat. However, the resistance data obtained showed that isolates from organic chicken meat were less resistant than isolates from conventional chicken meat to ampicillin ($P = 0.0001$), chloramphenicol ($P = 0.0004$), doxycycline ($P = 0.0013$), ciprofloxacin ($P = 0.0034$), gentamicin ($P = 0.0295$) and sulfisoxazole ($P = 0.0442$), and were less resistant than isolates from turkey meat to doxycycline ($P = 0.0014$) and sulfisoxazole ($P = 0.0442$). Multidrug resistant isolates were found in every group tested, but rates of multidrug resistant strains were higher in conventional chicken (63.3%) and turkey (56.7%) than organic chicken (41.7%) meat. The rates obtained for antimicrobial resistance support the theory that although organic chicken meat contains more Enterobacteriaceae contamination, organic farming practices contribute to decreased dissemination of antibiotic resistance.
Keywords: Poultry; Organic; Enterobacteriaceae; Antimicrobial; Resistance

Bo Liu, Deborah Glenn, Katrina Buckley, Trichoderma communities in soils from organic, sustainable, and conventional farms, and their relation with Southern blight of tomato, Soil Biology and Biochemistry,

Volume 40, Issue 5, May 2008, Pages 1124-1136, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.12.005.
(http://www.sciencedirect.com/science/article/pii/S0038071707004725)
Abstract:
The objectives of this research were to investigate the relationship between propagule numbers and genetic diversity of Trichoderma species and Southern blight of tomato caused by soilborne plant pathogen Sclerotium rolfsii in soils with long-term organic, sustainable, and conventional farms. Dilution plating was use to quantify the propagule numbers of Trichoderma, denaturing gradient gel electrophoresis (DGGE) and DNA sequence analysis were used to identify Trichoderma species, and greenhouse assay were conducted for soil suppressiveness to Southern blight. The propagule numbers of Trichoderma tend to be higher in soils from conventional farms. There was no clear separation for the propagule numbers of Trichoderma based on different management systems using canonical correspondence analysis (CCA). However, there was general separation for total microbial communities based on organic and conventional management systems using CCA. That suggests that the difference of soil suppressiveness to disease from organic, sustainable, and conventional farms is due to the difference of the total microbial diversity but not directly due to the Trichoderma populations in each farming system. The propagule numbers of soil Trichoderma did not significantly correlate with the diseases suppressiveness, although individual species of Trichoderma harzianum was shown to be related to disease suppressiveness. Moreover, several Trichoderma species were found in the soil tested based on DGGE and DNA sequence analysis. Trichoderma hamatum, T. harzianum, Trichoderma virens, and Trichoderma erinaecem were the most abundant species in tested soil.
Keywords: Trichoderma spp.; Organic and conventional; Dilution plating; DGGE; DNA sequence analysis; Canonical correspondence analysis (CCA)

Roberto Altieri, Alessandro Esposito, Olive orchard amended with two experimental olive mill wastes mixtures: Effects on soil organic carbon, plant growth and yield, Bioresource Technology, Volume 99, Issue 17, November 2008, Pages 8390-8393, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.02.048.
(http://www.sciencedirect.com/science/article/pii/S0960852408001934)
Abstract:
Amendments of olive orchard soil with two different preparations of olive mill solid waste (OMWMs) at the rate of 9 ton ha-1 per year for five years in two different plots were compared with an industry standard soil amendment using urea. Both the OMWMs amendments showed significant increases in total organic carbon and humic substances in soil of approximately 40% and 58%, respectively, without negative effects on tree growth and yield. This work has shown that olive oil mill waste (OMW) can be recycled safely using the bioremediation system used in this study. We suggest that this system is particularly beneficial to organic farming and is an alternative solution to direct spreading of raw OMW on farm lands.
Keywords: Olive-mill waste; Amendment; Organic carbon; Humification

Vincent M.P. Bouchet, Pierre-Guy Sauriau, Influence of oyster culture practices and environmental conditions on the ecological status of intertidal mudflats in the Pertuis Charentais (SW France): A multi-index approach, Marine Pollution Bulletin, Volume 56, Issue 11,

November 2008, Pages 1898-1912, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.07.010.
(http://www.sciencedirect.com/science/article/pii/S0025326X08003810)
Abstract:
The ecological quality status (EcoQ) of intertidal mudflats constrained by Pacific oyster farming was assessed by single (H', AMBI, BENTIX and BOPA) and multimetric (M-AMBI and average score) index approaches in the Pertuis Charentais (SW France). Fifteen sampling stations were monitored seasonally for sedimentological features and macrozoobenthos in 2004. Sediments affected by oyster biodeposits showed organic matter enrichment, and sediments from off-bottom culture sites had higher organic matter contents and lower redox potentials than sediments from on-bottom culture sites. Biotic indices consistently registered responses of macrozoobenthos to organic enrichment but there was only partial agreement between single index-derived EcoQs. The average score was better than M-AMBI and single indices for determining EcoQs. Accordingly, oyster farming alters intertidal macrozoobenthic assemblages moderately, and off-bottom cultures cause more disturbance than on-bottom cultures. Hydrodynamics and seasons may interact with culture practices in smothering/strengthening biodeposition-mediated effects through dispersal/accumulation of biodeposits.
Keywords: Oyster farming practices; Intertidal mudflats; Biotic index; Benthic macrofauna; Seasonal variations; Exposed/sheltered

Y. Zhang, Y.C. Zhao, X.Z. Shi, X.X. Lu, D.S. Yu, H.J. Wang, W.X. Sun, J.L. Darilek, Variation of soil organic carbon estimates in mountain regions: A case study from Southwest China, Geoderma, Volume 146, Issues 3-4, 31 August 2008, Pages 449-456, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.06.015.
(http://www.sciencedirect.com/science/article/pii/S0016706108001791)
Abstract:
Soil organic carbon (SOC) is an important soil component of farming systems and plays a key role in terrestrial ecosystems. However, there is a large variation in SOC estimates at both regional and global scales. The widely used soil type method is usually projected using a planimetric approach, and hence SOC estimates vary notably compared to those generated from more rigorous 3-D surfaces describing rugged terrain. In order to improve the accuracy of SOC storage estimates for regions with complex landforms, this paper examined the causes of variability in estimated SOC storage and SOC density in the upper 1 m soil depth based on 798 soil profiles from Southwest China. The study area is a region with rugged terrain, including the Guangxi Zhuang Autonomous Region, and the Guizhou and Yunnan Provinces.
Three methods, the soil profile statistics (SPS), the GIS-based planar soil type (GST-2D), and the GIS-based three-dimensional soil type (GST-3D), were applied to estimate SOC storage. Results demonstrate that the GST-3D, which used soil surface area data, was more accurate than the other two methods. The SOC storages estimated by the SPS and the GST-2D methods were lower than the GST-3D mainly due to the underestimation of soil acreage. Of the four geomorphologic units represented in the study area, the complex landforms with slopes greater than 18.2[degree sign] covered more than 30%. There is a relatively big difference (> 6%) between planimetric projection area and surface area in this region, making the effect of landform on the estimate of SOC an important factor to be considered. However, such thresholds (30% and 18.2[degree sign]) as terrain descriptor boundaries need to be further verified in other mountainous regions.

Keywords: Soil organic carbon (SOC); Soil profile statistics (SPS); Surface area; Projection area; Variation

Audun Korsaeth, Relations between nitrogen leaching and food productivity in organic and conventional cropping systems in a long-term field study, Agriculture, Ecosystems & Environment, Volume 127, Issues 3-4, September 2008, Pages 177-188, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.03.014.
(http://www.sciencedirect.com/science/article/pii/S0167880908001229)
Abstract:
An ideal agricultural system should both maximize food production and minimize undesirable effects on the environment. The long-term Apelsvoll cropping system experiment, located in southeast Norway, was used in this study, to compare yields, major N flows (in particular measured leaching/runoff losses) and the N loss-to-food production ratios (LFP-ratios) in six different cropping systems over a 4-year period. The experiment included three systems with cash-cropping (CA1: conventional arable farming; CA2: arable farming practice with environmentally sound management; OA: organic arable farming with 25% of the area as green manure, and three systems with both arable and fodder crops, representing mixed dairy production (CM: conventional farming practice with 50% grass-clover ley; OM1: organic farming with 50% grass-clover ley; OM2: organic farming with 75% grass-clover ley). The forage production was assumed to be used for milk and meat production, in amounts calculated on the basis of available feed and estimated requirements for dairy cattle. All farm produce (cereals, potatoes, milk and meat) was converted into metabolizable energy for human consumption. Organic cropping gave significantly lower yields than conventional cropping, for both arable and mixed dairy systems, most likely due to sub-optimal plant nutrition and the lack of plant protection in the organic systems. The average net energy production in CA1 and CA2 was 2.4-5.3 times greater than that in the other systems, which illustrates the energy costs of taking 25% of the area out of food production to produce green manure (OA) and the energy cost of including an extra trophic level in the nutrient chain (CM, OM1 and OM2). Only CA2 and CM appeared to have a balanced N budget, whereas the other systems all had N deficits, in particular CA1 and OA. The total N losses to drainage were largest from CA1, but not significantly larger than those from OA, which had the largest N runoff of the systems, most likely due to the green manure in its rotation. The conventional system with environmentally sound management (CA2) had the lowest LFP-ratios overall. Among the arable cropping systems, the organic system with 25% green manure (OA) had the highest LFP-ratios. The mixed dairy systems had generally higher LFP-ratios than the arable systems. Including leaching/runoff N losses in the LFP-ratio, CA1, CA2, OA, CM, OM1 and OM2 appeared to lose 0.6, 0.4, 1.1, 0.9, 1.2 and 1.1 kg N, respectively, per GJ of produced metabolizable energy for human consumption.
Keywords: Arable cropping systems; Cereal yields; Human nutrition; Food production; Loss-to-production ratios; Mixed dairy systems; Net energy production; Nitrogen budgets; Yields

Hugh Riley, Reidun Pommeresche, Ragnar Eltun, Sissel Hansen, Audun Korsaeth, Soil structure, organic matter and earthworm activity in a comparison of cropping systems with contrasting tillage, rotations, fertilizer levels and manure use, Agriculture, Ecosystems &

Environment, Volume 124, Issues 3-4, April 2008, Pages 275-284, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.11.002.
(http://www.sciencedirect.com/science/article/pii/S0167880907002605)
Abstract:
In order to assess long-term effects on productivity, environmental impacts and soil fertility of contrasting farming practices, six cropping systems, ranging from conventional arable without livestock to organic mixed dairy farming with few arable crops, have been compared since 1989 on a loam soil. A decline in soil structure quality was found in a conventional arable system with annual ploughing with no rotational grass. This system had higher bulk density and mean aggregate size than other systems, and lower levels of plant available water and aggregate stability. Opposite trends were related to the proportion of grass leys in the other systems and to their levels of soil organic matter. The latter declined markedly over 15 years in the conventional arable system, and there were smaller declines in most other systems. In an arable system without ploughing, but with rotary tillage in spring, organic matter was maintained and high structural stability was found. This system had high bulk density, but the proportion of small aggregates equalled that found in systems with ley. There were overall increases in earthworm density (84%), earthworm biomass (80%) and the density of earthworm channels (132%) in the topsoil between 1994 and 2004. Most of these increases were found in systems with 1-3 years of ley in the 4-year rotation. Low values of all earthworm parameters, and only minor changes over the period studied, were found in two non-organic arable systems without ley, indicating high pressure on soil fauna. Lower earthworm activity was found in the non-organic arable system with reduced tillage as compared to the non-organic arable system with annual ploughing. Thus, 50% leys in the rotation appeared desirable for the maintenance of satisfactory soil structure and earthworm activity. Though the deterioration of soil structure in the conventional arable system was not extreme, as the soil was well structured initially, the results may have implications for the sustainability of stockless arable systems on soils with a less favourable initial structure.
Keywords: Aggregates; Arable; A. caliginosa; Bulk density; Ley; L. terrestris; Porosity; Stability; Soil quality

An Coorevits, Valerie De Jonghe, Joachim Vandroemme, Rieka Reekmans, Jeroen Heyrman, Winy Messens, Paul De Vos, Marc Heyndrickx, Comparative analysis of the diversity of aerobic spore-forming bacteria in raw milk from organic and conventional dairy farms, Systematic and Applied Microbiology, Volume 31, Issue 2, 26 June 2008, Pages 126-140, ISSN 0723-2020, DOI: 10.1016/j.syapm.2008.03.002.
(http://www.sciencedirect.com/science/article/pii/S0723202008000192)
Abstract:
Bacterial contamination of raw milk can originate from different sources: air, milking equipment, feed, soil, faeces and grass. It is hypothesized that differences in feeding and housing strategies of cows may influence the microbial quality of milk. This assumption was investigated through comparison of the aerobic spore-forming flora in milk from organic and conventional dairy farms. Laboratory pasteurized milk samples from five conventional and five organic dairy farms, sampled in late summer/autumn and in winter, were plated on a standard medium and two differential media, one screening for phospholipolytic and the other for proteolytic activity of bacteria. Almost 930 isolates were obtained of which 898 could be screened via fatty acid methyl

ester analysis. Representative isolates were further analysed using 16S rRNA gene sequencing and (GTG)5-PCR. The majority of aerobic spore-formers in milk belonged to the genus Bacillus and showed at least 97% 16S rRNA gene sequence similarity with type strains of Bacillus licheniformis, Bacillus pumilus, Bacillus circulans, Bacillus subtilis and with type strains of species belonging to the Bacillus cereus group. About 7% of all isolates may belong to possibly new spore-forming taxa. Although the overall diversity of aerobic spore-forming bacteria in milk from organic vs. conventional dairy farms was highly similar, some differences between both were observed: (i) a relatively higher number of thermotolerant organisms in milk from conventional dairy farms compared to organic farms (41.2% vs. 25.9%), and (ii) a relatively higher number of B. cereus group organisms in milk from organic (81.3%) and Ureibacillus thermosphaericus in milk from conventional (85.7%) dairy farms. One of these differences, the higher occurrence of B. cereus group organisms in milk from organic dairy farms, may be linked to differences in housing strategy between the two types of dairy farming. However, no plausible clarification was found for the relatively higher number of thermotolerant organisms and the higher occurrence of U. thermosphaericus in milk from conventional dairy farms. Possibly this is due to differences in feeding strategy but no decisive indications were found to support this assumption.
Keywords: Aerobic spore-formers; Bacillus s.l.; Raw milk; Organic vs. conventional

Nikolaos Lampadariou, Ioanna Akoumianaki, Ioannis Karakassis, Use of the size fractionation of the macrobenthic biomass for the rapid assessment of benthic organic enrichment, Ecological Indicators, Volume 8, Issue 5, September 2008, Pages 729-742, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2008.01.003.
(http://www.sciencedirect.com/science/article/pii/S1470160X08000046)
Abstract:
A new biomass index for monitoring the impact of marine fish cage farming on the benthic environment was evaluated at seven commercial fish farms in the eastern Mediterranean. At each farm, stations near and further away from the cages were sampled for macrofauna and geochemical variables during July 2001, and March and October 2002. Benthic samples were sequentially sieved through 1.0 and 0.5 mm mesh screens and a biomass fractionation index (BFI) was estimated as follows: biomass having passed through 1.0 mm and retained on 0.5 mm sieve only/total biomass (biomass retained on 1.0 mm + 0.5 mm sieve). BFI was quantitatively assessed and compared with the geochemical faunistic and management practice data. BFI was found to decrease consistently with distance from fish cages and particularly after 10 m from the edge of the cages. At all farms, BFI was found to be significantly correlated with distance, redox potential and organic carbon. Multiple regression analysis showed that BFI incorporates various components of sediment geochemistry (sediment grain size and total organic carbon) as well as distance and feeding rates. Although BFI needs to be further tested in different geographic locations and under different management practices, the results seem to be promising for long-term monitoring programmes since it provides a simple and inexpensive solution for assessing the effects of benthic organic enrichment due to fish farm activities.
Keywords: Biomass fractionation index (BFI); Macrobenthos monitoring; Benthic enrichment; Aquaculture; Mediterranean

Luigi Vezzulli, Mariapaola Moreno, Valentina Marin, Elisabetta Pezzati, Marco Bartoli, Mauro Fabiano, Organic waste impact of capture-based Atlantic bluefin tuna aquaculture at an exposed site in the Mediterranean Sea, Estuarine, Coastal and Shelf Science, Volume 78, Issue 2, 20 June 2008, Pages 369-384, ISSN 0272-7714, DOI: 10.1016/j.ecss.2008.01.002.
(http://www.sciencedirect.com/science/article/pii/S0272771408000061)
Abstract:
A variety of pelagic and benthic parameters were measured at an aquaculture farm used for the fattening of Atlantic bluefin tuna (Thunnus thynnus) which is located at an exposed site (700 m from the coast, average bottom depth of 45 m and average current speed of 6 cm s-1) in the Mediterranean Sea. The objective was to test whether modern off-shore tuna fattening industries can exert a sustainable organic waste impact on the receiving environment as has been reported for the offshore culture of more traditional Mediterranean species such as sparids. In the water column, the concentration of phytopigments, organic matter, heterotrophic bacteria and the taxonomic abundance of mesozooplankton (at the species level) were assessed. In the sediment, we assessed the concentration of reduced sulphur pools, phytopigments, organic matter, heterotrophic bacteria and the taxonomic abundance of meiofauna (at the taxa level) and nematodes (at the genus level). For most parameters, we found no substantial differences between farm and control sites. Deviations of farm values from control values, when they occurred, were small and did not indicate any significant impact on either the pelagic and benthic environment. Deviations were more apparent in the benthic compartment where lower redox potential values, higher bacterial production rates and a change in nematode genus composition pointed out to early changes in the sediment's metabolism. In addition, indigenous potential pathogenic bacteria showed higher concentration at the fish farm stations and were a warning of an undesirable event that may become established following aquaculture practice in oligotrophic environments. The overall data from this study provide extensive experimental evidence to support the sustainability of modern offshore farming technology in minimizing the hypertrophic-dystrophic risks associated with the rapidly-expanding tuna-fattening industry in the Mediterranean Sea.
Keywords: Atlantic bluefin tuna; organic wastes; zooplankton; meiofauna; aquaculture; Mediterranean Sea

U. Bausenwein, A. Gattinger, U. Langer, A. Embacher, H.-P. Hartmann, M. Sommer, J.C. Munch, M. Schloter, Exploring soil microbial communities and soil organic matter: Variability and interactions in arable soils under minimum tillage practice, Applied Soil Ecology, Volume 40, Issue 1, September 2008, Pages 67-77, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2008.03.006.
(http://www.sciencedirect.com/science/article/pii/S092913930800053X)
Abstract:
This study describes an integrated approach (1) to monitor the quantity and quality of water extractable organic matter (WEOM) and size, structure and function of microbial communities in space (depth) and time, and (2) to explore the relationships among the measured properties. The study site was an arable field in Southern Germany under integrated farming management including reduced tillage. Samples of this Eutric Cambisol soil were taken in July 2001, October 2001, April 2002 and July 2002 and separated into three depths according to the soil profile (0-10 cm, 10-28 cm and 28-40 cm). For each sample, the

quantity and quality (humification index, HIX) of water extractable organic matter (WEOM) were measured concomitantly with soil enzyme activities (alkaline phosphatase, [beta]-glucosidase, protease) and microbial community size (Cmic). Furthermore, microbial community structure was characterised based on the fingerprints of nucleic acids (DNA) as well as phospholipid fatty acids (PLFA). We observed strong influences of sampling date and depth on the measured parameters, with depth accounting for more of the observed variability than date. Increasing depth resulted in decreases in all parameters, while seasonal effects differed among variants. Principal component (PC) analysis revealed that both DNA and PLFA fingerprints differentiated among microbial communities from different depths, and to a smaller extent, sampling dates. The majority of the 10 PLFAs contributing most to PC 1 were specific for anaerobes. Enzyme activities were strongly related to Cmic, which was depending on water extractable organic carbon and nitrogen (WEOC and WEON) but not to HIX. HIX and WEOM interact with the microbial community, illustrated by (1) the correlation with the number of PLFA peaks (community richness), and (2) the correlations with community PC analysis scores.
Keywords: Tillage; Microbial community structure; Enzymatic activities; Organic carbon

Matt Reed, The rural arena: The diversity of protest in rural England, Journal of Rural Studies, Volume 24, Issue 2, Social Movements and Rural Politics, April 2008, Pages 209-218, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2007.12.006.
(http://www.sciencedirect.com/science/article/pii/S0743016707000836)
Abstract:
In the past 15-20 years, the rural areas of England have been used by a wide diversity of groups as the stage for their protest activities. Some have argued that this is due the rise of a rural social movement; this paper contends that rural areas have become both available and advantageous as the locale of protest through a range of interlocking factors. Firstly, that the rise of the network society has repositioned the societal importance of rural areas. Secondly, that the governance of rural areas has changed, allowing the social stake of rurality to be more widely contested. Thirdly, that opportunities to protest have shifted in favour of rural spaces, in terms of technology and policing. Through a discussion of recent changes in rural England and three case studies, The Land is Ours, Farmers for Action and the Organic Food and Farming Movement, this paper examines these changes and what they mean for the future of rural England.
Keywords: Social movements; Rural protest; Organic movement; England

Jennifer R. Reeve, Jeffrey L. Smith, Lynne Carpenter-Boggs, John P. Reganold, Soil-based cycling and differential uptake of amino acids by three species of strawberry (Fragaria spp.) plants, Soil Biology and Biochemistry, Volume 40, Issue 10, October 2008, Pages 2547-2552, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.06.015.
(http://www.sciencedirect.com/science/article/pii/S0038071708002150)
Abstract:
Evidence is growing that amino acids can be an important source of plant N in nutrient limited natural ecosystems, but relatively little is known about the effect of agricultural management on soil amino acid pools and turnover. Organic management in particular relies on slow-release organic inputs as fertilizer, which could result in greater pools of soil amino acids available for plant uptake. Moreover, we know

little about potential differences in amino acid uptake ability within plant families and whether this ability may have been lost during domestication. In order to determine the relative effects of soil type and management on amino acid turnover, we measured the effect of fine- versus coarse-textured soil and organic versus conventional management on free amino acids and proteolytic activity in the field. Secondly, we conducted greenhouse experiments to determine the ability of domestic and wild strawberry to utilize amino acid-N. Fine-textured and organically managed soils contained significantly higher total C and N than coarse-textured and conventionally managed soils. There were no significant differences in free amino acids or protease activity in relation to texture or management. Amino acid turnover was calculated at 0.7-1.5 h. Turnover time was significantly greater in fine-textured soils. Turnover time as a result of substrate additions was significantly shorter in coarse-textured soils; in fine-texturedsoils turnover time was shorter under conventional management. This suggests less competition for amino acids in soils with greater C, N and/or cation exchange capacity (CEC), such as fine-textured and organically managed soils. Two wild species of strawberry, Fragaria virginiana and Fragaria chiloensis, took up significantly more 14C labeled glycine than the domesticated species, Fragaria fragaria. More research is needed to determine whether strawberry cultivars could be selected or bred for their ability to capture amino acid-N, thus improving N-use efficiency in farming systems relying on the breakdown of organic matter as a N source.
Keywords: Amino acid uptake; Amino acid turnover; Strawberry; Organic agriculture

N. Fall, Y.T. Grohn, K. Forslund, B. Essen-Gustafsson, R. Niskanen, U. Emanuelson, An Observational Study on Early-Lactation Metabolic Profiles in Swedish Organically and Conventionally Managed Dairy Cows, Journal of Dairy Science, Volume 91, Issue 10, October 2008, Pages 3983-3992, ISSN 0022-0302, DOI: 10.3168/jds.2008-1099.
(http://www.sciencedirect.com/science/article/pii/S0022030208710269)
Abstract:
The aim of this observational study was to compare indicators of energy balance in early lactation in organically managed dairy cows (OMC) and conventionally managed dairy cows (CMC) under field conditions. The diets of OMC and CMC differ as a consequence of the rules and principles of organic dairy farming. The study was based on clinical examinations and blood samples from cows within the range from 2 wk prepartum to 6 wk postpartum, collected from 20 organic and 20 conventional dairy farms with 3 visits at each farm. The farms were located in a southeastern area of Sweden and ranged in size from 45 to 120 cows. The blood parameters selected to reflect energy metabolism were nonesterified fatty acids, [beta]-hydroxybutyrate, glucose, and insulin. At clinical examination body condition score was registered. The shape of the lactation curve in early lactation was modeled to assess potential differences that could explain the blood parameter profiles. The conventionally managed cows increased their milk yield faster than OMC within the first 2 wk of lactation. Blood nonesterified fatty acid concentrations were similar between the management types, but with a tendency of lesser concentrations in OMC, primarily in early lactation. Postcalving [beta]-hydroxybutyrate concentrations were constantly lesser in OMC during the first 6 wk of lactation. An interaction between season and insulin concentration necessitated stratification on season. During spring the profiles overlapped, but

there was a significant difference in the first 4 d post-calving, when organically managed cows had greater insulin concentrations and in d 30 to 34 when conventionally managed cows had greater insulin concentrations. During fall the profiles overlapped completely and there was no significant difference at any point in time. Glucose concentrations tended to decrease slightly postcalving followed by a gradual elevation to a concentration just under the precalving concentration during the study period. Body condition scores decreased slightly over the study period. No differences were found between the management types with regard to glucose concentrations or registered body condition score. In conclusion, the OMC did not show a greater extent of mobilization of body tissue than CMC as expressed by our study variables. Hence, OMC adjusted the production amount according to feed intake.
Keywords: organic dairy cow; metabolic profile

Sebastiana Melero, Karl Vanderlinden, Juan Carlos Ruiz, Engracia Madejon, Long-term effect on soil biochemical status of a Vertisol under conservation tillage system in semi-arid Mediterranean conditions, European Journal of Soil Biology, Volume 44, Issue 4, July-August 2008, Pages 437-442, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.06.003.
(http://www.sciencedirect.com/science/article/pii/S1164556308000666)
Abstract:
Long-term field experiments are expected to provide important information regarding soil properties affected by conservation management practices. Several studies have shown that soil enzyme activities are sensitive in discriminating among soil management effects. In this study we evaluated the long-term effect of direct drilling (DD) under a crop rotation system (cereals-sunflower-legumes), on the stratification of soil organic matter content and on biochemical properties in a dryland in southwest Spain. The results were compared to those obtained under conventional tillage (CT). Soil biochemical status was evaluated by measuring the enzymatic activities (dehydrogenase, [beta]-glucosidase, alkaline phosphatase and arylsulphatase) during the flowering period of a pea crop. Soil samples were collected in May 2007 at three depths (0-5, 5-10 and 10-20 cm). Total organic carbon (TOC) contents and values of soil enzyme activities were higher in soils subjected to DD than to CT, specifically at 0-5 cm depth. Although a slight decrease of TOC and enzymatic activities with increasing soil depth was observed, no significant differences were found among different depths of the same treatment. This could be related to the high clay content of the soil, a Vertisol. Enzyme activities values showed high correlation coefficients (from $r = 0.799$ to $r = 0.870$, $p < 0.01$) with TOC. Values of activity of the different enzymes were also correlated ($p < 0.01$). Values of stratification ratios did not show significant differences between tillage practices. The high clay content of the soil is responsible for this lack of differences because of the protection by clay mineral of TOC and soil enzymes activities.
Long-term soil conservation management by direct drilling in a dryland farming system improved the quality of a clay soil, especially at the surface, by enhancing its organic matter content and its biological status.
Keywords: Clay content; Direct drilling; Dryland; Enzymatic activities; Sustainable agriculture; Total organic carbon

Elena Diaz-Almela, Nuria Marba, Elvira Alvarez, Rocio Santiago, Marianne Holmer, Antoni Grau, Simone Mirto, Roberto Danovaro, Anthony Petrou, Marina Argyrou, Ioannis Karakassis, Carlos Manuel Duarte, Benthic input rates predict seagrass (Posidonia oceanica) fish farm-induced decline, Marine Pollution Bulletin, Volume 56, Issue 7, July 2008, Pages 1332-1342, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.03.022. (http://www.sciencedirect.com/science/article/pii/S0025326X0800177X)
Abstract:
Fish farms represent a growing source of anthropogenic disturbance to benthic communities, and efficient predictors of such impacts are urgently needed. We explored the effects of fish farm benthic organic and nutrient inputs on the population dynamics of a key seagrass species (Posidonia oceanica) in four Mediterranean deep meadows adjacent to sea bream and sea bass farms. We performed two annual plant censuses on permanent plots at increasing distance from farms and measured benthic sedimentation rates around plots. High shoot mortality rates were recorded near the cages, up to 20 times greater than at control sites. Recruitment rates increased in variability but could not compensate mortality, leading to rapid seagrass decline within the first 100 m from cages. Seagrass mortality increased with total sedimentation rates (K = 0.55, p < 0.0002), and with organic matter (K = 0.50, p = 0.001), total nitrogen (K = 0.46, p = 0.002) and total phosphorus (K = 0.56, p < 3 [middle dot] 10-5) inputs. P. oceanica decline accelerated above a phosphorus loading threshold of 50 mg m-2 day-1. Phosphorus benthic sedimentation rate seems a powerful predictor of seagrass mortality from fish farming. Coupling direct measurements of benthic sedimentation rates with dynamics of key benthic species is proposed as an efficient strategy to predict fish farm impacts to benthic communities.
Keywords: Aquaculture; Conservation; Benthic inputs; Organic loading; P loading; Population dynamics; Seagrass; Thresholds

Margrethe Askegaard, Jorgen Eriksen, Residual effect and leaching of N and K in cropping systems with clover and ryegrass catch crops on a coarse sand, Agriculture, Ecosystems & Environment, Volume 123, Issues 1-3, January 2008, Pages 99-108, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.05.008. (http://www.sciencedirect.com/science/article/pii/S0167880907001612)
Abstract:
In low input farming systems without inorganic N-fertilizer input, cereal cropping is a challenge because of the need for an adequate N supply. The objective of this investigation was to explore the feasibility of using clover (red/white) catch crops instead of ryegrass in crop production on coarse sand. Two field experiments tested the effects of clover and ryegrass catch crops on N and K leaching and on grain yield of a succeeding spring barley. Treatments included animal manure regimes, main crops (spring barley = low soil N status or lupin = high soil N status) and levels of K fertilizer (no K or 80 kg K ha-1). The residual effect of the clover catch crop on grain yield of the succeeding spring barley was significantly higher than that of the ryegrass, especially under the low N conditions. When animal manure (70 kg total-N ha-1) was added to the spring barley succeeding a ryegrass catch crop, the difference in residual effect between clover and ryegrass catch crops disappeared. Thus, clover appeared to have the potential to substitute animal manure. Leaching of NO3-N and K was estimated by means of porous ceramic suction cups installed at 1 m

depth. Both the clover and ryegrass catch crops reduced the annual flow-weighted mean NO3-N concentrations from 13-16 to 5-8 mg L-1, which is below the WHO maximum for drinking water. The annual NO3-N leaching from a spring barley treatment without catch crops was approximately 100 kg ha-1. Clover and ryegrass catch crops reduced the losses significantly by approximately 40-80% depending on year and treatment, with ryegrass being more effective than clover. Catch crops reduced K leaching significantly but the relative effect was lower than for N. The clover catch crops appeared suitable for low-N cropping systems on coarse sand with respect to both production and environment.
Keywords: Organic agriculture; White clover; Red clover; Perennial ryegrass; Animal manure; Low soil fertility

Andreas de Neergaard, Jakob Magid, Ole Mertz, Soil erosion from shifting cultivation and other smallholder land use in Sarawak, Malaysia, Agriculture, Ecosystems & Environment, Volume 125, Issues 1-4, May 2008, Pages 182-190, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.12.013.
(http://www.sciencedirect.com/science/article/pii/S0167880908000042)
Abstract:
The sustainability of shifting cultivation systems and their impact on soil quality continues to be debated, and although a growing body of literature shows a limited impact on, e.g. soil carbon stocks, shifting cultivation still has a reputation as detrimental to the environment. We wished to compare soil erosion from three land use types in a shifting cultivation system, namely upland rice, pepper gardens and native forest. We used two sample sites within the humid tropical lowland zone in Sarawak, Malaysia. Both areas had steep slopes between 25[degree sign] and 50[degree sign], and were characterised by a mosaic land use of native forest, secondary re-growth, upland rice fields and pepper gardens. Soil samples were collected to 90 cm depth from all three land use types, and analysed for various chemical parameters, including texture, total organic matter and 137Cs content. 137Cs is a radioactive isotope derived from nuclear fallout, and was used to estimate the retention of topsoil in the profiles. Soil chemical parameters in upland rice fields, such as extractable cations, pH and conductivity, indicated limited soil transportation downslope, and depletion of cations from upslope samples are most likely caused by leaching and losses via ashes after clearing and burning. The position on slope had no significant effect on soil texture, carbon or P content, indicating very limited physical movement of soil downslope. A soil carbon inventory to 90 cm depth on the three land uses only showed a higher carbon concentration in the top 5 cm of forest and upland rice plots. When corrected for soil density, there was no effect of land use on the carbon inventory. Moreover, the carbon content in the top 30 cm contributed <50% of the total carbon inventory, hence even significant effects of land use on carbon content in the upper soil layers, are unlikely to change the carbon inventory dramatically. 137Cs content in the soil profile indicated largest retention of original topsoil in the native forest plots, and a loss of 18 and 35% of topsoil from upland rice and pepper gardens, respectively, over the past 40 years. When comparing to 30 cm depth, soil loss was 30% from both upland rice and pepper fields. Low 137Cs activity in deeper soil layers rendered a total profile inventory impossible. It is concluded that shifting cultivation of upland rice in the current system is not leading to degradation of soil chemical and physical quality. The soil carbon

inventory is not affected by land use in this analysis, due to the contribution from the deeper soil layers.
Keywords: 137Cs; Erosion; Upland rice; Black pepper; Soil carbon; Slash-and-burn; Swidden farming

Frederique Angevin, Etienne K. Klein, Cecile Choimet, Arnaud Gauffreteau, Claire Lavigne, Antoine Messean, Jean Marc Meynard, Modelling impacts of cropping systems and climate on maize cross-pollination in agricultural landscapes: The MAPOD model, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 471-484, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.010.
(http://www.sciencedirect.com/science/article/pii/S1161030107001244)
Abstract:
New concerns about crop coexistence in agricultural landscapes are being expressed in reaction to the prospect of introducing transgenic crops into European cropping systems: these include meeting current consumer demand for non-GM products, respecting threshold levels required for organic farming labels as well as keeping food cultures separated from those destined for the pharmaceutical and energy industries.
To address these concerns in the case of maize crops, we have chosen a modelling approach. Our aim was to simulate cross-pollination in the case of existing agricultural landscapes, taking into account the effect of climate and cropping techniques in order to forecast gene escape from genetically modified maize to non-GM maize. The resulting spatially explicit model, MAPOD (Matricial Approach to POllen Dispersal), is presented in this paper. A preliminary evaluation is also provided.
Pollen exchanges between GM and non-GM maize crops are simulated and influencing factors such as field sizes and shapes, distribution of GM and non-GM fields in the agricultural landscape as well as flowering dates and dynamics are integrated. Model parameter values were either derived from existing models of pollen dispersal or estimated from experimental field studies.
The preliminary evaluation of MAPOD was carried out by comparing simulation results with data from two French and one American gene flow field trials. MAPOD was found to provide good average predictive values.
Examples of output data illustrate the capacity of the model to simulate a wide range of agricultural contexts. These simulation results provide a basis for designing coexistence rules and monitoring procedure set-up.
Keywords: Corn; Pollen dispersal; Flowering; Cropping system; Adventitious presence; Coexistence; Gene flow; GMO

Lucy Jarosz, The city in the country: Growing alternative food networks in Metropolitan areas, Journal of Rural Studies, Volume 24, Issue 3, July 2008, Pages 231-244, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2007.10.002.
(http://www.sciencedirect.com/science/article/pii/S0743016707000654)
Abstract:
Alternative food networks (AFNs) are commonly defined by attributes such as the spatial proximity between farmers and consumers, the existence of retail venues such as farmers markets, community supported agriculture (CSA) and a commitment to sustainable food production and consumption. Focusing upon processes rather than attributes, this paper identifies two place-based processes that both promote and constrain

the emergence and development of AFNs. Urbanization and rural restructuring are critical to the development of AFNs. AFNs are not a 'thing' to be described, but rather emerge from political, cultural and historical processes. The interactions of urbanization and rural restructuring produce AFNs that are differentiated and marked by uneven development that does not necessarily support all farmers participating in the network. This indicates both the fragility and the dynamism inherent in AFNs that are tied to metropolitan development and change. Paradoxically, increasing urban demand for seasonal, and organic produce grown `close to home' and the processes of rural restructuring which emphasize small-scale sustainable family farming and its direct food linkages to cities do not necessarily enable all farmers to consistently make a living from season to season. Evidence for these claims comes from an in-depth, qualitative case study reliant upon participant observation, in-depth interviews and draws from a statewide farmer survey and a regional consumer survey in Washington State.
Keywords: Alternative food network; Sustainable agriculture; Farmers markets; Urban agriculture

Emma Lea, Anthony Worsley, Australian consumers' food-related environmental beliefs and behaviours, Appetite, Volume 50, Issues 2-3, March-May 2008, Pages 207-214, ISSN 0195-6663, DOI: 10.1016/j.appet.2005.07.012.
(http://www.sciencedirect.com/science/article/pii/S0195666307003091)
Abstract:
The aim of this study was to examine Australians' food-related environmental beliefs and behaviours. Questionnaires were posted to 500 randomly selected adults, with 223 questionnaires completed (58% response rate). Decreased use of packaging by food manufacturers was viewed as being the most important item to help the environment, while lower meat consumption was seen as least likely to help. Composting food scraps and purchase or consumption of locally produced foods were the most commonly performed food-related environmental behaviours, while use of organic products was the least commonly performed. Moderate consistency (rs=0.54) was found between reported beliefs and behaviours. Older people were more likely to perform certain food-related environmental behaviours, such as composting. Awareness of the impact on the environment of meat production, organic compared to conventional farming, and food packaging was low even among those who were found to already believe that food-related actions are important to help the environment, suggesting widespread consciousness raising is needed.
Keywords: Food; Environment; Beliefs; Behaviours; Survey; Australia

Marika Truu, Jaak Truu, Mari Ivask, Soil microbiological and biochemical properties for assessing the effect of agricultural management practices in Estonian cultivated soils, European Journal of Soil Biology, Volume 44, Issue 2, March-April 2008, Pages 231-237, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2007.12.003.
(http://www.sciencedirect.com/science/article/pii/S1164556307001744)
Abstract:
A set of soil microbiological and biochemical properties was used to assess the influence of agricultural practices such as rotation, usage of pesticides, and fertilizers on the three most widespread soil types (Calcaric Regosols, Calcaric Cambisols and Stagnic Luvisols) in the fields of horticultural farms throughout Estonia. Microbial biomass, dehydrogenase and alkaline phosphatase activity were significantly

higher in Calcaric Regosols, whereas measured soil chemical parameters showed practically no difference among soil types. Multivariate exploratory analysis of soil biochemical and microbiological parameters clearly distinguished soils with different management practices when the effect of soil type was taken into account in data analysis. Activity of dehydrogenase, potential nitrification, N-mineralisation, and microbial biomass contributed most strongly to the differentiation of soils from differently managed fields. Soils managed according to organic farming principles were generally characterized by elevated microbiological parameter values, but at the same time the variation of those parameters among soils from these fields was also highest. The application of organic manure positively affected microbial biomass, N-mineralisation, potential nitrification, dehydrogenase and acidic phosphatase activity. Data analysis indicated that the amount of mineral nitrogen fertilizers added over time has a stronger effect on microbial biomass than the amount added in a given year. Legume-based crop rotation increased soil respiration and microbial biomass.
Keywords: Agricultural management practice; Microbial activity; Microbial biomass; Soil type

S. Van der Linden, A.M. Mouazen, J. Anthonis, H. Ramon, W. Saeys, Infrared laser sensor for depth measurement to improve depth control in intra-row mechanical weeding, Biosystems Engineering, Volume 100, Issue 3, July 2008, Pages 309-320, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.03.010.
(http://www.sciencedirect.com/science/article/pii/S1537511008001116)
Abstract:
Mechanical weeding is considered as an essential component in organic farming because there are few alternative methods to control intra-row weeds. However, intra-row mechanical weed control still has problems with efficacy due to the absence of, or poor, working depth control, of intra-row mechanical weeders. To improve depth control, intra-row mechanical weeders need to be combined with a sensor, whose output is used to control the depth of the weeders. The purpose of this work was to develop and evaluate a laser-based optical sensor that can be used to improve the working depth control of intra-row mechanical weeders. The performance of the depth sensor in frame height measurement and soil/crop discrimination was investigated under different soil properties and crop types representing field conditions during mechanical weeding. The results showed that the sensor depth measurement was not affected by the soil texture and soil moisture content of Belgian soils under organic farming conditions. The range of depth measurement is approximately 190 mm comprising a mid-point at 365 mm from the measured surface with a precision of at least 1 mm. Because optic filters were used the depth sensor was not influenced by sunlight. The sensor had a mean measurement speed of 35 ms. Furthermore, the sensor has been proved to be able to discriminate between soil and crop samples with a maximum error of 5% and is able to detect the depth in motion with a repeatable precision of 5 mm. In conclusion, the sensor has the ability to detect the working depth and to provide improved depth measurement to enhance depth regulation of intra-row mechanical weeders.

Myriam D. Callier, Christopher W. McKindsey, Gaston Desrosiers, Evaluation of indicators used to detect mussel farm influence on the benthos: Two case studies in the Magdalen Islands, Eastern Canada,

Aquaculture, Volume 278, Issues 1-4, 10 June 2008, Pages 77-88, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2008.03.026.
(http://www.sciencedirect.com/science/article/pii/S0044848608001567)
Abstract:
The aim of this study was to identify appropriate indicators to determine the influence of mussel aquaculture on the benthic environment. Both sediment [particle size, sediment profile imaging (SPI), % OM] and benthic community (abundance, biomass, number of species, Margalef's species richness, Shannon-Weiner diversity, Pielou's eveness, individual body mass, trophic group, a biotic index -- AMBI, and community structure) characteristics were evaluated at two mussel farms in Great-Entry (GE) and Havre-aux-Maisons (HAM) lagoons in the Magdalen Islands (Quebec, Canada). Sampling stations were positioned directly beneath the outer-most mussel lines (0 m) and at distances of 3, 6, 9, 15, 30 m and at a control site (at either 300 or 500 m) along a transect leading from each farm. Contrasting patterns were observed. At GE, sediment characteristics and benthic communities did not vary among stations and were characterized by low diversity, abundance and biomass. At HAM, % OM decreased and macrofaunal diversity and abundance increased with increasing distance from the farm. Biomass was low under the mussel line, increased between 3 and 30 m and was low again at 300 m. This was explained by the abundance of the polychaete Pectinaria granulata, which seems to have benefited from a moderate organic loading associated with the mussel farm. The mean individual biomass of the second-order opportunistic deposit feeders P. granulata and Heteromastus filiformis decreased with distance from the farm, whereas that of the pollution-sensitive suspension feeder Ensis directus and deposit feeder Tellina agilis increased with increasing distance from the farm. At HAM, the effects of mussel farming were restricted to the vicinity of the farm, while at GE the pattern was less clear. The GE mussel farm had either little effect on the local environment or else larger-scale but diffuse effects. The study showed that the a priori choice of the sampling stations and indicators may influence the interpretation of the results. Community structure and SPI were the most efficient indices for detecting both small- and broader-scale influences at both studied mussel farms.
Keywords: Aquaculture effects; Abundance; Biomass; Richness; Diversity; AMBI; Macrofaunal community structure; Organic enrichment; SPI

C. QUANTIN, O. GRUNBERGER, N. SUVANNANG, E. BOURDON, Land Management Effects on Biogeochemical Functioning of Salt-Affected Paddy Soils, Pedosphere, Volume 18, Issue 2, April 2008, Pages 183-194, ISSN 1002-0160, DOI: 10.1016/S1002-0160(08)60006-5.
(http://www.sciencedirect.com/science/article/pii/S1002016008600065)
Abstract:
Most lowlands in Northeast Thailand (Isaan region) are cultivated with rice and large areas are affected by salinity, which drastically limits rice production. A field experiment was conducted during the 2003 rainy season to explore the interactions between salinity and land management in two fields representative of two farming practices: an intensively managed plot with organic inputs and efficient water management, and one without organic matter addition. Field measurements, including pH, Eh, electrical conductivity (EC), and soil solution chemistry, were performed at three depths, with a particular focus on Fe dynamics, inside and outside saline patches.
High reducing conditions appeared after flooding particularly in plots receiving organic matter and reduction processes leading to oxide

reduction and to the release of Fe and, to a lesser extend, Mn to the soil solution. Oxide reduction led to the consumption of H+ and the more the Fe reduction was, the higher the pH was, up to 6.5. Formation of hydroxy-green rust were likely to be at the origin of the pH stabilization. In the absence of organic amendments, high salinity prevented the establishment of the reduction processes and pH value remained around 4. Even under high reduction conditions, the Fe concentrations in the soil solution were below commonly observed toxic values and the amended plot had better rice production yield.
Keywords: field experiment; pH regulation; redox processes; salt-affected paddy soils; soil management

Marta Perez, Tania Garcia, Olga Invers, Juan Manuel Ruiz, Physiological responses of the seagrass Posidonia oceanica as indicators of fish farm impact, Marine Pollution Bulletin, Volume 56, Issue 5, May 2008, Pages 869-879, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2008.02.001. (http://www.sciencedirect.com/science/article/pii/S0025326X08000714)
Abstract:
The development of aquaculture along the Mediterranean coastline degrades the marine environment, in particular Posidonia oceanica meadows, which, in extreme cases, show high mortality. Here we studied the effects of organic matter and nutrient input from the effluents of three fish farms, located along the Mediterranean coast, on P. oceanica physiology. For this purpose, we measured physiological variables such as total nitrogen (N) content, free amino acid (FAA) concentration and composition, N stable isotope ratio ([delta]15N), total phosphorus (P) content and total non-structural carbohydrate (TNC) content in plant tissues and epiphytes affected by organic discharges (highly impacted stations: HI, and less impacted stations: LI) and compared these results with those obtained in references sites (control stations: C). For all the descriptors analyzed in P. oceanica epiphytes, the values recorded in the vicinity of cages were, in general, much higher than those in C. Leaves did not respond consistently in any case. Total N content and [delta]15N in epiphytes together with the total P content in rhizomes and epiphytes were the physiological descriptors that showed the most consistent responses to fish farm effluents. On the basis of these observations, we conclude that fish farm activities strongly affect the physiological parameters of nearby P. oceanica meadows. We propose that changes in these physiological parameters may be useful indicators of marine environmental degradation in studies that monitor the effects of fish farming.
Keywords: Posidonia oceanica; Mediterranean Sea; Fish farm; Bioindicators; Physiology; Epiphytes

Emilie B. Grossmann, David J. Mladenoff, Farms, fires, and forestry: Disturbance legacies in the soils of the Northwest Wisconsin (USA) Sand Plain, Forest Ecology and Management, Volume 256, Issue 4, 10 August 2008, Pages 827-836, ISSN 0378-1127, DOI: 10.1016/j.foreco.2008.05.048. (http://www.sciencedirect.com/science/article/pii/S0378112708004611)
Abstract:
We studied the long-term effects of disturbance within the Northwest Wisconsin (USA) Sand Plain (NWSP), an ecoregion that is characterized by very sandy soil and an active disturbance history that includes fire, agriculture and industrial forestry, largely clearcut logging of jack pine (Pinus banksiana) and aspen (Populus spp.). Open 'barrens' communities on this landscape were formerly maintained by fire, and are a high conservation priority. Hill's Oak (Quercus ellipsoidalis) can

also dominate forest canopies, while blueberry (Vaccinium angustifolium), and sweetfern (Comptonia peregrina) are common shrub species. We structured a field sampling design with a spatial-temporal database built from historic airphotos (1938 and 1997) and fire records to examine whether soil organic matter and nutrients vary with disturbance history in the nonforest habitats of the sand plain. We sampled soils along 83 transects, randomly stratified among five sampled classes: (1) nonforest-farming history; (2) nonforest-fire history; (3) nonforest-clearcut only history; (4) evergreen forest of jack pine and red pine (P. resinosa); and (5) deciduous forest of Hill's oak and aspen. Logging of the original forest took place in the late 1800s-early 1900s. The farms were abandoned between 1938 and 1960, and the most recent fire occurred in 1977. Thus, the duration of the agricultural legacy is approximately 45-65 years while observed fire effects have lasted for 26 years.
We observed strong agricultural legacies, including high P and low OM, N and Ca. One possible explanation for the N legacy is that it is tied to soil OM accretion which may be driven by plant growth. We detected no difference in mean values for any of the soil properties between soils from nonforested areas within the Five-Mile fire and soils from nonforested areas with a clearcut-only history. We did observe a fire effect in high variance for soil P. This could have resulted from variations in fire severity and ash convection and deposition.
Forest soils generally had lower pH than the nonforest soils, and the deciduous forest soils had the lowest pH and also very low Ca. We also observed high within-transect coefficient of variation for Ca in the forest soils.
We conclude that agriculture is a qualitatively different disturbance-type than fire or clearcutting, that disturbance legacies tend to be most persistent with geologically stable elements, such as P, and that management and conservation planning within the NWSP would benefit from site-specific agricultural history, as well as attention to Ca.
Keywords: Northwest Wisconsin Sand Plain; Disturbance legacy; Nitrogen; Organic matter; Phosphorus; Potassium; Calcium; Magnesium; pH; Variance; Scale

Neda Farahbakhshazad, Dana L. Dinnes, Changsheng Li, Dan B. Jaynes, William Salas, Modeling biogeochemical impacts of alternative management practices for a row-crop field in Iowa, Agriculture, Ecosystems & Environment, Volume 123, Issues 1-3, January 2008, Pages 30-48, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.04.004. (http://www.sciencedirect.com/science/article/pii/S016788090700134X)
Abstract:
The management of contemporary agriculture is rapidly shifting from single-goal to multi-goal strategies. The bottleneck of implementing the strategies is the capacity of predicting the simultaneous impacts of change in management practices on agricultural production, soil and water resources and environmental safety. Process-based models provide an opportunity to quantify the impacts of farm management options on various pools and fluxes of carbon (C) and nitrogen (N) in agroecosystems. The denitrification-decomposition or DNDC model was recently modified for simulating N cycling for the U.S. Midwestern agricultural systems. This paper reports a continuous effort on applying the model for estimating the impacts of alternative management practices (e.g., no-till, cover crop, change in fertilizer rate or timing) on agro-ecosystems in the Midwestern U.S. A typical row-crop field in Iowa was selected for the sensitivity tests. The modeled

results were assessed with a focus on four major indicators of agro-ecosystems, namely crop yield, soil organic carbon (SOC) sequestration, nitrate-N leaching loss and nitrous oxide (N2O) emissions. The results indicated that no-till practice significantly increased SOC storage and reduced nitrate-N leaching rate, but slightly decreased crop yield and increased N2O emissions. By modifying the methods of fertilizer application in conjunction with the no-till practice, the disadvantages of no-till could be overcome. For example, increasing the fertilizing depth and using a nitrification inhibitor could substantially reduce N2O emissions and increase crop yield under the no-till conditions. This study revealed the complexity of impacts of the alternative farming management practices across different climate conditions, soil properties and management regimes. Process-based models can play an important role in quantifying the comprehensive effects of management alternatives on agricultural production and the environment.
Keywords: Agro-ecosystem management; Crop yield; DNDC model; Nitrate-N leaching; N2O emission; Soil organic carbon sequestration

L. de Paz, J.M. Neto, J.C. Marques, A.J. Laborda, Response of intertidal macrobenthic communities to long term human induced changes in the Eo estuary (Asturias, Spain): Implications for environmental management, Marine Environmental Research, Volume 66, Issue 2, August 2008, Pages 288-299, ISSN 0141-1136, DOI: 10.1016/j.marenvres.2008.04.004.
(http://www.sciencedirect.com/science/article/pii/S0141113608001529)
Abstract:
Long term macrobenthos data together with physical habitat parameters were analysed to investigate spatial and temporal changes at an estuary under different anthropogenic pressures, mainly increasing shellfish farming. The aim was to assess the possible impacts of these pressures on the macrobenthic communities by comparing a period before and after changes in these pressures. Benthic samples were seasonally collected in 1990 (before major anthropogenic changes), 2000 and 2005 at the same sampling stations located on three different habitats in the Eo estuary (Northern Spanish coast). Multivariate and univariate methods were used to assess spatial variability of benthic assemblages and to compare community changes over time. Data from 1990 was assumed as the reference situation to appraise the subsequent impacts.
We observed a significant spatial variability of the benthic assemblages in the system as a function of habitat heterogeneity in relation to sediment composition, presence/absence and density of seagrasses, and hydrodynamic regime. Changes were detected in the community composition at all sites during this 15 year period. The extent of changes was related to initial community conditions, rather than the intensity of the pressure. The results suggest that the responses of the benthic communities to human induced perturbations occurring in the system are largely dependent on its intrinsic buffer capacity, and that these communities have been able to cope with an increasing environmental stress (organic enrichment). In conclusion, to keep shellfish farming at a sustainable level without undesirable impacts, the disturbance intensity must be kept below the system carrying capacity. This will allow natural communities to cope with pressures and thus avoid further deterioration in ecological quality.
Keywords: Benthos; Long-term; Shellfish culture; Ecosystem disturbance; Environmental impact; Eo estuary; Cantabric sea

L.G. Dias, D.M. Correia, J. Sa-Morais, F. Sousa, J.M. Pires, A.M. Peres, Raw bovine meat fatty acids profile as an origin discriminator, Food Chemistry, Volume 109, Issue 4, 15 August 2008, Pages 840-847, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.01.008. (http://www.sciencedirect.com/science/article/pii/S0308814608000757)
Abstract:
Consumers are very concerned in 'Protected Designation of Origin' (PDO) products, namely meat, since they associate these products to quality and healthy foods. Thus, it is necessary to implement analytical methodologies that could assure consumers about the products they purchase. Since this kind of meat is usually sold with no information concerning cattle sex, age and slaughter season, these characteristics were intentionally not taken into account. In this study, two Portugueses PDO bovine breeds (Mirandesa and Barrosa) and two production sub-systems (traditional and organic farming) were studied during a two-year period. Statistical analysis showed that production system and breed had a significant effect on the overall raw meat fatty acids (FA) content. Besides, the FA profiles could be used as an effective tool to differentiate the four groups studied allowing a 100% correct classification. The meat FA content was also correlated with the relative importance of the animal feeding stuff area.
Keywords: Bovine breed; Fatty acids; Linear discriminant analysis; Meat differentiation; Production systems

C.M. Diaz Lira, T.N. Barry, W.E. Pomroy, E.L. McWilliam, N. Lopez-Villalobos, Willow (Salix spp.) fodder blocks for growth and sustainable management of internal parasites in grazing lambs, Animal Feed Science and Technology, Volume 141, Issues 1-2, 1 March 2008, Pages 61-81, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.05.030. (http://www.sciencedirect.com/science/article/pii/S0377840107002106)
Abstract:
A grazing experiment was conducted in the East Coast region of the North Island of New Zealand with 180 weaned ram lambs grazing typical dryland summer pasture versus grazing willow (Salix spp.) fodder blocks. The experiment was conducted over a 14-week period with three forage treatments, comprising control pasture, restricted access to willow fodder blocks and full access to willow fodder blocks, with each treatment further divided into undrenched and regularly anthelmintic drenched groups. Live weight (LW) and dag score (DS) were recorded at 14-day intervals. Fifteen lambs in both drenched and undrenched groups were regularly monitored for faecal nematode egg counts (FEC) and nematode larval cultures (LC). Carcase weight (CW; kg) and LW (kg) data was collected from 12 additional lambs slaughtered at the beginning of the experiment to predict initial CW of the experimental lambs from their initial LW. At the end of the grazing experiment, all lambs were slaughtered in a commercial abattoir; CW and GR (fatness) was recorded. The abomasum and small and large intestines were collected from 10 lambs from each undrenched group for estimation of total worm nematode numbers. Organic matter digestibility (OMD; 0.65) and metabolisable energy (ME; 9.7 MJ/kg DM) content were similar for fodder block pasture and control pasture; the selected tree fodder had a higher OMD (0.71) and ME concentration (10.7 MJ/kg DM). Herbage condensed tannin (CT) concentration in willow fodder blocks was consistently higher than the trace CT levels detected in control pasture (14.5 g/kg DM versus 6.2 g/kg DM); tree fodder contained higher concentrations of CT (45.5 g/kg DM). Undrenched lambs grazing either control pasture or willow fodder blocks had lower LW gain (LWG) and CW gain (CWG) than lambs regularly

drenched with anthelmintic (P<0.0001). Lambs grazing fodder blocks had consistently lower DS and carcase GR and undrenched lambs grazing fodder blocks had reduced worm burdens of economically important internal parasites compared with undrenched lambs grazing control pasture. Lamb growth rates were reduced by restricted access to willow fodder blocks (P<0.01), but not by full access. Undrenched lambs grazing fodder blocks with full access had similar LWG, final DS and carcase GR to regularly drenched lambs grazing control pasture (the conventional farming system), but had reduced rates of CWG. It was concluded that willow fodder blocks could have a place in integrated systems for the control of internal parasites in grazing lambs, leading to a reduction in anthelmintic drench use, but that this would probably result in lower CW relative to regularly drenched lambs.
Keywords: Willow trees (Salix sp.); Willow fodder blocks; Parasite control; Condensed tannin; Bioactive forages; Biological control

Dang K. Nhan, Marc C.J. Verdegem, Nguyen T. Binh, Le T. Duong, Ana Milstein, Johan A.J. Verreth, Economic and nutrient discharge tradeoffs of excreta-fed aquaculture in the Mekong Delta, Vietnam, Agriculture, Ecosystems & Environment, Volume 124, Issues 3-4, April 2008, Pages 259-269, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.10.005.
(http://www.sciencedirect.com/science/article/pii/S0167880907002551)
Abstract:
The present study quantifies the effects on production, nutrient discharge and economic return of the use of pig and human excreta in pond farming. On-farm data from various studies were integrated and analyzed applying single and multiple regression methods. Pond-dissolved oxygen concentration, water exchange and nutrient discharge interacted and were strongly affected by input level. Increased input levels coincided with farmers exchanging more water and discharging more chemical oxygen demand (COD), nitrogen (N), phosphorus (P) and total suspended solids (TSS). Fish yield and the accumulation of organic carbon, N and P in pond sediments increased with the excreta input level. Using a regression model, it was predicted that with an excreta input of 5 kg N ha-1 day-1, a fish yield of 8380 kg and an economic return of 52 million VND ha-1 year-1 can be obtained while about 2060 kg COD, 645 kg N, 210 kg P and 39,200 kg TSS ha-1 year-1 will be discharged. At this input level, it was estimated that about 9% of input-N will be recovered in harvested fish while 52% will accumulate in the pond sediment. Hence, fish culture reduces nutrient discharge from excreta by 61% while generating income for resource-poor farmers. However, in the long run such a system will become unsustainable when more farmers take up this farming practice. The challenges are to reduce nutrient discharges from ponds while maintaining high production and profitability and to use the nutrients accumulated pond sediments more efficiently.
Keywords: Excreta-fed aquaculture; Integrated aquaculture-agriculture; Economics; Environment; Vietnam

Elke Noellemeyer, Federico Frank, Cristian Alvarez, German Morazzo, Alberto Quiroga, Carbon contents and aggregation related to soil physical and biological properties under a land-use sequence in the semiarid region of central Argentina, Soil and Tillage Research, Volume 99, Issue 2, June 2008, Pages 179-190, ISSN 0167-1987, DOI: 10.1016/j.still.2008.02.003.
(http://www.sciencedirect.com/science/article/pii/S0167198708000305)
Abstract:

Land-use change affects vast areas of the semiarid region of central Argentina, where agriculture becomes predominant over mixed farming systems, and large areas of permanent pastures (PAS) are being converted to agricultural land. This land-use change causes loss of soil structure, but very little is known about the effect of changes in aggregate size distribution on soil physical, chemical and biological properties. We decided to use dry sieved aggregates since this technique is commonly used in semiarid regions. The study was carried out at Anguil, La Pampa, Argentina. The soil was a sandy loam Entic Haplustoll with a carbonate-free A-horizon. The PAS site had been under weeping love grass for more than 40 years. Parts of this PAS were turned to cultivation in 1989 (CULT14) and in 2001 (CULT2). Sampling was carried out at 0.6 m intervals to 0.18 m depth. Bulk density (BD), organic carbon (OC), and water holding capacity and infiltration were determined on these samples. Dry aggregate size distribution and OC content of the size fractions were determined on large undisturbed samples. Samples of pooled aggregate size fractions >4, 1-4, and <1 mm, as well as corresponding samples of non fractionated soil were incubated and respiration was measured by CO2 evolved. The soil of CULT2 had 29% lower contents of large (>4 mm) and 37% higher contents of very small (<1 mm) aggregates than PAS. The intermediate size aggregates were not affected by the short-term effect of tillage. OC loss in CULT2 was 16% regarding PAS. Longer term effects of cultivation were characterized by 30% loss of intermediate size aggregates, 22% increase of bulk density, 74 and 19% decrease in water infiltration and water retention, respectively of CULT14 compared to PAS. A 32% decrease of OC was observed after 14 years of cultivation. Intermediate size aggregates had highest OC contents and no difference between treatments was found, except for a lower value of large aggregates in CULT14. Respiration rates and total CO2 evolved was related to OC contents of fractions; however, PAS respired more from its small aggregates than expected from their OC content. The results showed that OC turnover and loss of aggregation was very fast in this soil, but soil hydraulic properties were affected in the longer term. Dry aggregates were found to useful for studying soil degradation, and they showed similar trends as those indicated in the literature for water stable aggregates.
Keywords: Land-use change; Semiarid Argentina; OC turnover; Dry aggregate size changes; Physical properties; Respiration rates

Seungdo Kim, Bruce E. Dale, Life cycle assessment of fuel ethanol derived from corn grain via dry milling, Bioresource Technology, Volume 99, Issue 12, Cellulose Conversion in Dry Grind Plants, August 2008, Pages 5250-5260, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.09.034. (http://www.sciencedirect.com/science/article/pii/S0960852407007791)
Abstract:
Life cycle analysis enables to investigate environmental performance of fuel ethanol used in an E10 fueled compact passenger vehicle. Ethanol is derived from corn grain via dry milling. This type of analysis is an important component for identifying practices that will help to ensure that a renewable fuel, such as ethanol, may be produced in a sustainable manner. Based on data from eight counties in seven Corn Belt states as corn farming sites, we show ethanol derived from corn grain as E10 fuel would reduce nonrenewable energy and greenhouse gas emissions, but would increase acidification, eutrophication and photochemical smog, compared to using gasoline as liquid fuel. The ethanol fuel systems considered in this study offer economic benefits, namely more money returned to society than the investment for producing

ethanol. The environmental performance of ethanol fuel system varies significantly with corn farming sites because of different crop management practices, soil properties, and climatic conditions. The dominant factor determining most environmental impacts considered here (i.e., greenhouse gas emissions, acidification, eutrophication, and photochemical smog formation) is soil related nitrogen losses (e.g., N2O, NOx, and NO3-). The sources of soil nitrogen include nitrogen fertilizer, crop residues, and air deposition. Nitrogen fertilizer is probably the primary source. Simulations using an agro-ecosystem model predict that planting winter cover crops would reduce soil nitrogen losses and increase soil organic carbon levels, thereby greatly improving the environmental performance of the ethanol fuel system.
Keywords: Corn; Dry milling; Eco-efficiency; E10 fuel; Life cycle assessment

Boutheina Grami, Nathalie Niquil, Asma Sakka Hlaili, Michel Gosselin, Dominique Hamel, Hassine Hadj Mabrouk, The plankton food web of the Bizerte Lagoon (South-western Mediterranean): II. Carbon steady-state modelling using inverse analysis, Estuarine, Coastal and Shelf Science, Volume 79, Issue 1, 10 August 2008, Pages 101-113, ISSN 0272-7714, DOI: 10.1016/j.ecss.2008.03.009.
(http://www.sciencedirect.com/science/article/pii/S0272771408001078)
Abstract:
A steady-state model of the planktonic food web of the Bizerte Lagoon (Tunisia, South-western Mediterranean) was developed to characterize its structure and functioning through four stations: MA under urban discharge, MB impacted by industrial input, MJ located at proximity of shellfish farming and R in the central area of the lagoon. Carbon stocks of eight chosen compartments were determined and flows were assigned for each one from field data. Missing flow values were calculated by inverse analysis for each station. Network analysis was applied to the resulting food web models to characterize their properties. These analyses mainly showed similarity among stations concerning (1) a high primary production of phytoplankton which was dominated by >10 [mu]m cells (i.e. diatoms); (2) important herbivory against detritivory in stations MA and MJ; (3) major role of detritivory in stations MB and R; (4) efficiency of microbial link in transferring carbon for higher trophic level; (5) efficiency of microzooplankton as a trophic link between detritus, dissolved organic carbon, autotrophs and mesozooplankton; (6) important recycling of carbon leading to conclude about an immature state of the ecosystem. Differences between the functioning of microbial food webs in the lagoon are mainly due to the location of stations. The proximity of station MB to inland and industrial discharges affected its productivity and made it the least productive station. Water circulation into the lagoon made pollutant concentrate into the south and the western sections which seemed to affect the planktonic food web, since the values of productivity reported for stations MB and R were lower than those calculated for the others stations.
Keywords: plankton; food web; inverse method; coastal Mediterranean lagoon

Ndeye Yacine Badiane Ndour, Wafa Achouak, Richard Christen, Thierry Heulin, Alain Brauman, Jean-Luc Chotte, Characteristics of microbial habitats in a tropical soil subject to different fallow management,

Applied Soil Ecology, Volume 38, Issue 1, January 2008, Pages 51-61, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.09.001.
(http://www.sciencedirect.com/science/article/pii/S0929139307001126)
Abstract:
Changes in land use affect soil properties. In most West-African farming systems forest-fallow management intended to restore soil fertility no longer functions efficiently because the duration of the fallow periods has been shortened and the fallow areas have been reduced. Alternative practices must, therefore, be adopted.
This study tested the efficiency of short periods of improved fallows (Andropogon gayanus and Acacia holosericea) in regenerating soil microbial properties, compared to the efficiency of a natural long-term fallow. The microbial community was studied by cloning and sequencing 16S rDNA and by analyzing enzyme activities (alkaline phosphatase, [beta]-glucosidase). The study was carried out at the soil aggregate scale to test how the microbial community in different micro-habitats reacted to the different fallow practices.
The 4-year-old Acacia holosericea and Angropogon gayanus fallows did not regenerate soil properties as efficiently as the 21-year-old natural fallow. However, Andropogon gayanus could be used to restore soil properties quickly. Three different aggregate-size fractions were affected by fallow management: organic residues, the >2000 [mu]m fraction and the 2-50 [mu]m fraction. These microhabitats were enriched with bacteria belonging to the Telluria genus and more generally to [beta]-Proteobacteria.
Keywords: Tropics; Fallows; Microhabitats; rrs sequences; Telluria

Miguel S. Castillo, Alan L. Wright, Soil phosphorus pools for Histosols under sugarcane and pasture in the Everglades, USA, Geoderma, Volume 145, Issues 1-2, 15 May 2008, Pages 130-135, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.03.006.
(http://www.sciencedirect.com/science/article/pii/S0016706108000797)
Abstract:
Land use changes in the Everglades Agricultural Area (EAA) in southern Florida may influence the distribution and availability of P. Cultivated soils in the EAA are being converted back to their historic use as seasonally-flooded prairies as part of Everglades restoration projects. The objectives of this study were to determine the distribution of P in soil chemical fractions in relation to long-term land management to predict P cycling and transformations for future land uses. Soil under pasture (100 yr) and planted to sugarcane (Saccharum sp.) for 50 yr were amended with P (0, 10, 50, 150 kg P ha-1), and its distribution in labile, Fe-Al bound P, Ca-bound P, humic-fulvic acid P, and residual P pools determined for surface soil (0-15 cm). Most P fertilizer entered Fe-Al and Ca-bound fractions. Cultivation contributed to higher pH and increased the Ca content in soil compared to pasture due to incorporation of bedrock limestone into soil by tillage. The land uses were differentiated by P storage in different pools. Subsequently, long-term fertilization increased soil total P for cultivated soil relative to pasture, but plant-available P constituted less than 1% of the total P. Labile P increased with increasing P application rate, ranging from 1.3 to 7.2 mg kg- 1 for cultivated soil and 1.4 to 10.7 mg kg- 1 for pasture. Most of the applied P was recovered in the Fe-Al fraction for pasture and the Ca-bound P fraction for cultivated soil. The Ca-bound P fraction represented the greatest proportion of total P for sugarcane (41%), but only 12% for pasture. The majority of P in the pasture was present in

the humic-fulvic acid fraction (45%), compared to only 23% for sugarcane. The higher pH of the cultivated soil (6.8) favored retention in Ca fractions while the lower pH of pasture (5.3) favored P retention in the humic-fulvic acid fraction. The proportion of total P as organic P was greater for pasture (78%) than cultivated soil (52%). Higher P levels in more recalcitrant fractions for cultivated soils indicated that more of the applied fertilizer P was sequestered in stable fractions, which decreased P availability to crops and may subsequently increase P fertilizer requirements necessary to maintain optimal plant-available nutrient levels. Subsequently, continuation of current farming practices and tillage regimes promotes the redistribution of Ca from subsurface to surface soil, which leads to greater P sequestration in the Ca-bound fraction. However, P in inorganic fractions may be released upon onset of changes in land use. Thus, conversion to seasonally-flooded prairies may have a more dramatic effect on P release from cultivated than pasture soils since cultivated soils have more P in inorganic pools.
Keywords: Everglades Agricultural Area; Histosols; Land use; Phosphorus fractionation

Paul Kardol, Annemieke Van der Wal, T. Martijn Bezemer, Wietse de Boer, Henk Duyts, Remko Holtkamp, Wim H. Van der Putten, Restoration of species-rich grasslands on ex-arable land: Seed addition outweighs soil fertility reduction, Biological Conservation, Volume 141, Issue 9, September 2008, Pages 2208-2217, ISSN 0006-3207, DOI: 10.1016/j.biocon.2008.06.011.
(http://www.sciencedirect.com/science/article/pii/S0006320708002188)
Abstract:
A common practice in biodiversity conservation is restoration of former species-rich grassland on ex-arable land. Major constraints for grassland restoration are high soil fertility and limited dispersal ability of plant species to target sites. Usually, studies focus on soil fertility or on methods to introduce plant seeds. However, the question is whether soil fertility reduction is always necessary for getting plant species established on target sites. In a three-year field experiment with ex-arable soil with intensive farming history, we tested single and combined effects of soil fertility reduction and sowing mid-successional plant species on plant community development and soil biological properties. A controlled microcosm study was performed to test short-term effects of soil fertility reduction measures on biomass production of mid-successional species. Soil fertility was manipulated by adding carbon (wood or straw) to incorporate plant-available nutrients into organic matter, or by removing nutrients through top soil removal (TSR). The sown species established successfully and their establishment was independent of carbon amendments. TSR reduced plant biomass, and effectively suppressed arable weeds, however, created a desert-like environment, inhibiting the effectiveness of sowing mid-successional plant species. Adding straw or wood resulted in short-term reduction of plant biomass, suggesting a temporal decrease in plant-available nutrients by microbial immobilisation. Straw and wood addition had little effects on soil biological properties, whereas TSR profoundly reduced numbers of bacteria, fungal biomass and nematode abundance. In conclusion, in ex-arable soils, on a short-term sowing is more effective for grassland restoration than strategies aiming at soil fertility reduction.

Keywords: Biomass production; Carbon addition; Land use change; Microbial community; Nematodes; Propagule availability; Secondary succession; Top soil removal; Vegetation composition

Isabelle Veissier, Andrew Butterworth, Bettina Bock, Emma Roe, European approaches to ensure good animal welfare, Applied Animal Behaviour Science, Volume 113, Issue 4, Farm Animal Welfare since the Brambell Report, October 2008, Pages 279-297, ISSN 0168-1591, DOI: 10.1016/j.applanim.2008.01.008.
(http://www.sciencedirect.com/science/article/pii/S0168159108000099)
Abstract:
Conventions to protect domestic animals during transport, farming and slaughter were established by the Council of Europe and approved by many European states. Conventions are followed by recommendations that specify how the general principles of conventions apply for the different species. The European Union (EU) started discussions on animal welfare in the 1980s and adopted a series of Directives to protect farm animals. Both Recommendations and Directives define higher space allowance, more opportunity for social contacts, balanced diet, enriched environment, and limitation of harmful procedures. Animal welfare law varies across Europe with Northern states generally having the most stringent legislation.
There is also an increasing variety of farm production schemes within European member states which contain animal welfare standards that go beyond the legal minimum. Some schemes are retailer-led; others are founded by producer organizations, sometimes in co-operation with non-governmental organisations. The differences between schemes reflect higher national legal requirements, higher quality industry schemes, organic production schemes and specific welfare-friendlier schemes. The communication of these higher welfare standards to consumers through the use of a quality assurance scheme logo on a product or packaging claims does not always happen. Farmers differ in their motivation for participating in animal welfare schemes. Some are mainly encouraged by premium prices; others give ethical reasons for changing towards animal friendly production methods.
Although there is no official link between the Brambell report and European regulations to protect farm animals, the fact that the first European regulations to protect animals were adopted 10 years after the report and were in line with the conclusions of the report suggest that the report was influential, not only in the United Kingdom but also in the rest of Europe.
Keywords: European legislation; Animal-welfare friendly products; Marketing schemes; Attitudes

M.G. Paoletti, A. Tsitsilas, L.J. Thomson, S. Taiti, P.A. Umina, The flood bug, Australiodillo bifrons (Isopoda: Armadillidae): A potential pest of cereals in Australia, Applied Soil Ecology, Volume 39, Issue 1, May 2008, Pages 76-83, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.11.009.
(http://www.sciencedirect.com/science/article/pii/S0929139307001655)
Abstract:
Agricultural invertebrate pests cause substantial losses through reduced productivity and increases in pesticide application. Understanding the basic biology of pest species and how they interact with other invertebrates within specific industries is important for developing targeted control strategies. In 2006, feeding damage to emerging cereal crops in parts of New South Wales, Australia, was

caused by Australiodillo bifrons (Budde-Lund, 1885), an endemic slater species. This appears to be a new phenomenon as slaters are not widely known to be a pest of cultivated plants, but rather feed on decaying organic matter. Samples were collected from these areas and affected farmers interviewed. We observed and report on the swarming of A. bifrons populations in the field, a characteristic behaviour that may contribute to the pest status of this species. We also examined the feeding characteristics of A. bifrons and another slater species, Porcellio scaber (Latreille), to wheat seedlings under laboratory conditions. Our results suggest A. bifrons can cause significant feeding damage to wheat seedlings and reaches very high densities in the field. The presence of shelterbelts along crop margins could be harbouring large populations of A. bifrons, although they also provide a refuge for many beneficial invertebrates that could control pest populations. We propose that the pest status of A. bifrons in parts of New South Wales may be increasing due to changes in farming practices and/or in response to climate change.
Keywords: Slaters; Terrestrial isopods; Wheat; Oats; Swarms; Emerging pest; Climate

ScienceDirect Organic Farming 2011

Gopal B. Thapa, Kanokporn Rattanasuteerakul, Adoption and extent of organic vegetable farming in Mahasarakham province, Thailand, ***Applied Geography***, Volume 31, Issue 1, Hazards, January 2011, Pages 201-209, ISSN 0143-6228, DOI: 10.1016/j.apgeog.2010.04.004. (http://www.sciencedirect.com/science/article/pii/S0143622810000500)
Abstract:
Consistent with the national policy of sustainable agriculture promotion, the Government of Thailand has implemented organic vegetable farming (OVF) pilot projects in several provinces. This study analyzed the level of adoption and extent of OVF at farm household level in Mahasarakham Province based on information collected from 172 sample vegetable farmers. The results have indicated that slightly more than half of the sample farmers were growing organic vegetables, although the extent of the area under organic vegetables varied from one farm household to another. The result of the Logistic Regression analysis performed to find out the factors that determine the adoption of OVF, found significant influence of several factors including women's leading role in OVF, motivation by GOs and NGOs, motivation by community members and farmers' groups, attendance in training, satisfaction with the price of organic vegetables, and the intensity of pest hazard. Moreover, the Linear Regression analysis carried out to explore the determinants of the extent of OVF at farm household level revealed three significantly influencing factors, namely: the amount of organic fertilizers such as farm yard manure and compost produced by farmers themselves, perception of the harmful effect of inorganic pesticides and the length of experience in growing vegetables. Explanations are provided for the role of these factors in the level of adoption and extent of OVF, and broad policy instruments conducive to the promotion of OVF in an effective way, are suggested.
Keywords: Organic vegetable farming; Organic fertilizers; Bio-pesticides; Synthetic fertilizers; Inorganic pesticides; Influencing factors; Mahasarakham province

Irene Tzouramani, Alexandra Sintori, Angelos Liontakis, Pavlos Karanikolas, George Alexopoulos, An assessment of the economic

performance of organic dairy sheep farming in Greece, Livestock Science, In Press, Corrected Proof, Available online 14 June 2011, ISSN 1871-1413, DOI: 10.1016/j.livsci.2011.05.010.
(http://www.sciencedirect.com/science/article/pii/S1871141311001934)
Abstract:
Sheep farming is an important and well-established activity in Greece, especially in mountainous and semi-mountainous areas. In these areas, organic sheep farming has recently experienced a significant increase, representing a promising alternative to conventional methods for a number of sheep farms. This study analyses the financial performance of sheep breeding and the risk that producers are taking in practising it. Through a stochastic efficiency analysis with respect to a function, we explored the economic viability of conventional and organic sheep farming; key factors determining the economic outcome of these activities were also investigated. Both organic and conventional sheep farming appear to be viable alternatives. The viability of organic farming lies, mainly, in organic payments, while conventional farming generates a lower net return.
Keywords: Organic farming; Dairy sheep; Economics; Agricultural policy

Naoufel Mzoughi, Farmers adoption of integrated crop protection and organic farming: Do moral and social concerns matter?, Ecological Economics, Volume 70, Issue 8, 15 June 2011, Pages 1536-1545, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2011.03.016.
(http://www.sciencedirect.com/science/article/pii/S0921800911001054)
Abstract:
We investigate empirically the role of moral and social concerns in farmers' decision to adopt integrated crop protection (IP) and organic farming (OF). A survey questionnaire has been sent to 1286 fruit-growers and vegetable producers located in the French areas of Alpes de Haute Provence, Hautes-Alpes and Vaucluse. Analysis of individual responses (N = 243) shows that, although economic concerns play a strong role, a significant number of respondents give high importance to moral and social ones. We also examine how these considerations matter according to different crop protection strategies, that is, conventional farming, IP and OF. Using a multinomial logistic regression, we find that (1) social concerns (e.g., showing to others one's environmental commitment) drive both IP and OF adoption, (2) moral concerns (e.g., do not feel guilty about one's choices) increase the probability of organic farming adoption only, and (3) farmers who give high importance to economic concerns (e.g., cutting production costs) are less likely to adopt OF.
Keywords: Integrated protection; Organic farming; Social and moral concerns

Gunnar Breustedt, Uwe Latacz-Lohmann, Torben Tiedemann, Organic or conventional? Optimal dairy farming technology under the EU milk quota system and organic subsidies, Food Policy, Volume 36, Issue 2, April 2011, Pages 223-229, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2010.11.019.
(http://www.sciencedirect.com/science/article/pii/S0306919210001338)
Abstract:
This paper assesses the competitiveness of organic and conventional dairy farms under different milk market and organic farming policy scenarios. We use a DEA-based model to estimate for each policy scenario the sample farms' profit potential in both technologies. The model enables identification of a farm's optimal technology based on

its input-output observations. The empirical analysis is based on the annual accounts of 1300 Bavarian dairy farms. Results indicate that approximately 69% (78%) of the organic (conventional) farms have chosen their optimal farming system. The remaining organic (conventional) farmers could increase their profit on average by roughly 6% (10%) by switching to the other technology. Abolishment of the EU milk quota results in a considerable decline in the number of sample farms for which organic farming is the optimal technology, suggesting that, ceteris paribus, organic dairy farms may lose competitive advantage with the deregulation of the EU's milk market regime in 2015. Organic maintenance payments more than double the number of farms with a higher earning potential in organic farming, but their effectiveness could decline when the milk quota is abolished.
Keywords: Organic farming; EU milk quota; Data Envelopment Analysis; Organic subsidies

Peter A. Roussos, Phytochemicals and antioxidant capacity of orange (Citrus sinensis (l.) Osbeck cv. Salustiana) juice produced under organic and integrated farming system in Greece, Scientia Horticulturae, Volume 129, Issue 2, 10 June 2011, Pages 253-258, ISSN 0304-4238, DOI: 10.1016/j.scienta.2011.03.040.
(http://www.sciencedirect.com/science/article/pii/S0304423811001634)
Abstract:
Organically and integrated produced orange (Citrus sinensis (l.) Osbeck cv. Salustiana) fruits were assayed in terms of fruit characteristics and juice phytochemicals over a period of two years. Fruit size and juice volume were higher under organic farming system. There were not any significant differences concerning either the carbohydrates' or organic acids' concentrations of the juice. Similar results were obtained concerning the total phenol, the total o-diphenol and the total flavonoid concentration of the juice, while neither hesperidin nor narirutin differentiated significantly. However, [beta]-carotene concentration was detected in higher concentration in organically produced fruit (0.43 mg L-1). Juice extracted from both integrated and organically produced fruits exhibited similar antioxidant capacity values (based on 2,2-diphenyl-1-picryl hydrazyl and ferric reducing/antioxidant power assays), while correlation analysis revealed the significant contribution of phenolic compounds to antioxidant capacity (r = 0.75-0.86). Most of the amino acids determined were quantified in similar concentration in the juice of both organic and integrated produced fruits (approximately 1600 mg L-1). The present results indicate that integrated oranges cv Salustiana, under the cultivation management implemented in this experiment, present similar antioxidant and nutritional values to the organically produced ones.
Keywords: Amino acids; Antioxidant capacity; Ascorbic acid; Carbohydrates; Integrated farming system; Orange; Organic culture; Phenols

Thomas Nemecek, David Dubois, Olivier Huguenin-Elie, Gerard Gaillard, Life cycle assessment of Swiss farming systems: I. Integrated and organic farming, Agricultural Systems, Volume 104, Issue 3, March 2011, Pages 217-232, ISSN 0308-521X, DOI: 10.1016/j.agsy.2010.10.002.
(http://www.sciencedirect.com/science/article/pii/S0308521X10001381)
Abstract:
Organic farming (OF) is considered a promising solution for reducing environmental burdens related to intensive agricultural management practices. The question arises whether OF really reduces the

environmental impacts once lower yields and all the changes in farming methods are taken into consideration. This question is addressed in a comprehensive study of Swiss arable cropping and forage production systems comparing OF to integrated production (IP) systems by means of the life cycle assessment (LCA) method.
The LCA study investigated the environmental impacts of two long-term farming system experiments: the DOC experiment comparing bio-dynamic, bio-organic and conventional/integrated farming and the 'Burgrain' experiment encompassing integrated intensive, integrated extensive and organic production. All treatments received similar amounts of farmyard manure. The system boundary encompasses the plant production system; storage and application of farmyard manure is included in the system boundary, the animal husbandry is not included. The Swiss Agricultural Life Cycle Assessment method (SALCA) was used to analyse the environmental impacts.
In the overall assessment OF was revealed to be either superior or similar to IP in environmental terms. OF has its main strengths in better resource conservation, since the farming system relies mainly on farm-internal resources and limits the input of external auxiliary materials. This results in less fossil and mineral resources being consumed. Moreover the greatly restricted use of pesticides makes it possible to markedly reduce ecotoxicity potentials on the one hand, and to achieve a higher biodiversity potential on the other. This overall positive assessment is not valid for all organic products: some products such as potatoes had higher environmental burdens than their counterparts from IP.
The main drawbacks identified for Swiss OF systems are lower yields. As a consequence some production factors are used less efficiently, thus partly negating the advantages of OF. Furthermore, the different manure management strategy leads to relatively high nutrient losses in relation to yield. These two points were shown to be the main priorities for the environmental optimisation of OF systems. The differences between the bio-organic and the bio-dynamic farming systems consisted in a slightly higher input of organic matter, a few applications of mineral fertilisers and copper applications in the former.
The eco-efficiency analysis led to the conclusion that the optimisation of OF is mainly output-driven, i.e. that higher yields of good quality should be achieved with the available (limited) resources. On the contrary, optimisation of IP was found to be input-driven; the inputs should be used in a quantity and manner which minimise the environmental burdens per unit produced. The study showed that despite the efforts of recent years, there is still considerable room for the environmental optimisation of Swiss farming systems.
Keywords: Integrated production; Organic farming; Life cycle assessment; Farming systems; Environmental impacts

Doris Lapple, Tom Van Rensburg, Adoption of organic farming: Are there differences between early and late adoption?, Ecological Economics, Volume 70, Issue 7, Special Section: Ecological Economics and Environmental History, 15 May 2011, Pages 1406-1414, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2011.03.002.
(http://www.sciencedirect.com/science/article/pii/S0921800911000917)
Abstract:
Based on the fact that not all farmers adopt a technology at the same time, it is argued in this paper that the distinction between groups is important because early, medium and late adopters respond differently

to economic and non-economic factors when they consider whether to take up organic farming or not. The individual effects on adoption between the groups are identified by the use of multinomial logit analysis. The results provide evidence that there are significant differences in the characteristics between the adopter groups. The findings also reveal that the factors that affect adoption play a different role for early, medium and late adopters, particularly with regard to farming intensity, age, information gathering as well as attitudes of the farmer. More specifically, early adopters were the youngest to adopt organic farming and their decisions were found to be less profit related compared to other groups. Late adoption is constrained by risk considerations, while environmental attitudes and social learning were identified to be important determinants for all adopter groups. Overall, the findings strongly suggest, that for policy measures to be effective, the current state of diffusion has to be taken into account.
Keywords: Organic farming; Early and late adoption; Multinomial logit analysis; Farmer attitudes

Andreas Flohre, Max Rudnick, Gyorgy Traser, Teja Tscharntke, Till Eggers, Does soil biota benefit from organic farming in complex vs. simple landscapes?, Agriculture, Ecosystems & Environment, Volume 141, Issues 1-2, April 2011, Pages 210-214, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.02.032.
(http://www.sciencedirect.com/science/article/pii/S0167880911000843)
Abstract:
Organic farming can counteract detrimental effects of agricultural intensification on farmland biodiversity. Enhancing biodiversity with agri-environmental schemes is hypothesized to be more efficient in simple than complex landscapes, a pattern confirmed for many aboveground taxa. Although belowground biodiversity is an important part of the agroecosystem, studies on the interacting effects of local and landscape intensification on the belowground detritivore community, including bacteria, fungi, collembolans and earthworms are lacking. We sampled diversity and abundance of arable weeds, earthworms and collembolans, soil respiration rate and microbial biomass in 12 pairs of organically and conventionally managed fields in landscapes differing in structural complexity. Organic farming significantly enhanced species richness of arable weeds, while conventional farming enhanced soil respiration and abundance of Collembola with furca. This research shows that the landscape context plays a significant role in shaping effects of organic vs. conventional farming on soil biota. Earthworm species richness in simple landscapes, where predation pressure is reduced, was enhanced by organic farming, whereas in complex landscapes, conventional farming, which often causes reduced predation, fostered earthworm species richness. As the same pattern was found for microbial carbon biomass, earthworms may have enhanced microbial biomass. In contrast to earthworm and microbial diversity, aboveground biodiversity benefits most from organic farming in simple landscapes. In general, organic farming appears to be more efficient in conserving aboveground than belowground diversity.
Keywords: Agri-environmental schemes; Soil biodiversity; Landscape complexity; Organic farming; Earthworms; Microbial biomass

Carsten Daugbjerg, Richard Tranter, Caroline Hattam, Garth Holloway, Modelling the impacts of policy on entry into organic farming: Evidence from Danish-UK comparisons, 1989-2007, Land Use Policy, Volume 28,

Issue 2, April 2011, Pages 413-422, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2010.09.001.
(http://www.sciencedirect.com/science/article/pii/S026483771000092X)
Abstract:
This paper analyses organic farming entry decisions using a piece-wise linear depiction of policy. Our goal is to ascertain, from the available but limited information, whether Danish and UK policy measures toward organic agriculture have affected participation. Despite considerable interest in the growth of organic farming there has been little systematic analysis of it, although it is commonly believed that enhanced income levels have played a part. Whilst analyses of organic farming policy have provided extensive reviews of instruments applied, generally speaking, the spirit of those enquiries takes as datum that organic policies have had the desired impacts. Yet such conjectures remain mostly untested. Hence, there is a need to examine systematically if there exist relationships between the introduction of organic farming policies and the growth of organic farming, and whether particular policy measures are more effective than others. Here, we take a first step in this endeavor by undertaking an econometric analysis of the relationship between 14 organic farming policy measures and participation rates in Denmark and the UK during 1989-2007. Using two response variables - the numbers of farmers converted to organic production and the total land area under organic practice - we implement a simple, Bayesian methodology and evaluate the stepwise-linear impacts of policy. Extensions for future work are discussed. Six policy measures in the two study countries were found to be significant influences on participation, five of them direct supply-side instruments. For the UK, all of the policies are annual subsidies for organic farmers once conversion was complete. For Denmark, the policies are the introduction of organic subsidies for non-dairy farms, the extension of subsidies beyond 1997 and support for the costs of marketing services.
Keywords: Organic farming policy measures; Denmark and the UK; Robust Bayesian inference

Claire Lamine, Transition pathways towards a robust ecologization of agriculture and the need for system redesign. Cases from organic farming and IPM, Journal of Rural Studies, Volume 27, Issue 2, April 2011, Pages 209-219, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2011.02.001.
(http://www.sciencedirect.com/science/article/pii/S0743016711000179)
Abstract:
The growing criticism of intensive agricultural practices that lead to a deterioration of natural resources and a decrease of biodiversity has progressively led to more environmental constraints being put on agricultural activities through an 'ecologization' of agricultural policies. The aims of these policies have been to protect environmentally sensitive areas, to improve groundwater quality and, more recently, to develop organic farming and/or reduce pesticide use. However, these efforts are still a far cry from a robust ecologization of agricultural practices. In order to identify the conditions for the implementation of such an ecologization, the changes in practices from conventional agriculture towards organic farming and integrated pest management (IPM) are investigated using a sociological study of farmers' trajectories, coupled with the ESR (Efficiency-Substitution-Redesign) framework developed by biological and agricultural scientists. This combined approach reveals that a robust ecologization

of agricultural practices requires us to take into account the specific and variable tempo of farmers' trajectories and to redesign not only technical agricultural systems but also interactions within larger agrifood systems.
Keywords: IPM; Organic farming; Pesticides; Agricultural transitions; Ecologization

Christina Fischer, Andreas Flohre, Lars W. Clement, Peter Batary, Wolfgang W. Weisser, Teja Tscharntke, Carsten Thies, Mixed effects of landscape structure and farming practice on bird diversity, Agriculture, Ecosystems & Environment, Volume 141, Issues 1-2, April 2011, Pages 119-125, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.02.021.
(http://www.sciencedirect.com/science/article/pii/S0167880911000594)
Abstract:
Bird abundance, species richness and diversity of bird communities were analysed on 59 plots during breeding season and 61 plots during winter (500 m x 500 m around winter wheat fields) in two contrasting regions of Germany differing in land-use history (West vs. East), landscape structural complexity (40-100% arable land) and farming practice (organic vs. conventional). Abundance, species richness and diversity were higher in West Germany, presumably due to the higher overall habitat-type diversity, and decreased with decreasing landscape complexity, this being marked for farmland and forest birds. In contrast, abundances of openland bird species were higher in East Germany during both seasons and increased with decreasing landscape complexity. During breeding season (but not in winter) organic farming enhanced the species richness of all bird groups, presumably due to more and diverse food resources. Farmland and forest bird species in agricultural landscapes therefore appear to be mainly enhanced by landscape complexity owing to the availability of nesting and sheltering places in non-crop habitats, while openland bird species require high proportions of arable land.
Keywords: Farmland, openland and forest species; Landscape complexity; Organic farming

M.M. Moreno, C. Lacasta, R. Meco, C. Moreno, Rainfed crop energy balance of different farming systems and crop rotations in a semi-arid environment: Results of a long-term trial, Soil and Tillage Research, Volume 114, Issue 1, July 2011, Pages 18-27, ISSN 0167-1987, DOI: 10.1016/j.still.2011.03.006.
(http://www.sciencedirect.com/science/article/pii/S016719871100064X)
Abstract:
This study was conducted to determine how energy balances of crop production are affected by three farming systems (conventional, conservation with no tillage, and organic) and four barley-based crop rotations (barley followed by fallow [B-F], barley in rotation with vetch [B-V] or sunflower [B-S], and barley monoculture [B-B]), under the semi-arid conditions of central Spain over a 15-year period (1993/94-2007/08). As inputs, the factors supplied and controlled by farmers were considered. The energy balance variables considered were net energy produced (energy output minus energy input), the energy output/input ratio, and energy productivity (crop yield per unit energy input). The total energy inputs were 3.0-3.5 times greater in the conservation (10.4 GJ ha-1 year-1) and conventional (11.7 GJ ha-1 year-1) systems than in the organic system (3.41 GJ ha-1 year-1). With respect to the crop rotations, the total energy inputs varied from 6.19 GJ ha-1 year-1 for B-F to 11.7 GJ ha-1 year-1 for B-B. The lowest

energy use corresponded to B-F in the organic system (2.56 GJ ha-1 year-1), and the highest to B-B in the conventional and conservation systems (16.3 and 14.9 GJ ha-1 year-1, respectively). Energy output was lowest in the organic system (17.9 GJ ha-1 year-1), a consequence of the lower barley grain and vetch hay yields. With respect to the crop rotation, the order followed B-B (19.1 GJ ha-1 year-1) [approximate] B-F < B-S < B-V (29.3 GJ ha-1 year-1, 53% higher). All the energy efficiency variables analysed had the highest values for the organic system (net energy of 14.5 GJ ha-1 year-1, output/input ratio of 5.36 and energy productivity of 400 kg GJ-1). No differences were recorded between the conventional and conservation managements. This indicates that, in terms of energy efficiency, the viability of organic systems (low-input practices) under semi-arid conditions, compared to farming systems requiring agrochemicals (conventional and conservation), would appear more recommendable. Cereal monoculture (B-B), independent of the crop management employed, is an energetically unfavourable practice, especially in the driest seasons. However, crop rotations, especially those including a leguminous plant, increase energy efficiency.
Keywords: Energy analysis; Energy use efficiency; Organic farming; Crop rotation; Semi-arid conditions; Long-term trial

Montserrat Bassa, Celine Boutin, Lourdes Chamorro, F. Xavier Sans, Effects of farming management and landscape heterogeneity on plant species composition of Mediterranean field boundaries, Agriculture, Ecosystems & Environment, Volume 141, Issues 3-4, May 2011, Pages 455-460, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.04.012.
(http://www.sciencedirect.com/science/article/pii/S0167880911001320)
Abstract:
The aim of this study was to evaluate the effect of farming management (field and boundary management), boundary structure (width and habitat assemblage), and landscape heterogeneity on plant species composition in field boundaries. Plant species were characterised according to their conservation value, life form and affinity to soil nutrient conditions. We surveyed 30 field boundaries next to organic fields and 30 next to conventional fields distributed along a gradient of landscape complexity. A Detrended Correspondence Analysis was performed using all 517 species recorded in order to study the variation in species composition. Field and boundary management, boundary width, habitat assemblage of field boundaries (estimated with the percentage cover of Mediterranean grasslands) and landscape heterogeneity contributed significantly in predicting the variation in species composition. Perennial species of conservation value with affinity to nutrient-poor soil conditions were more likely to be found in wide managed boundaries characterized by a high percentage cover of Mediterranean grasslands, which are adjacent to organic fields and within heterogeneous landscapes.
Keywords: Agricultural landscape; Field boundary; Mediterranean grassland; Organic farming; Plant species composition

Christina Fischer, Carsten Thies, Teja Tscharntke, Small mammals in agricultural landscapes: Opposing responses to farming practices and landscape complexity, Biological Conservation, Volume 144, Issue 3, The New Conservation Debate: Beyond Parks vs. People, March 2011, Pages 1130-1136, ISSN 0006-3207, DOI: 10.1016/j.biocon.2010.12.032.
(http://www.sciencedirect.com/science/article/pii/S0006320710005410)
Abstract:

Organic farming often counteracts the decline of various taxa owing to agricultural intensification, but little is known about the relative importance of local management and landscape context for small mammals. We examined the abundance, species richness and diversity of small mammal communities in 22 organically and conventionally managed winter wheat fields pairwise located along a gradient of landscape structural complexity (41-94% arable land). Complex landscapes significantly increased small mammal abundance and (with marginal significance) species richness and diversity, but only in conventional fields, whereas organic farming increased small mammals in simple landscapes. These results indicate the importance of landscape complexity for small mammal populations in an intensified agriculture. Analyses at multiple spatial scales (100 m, 250 m, 500 m radii around focal fields), showed opposing responses of the three most abundant species to landscape complexity. Apodemus agrarius PALLAS abundance increased with increasing landscape complexity at a spatial scale of 100 m, whereas Microtus arvalis PALLAS and Sorex araneus L. abundances decreased with increasing landscape complexity at spatial scales of 100 m and 500 m, respectively, suggesting species-specific ecological needs as well as functional spatial scales for conservation management. In conclusion, agri-environmental measures for small mammals such as organic farming are most effective in simple landscapes, while complex landscapes presumably function as source habitats and can compensate for local agricultural intensification in conventional fields.
Keywords: Agricultural intensification; Apodemus agrarius; Microtus arvalis; Organic farming; Sorex araneus

Thomas Nemecek, Olivier Huguenin-Elie, David Dubois, Gerard Gaillard, Britta Schaller, Andreas Chervet, Life cycle assessment of Swiss farming systems: II. Extensive and intensive production, Agricultural Systems, Volume 104, Issue 3, March 2011, Pages 233-245, ISSN 0308-521X, DOI: 10.1016/j.agsy.2010.07.007.
(http://www.sciencedirect.com/science/article/pii/S0308521X10001393)
Abstract:
Extensive or low-input farming is considered a way of remedying many problems associated with intensive farming practices. But do extensive farming systems really result in a clear reduction in environmental impacts, especially if their lower productivity is taken into account? This question is studied for Swiss arable cropping and forage production systems in a comprehensive life cycle assessment (LCA) study.
Three long-term experiments (DOC experiment comparing bio-dynamic, bio-organic and conventional farming, the 'Burgrain' experiment including integrated intensive, integrated extensive and organic systems and the 'Oberacker' experiment with conventional ploughing and no-till soil cultivation, are considered in the LCA study. Furthermore, model systems for arable crops and forage production for feeding livestock are investigated by using the Swiss Agricultural Life Cycle Assessment method (SALCA).
The analysis covers an overall extensification of cropping systems and forage production on the one hand and a partial extensification of fertiliser use, plant protection and soil cultivation on the other. The overall extensification of an intensively managed system reduced environmental impacts in general, both per area unit and per product unit. In arable cropping systems medium production intensity gave the best results for the environment, and the intensity should not fall below the environmental optimum in order to avoid a deterioration of

eco-efficiency. In grassland systems, on the contrary, a combination of both intensively and extensively managed plots was preferable to medium intensity practices on the whole area. The differences in yield, production intensity and environmental impact were much more pronounced in grassland than in arable cropping systems.
Partial extensification of a farming system should be conceived in the context of the whole system in order to be successful. For example, the extensification solely of fertiliser use and soil cultivation resulted in a general improvement in the environmental performance of the farming system, whereas a reduction in plant protection intensity by banning certain pesticide categories reduced negative impacts on ecotoxicity and biodiversity only, while increasing other burdens such as global warming, ozone formation, eutrophication and acidification per product unit. The replacement of mineral fertilisers by farmyard manure as a special form of extensification reduced resource use and improved soil quality, while slightly increasing nutrient losses.
These results show that a considerable environmental improvement potential exists in Swiss farming systems and that a detailed eco-efficiency analysis could help to target a further reduction in their environmental impacts.
Keywords: Farming systems; Intensive production; Extensive production; Low-input farming; Life cycle assessment; Environmental impacts

Frank W. Oudshoorn, Claus Aage G. Sorensen, Imke J.M. de Boer, Economic and environmental evaluation of three goal-vision based scenarios for organic dairy farming in Denmark, Agricultural Systems, Volume 104, Issue 4, April 2011, Pages 315-325, ISSN 0308-521X, DOI: 10.1016/j.agsy.2010.12.003.
(http://www.sciencedirect.com/science/article/pii/S0308521X10001605)
Abstract:
The objective of this study was to explore the sustainability of future organic dairy farming systems in Denmark, by evaluating the economic and environmental consequences of three scenarios at the farm level based on different visions of future sustainability leading to different farm-based goals. The future sustainable organic dairy farming systems were deduced from participative sessions with stakeholders, and used to define specific scenarios and related key parameters. Parameterization of the scenarios was based on model simulations and the invoking of expert knowledge. Each scenario was designed to fulfil different aspects of sustainability. The business as usual scenario (BAU) was driven by economic incentives and implemented new technologies and measures to enhance productivity and efficiency. This scenario was expected to be the mainstream strategy of future organic dairy production in Denmark. In the animal welfare scenario (ANW), economic efficiency was subordinate to animal welfare, and measures to improve animal welfare, such as lower milk yield, extra grazing area and a deep-litter barn, were incorporated. The environmental scenario (ENV) was designed to minimize N losses into the environment, reduce emission of greenhouse gases and the use of fossil energy, and was based on self-sufficiency regarding nutrients and feed. The economic evaluation of the scenarios was based on quantification of farm profitability (i.e. net profit), whereas environmental evaluation was based on the quantification of the N-surplus per ha, emission of greenhouse gases, and use of fossil energy per kg energy-corrected milk (ECM).
Compared to prolonging the current main stream strategy (BAU), the evaluation of scenarios revealed that investing in animal welfare

comprised trade-offs regarding farm profitability, climate change and the use of fossil energy. In ANW, net profit per farm was almost 39 k[euro] lower than in BAU, whereas emission of greenhouse gases and energy per kg ECM was 8% and 3% higher, respectively. Minimizing environmental impact in ENV reduced local as well as global environmental impact without an economic trade-off. Greenhouse gas emission per kg ECM was 5% lower and fossil energy use was 11% lower than in BAU. The N-surplus of ENV was 80 kg per ha, whereas the N-surplus was approximately 116 in both BAU and ANW. Prolonging the current main stream strategy (BAU) resulted in a high local environmental impact, a moderate global environmental impact and a high economic risk related to changes in milk price or costs.
Keywords: Organic dairy production; Scenarios; Sustainability assessment; Profitability; Environmental impact; Animal welfare

Carlos Ponce, Carolina Bravo, David Garcia de Leon, Marina Magana, Juan Carlos Alonso, Effects of organic farming on plant and arthropod communities: A case study in Mediterranean dryland cereal, Agriculture, Ecosystems & Environment, Volume 141, Issues 1-2, April 2011, Pages 193-201, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.02.030. (http://www.sciencedirect.com/science/article/pii/S016788091100082X)
Abstract:
Organic farming is considered an important way to preserve biodiversity in agricultural landscapes. However, more work is still necessary to enable a full appraisal of the potential benefits of this way of farming, since studies differ in the evaluation of its effectiveness. Studies are particularly scarce in the Mediterranean region, where different climatic and ecological conditions prevent simple extrapolations from work carried out at northern latitudes. In the present study, an analysis of weed and arthropod communities was conducted in 28 pairs of organic and conventional fields in a dry cereal farmland in central Spain. Plants were identified to the species level, and arthropods to the family level. Pitfalls and sweep nets were used to sample respectively, ground-dwelling and plant-visiting arthropods. Abundance (total numbers of individuals), richness (total numbers of plant species or arthropod families), diversity (Shannon-Wiener index) and biomass (milligrams per pitfall/sweep-net) were calculated for each field and compared between organic and conventional fields using Generalized Linear Mixed Models (GLMMs). To explore the effect of predictor variables on weed richness and arthropod biomass, GLMMs were used. Organic fields showed higher abundance of weeds and arthropods (3.01 and 1.43 times, respectively), higher weed richness and diversity (2.76 and 2.33 times, respectively), and a 24% reduction in cereal plants. Arthropod diversity was lower in organic fields due to the presence of three dominant groups: Collembola, Chloropidae (Diptera), and Aphididae (Hemiptera). Weed richness increased as cereal cover decreased in organic fields. Total arthropod biomass was slightly higher in organic fields, and was affected by weed abundance and diversity. The differences between organic and conventional fields found in this study were higher than those reported for northern latitudes. This could be explained by the richer weed flora in the Mediterranean region, and a higher weed seed availability favored by the two-year rotation system typical of Iberian dry cereal farmland. We conclude that organic farming may contribute to preserve biodiversity in dryland cereal agroecosystems in the Mediterranean region.
Keywords: Diversity; Richness; Abundance; Weed and arthropod; Agri-environment scheme; Farmland

Christina Vakali, Johann G. Zaller, Ulrich Kopke, Reduced tillage effects on soil properties and growth of cereals and associated weeds under organic farming, Soil and Tillage Research, Volume 111, Issue 2, January 2011, Pages 133-141, ISSN 0167-1987, DOI: 10.1016/j.still.2010.09.003.
(http://www.sciencedirect.com/science/article/pii/S0167198710001698)
Abstract:
In organic farming, reduced tillage is often avoided because of potentially negative consequences for crops and weeds. On an experimental organic farm in Germany, we studied during three years the effects of the three tillage systems mouldboard ploughing (MP, inversion to 30 cm depth), two layer ploughing (TP, inversion to 15 cm, loosening to 30 cm) and layer cultivation (LC, only loosening to 30 cm) on soil properties, root and shoot growth of barley and rye and their associated weeds. The different tillage systems were applied for five consecutive years prior to the initiation of the current study within a five-course crop rotation consisting of green fallows, peas and cereals. During the current investigation, different tillage systems were applied after cereal harvests only resulting in different time periods between tillage and seeding for barley and rye. Generally, differences between tillage systems were most pronounced between LC and MP or TP while effects of MP and TP were similar. Soil aggregate stability under both crops was on average 46% and 18% higher at LC than at MP and TP, respectively. Soil penetration resistance under barley was on average 199% higher at LC than at MP ($p = 0.012$); under rye tillage systems had no effect on penetration resistance. Soil respiration was unaffected by tillage systems under both crops. Root length density (RLD) under barley was in the first two years 50% higher at MP than at LC in 20-30 cm soil depth; in the third year 32% higher under TP than MP or LC in the upper soil horizons. RLD under rye was unaffected by tillage treatments. Barley shoot mass was 38% lower at LC and 24% lower at TP than at MP ($p = 0.044$), rye shoot mass was in two years not influenced ($p = 0.58$). Weed shoot mass in barley was across years 88% and 65% higher at LC than at MP and TP, respectively; under rye no clear influence of tillage systems on weed shoot mass was observed. Experimental years differed considerably regarding annual precipitation and mean air temperatures and significantly influenced all parameters measured, however did not interact with the tillage treatments for most parameters.
Keywords: Mouldboard plough; Two-layer-plough; Layer cultivator; Soil parameters; Root length density; Shoot mass

G.P. Stamou, M.D. Argyropoulou, M.A. Tsiafouli, N. Monokrousos, S.P. Sgardelis, E.M. Papatheodorou, The study of secondary successional patterns in soil using network analysis: The case of conversion from conventional to organic farming, Pedobiologia, Volume 54, Issue 4, 10 July 2011, Pages 253-259, ISSN 0031-4056, DOI: 10.1016/j.pedobi.2011.03.006.
(http://www.sciencedirect.com/science/article/pii/S0031405611000400)
Abstract:
Soil disturbances that exert strong impacts on biota and their resources are also expected to induce changes in the web of interactions among soil variables. The objective of this paper was to explore the hypothesis that during the first years after the conversion from conventional to organic farming gradual changes occur in the

correlations among the nematode, microbial and nutrient flow components, resulting in increased complexity of the soil system. To test this hypothesis, we used network analysis techniques to analyze data from conventional (Conv) and organic asparagus cultivations, as well as from the adjacent hedgerows (Hedg). Organic cultivations were managed organically for 2, 3 and 5 years (Org-2, Org-3, Org-5), representing thus steps along a gradient that corresponds to the duration of organic farming.
The estimated network cohesion and centrality, as well as the key player metrics, showed that the correlation network of the newest organic systems, and mostly that of Org-3, was disorganized compared with that of Conv. This trend was reversed, and a complex and more cohesive network was formed in Org-5. In addition, by employing QAP techniques and Spearman rank correlation coefficients, inter-network correlations were estimated and similarities were found between the correlation network from Org-2 and that of Org-3. The structure of the latter was correlated with that from Org-5.
Our results indicated that the conversion of a conventional system to organic induces a disturbance into the soil system routine, probably launching secondary successional changes in the interactions among soil components. These changes seem to involve the gradual destruction of existing interactions leading to the disorganization of the correlation network and the reconstruction of a more complicated one after 3-5 years.
Keywords: Nematode functional guilds; Microbial biomass; N- and C-cycle; Soil disturbance

M.K. Smith, J.P. Smith, G.R. Stirling, Integration of minimum tillage, crop rotation and organic amendments into a ginger farming system: Impacts on yield and soilborne diseases, Soil and Tillage Research, Volume 114, Issue 2, August 2011, Pages 108-116, ISSN 0167-1987, DOI: 10.1016/j.still.2011.04.006.
(http://www.sciencedirect.com/science/article/pii/S0167198711000845)
Abstract:
Ginger (Zingiber officinale) production is facing increasing disease and pest pressure and declining yield with continuing intensive cultivation practices. A four year experiment was established in south-eastern Queensland on a red ferrosol that had a long (>60 years) history of ginger farming. Minimal tillage and organic amendments were compared with conventional practice that involved frequent tillage and soil fumigation using 1,3-dichloropropene (Telone(R)). Ginger crops were grown in the second and fourth year of the experiment, following an annual rotation with different cover crops including oats (Avena sativa), Brassica spp., soybean (Glycine max) and forage sorghum (Sorghum bicolour X S. sudanese). A pasture ley of Pangola grass (Digitaria eriantha subsp. pentzii) provided a treatment continuum from major to minor disruption in the soil's physical fertility and biological communities, and was therefore only planted to ginger in the fourth year of the experiment. Ginger seed-pieces (sections of the rhizome used for planting) were planted into both tilled and untilled beds using a double disc opener on a specially designed ginger planter. Rhizome yield in the final year was greatest (74.2 t/ha) and losses to pathogens (Pythium myriotylum and Fusarium oxysporum f. sp. zingiberi) minimal (7.0%) in the pasture ley that had been cultivated prior to planting ginger. Furthermore, the minimum-tilled cover cropped treatment, which likewise had been cultivated prior to planting ginger, yielded well (62.0 t/ha), with few losses (5.0%) from rhizome rots.

Conversely the fumigated treatment had the highest losses (35.9%) due to Pythium Soft Rot and lowest yields (20.2 t/ha). Minimum-tilled plantings of ginger, however, resulted in poor yields (30.9-43.1 t/ha) but had acceptable levels of disease.
Keywords: Conservation tillage; Soil fertility; Disease suppression; Krasnozems

Ana R. Lopes, Catia Faria, Angeles Prieto-Fernandez, Carmen Trasar-Cepeda, Celia M. Manaia, Olga C. Nunes, Comparative study of the microbial diversity of bulk paddy soil of two rice fields subjected to organic and conventional farming, Soil Biology and Biochemistry, Volume 43, Issue 1, January 2011, Pages 115-125, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2010.09.021.
(http://www.sciencedirect.com/science/article/pii/S0038071710003548)
Abstract:
Two adjacent paddies of an experimental rice field, subjected to organic and conventional farming, were characterized aiming the comparative assessment of microbiological variations occurring in the bulk paddy soil over the rice cycle. This study comprehended the simultaneous characterization of general physicochemical soil properties [total carbon and nitrogen, pH (H2O and KCl), C:N ratio and water content], biochemical properties [enzymatic activities and Community Level Physiological Profiles (CLPP)], the estimation of cultivable organisms (enumeration of fast growing heterotrophic bacteria, actinomycetes and fungi) and the assessment of bacterial diversity using a culture-independent method (PCR-DGGE fingerprinting). The linkage of the parameters measured was analysed by canonical correspondence analysis (CCA).
CCA ordination plots of the CLPP showed a similar pattern of microbial functional activity in both agronomic management systems, except in June. Enzymatic activity, water content and fungi counts were the main factors affecting the observed CLPP time variation. Such a variation was not expressed by the Shannon and evenness indices, which did not evidence significant differences in the bacterial and functional diversity between or within farming type over the analysed period. The cluster and CCA analyses of the DGGE profiles allowed the distinction of the bacterial communities of both paddies, with temporal variations being observed in the organically managed field but not in the conventional paddy. Enzymatic activity, pH and molinate content were the factors which most contributed to the observed variations. Altogether these results underline the functional redundancy of the rice paddy soil and evidence the temporal variations on the metabolic activity of soil, irrespective of farming type.
Keywords: Cultivable microbial counts; Soil enzymatic activity; CLPP; DGGE fingerprinting; Bacterial community diversity; Agronomic management

S. Sujatha, Ravi Bhat, C. Kannan, D. Balasimha, Impact of intercropping of medicinal and aromatic plants with organic farming approach on resource use efficiency in arecanut (Areca catechu L.) plantation in India, Industrial Crops and Products, Volume 33, Issue 1, January 2011, Pages 78-83, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2010.09.001.
(http://www.sciencedirect.com/science/article/pii/S0926669010002116)
Abstract:
The present investigation was conducted at Vittal, Karnataka, India during 2004-2007 to study the feasibility of intercropping of medicinal and aromatic plants (MAPs) in arecanut plantation. The results revealed

that MAPs can be successfully grown as intercrops in arecanut plantation with increased productivity and net income per unit area. Kernel equivalent yield of MAPs varied between 272 kg ha-1 in case of Piper longum to 1218 kg ha-1 in Cymbopogon flexuosus. Pooled data indicated that Asparagus racemosus produced fresh root yield of 10,666 kg ha-1 of arecanut plantation and contributed to maximum kernel equivalent yield of 1524 kg ha-1 among all medicinal and aromatic plants. Intercropping of MAPs in arecanut was found economical. The net return per rupee investment was highest in C. flexuosus (4.25) followed by Bacopa monnieri (3.64), Ocimum basilicum (3.46) and Artemisia pallens (3.12). The total system productivity of arecanut + MAPs intercropping system varied from 2990 to 4144 kg ha-1. Arecanut + O. basilicum intercropping system registered significantly higher production efficiency 8.2 kg ha-1 day-1 than other systems. Intercropping of MAPs had more positive effect on soil pH in arecanut based cropping system. The soil pH was 5.6 in 2004 and it was 0.3-0.9 units higher in 2007. Soil organic carbon (SOC) content varied significantly due to intercropping of MAPs at the end of experiment. The SOC content increased in Aloe vera, A. pallens, P. longum and B. monnieri, while it depleted in grasses and rhizomatic MAPs. Based on demand and marketing opportunities for MAPs, farmers are advised to grow aromatic plants in large areas on a community basis to meet huge industrial demand and variety of medicinal crops in small areas to meet the requirement of traditional systems of medicine.
Keywords: Asparagus racemosus; Bacopa monnieri; Vetiveria zizanoides; Piper longum; Cymbopogon flexuous; Ocimum basilicum; MAPs; Intercropping; Arecanut

Caio Fabio Stoffel Efrom, Luiza Rodrigues Redaelli, Rafael Narciso Meirelles, Claudia Bernardes Ourique, Laboratory evaluation of phytosanitary products used for control of the South American fruit fly, Anastrepha fraterculus, in organic farming, Crop Protection, Volume 30, Issue 9, September 2011, Pages 1162-1167, ISSN 0261-2194, DOI: 10.1016/j.cropro.2011.05.007.
(http://www.sciencedirect.com/science/article/pii/S0261219411001712)
Abstract:
The South American fruit fly, Anastrepha fraterculus (Wied.), is one of the principal pests of fruit crops in Brazil. While organic farms use several compounds to control fruit flies, such as oils, plant extracts and soaps, there is little scientific evidence of their effectiveness. Our main goal was to evaluate the phytosanitary products used in organic orchards on A. fraterculus under laboratory conditions. Four multiples (0.25x, 0.5x, 1x and 2x) of the manufacturer-recommended concentrations of Rotenat CE(R) (extract of Derris spp. with rotenone 5%) (600 ml 100 l-1), Pironat(R) (pyroligneous extract) (250 ml 100 l-1), Biopirol 7M(R) (pyroligneous extract) (200 ml 100 l-1), Organic neem(R) (neem oil 80%) (500 ml 100 l-1), Natuneem(R) (neem oil - 1500 ppm of azadirachtin) (500 ml 100 l-1) and lime sulfur (20% S + 9% Ca) (5000 ml 100 l-1) were tested on A. fraterculus via ingestion and direct contact, topical application and residual application. We subsequently tested deterrence effects of the same products on oviposition. Organic Neem(R), Natuneem(R), lime sulfur, Pironat(R), and Biopirol 7M(R) showed no insecticidal effect on the South American fruit fly. Only Rotenat CE(R) (1200 ml 100 l-1) showed an effect (71.6% mortality) following ingestion/contact. Lime sulfur, Pironat(R) and Biopirol 7M(R) did not prevent oviposition of A. fraterculus on artificial fruits.

Keywords: Rotenone; Lime sulfur; Neem; Pyroligneous extract; Fruit fly

P. Toro-Mujica, A. Garcia, A.G. Gomez-Castro, R. Acero, J. Perea, V. Rodriguez-Estevez, C. Aguilar, R. Vera, Technical efficiency and viability of organic dairy sheep farming systems in a traditional area for sheep production in Spain, Small Ruminant Research, In Press, Corrected Proof, Available online 13 July 2011, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2011.06.008.
(http://www.sciencedirect.com/science/article/pii/S0921448811002501)
Abstract:
The technical efficiency and viability of organic dairy sheep farming systems were investigated in Castilla-La Mancha, a Spanish region with a tradition of sheep rearing. The thirty one farms sampled, had an average of 359 ha, 508 sheep and 1.9 work units (WU); the reproductive rate was 1.5 lambs per ewe and year and the human productivity reached 303 sheep/WU. There was however a high degree of variation among farms. Although the average level of technical efficiency was 66%, 74% of farms sampled operated at medium or low rates of technical efficiency. Differences in technical efficiency were largely due to the consumption of feeding supplements and productivity. A total of 45% of the farms was classified as non-viable. It was concluded that strategies for improving competitiveness and the use of resources are specific to each level of efficiency. The most efficient farms must increase their size; moderately efficient farms need to focus their efforts on improving the management of resources to enhance results. Improving competitiveness of the less efficient farms requires an increase of productivity; a better balance between the use of feeding supplements and the sheep productive capacity.
Keywords: Econometric models; Organic production; Benchmarking

Lee-Ann Sutherland, 'Effectively organic': Environmental gains on conventional farms through the market?, Land Use Policy, Volume 28, Issue 4, October 2011, Pages 815-824, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2011.01.009.
(http://www.sciencedirect.com/science/article/pii/S0264837711000196)
Abstract:
Qualitative field research in England identified a cohort of farmers practicing what they self-defined as `effectively organic' or `semi-organic' farming. Utilising Ajzen's theory of planned behaviour as a framework for analysis, reducing inputs was found to be primarily a response to financial pressures, also reflected in changing substantive norms towards balancing risks and potential returns against investment, rather than optimising production. However, despite the apparent ease of converting to organic farming from low input practice, formal conversion to organic farming was not found to be the automatic outcome of this trajectory: instead, organic farming was identified as only one of a number of options for increasing the financial viability of the farming operation, which included other niche markets, pluriactivity and contracting land to and from other farmers. The affiliation of low input farmers with organic production denotes positive attitudes towards both organic farming and environmental practices, but a lack of understanding about organic farming techniques. The author argues that due to declining returns/input ratios, future conversion to organic farming may reflect the value placed on other aspects of organic production, such as increased labour, risk reduction and environmental ideals, and highlights the environmental implications of the ongoing `cost price squeeze' on farming households.

Keywords: Organic farming; Diversification; Conventionalisation; Integrated farming; Agri-environmental policy

Antonio Pusceddu, Luc Della Patrona, Benoit Beliaeff, Trophic status of earthen ponds used for semi-intensive shrimp (Litopenaeus stylirostris, Stimpson, 1874) farming in New Caledonia (Pacific Ocean), Marine Environmental Research, In Press, Accepted Manuscript, Available online 11 August 2011, ISSN 0141-1136, DOI: 10.1016/j.marenvres.2011.07.005.
(http://www.sciencedirect.com/science/article/pii/S0141113611000882)
Abstract:
We have investigated temporal variability in the quantity and biochemical composition of sediment organic matter along with variables proxies of water eutrophication (e.g., inorganic nutrient and chlorophyll-a) at two shrimp farms located in the Southern coast of New Caledonia and characterised by clear differences in shrimp feeding practices and levels of initial trophic conditions. The results of our study reveal that the trophic status of the water column increased during the rearing cycle at both sites, determining a general, though moderated, eutrophication. However, the water column trophic descriptors did not allow to discriminate differences in the trophic status among the investigated sites or between sites in the same farming plant, even if they were subjected to different feeding practices and largely different initial characteristics of the sediment. Temporal variations in biopolymeric C and phytopigment sedimentary contents (used as proxies of benthic eutrophication) varied inconsistently among sites. The multivariate analyses did not identify significant temporal patterns in the benthic trophic status, but allowed discriminating the four investigated sites. The semi-intensive shrimp farming significantly contributed to changing the water column and sediments trophic status of the earthen ponds, but the extent of those changes was not consistently observed in all ponds. In any of the investigated ponds the trophic status exceeded concerning thresholds over which hypoxia or anoxia could occur. We conclude that the established semi-intensive practices adopted so far for shrimp farming activities in the earthen ponds of New Caledonia are able to maintain the status of the ponds below the eutrophication levels over which dystrophic crises could sharply abate most of the reared biomass.
Keywords: Eutrophication; shrimp farm; sedimentary organic matter; New Caledonia

M. Askegaard, J.E. Olesen, I.A. Rasmussen, K. Kristensen, Nitrate leaching from organic arable crop rotations is mostly determined by autumn field management, Agriculture, Ecosystems & Environment, Volume 142, Issues 3-4, August 2011, Pages 149-160, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.04.014.
(http://www.sciencedirect.com/science/article/pii/S0167880911001344)
Abstract:
Two main challenges facing organic arable farming are the supply of nitrogen (N) to the crop and the control of perennial weeds. Nitrate leaching from different organic arable crop rotations was investigated over three consecutive four-year crop rotations in a field experiment at three locations in Denmark (12 years in total). The experimental treatments were: (i) crop rotation, (ii) catch crop and (iii) animal manure. Nitrate leaching was estimated from measured soil nitrate concentration in ceramic suction cells and modelled drainage. There were significant effects on annual N leaching of location (coarse sand > loamy sand > sandy loam) and catch crops (without > with). Including

a grass-clover green manure on 25% of the area did not increase N leaching compared with crop rotations without green manure. Also the application of animal manure did not influence N leaching, probably because even in the manured treatments the application rate was lower than crop demand. The results identify management of crop and soil during autumn as the main determinant of N leaching. Nitrate leaching was lowest for a catch crop soil cover during autumn and winter (avg. 20 kg N ha-1), a soil cover of weeds/volunteers had on avg. 30 kg N ha-1, and the largest N leaching losses were found after stubble cultivation (avg. 55 kg N ha-1). The N leaching losses increased with increasing number of autumn soil cultivations.
Keywords: Catch crop; Organic manure; Organic farming; Green manure; Perennial weeds; Stubble cultivation

Jordi Doltra, Mette Laegdsmand, Jorgen E. Olesen, Cereal yield and quality as affected by nitrogen availability in organic and conventional arable crop rotations: A combined modeling and experimental approach, European Journal of Agronomy, Volume 34, Issue 2, February 2011, Pages 83-95, ISSN 1161-0301, DOI: 10.1016/j.eja.2010.11.002.
(http://www.sciencedirect.com/science/article/pii/S1161030110000973)
Abstract:
The effects of nitrogen (N) availability related to fertilizer type, catch crop management, and rotation composition on cereal yield and grain N were investigated in four organic and one conventional cropping systems in Denmark using the FASSET model. The four-year rotation studied was: spring barley-(faba bean or grass-clover)-potato-winter wheat. Experiments were done at three locations representative of the different soil types and climatic conditions in Denmark. The three organic systems that included faba bean as the N fixing crop comprised a system with manure (stored pig slurry) and undersowing catch crops (OF + C + M), a system with manure but without undersowing catch crops (OF - C + M), and a system without manure and with catch crops (OF + C - M). A grass-clover green manure was used as N fixing crop in the other organic system with catch crops (OG + C + M). Cuttings of grass-clover were removed from the plots and an equivalent amount of total-N in pig slurry was applied to the cropping system. The conventional rotation included mineral fertilizer and catch crops (CF + C + F), although only non-legume catch crops were used. Measurements of cereal dry matter (DM) at harvest and of grain N contents were done in all plots. On average the FASSET model was able to predict the yield and grain N of cereals with a reasonable accuracy for the range of cropping systems and soil types studied, having a particularly good performance on winter wheat. Cereal yields were better on the more loamy soil. DM yield and grain N content were mainly influenced by the type and amount of fertilizer-N at all three locations. Although a catch crop benefit in terms of yield and grain N was observed in most of the cases, a limited N availability affected the cereal production in the four organic systems. Scenario analyses conducted with the FASSET model indicated the possibility of increasing N fertilization without significantly affecting N leaching if there is an adequate catch crop management. This would also improve yields of cereal production of organic farming in Denmark.
Keywords: Winter wheat; Spring barley; Nitrogen leaching; Organic farming; FASSET model

Jana Kalinova, Nadezda Vrchotova, The influence of organic and conventional crop management, variety and year on the yield and flavonoid level in common buckwheat groats, Food Chemistry, Volume 127, Issue 2, 15 July 2011, Pages 602-608, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2011.01.050.
(http://www.sciencedirect.com/science/article/pii/S0308814611001373)
Abstract:
Common buckwheat (Fagopyrum esculentum Moench) is a pseudocereal that is cultivated for its achenes that possess a high level of flavonoids. Some scientific studies have found that the growing conditions can significantly affect the flavonoid content in conventional and organic food products. Hence, the present study compared conventionally and organically produced common buckwheat with respect to the content of selected flavonoids, thousand achenes weight and achene yield. Three buckwheat varieties were grown with organic and conventional crop management under the same environmental conditions. The thousand achenes weight and achene yield were not significantly influenced by way of crop management. The level of rutin, epicatechin, catechin, and epicatechin gallate in buckwheat groats (hulled achenes) were quantified with high pressure liquid chromatography. Only rutin and epicatechin gallate reached significantly higher level in organic groats. However, the differences were influenced by environmental conditions in the given year and variety.
Keywords: Fagopyrum esculentum; Rutin; Epicatechin; Catechin; Epicatechin gallate; Yield; TGW; Organic farming

Raffaella Balestrini, Cristina Arese, Carlo Andrea Delconte, Alessandro Lotti, Franco Salerno, Nitrogen removal in subsurface water by narrow buffer strips in the intensive farming landscape of the Po River watershed, Italy, Ecological Engineering, Volume 37, Issue 2, February 2011, Pages 148-157, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2010.08.003.
(http://www.sciencedirect.com/science/article/pii/S0925857410002582)
Abstract:
In many countries buffer strips have become an important management tool widely accepted for controlling the diffuse pollution and supporting the development of more sustainable agriculture. However, there is the need to investigate their role in intensive farming systems where a realistic and shareable proposal to realize buffer strips can only foresee the use of a limited space. We evaluated the nitrogen buffering capacities of two narrow riparian strips (5–8 m) along irrigation ditches located in a typical flat agricultural watershed of the alluvial plain of the River Po (Northern Italy). Subsurface water level and nutrient concentrations were monitored along transects of piezometers installed from crop fields to ditches in two different areas. Spatial and temporal variation in water chemistry and hydrology were investigated to individuate the main processes (biological or physical) leading to groundwater nitrate depletion related to fertilization, pluviometric regime and seasonal variation. The results obtained indicate an elevated nitrate removal efficiency in both riparian areas. Compared to the high mean concentrations measured at the exit of the crop fields (10–90 mg l-1 N-NO3-), nitrate levels within riparian sites can be very low, completely disappearing below the ditches. The patterns of some chemical species (O2, SO42- and HCO3-) and the potential denitrification rates suggest that denitrification plays a predominant role in the N-NO3- depletion observed in the first few meters of the herbaceous strip. The key factors in the system are

the elevated groundwater residence time and the effect of the evapotranspiration. The water uptake by woody vegetation affects the subsurface water to flow through the riparian zone and, at the same time, it contributes to completely remove the nitrate from the groundwater.
Our findings also suggest the double role of riparian vegetation both in ecohydrological and biological terms. In fact the water uptake by trees affects the subsurface flow pattern and contributes to completely remove the nitrate in the riparian zone.
Keywords: Hydrology; Groundwater; Soil; Denitrification; Organic carbon; Oxygen; Plant uptake

Juan Francisco Herencia, Pedro A. Garcia-Galavis, Jose Antonio Ruiz Dorado, Celia Maqueda, Comparison of nutritional quality of the crops grown in an organic and conventional fertilized soil, Scientia Horticulturae, Volume 129, Issue 4, 27 July 2011, Pages 882-888, ISSN 0304-4238, DOI: 10.1016/j.scienta.2011.04.008.
(http://www.sciencedirect.com/science/article/pii/S030442381100183X)
Abstract:
Organic farming is growing rapidly in its potential for producing healthy foods and has been adopted in a wide range of climate and soil types. The perception among consumers is that organically produced crops possess higher nutritional quality. However, there are many factors that can affect the nutritional quality of crops, and few studies have been able to account for these differences.
A comparative long-term study of organic versus mineral fertilisation has been conducted for nine years in a calcareous loamy soil classified as Xerofluvent in the Guadalquivir River Valley, near Seville, Spain. The macronutrient concentration, dry matter and nitrate content in the edible part of the plants over the last five years of the experiment were examined. We found that the nitrate concentration in the edible parts was significantly lower in crops grown in organically fertilised plots. We also found a tendency for lower N and higher P content in organic crops cultivated in same crop cycle. However, the results also showed variability in the nutritional parameters for the same crop but cultivated in different years. We conclude that it is not possible to assert a higher nutritional quality of organic crops according only to the criteria of fertiliser type; other factors, such as fertiliser characteristics and management in each particular crop cycle, exert a higher influence on the nutrient content of crops.
Keywords: Organic farming; Crop; Macronutrients; Nitrate content; Vegetative compost; Nutritional quality

Carlos Sanz-Lazaro, Maria Dolores Belando, Lazaro Marin-Guirao, Francisco Navarrete-Mier, Arnaldo Marin, Relationship between sedimentation rates and benthic impact on Maerl beds derived from fish farming in the Mediterranean, Marine Environmental Research, Volume 71, Issue 1, February 2011, Pages 22-30, ISSN 0141-1136, DOI: 10.1016/j.marenvres.2010.09.005.
(http://www.sciencedirect.com/science/article/pii/S0141113610001637)
Abstract:
The aim of this work was to study the dispersion of particulate wastes derived from marine fish farming and correlate the data with the impact on the seabed. Carbon and nutrients were correlated with the physico-chemical parameters of the sediment and the benthic community structure. The sedimentation rates in the benthic system were 1.09, 0.09 and 0.13 g m-2 day-1 for particulate organic carbon (POC),

particulate organic nitrogen (PON) and total phosphorus (TP), respectively. TP was a reliable parameter for establishing the spatial extent of the fish farm particulate wastes. Fish farming was seen to influence not only physico-chemical and biological parameters but also the functioning of the ecosystem from a trophic point of view, particularly affecting the grazers and the balance among the trophic groups. POC, PON and TP sedimentation dynamics reflected the physico-chemical status of the sediment along the distance gradient studied, while their impact on the benthic community extended further. Therefore, the level of fish farm impact on the benthic community might be underestimated if it is assessed by merely taking into account data obtained from waste dispersion rates. The benthic habitat beneath the fish farm, Maerl bed, was seen to be very sensitive to aquaculture impact compared with other unvegetated benthic habitats, with an estimated POC-carrying capacity to maintain current diversity of 0.087 g C m-2 day-1 (only 36% greater than the basal POC input). Environmental protection agencies should define different aquaculture waste load thresholds for different benthic communities affected by finfish farming, according to their particular degree of sensitivity, in order to maintain natural ecosystem functions.
Keywords: Mediterranean; Particulate wastes; Finfish aquaculture; Trophic groups

J. Stadmark, D.J. Conley, Mussel farming as a nutrient reduction measure in the Baltic Sea: Consideration of nutrient biogeochemical cycles, Marine Pollution Bulletin, Volume 62, Issue 7, July 2011, Pages 1385-1388, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2011.05.001. (http://www.sciencedirect.com/science/article/pii/S0025326X11002517)
Abstract:
Nutrient loads from the land to the sea must be reduced to combat coastal eutrophication. It has been suggested that further mitigation efforts are needed in the brackish Baltic Sea to decrease nutrients, especially in eutrophic coastal areas. Mussel farming is a potential measure to remove nutrients directly from the sea. Mussels consume phytoplankton containing nitrogen (N) and phosphorus (P); when the mussels are harvested these nutrients are removed from the aquatic system. However, sedimentation of organic material in faeces and pseudo-faeces below a mussel farm consumes oxygen and can lead to hypoxic or even anoxic sediments causing an increased sediment release of ammonium and phosphate. Moreover, N losses from denitrification can be reduced due to low oxygen and reduced numbers of bioturbating organisms. To reveal if mussel farming is a cost-effective mitigation measure in the Baltic Sea the potential for enhanced sediment nutrient release must be assessed.
Keywords: Eutrophication; Filter feeder; Hypoxia; Nitrogen; Nutrient removal; Phosphorus; Sediment release

F.W. Oudshoorn, T. Kristensen, A.J. van der Zijpp, I.J.M. de Boer, Sustainability evaluation of automatic and conventional milking systems on organic dairy farms in Denmark, NJAS - Wageningen Journal of Life Sciences, In Press, Corrected Proof, Available online 16 July 2011, ISSN 1573-5214, DOI: 10.1016/j.njas.2011.05.003. (http://www.sciencedirect.com/science/article/pii/S1573521411000376)
Abstract:
Organic dairy farmers in Denmark currently are implementing automatic milking systems (AMS) to save labour costs. As organic agriculture aims at sustainable production, the introduction of a new technology such as

AMS should be evaluated regarding its economic viability, environmental impact, and social acceptability, i.e., its contribution to sustainable development. The objective of this research, therefore, was to evaluate sustainability of AMS use on organic dairy farms in Denmark, by comparing results of a set of sustainability indicators for nine farms using AMS with nine farms using conventional milking systems (CMS). Sustainability indicators were quantified for economic performance of the farm, on-farm eutrophication, on-farm biodiversity, animal welfare (including health), grazing time, milk composition and labour time. Milk yield per cow per year was higher for AMS farms (9021 kg energy corrected milk [ECM] per cow per year) than for CMS farms (7664 kg ECM), but did not result in a higher net profit or gross margin per cow for AMS farms. Nitrogen surplus per hectare of available land was higher for AMS farms (110 kg N ha-1) than for CMS farms (66 kg N ha-1). This difference was not due to the use of AMS but was caused by a higher export of manure by the CMS farms. The number of veterinary treatments per cow per year was unaffected by AMS use, but culling rate was higher for the AMS farms (38%) than for the CMS farms (32%). There was no difference between the AMS and CMS farms in milk composition indicators such as somatic cell count, clostridium spores, and urea. The acid degree value (ADV), measuring free fatty acids (FFA) in the milk, was higher in the milk from the AMS farms (0.78 meq l-1) compared with the CMS farms (0.49 meq l-1). Labour time measured in hours of work per dairy cow per day, was only half for the AMS compared with the CMS users; i.e., 2.3 min per cow per day. Grass intake by grazing as percentage of total feed intake was reduced by AMS (5.1 kg DM per cow per day for the AMS farms against 6.8 kg DM per cow per day for the CMS farms). From this quantification of selected sustainability indicators it can be concluded that organic dairy farms using AMS, in spite of the substantial decrease in grazing time, show the potential of economic and environmental sustainable development within the range of herd sizes investigated (65-157 cows per farm). Even though the lower number of grazing hours per cow per year on the AMS farms did not affect indicator scores for animal health or milk quality, this reduction in grazing hours might be a problem for consumers to accept AMS use.
Keywords: Organic dairy farming; Automatic milking system; Sustainability indicators; Grazing

J.M. Cooper, G. Butler, C. Leifert, Life cycle analysis of greenhouse gas emissions from organic and conventional food production systems, with and without bio-energy options, NJAS - Wageningen Journal of Life Sciences, In Press, Corrected Proof, Available online 23 June 2011, ISSN 1573-5214, DOI: 10.1016/j.njas.2011.05.002.
(http://www.sciencedirect.com/science/article/pii/S1573521411000340)
Abstract:
The Nafferton Factorial Systems Comparison experiments were begun in 2003 to provide data on the production and quality effects of a whole spectrum of different crop production systems ranging from fully conventional to fully organic. In this paper, the crop production data for the first 4 years of the experiments have been used to conduct a life cycle analysis of the greenhouse gas (GHG) emissions from organic and conventional production systems. Actual yield and field activity data from two of the treatments in the experiments (a stocked organic system and a stockless conventional system) were used to determine the GHG emissions per hectare and per MJ of human food energy produced, using both the farm gate and wider society as system boundaries. Emissions from these two baseline scenarios were compared with six

other modelled scenarios: conventional stocked system, a stockless system where all crop residues were incorporated into the soil, two stocked systems where manure was used for biogas production, and two stockless systems where all crop residues were removed from the field and used for bio-energy production. Changing the system boundary from the farm gate to wider society did not substantially alter the GHG emissions per hectare of land when organic production methods were used; however, in conventional systems, which rely on more off-farm inputs, emissions were much greater per hectare when societal boundaries were used. Incorporating on-farm bioenergy production into the system allowed GHG emissions to be offset by energy generation. In the case of the organic system that included pyrolysis of crop residues, net GHG emissions were negative, indicating that energy offsets and sequestration of C in biochar can completely offset emissions of GHG from food production. The analysis demonstrates the importance of considering system boundaries and the end use of all agricultural products when conducting life cycle analyses of food production systems.
Keywords: Life cycle analysis; Organic farming; Carbon sequestration; Greenhouse gas emissions; Crop production systems; Mixed farming; Off-farm inputs

M.D. Eyre, C.N.R. Critchley, C. Leifert, S.J. Wilcockson, Crop sequence, crop protection and fertility management effects on weed cover in an organic/conventional farm management trial, European Journal of Agronomy, Volume 34, Issue 3, April 2011, Pages 153-162, ISSN 1161-0301, DOI: 10.1016/j.eja.2011.01.001.
(http://www.sciencedirect.com/science/article/pii/S1161030111000025)
Abstract:
A survey of 128 plots, in 2008, of a trial where the effects of crop protection can be separated from those of fertility management, generated weed cover data within six crops (winter wheat, winter barley, spring barley, potatoes, cabbages and a grass/clover ley). The effects of the 2008 crop types, of the two preceding crops and of organic and conventional crop protection and fertility management, were assessed using mixed-effects models and constrained ordination. Cover data for 22 weed species and for monocotyledon, dicotyledon, annual, perennial and total weed cover were used. Cover of 15 weed species, and of the five weed groups, was significantly affected by 2008 crops, with cover highest in spring beans and cabbage. Nine and four weed species 2008 cover were significantly related to crops grown in 2007 and 2006 respectively, as were dicotyledon, annual and total weed cover, but not monocotyledon or perennial cover. Cover of 15 species, and the five groups, was significantly higher in plots with organic crop protection, but only eight species and annuals were significantly affected by fertility management. Crop:crop protection produced the most significant interactions with most cover in organically managed plots. Five species, perennials and total weed cover produced significant three-factor models. The greatest weed cover was in organic crop protected but conventionally fertilised spring barley and the least in totally conventional winter barley. Other factors such as crop density and mechanical weeding also affected 2008 weed cover. The ordination indicated that most of the 22 species were strongly associated with crops from all three years. The sequence of crops in the rotation had a profound effect on weed cover. Where three spring-sown, difficult to weed, crops were grown in sequence (spring beans, potatoes and vegetables, spring barley) weed cover increased. However, cover was

limited in grass/clover and some cereal plots with different preceding crops. Models predicting weed cover may need to take into account crop sequences within crop rotations, as well as the more usual management inputs.
Keywords: Weed cover; Organic farming; Cereal; Vegetable; Grass; Crop rotation

Shabeg S. Briar, Sally A. Miller, D. Stinner, M.D. Kleinhenz, Parwinder S. Grewal, Effects of organic transition strategies for peri-urban vegetable production on soil properties, nematode community, and tomato yield, Applied Soil Ecology, Volume 47, Issue 2, February 2011, Pages 84-91, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2010.12.001.
(http://www.sciencedirect.com/science/article/pii/S0929139310002581)
Abstract:
Four organic transition strategies including tilled fallow (FA), mixed-species hay (HA), low intensity open-field vegetable production (FV) and intensive vegetable production under high tunnels (HT), each with and without annual compost amendment, were analyzed for nematode communities and soil properties from 2003 to 2006. Tomato was grown in all plots at the end of the transition period (2006). Overall the enrichment opportunist bacterivore nematodes belonging to c-p 1 (colonizer-persister) and general opportunist c-p 2 classes were favored by compost amendment. Hay (HA) had the highest abundance of c-p 1 bacterivores followed by HT with compost compared to other compost treatments. HA and HT without compost showed similar levels of c-p 2 but lower c-p 1 bacterivores compared to their compost-amended counterparts. Nematode food webs in all strategies with and without compost had low structure (SI) and enrichment index (EI) values. The lack of increase in EI in compost-amended plots was mainly due to the higher abundance of c-p 2 bacterivores compared to c-p 1 bacterivores. A decline of SI in HA plots after the incorporation of hay and consistently low SI in HT where soil disturbance was more frequent and temperature profiles were significantly different from those in open-field settings demonstrate that compost amendment alone is insufficient to increase trophic linkages in the soil food web. Although compost application increased the organic matter, microbial biomass (MB) and N levels compared with non-amended controls in general, N and MB were the highest in HT and HA. In temperate climates, soil temperatures in high tunnels covered year-round tend to exceed those in open fields in spring and fall months. The soil food web, in turn, may remain more active in these settings contributing to enhanced N mineralization. In this study, tomato yield in HT plots exceeded yield in other treatments potentially due to the season extension and higher N availability.
Keywords: Organic farming; High tunnels; Nematode communities; Bacterivores; Microbial biomass

Valentina Picchi, Carmela Migliori, Roberto Lo Scalzo, Gabriele Campanelli, Valentino Ferrari, Luigi Francesco Di Cesare, Phytochemical content in organic and conventionally grown Italian cauliflower, Food Chemistry, In Press, Corrected Proof, Available online 21 July 2011, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2011.07.036.
(http://www.sciencedirect.com/science/article/pii/S0308814611009836)
Abstract:
An experiment was conducted that compared the phytochemical content of two genotypes (Emeraude and Magnifico) of a green typology cauliflower under conventional or organic management. In addition, three fertilisation regimes were considered within the framework of organic

agriculture. The two genotypes showed a contrasting response to organic practices: the phytochemical content of Emeraude was generally reduced, while in Magnifico, most of the quality parameters were unaffected or increased. In addition, under organic management, the use of higher fertilisation levels significantly increased the phytochemical production of Magnifico, in particular ascorbic acid ($P < 0.05$) and polyphenols ($P < 0.01$). However, the same fertigation treatments decreased the phytochemical production of Emeraude, particularly glucosinolates and ascorbic acid. This genotype was identified as a key factor in the determination of cauliflower quality under different management practices. Moreover, our results indicate that the addition of fertilisers to organic soil might be effective only with a cauliflower genotype suited to organic agriculture.
Keywords: Cauliflower; Organic and conventional farming; Phytochemicals; Glucosinolates; Volatile substances; Antioxidants

M. Kimming, C. Sundberg, A. Nordberg, A. Baky, S. Bernesson, O. Noren, P.-A. Hansson, Life cycle assessment of energy self-sufficiency systems based on agricultural residues for organic arable farms, Bioresource Technology, Volume 102, Issue 2, January 2011, Pages 1425-1432, ISSN 0960-8524, DOI: 10.1016/j.biortech.2010.09.068.
(http://www.sciencedirect.com/science/article/pii/S0960852410015816)
Abstract:
The agricultural industry today consumes large amounts of fossil fuels. This study used consequential life cycle assessment (LCA) to analyse two potential energy self-sufficient systems for organic arable farms, based on agricultural residues. The analysis focused on energy balance, resource use and greenhouse gas (GHG) emissions. A scenario based on straw was found to require straw harvest from 25% of the farm area; 45% of the total energy produced from the straw was required for energy carrier production and GHG emissions were reduced by 9% compared with a fossil fuel-based reference scenario. In a scenario based on anaerobic digestion of ley, the corresponding figures were 13%, 24% and 35%. The final result was sensitive to assumptions regarding, e.g., soil carbon content and handling of by-products.
Keywords: LCA; Agricultural residues; Energy self-sufficiency; Organic farming

D.F. van Apeldoorn, M.P.W. Sonneveld, K. Kok, Landscape asymmetry of soil organic matter as a source of agro-ecosystem resilience, Agriculture, Ecosystems & Environment, Volume 140, Issues 3-4, March 2011, Pages 401-410, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.01.002.
(http://www.sciencedirect.com/science/article/pii/S016788091100003X)
Abstract:
In agricultural landscapes, drivers at different spatial and temporal scales result in a non-random spatio-temporal variability of landscape characteristics. Patterns of soil organic matter (SOM) are for example controlled by both pedological and climatic factors as well as historic and current land use. The observed patterns linked to their generating processes can be referred to as the landscape asymmetry of SOM.
In this paper we identify and evaluate landscape asymmetry of SOM in an agricultural landscape in the Netherlands. Subsequently we infer implications of applying the concept of landscape asymmetry for understanding agro-ecosystem resilience.
We modeled SOM dynamics of grassland soils to identify dominant long-term drivers and combined and analyzed land use history and landscape characteristics to explain the spatial variability of SOM contents.

Sensitivity analyses show that the dominant parameter for attainable SOM content is the mineralization rate of SOM. Results furthermore indicate, that SOM content is related to temporal variability in land use and to spatial variability of groundwater hydrology and soil texture. The landscape asymmetry of SOM provides windows of opportunities for farmers who wish to reduce fertilizer input. However, connecting landscape asymmetry to other scales reveals potential cascades of events that might undermine agro-ecosystem resilience.
Keywords: Resilience; Multi-scale; Soil organic matter; Sandy soils; Netherlands; Dairy farming

Falko Kaufmann, Gurbuz Das, Birgit Sohnrey, Matthias Gauly, Helminth infections in laying hens kept in organic free range systems in Germany, Livestock Science, In Press, Corrected Proof, Available online 25 June 2011, ISSN 1871-1413, DOI: 10.1016/j.livsci.2011.05.015. (http://www.sciencedirect.com/science/article/pii/S1871141311002034)
Abstract:
This study describes the spectrum and intensity of helminth infections in laying hens kept in organic production systems in Germany. A total of 740 laying hens from 18 organic free range farms were collected between 2007 and 2010. The hens were sacrificed and the gastrointestinal tracts were examined for the presence and intensity of helminth infections with standard parasitological methods. Three nematode (Ascaridia galli, Heterakis gallinarum, Capillaria spp) and four cestode (Raillietina cesticillus, Hymenolepis cantaniana, Hymenolepis carioca, Choanotaenia infundibulum) species were found. Almost all hens (99.6%, N = 737) harboured at least one helminth species. Average worm burden per hen was 218.4 (SD = 218.3) worms. The most prevalent species were the nematodes Heterakis gallinarum (98%) followed by Ascaridia gali (88%) and Capillaria spp. (75.3%). The overall prevalence of the cestodes was 24.9%. Total worm burden was significantly higher during the summer season when compared with animals slaughtered during winter season (254 vs. 191, $P < 0.0001$). The most dominant helminth species was Heterakis gallinarum averaging 190 (SE = 9.8) worms per hen in the summer and 129 (SE = 8.7) in the winter season ($P < 0.0001$). Average Ascaridia galli burden was 25 (SE = 2.0) in summer and 26 (SE = 1.7) in winter ($P = 0.1160$). Risk of infection with any of the nematodes was 50% higher in summer compared to winter ([Psi] = 1.49, $P < 0.0319$). Probability of infection with any of the tapeworm species was 3.5 times higher in summer than in winter ($P < 0.0001$).
It can be concluded that the vast majority of hens are subclinically infected with at least one helminth species. The prevalence as well as intensity of the helminth infections, particularly with tapeworms, considerably increases in summer. The results indicate that it is essential to adopt alternative control strategies in order to lower infection risk in organic production systems which are gaining popularity.
Keywords: Prevalence; Worm burden; Hens; Nematodes; Organic farming; Production system

Troels Kristensen, Lisbeth Mogensen, Marie Trydeman Knudsen, John E. Hermansen, Effect of production system and farming strategy on greenhouse gas emissions from commercial dairy farms in a life cycle approach, Livestock Science, Volume 140, Issues 1-3, September 2011, Pages 136-148, ISSN 1871-1413, DOI: 10.1016/j.livsci.2011.03.002. (http://www.sciencedirect.com/science/article/pii/S1871141311000850)

Abstract:
This paper documents and illustrates a model to estimate the greenhouse gas (GHG) emissions and land use on commercial dairy farms. Furthermore, a method of allocating total farm emissions into meat and milk products was developed and, finally, potential mitigation options at farm scale were identified. The GHG emission at farm gate using a Life Cycle Approach (LCA) was estimated based on data from 35 conventional dairy farms with an average 122 cows and 127 ha, and 32 organic dairy farms with an average 115 cows and 178 ha. There was a significant ($p < 0.05$) higher emission in kg CO2-eq. per kg energy corrected milk (ECM) in the organic system (1.27) compared to conventional (1.20) before allocation into milk and meat. In the conventional system 88% was on-farm emission vs. 98% in the organic production system. Based on a mathematical model, an average of 15% of total farm GHG emissions was allocated to meat. This level was low compared with four other methods traditionally used to allocate between milk and meat, with the amounts allocated to meat ranging from 13% for economic value, 18% for protein mass, 23% for system expansion and up to 26% for biological allocation. The allocation method highly influenced the GHG emission per kg meat (3.41 to 7.33 kg CO2-eq. per kg meat), while the effect on the GHG emission per kg milk was lower (0.90 to 1.10 kg CO2-eq. per kg ECM). After allocation there was no significant effect of production system on GHG emission per kg ECM. Land requirement, including imported feed, was highest in the organic system at 2.37 m2 per kg ECM against 1.78 m2 in the conventional system. Farming strategies based on low stocking rate or with focus on high efficiency in the herd were identified as the most promising for reducing GHG emissions per kg milk at farm gate after allocation between meat and milk. It was concluded that the model can estimate relevant variation in GHG emissions between commercial farms without intensive data registration.
Keywords: Organic; Green house gas; Environmental impact; Mitigation; Dairy cattle; LCA

Luca Bechini, Nicola Castoldi, Alfred Stein, Sensitivity to information upscaling of agro-ecological assessments: Application to soil organic carbon management, Agricultural Systems, Volume 104, Issue 6, July 2011, Pages 480-490, ISSN 0308-521X, DOI: 10.1016/j.agsy.2011.03.005. (http://www.sciencedirect.com/science/article/pii/S0308521X11000436)
Abstract:
Upscaling of agro-ecological indicators applied in regional analyses is sensitive to scale issues of the input data. This study develops a methodology to quantify this sensitivity for an indicator of soil organic carbon (SOC) dynamics at the farming system level. A reference case consists of seven fully described farms in northern Italy. Both upscaling in complexity by substituting measured input with estimated input and upscaling in space by extending the methods to farms not included in the reference case are addressed. The indicator increased with 3-107% at four farms after substituting measured management input with that estimated by an expert, whereas it remained unchanged or decreased at the other three farms. Taking the modal value from a cluster of pedological input did not lead to additional uncertainty in most cases, and only slightly increased it in others. We evaluated spatial upscaling by including 733 farms divided in 18 clusters that were described with less information as compared to the reference farms. Within each cluster, we observed relevant variability of the indicator (coefficients of variation of 12-43%), as a consequence of

the heterogeneity of farms comprised in each cluster. In each cluster we calculated the indicator for one virtual farm, defined by using modal values for basic farm inputs. In this case the indicator was highly correlated (R2 = 0.98) with the average of the values obtained using measured basic farm inputs. We conclude that upscaling in complexity and space introduces uncertainty in the values of the indicator compared to the reference case. The extent of such differences depends on the variability of the systems under analysis and on indicator sensitivity.
Keywords: Agricultural databases; Agro-ecological indicators; Carbon sequestration; Cropping systems; Farming systems

Gloria I. Guzman, Manuel Gonzalez de Molina, Antonio M. Alonso, The land cost of agrarian sustainability. An assessment, Land Use Policy, Volume 28, Issue 4, October 2011, Pages 825-835, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2011.01.010.
(http://www.sciencedirect.com/science/article/pii/S0264837711000202)
Abstract:
Improving the sustainability of farms often incurs additional costs for farmers. These costs come from allocating land to the maintenance of the ecological processes (energy and material flows, natural population regulation) required for the agroecosystem to function. Since these costs are not recovered on the markets, farmers see a fall in profits, the financial viability of their farms is compromised, and they suffer the consequences of the environmental services they are providing. All this makes it essential to implement government policies designed to compensate farmers for their efforts. The issue of how to assess sustainability has generated widespread debate within ecological economics, specifically as to whether it is possible to place a monetary value on it and if so, how this should be done. In a previous article we showed that agrarian sustainability involves a land cost, therefore this cost can be translated into monetary values. The purpose of this study is to develop this concept in practical terms by applying it to organic farming. We calculated the land cost of agrarian sustainability (LACAS) in order to compare organic versus conventional management in olive farming, as this crop is grown extensively in Spain and other Mediterranean countries. The results show that the agro-environmental subsidy is not enough to encourage olive growers to make the conversion from conventional to organic methods, because the land cost of sustainability is not adequately offset. They also show that improving agroecosystems can allow the land to take on more functions without increasing the land cost. In our case, encouraging the multifunctionality of the land has permitted a reduction in this cost. The LACAS could be a useful tool, not only for drawing up government policies designed to support organic farming, but also for improving the sustainability of the agrarian sector.
Keywords: Land cost; Organic farming; Payments for environmental services; Land use; Agrarian sustainability

Jin He, Hongwen Li, Rabi G. Rasaily, Qingjie Wang, Guohua Cai, Yanbo Su, Xiaodong Qiao, Lijin Liu, Soil properties and crop yields after 11 years of no tillage farming in wheat-maize cropping system in North China Plain, Soil and Tillage Research, Volume 113, Issue 1, May 2011, Pages 48-54, ISSN 0167-1987, DOI: 10.1016/j.still.2011.01.005.
(http://www.sciencedirect.com/science/article/pii/S0167198711000183)
Abstract:

Soil deterioration and the accompanying decline in crop yields are the main factors limiting the further development of agriculture in North China Plain. The long-term effects of no tillage (NT) and conventional tillage (CT) on soil properties and crop yields were investigated in annual double cropping system of winter wheat-summer maize in the Gaocheng in Hebei, North China Plain over a 11-year period (1998-2009). Long-term NT significantly ($P < 0.05$) increased soil organic matter, available N and P in the top 10 cm by 16.1%, 31.0% and 29.6% as compared to CT treatment. Mean percentage of macro-aggregates (>0.25 mm, +8.1%) and macroporosity (>60 [mu]m, +43.3%) was also enhanced statistically ($P < 0.05$) in the 0-30 cm soil layer. Winter wheat and summer maize yields tended to be 3.5% and 1.4% higher under NT than under CT, particularly in the dry years, suggesting that the change in soil physical properties, soil fertility and moisture has provided a better environment for crop development. These improvements in soil properties and yields are of considerable importance for the degraded soils in semiarid North China Plain, as well as for food security, sustainable agriculture and carbon storage in the annual double cropping areas of China.
Keywords: No-tillage; Soil fertility; Aggregate stability; Soil porosity; Yield; Annual double cropping system

Pollyanna C. Cardoso, Ana Paula B. Tomazini, Paulo C. Stringheta, Sonia M.R. Ribeiro, Helena M. Pinheiro-Sant'Ana, Vitamin C and carotenoids in organic and conventional fruits grown in Brazil, Food Chemistry, Volume 126, Issue 2, 15 May 2011, Pages 411-416, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2010.10.109.
(http://www.sciencedirect.com/science/article/pii/S0308814610014019)
Abstract:
This study compared the concentration of vitamin C (ascorbic acid, AA, and dehydroascorbic acid, DHA) and carotenoids (lycopene and [beta]-carotene) between three fruits produced by organic and conventional farming. Vitamin C and carotenoids were analysed by high-performance liquid chromatography. The Student t-test ([alpha] = 5%) was applied to determine differences between the organic and conventional production systems. AA content was significantly higher in organic acerola (4023.39 mg/100 g) compared to its conventional production (2294.53 mg/100 g). Conversely, AA content was significantly higher in conventional strawberries (42.45 mg/100 g) than the organic ones (30.74 mg/100 g). The conventional production also showed significantly higher contents of DHA (persimmon: 7.50 mg/100 g vs. 0.96 mg/100 g) and [beta]-carotene (acerola: 6130.24 [mu]g/100 g vs. 2486.38 [mu]g/100 g) than the organic fruits. Lycopene was only detected in persimmons, but no significant difference was observed between farming systems. There was no evidence of the nutritional superiority of the organically grown fruits.
Keywords: Organic farming; Conventional farming; Fruit culture; Ascorbic acid; Dehydroascorbic acid; Provitamin A

Ben Phalan, Andrew Balmford, Rhys E. Green, Jorn P.W. Scharlemann, Minimising the harm to biodiversity of producing more food globally, Food Policy, Volume 36, Supplement 1, The challenge of global food sustainability, January 2011, Pages S62-S71, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2010.11.008.
(http://www.sciencedirect.com/science/article/pii/S0306919210001223)
Abstract:

Should farming and conservation policies aim broadly to separate land for nature and land for production (land sparing) or integrate production and conservation on the same land (wildlife-friendly farming)? Most studies that try to address this question suffer from flaws in sampling design, inappropriate metrics, and/or failure to measure biodiversity baselines. We discuss how these failings can be addressed, and what existing information tells us about the key debates on this topic. The evidence available suggests that trade-offs between biodiversity and yield are prevalent. While there are some wildlife-friendly farming systems that support high species richness, a large proportion of wild species cannot survive in even the most benign farming systems. To conserve those species, protection of wild lands will remain essential. Sustainable intensification could help to facilitate sparing of such lands, provided that as much attention is given to protecting habitats as to raising yields. We discuss the general circumstances under which yield increases can facilitate land sparing, recognising that policies and social safeguards will need to be context-specific. In some situations, bringing degraded lands into production could help reduce pressure on wild lands, but much more information is needed on the biodiversity implications of using degraded lands. We conclude that restricting human requirements for land globally will be important in limiting the impacts on biodiversity of increasing food production. To achieve this, society will need to integrate explicit conservation objectives into local, regional and international policies affecting the food system.
Keywords: Biodiversity conservation; Agriculture; Land sparing; Wildlife-friendly farming; Organic farming; Land-use policy

Shi-Yang Zhang, Gu Li, Hui-Bi Wu, Xing-Guo Liu, Yan-Hong Yao, Ling Tao, Huang Liu, An integrated recirculating aquaculture system (RAS) for land-based fish farming: the effects on water quality and fish production, Aquacultural Engineering, In Press, Accepted Manuscript, Available online 11 August 2011, ISSN 0144-8609, DOI: 10.1016/j.aquaeng.2011.08.001.
(http://www.sciencedirect.com/science/article/pii/S0144860911000471)
Abstract:
To mitigate the serious water pollution caused by the rapid expansion of the aquaculture industry in recent years, the development of improved aquaculture systems with more efficient water usage and less environmental impact has become essential. In this study, a land-based recirculating aquaculture system (RAS) was established that consisted of purification units (i.e., a primary biological pond, two parallel horizontal subsurface flow constructed wetlands [CWs], and a long ecological ditch) and 4-5 series-connected recirculating ponds. This system was mainly designed to stock channel catfish (Ictalurus punctatus), fifteenspine stickleback (Spinibarbus sinensis) and yellow catfish (Pelteobagrus fulvidraco), and the culture efficacy was evaluated based on a 2-year field experiment covering two growing seasons. According to the results, the primary biological pond played a role in sedimentation or nutrient retention, although this was not as evident when the CWs were functioning. The water flowing through the wetland system at a hydraulic loading rate (HLR) of 600 mm/day displayed lower values for the temperature, pH, dissolved oxygen (DO), suspended solids, organic matter and nutrients, whereas the electrical conductivity (EC) was higher, suggesting the accumulation of dissolved solids in the system. Due to the recirculation treatment, the trophic status of the recirculating ponds increased gradually along the

direction of the flow and was notably lower in comparison to the control. As a result, the fish production responded to the variation of the water quality, which was reflected in the measurements of culture efficacy (final weight, survival rate, SGR and yield). The three main rearing species showed a decreasing trend along the direction of the flow, which was higher compared to the control, whereas an opposite trend was observed for filter-feeding fish. A Pearson correlation analysis revealed that the main culture species were inclined to live in meso- or oligotrophic conditions, and the silver carp adapted to more eutrophic conditions. Because RAS can provide better environmental conditions year-round, the present culture method could be more suitable for species that are sensitive to water quality in typical subtropical areas.
Keywords: recirculating aquaculture system; culture efficacy; water quality; constructed wetland; sensitive species

Laura Jose-Maria, Jose M. Blanco-Moreno, Laura Armengot, F. Xavier Sans, How does agricultural intensification modulate changes in plant community composition?, Agriculture, Ecosystems & Environment, In Press, Corrected Proof, Available online 26 January 2011, ISSN 0167-8809, DOI: 10.1016/j.agee.2010.12.020.
(http://www.sciencedirect.com/science/article/pii/S0167880910003518)
Abstract:
Agricultural intensification, at local and landscape scales, has caused a decrease in plant diversity and changes in species composition in cereal fields. To better understand the role of landscape complexity and farming systems in shaping plant assemblages, it is of interest to focus on functional traits rather than on floristic composition, which may help to highlight trends in vegetation patterns. We analysed the relative abundance of various functional attributes (different life forms, growth forms, wind-pollinated species and wind-dispersed species) at three contrasted field positions (boundary, edge and centre) of 29 organic and 29 conventional cereal fields distributed in 15 agrarian localities of NE Spain. Agricultural intensification affected the biological attributes of the vegetation in dryland Mediterranean cereal fields; local factors (farming system and position) had a more prominent role in affecting plant functional composition than the surrounding landscape. Local factors were important for life form distribution, growth form and pollination type, whereas landscape complexity mainly affected the proportion of wind-dispersed species. Therefore, depending on the objective of the study, it is important to select functional attributes sensitive to the different scales of agricultural intensification, especially because landscape complexity and land-use intensity are commonly related.
Keywords: Functional trait; Landscape complexity; Mediterranean cereal field; Organic farming; Relative abundance; Within-field position

Laura Armengot, Laura Jose-Maria, Jose M. Blanco-Moreno, Albert Romero-Puente, F. Xavier Sans, Landscape and land-use effects on weed flora in Mediterranean cereal fields, Agriculture, Ecosystems & Environment, Volume 142, Issues 3-4, August 2011, Pages 311-317, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.06.001.
(http://www.sciencedirect.com/science/article/pii/S0167880911001915)
Abstract:
Land-use intensity and landscape complexity could potentially affect weed flora of agroecosystems, by means of changes in species richness and composition. However, previous results indicate diverging patterns.

This paper evaluates the relative importance of both factors on weed species richness and weed community composition within cereal fields in Catalonia (NE Spain). The percentage of arable land plus that occupied by human settlements within a circular sector of 1 km radius was used as a surrogate for landscape complexity and the amount of nitrogen inputs for land-use intensity. The seedbank, which could reflect the long-term effects of the agricultural intensification, and the emerged vegetation with and without weed control were surveyed to obtain comparable assessments of the weed flora, taking into account differences caused by weed control effectiveness. Intensive management induced changes in the emerged weed flora and caused a decline in species richness. Moreover, in the long-term (seedbank), it has also led to a certain level of weed loss. Conversely, landscape complexity had little effect on the seedbanks and emerged flora of cereal fields. Consequently, weed conservation policies in Mediterranean cereal fields should focus on farming practices and need not take account of the surrounding landscape.
Keywords: Species richness; Weed assemblages; Seedbank; Organic farming; Field centre; Nitrogen inputs

Lars Olav Brandsaeter, Anne Kjersti Bakken, Kjell Mangerud, Hugh Riley, Ragnar Eltun, Haldor Fykse, Effects of tractor weight, wheel placement and depth of ploughing on the infestation of perennial weeds in organically farmed cereals, European Journal of Agronomy, Volume 34, Issue 4, May 2011, Pages 239-246, ISSN 1161-0301, DOI: 10.1016/j.eja.2011.02.001.
(http://www.sciencedirect.com/science/article/pii/S1161030111000098)
Abstract:
To ensure optimum conditions for organic cereal growing, it is important to minimize both compaction and soil inversion depth. The relative effects of using light versus heavier tractors, shallow versus deeper ploughing and on-land versus in-furrow wheel placement during ploughing were investigated in three-year organic rotations dominated by cereals with naturally infested stands of perennial weeds. The second part of the experiments was carried out in continuous barley with transplanted root fragments of Cirsium arvense (L.) Scop. and rhizome pieces of Elymus repens (L.) Gould. Ploughing was performed in spring under favourable weather conditions. Neither tractor weight nor wheel placement influenced decisively the numbers and above-ground biomass of perennial weeds. Depth of ploughing, on the other hand, affected both perennial weed infestation and yield levels consistently. Weed numbers and the total above-ground weed biomass were mostly 50% lower with deep ploughing (25 cm) than with shallow ploughing (15 cm). The greatest advantage of deep ploughing appeared in the control of C. arvense, which in some cases was reduced by more than 90% compared to shallow ploughing. In organic rotations dominated by cereals, therefore, combating of perennial weeds by deep ploughing may be more important than factors such as tractor weight and wheel placement.
Keywords: Weed management; Elymus repens; Cirsium arvense; Sonchus arvensis; Cereals; Organic farming; Soil tillage

P. Martiniello, Cereal-forage rotations effect on biochemical characteristics of topsoil and productivity of the crops in Mediterranean environment, European Journal of Agronomy, Volume 35, Issue 4, November 2011, Pages 193-204, ISSN 1161-0301, DOI: 10.1016/j.eja.2011.06.002.
(http://www.sciencedirect.com/science/article/pii/S1161030111000682)

Abstract:
Rotations experiment have been investigated from 1991 to 2008 under irrigated and rainfed condition in Mediterranean environment. The crops studied were: annual winter binary mixture (BM), perennial meadow (ME) and durum wheat (W) continuously rotated for 3 years and W rotated on itself for all period of experiment (CW). The forage rotations emphasized on the impact made on biochemical characteristics of topsoil and productivity of the crops. The 3 years continuous wheat rotation over forage crops assess the advantage of forage crops left in the soil on seed yield and on quality of kernel. The continuous wheat rotation (CW) reduced the soil biochemical parameters, seed yield and quality of kernel. The value of organic carbon, C/N and total nitrogen, under rainfed in comparison to the values present in the topsoil at the beginning of experiment were 6.4% and 2.48 higher and 11.2% lower in ME and lower 5.2% in organic carbon and 2.8% total nitrogen and 0.21 higher in C/N in BM. The agronomic advantages allowed by forage rotations expire their effect after 3 years of continuous wheat. Yearly yield W gain under rainfed was 11.3 kg (ha yr)-1 in BM and 62 kg (ha yr)-1 in ME. The qualitative traits of wheat kernel rotated on forage were higher than those of continuous wheat CW. Results of biochemical characteristics obtained at the end of experiment evidenced that W after BM and ME rotations sustained, under irrigated and rainfed condition, the content of organic carbon and total nitrogen and C/N in the topsoil of the cropping system while continuously CW allowed strong impact of the parameter values present at beginning of experiment (organic carbon, total nitrogen and C/N was reduced under rainfed by 23.5%, 18.2 and 0.32 and 30.3%, 15.4% and 1.72 under irrigated, respectively).
Keywords: Annual winter binary mixture; Durum wheat; Farming cropping system; Irrigation; Lucerne; Organic matter; Rotation; Topsoil; Total nitrogen

G. Corre-Hellou, A. Dibet, H. Hauggaard-Nielsen, Y. Crozat, M. Gooding, P. Ambus, C. Dahlmann, P. von Fragstein, A. Pristeri, M. Monti, E.S. Jensen, The competitive ability of pea-barley intercrops against weeds and the interactions with crop productivity and soil N availability, Field Crops Research, Volume 122, Issue 3, 14 June 2011, Pages 264-272, ISSN 0378-4290, DOI: 10.1016/j.fcr.2011.04.004.
(http://www.sciencedirect.com/science/article/pii/S037842901100116X)
Abstract:
Grain legumes, such as peas (Pisum sativum L.), are known to be weak competitors against weeds when grown as the sole crop. In this study, the weed-suppression effect of pea-barley (Hordeum vulgare L.) intercropping compared to the respective sole crops was examined in organic field experiments across Western Europe (i.e., Denmark, the United Kingdom, France, Germany and Italy). Spring pea (P) and barley (B) were sown either as the sole crop, at the recommended plant density (P100 and B100, respectively), or in replacement (P50B50) or additive (P100B50) intercropping designs for three seasons (2003-2005). The weed biomass was three times higher under the pea sole crops than under both the intercrops and barley sole crops at maturity. The inclusion of joint experiments in several countries and various growing conditions showed that intercrops maintain a highly asymmetric competition over weeds, regardless of the particular weed infestation (species and productivity), the crop biomass or the soil nitrogen availability. The intercropping weed suppression was highly resilient, whereas the weed suppression in pea sole crops was lower and more variable. The pea-

barley intercrops exhibited high levels of weed suppression, even with a low percentage of barley in the total biomass. Despite a reduced leaf area in the case of a low soil N availability, the barley sole crops and intercrops displayed high weed suppression, probably because of their strong competitive capability to absorb soil N. Higher soil N availabilities entailed increased leaf areas and competitive ability for light, which contributed to the overall competitive ability against weeds for all of the treatments. The contribution of the weeds in the total dry matter and soil N acquisition was higher in the pea sole crop than in the other treatments, in spite of the higher leaf areas in the pea crops.
Keywords: Intercropping; Weeds; Nitrogen; Pea; Barley; Organic farming

Gustavo Cordero-Bueso, Teresa Arroyo, Ana Serrano, Javier Tello, Irene Aporta, Maria Dolores Velez, Eva Valero, Influence of the farming system and vine variety on yeast communities associated with grape berries, International Journal of Food Microbiology, Volume 145, Issue 1, 31 January 2011, Pages 132-139, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2010.11.040.
(http://www.sciencedirect.com/science/article/pii/S0168160510006719)
Abstract:
Wine production in most countries is based on the use of commercial strains leading to the colonisation of the wineries by these strains with the consequent reduction of autochthonous biodiversity. This implies that wine styles could therefore become standardised. The vineyard could be an important source of native yeasts of oenological interest. For this reason the objective of this study was to compare two agronomic conditions with the aim of preserving yeast biodiversity in the vineyard. A three year sampling plan was designed to evaluate the influence of different agronomic parameters on the biodiversity of fermentative grape yeasts. Thus two vineyards, one organic and one conventional, with three different grape varieties (Shiraz, Grenache and Barbera) were chosen. In total, 27 samples were collected from both vineyards. Of these, 1080 colonies were isolated and a total of 9 species were identified. The strains identified as Saccharomyces cerevisiae were genotyped by microsatellite analysis obtaining nine different electrophoretic patterns. Classical ecology indexes were used to obtain the richness (S), the biodiversity (H') and the dominance (D) of the species studied. The results indicated a clear influence on grape associated yeast diversity of the phytosanitary treatment used in the vineyard. This is the first time that classical ecology indexes have been used to study the ecology of the spontaneous fermentation of grape musts and the species Candida sorbosa and Pichia toletana have been described in vineyards of the Madrid winegrowing region.
Keywords: Yeasts; Grape variety; Vineyard; Ecological indexes; Genotype

Ilan Stavi, Rattan Lal, Variability of soil physical quality and erodibility in a water-eroded cropland, CATENA, Volume 84, Issue 3, March 2011, Pages 148-155, ISSN 0341-8162, DOI: 10.1016/j.catena.2010.10.006.
(http://www.sciencedirect.com/science/article/pii/S034181621000158X)
Abstract:
Physical degradation of the soil increases its susceptibility to erosion by water action. However, relatively few studies have evaluated the opposite, i.e., the impact of water erosion on soil erodibility. This study was conducted in a corn field in Ohio. Some sites within the field have experienced water-induced soil erosion following heavy

rainstorms. Physical characteristics of the soil were compared between eroded (ER) and un-eroded sites (UN). Compared with ER, the soil in UN had lower penetration resistance (4.87 vs. 4.53 MPa), bulk density (1.45 vs. 1.33 Mg m-3), and sand content (17.4 vs. 14.2%), and higher shear strength (80.1 vs. 125.3 KPa), hydraulic conductivity (3.0 vs. 3.4 cm h-1), intrinsic permeability (31.9 vs. 36.4 x 10-10 cm2), and contents of soil organic carbon (36.1 vs. 32.1 g kg-1), total nitrogen (3.3 vs. 3.1 g kg-1), clay (25.2 vs. 24.2%), silt (60.5 vs. 58.4%), and very fine sand (3.4 vs. 1.1%). Also Munsell's variables differed between ER and UN (1.24 vs. 0.54 for hue, 4.59 vs. 4.35 for value, and 1.99 vs. 1.79 for chroma, respectively). The erodibility factor (K) was lower in UN than in ER (0.00327 vs. 0.00354 Mg ha h ha-1 MJ-1 mm-1, respectively). Hence, it is suggested the ER sites within the corn field agroecosystem are more susceptible to accelerated erosion as compared with UN sites.
Keywords: Corn Belt; K factor; No-till farming; Saturated hydraulic conductivity; Soil color; Soil organic carbon

M. Fernandez-Aparicio, M.J.Y. Shtaya, A.A. Emeran, M.B. Allagui, M. Kharrat, D. Rubiales, Effects of crop mixtures on chocolate spot development on faba bean grown in mediterranean climates, Crop Protection, Volume 30, Issue 8, August 2011, Pages 1015-1023, ISSN 0261-2194, DOI: 10.1016/j.cropro.2011.03.016.
(http://www.sciencedirect.com/science/article/pii/S0261219411001050)
Abstract:
Chocolate spot incited by Botrytis fabae is a serious faba bean disease of worldwide distribution. The increasing interest in sustainable tools for disease control, together with the lack of sufficient levels of genetic resistance triggered our interest in the use of intercropping as a tool for the management of this disease. The effect of intercropping on chocolate spot severity was studied in field experiments performed in Egypt, the Palestinian Territories, Spain and Tunisia, in which a susceptible faba bean cultivar was grown as a monocrop or with two mixed species intercrops of either barley, oat, triticale, wheat, pea or common vetch, or with three mixed species intercrops of wheat and berseem clover. Chocolate spot was significantly reduced when faba bean was intercropped with cereals, but not when intercropped with legumes. Suppressive effects can be ascribed to a combination of host biomass reduction, altered microclimate and physical barriers to spore dispersal.
Keywords: Intercropping; Mixtures effect on disease; Botrytis fabae; Organic farming

Jessica R. Goldberger, Conventionalization, civic engagement, and the sustainability of organic agriculture, Journal of Rural Studies, Volume 27, Issue 3, July 2011, Pages 288-296, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2011.03.002.
(http://www.sciencedirect.com/science/article/pii/S0743016711000210)
Abstract:
It is often assumed that organic farming is synonymous with sustainable agriculture. The broad goals of sustainable agriculture include economic profitability, environmental stewardship, and community vitality. However, the 'question of sustainability' (Ikerd, 2008) can be asked of any type of farming, including organic production. One way to assess sustainability is to consider farmers' perceptions of the sustainability of their operations. I draw on data from a survey of certified organic producers in Washington State to broaden our

understanding of the sustainability of organic agriculture. Specifically, I consider certified organic producers' perceptions of the degree to which their operations contribute to broad sustainable agriculture goals. Moreover, I use multiple regression to investigate how these perceived contributions are influenced by farm conventionalization variables (e.g., organic acreage, non-organic sales, and specialization) and civic engagement variables (e.g., direct marketing, community group membership, and participation in sustainable/organic agriculture organizations) while controlling for farmer demographics and farm location. Farm conventionalization appears to have a significant negative effect on perceived contributions to environmental and social sustainability, but a significant positive effect on perceived contribution to economic sustainability. Civic engagement appears to have a significant positive effect on perceived contributions to environmental and social sustainability, but no effect on perceived contribution to economic sustainability.
Keywords: Organic agriculture; Sustainability; Conventionalization; Civic engagement; Civic agriculture; Farmer attitudes

Maria Dzunkova, Dagmar Janovska, Petra Hlasna Cepkova, Anna Prohaskova, Michal Kolar, Glutelin protein fraction as a tool for clear identification of Amaranth accessions, Journal of Cereal Science, Volume 53, Issue 2, March 2011, Pages 198-205, ISSN 0733-5210, DOI: 10.1016/j.jcs.2010.12.003.
(http://www.sciencedirect.com/science/article/pii/S0733521011000063)
Abstract:
In order to simplify the identification of amaranth accessions in gene banks or seed laboratories, a comprehensive method based on band position and relative band intensity data from the glutelin patterns of the chip microfluidic electrophoresis was developed. Chip electrophoresis protein fraction patterns were compared with the patterns obtained by the classical SDS-PAGE method. Fifty-nine Amaranth accessions (Amaranthus australis, Amaranthus cannabinus, Amaranthus deflexus, Amaranthus retroflexus, Amaranthus tuberculatus, Amaranthus wrightii and 53 unknown accessions of the grain species Amaranthus caudatus, Amaranthus cruentus and Amaranthus hypochondriacus) were analysed. Detailed pattern description of each group is provided here in the form of simplified pattern codes in the glutelin polymorphic area, enabling the identification of hybrid accessions and wild species. Inflorescence type and colour, weight of a thousand seeds, and seed colour were tested as additional phenotypic markers. The clustering within the grain amaranths group was related only to the different inflorescence types generally used to discriminate amaranth species. Statistical analysis of pattern similarities resulted in the segregation of the cultivated grain species, the monoecious wild species, and the dioecious wild species into three separate clusters.
Keywords: Wild Amaranth species; Grain amaranth species; Protein fractions; Chip electrophoresis

Magdolna Nagy Gasztonyi, Rita Tomoskozi Farkas, Maria Berki, Istvan Mihaly Petroczi, Hussein Gehad Daood, Content of phenols in wheat as affected by varietal and agricultural factors, Journal of Food Composition and Analysis, In Press, Corrected Proof, Available online 8 May 2011, ISSN 0889-1575, DOI: 10.1016/j.jfca.2011.04.011.
(http://www.sciencedirect.com/science/article/pii/S0889157511001177)
Abstract:

This study evaluates the concentration of various forms of ferulic acid in wheat and in wheat varieties grown under comparable organic and conventional conditions over two years. The effect of fungicide application in 2009 was also studied. Soluble conjugated and bound forms of ferulic acid were quantified by HPLC-PAD after extraction, the bound form was present predominantly up to 85-90% of total content. In 2008 the bound form of ferulic acid was measured in the range of 248-550 [mu]g/g, the conjugated form was between 11 and 40 [mu]g/g in all the wheat cultivars as a function of (NPK) treatments. Total ferulic acid content measured in 2009 varied in the range of 275-435; 267-341; 296-378 [mu]g/g, with fungicide and 189-394; 231-366; 182-324 [mu]g/g without fungicide in varieties Bekes, Csillag and Petur respectively. In 2008 a significantly higher amount of conjugated ferulic acid was measured in all three investigated cultivars as compared to the content found in 2009 for the same cultivars. As all the samples were treated with fungicide, the main factor was the year (climate conditions). The combination of NPK, fertilizers did not affect significantly the ferulic acid concentration, on the other hand the year (climate conditions) influenced significantly the soluble conjugated ferulic acid content in all fungicide treated varieties.
Keywords: Wheat; Cereal; Food composition; Food analysis; Ferulic acid; Phenolic polymers; Tannins; HPLC analysis; Farming conditions; Fertilization; Horticulture and biodiversity; Cultivar difference; Genotype differences; Organic agriculture

Patrice Coll, Edith Le Cadre, Eric Blanchart, Philippe Hinsinger, CecileVillenave, Organic viticulture and soil quality: A long-term study in Southern France, Applied Soil Ecology, In Press, Corrected Proof, Available online 21 August 2011, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2011.07.013.
(http://www.sciencedirect.com/science/article/pii/S0929139311001570)
Abstract:
The rate of conversion of conventional vineyards into organic farming is currently increasing. This results in modifications of agricultural practices such as the application of organic manure, the use of tillage or grass-cutting to control weeds and the application of natural pesticides with preventive action. One of the aims of organic farming is to preserve the environment. In this context, the objective of our work was to evaluate the long-term effects of organic viticulture on soil quality. The study was conducted in a commercial vineyard where plots which had been organically managed for 7 (Organic7), 11 (Organic11) and 17 years (Organic17) were compared to conventionally managed plots (Conventional). Soil physical and chemical parameters (bulk density, organic matter, available phosphorus, potassium and copper contents) and biological parameters (soil microbial biomass, density of nematode trophic groups and density and biomass of earthworm ecological categories) were measured. The organic farming led to an increase in soil organic matter, potassium content, soil microbial biomass, plant-feeding and fungal-feeding nematode densities. However, organic farming increased soil compaction, decreased endogeic earthworm density and did not modify the soil micro-food web evaluated by nematofauna analysis. Our study highlights the difficulty to show the benefits of organic farming on global soil quality in this particular pedoclimatic area and set of farming practices.
Keywords: Conventional viticulture; Bioindicators; Organic matter; Microbial biomass; Nematodes; Earthworms

J.-P. Wagenaar, P. Klocke, G. Butler, G. Smolders, J.H. Nielsen, A. Canever, C. Leifert, Effect of production system, alternative treatments and calf rearing system on udder health in organic dairy cows, NJAS - Wageningen Journal of Life Sciences, In Press, Corrected Proof, Available online 5 August 2011, ISSN 1573-5214, DOI: 10.1016/j.njas.2011.06.001.
(http://www.sciencedirect.com/science/article/pii/S1573521411000388)
Abstract:
In the last decade the main goals of organic dairying have been to attain acceptable levels of milk production, increase opportunities for animals to perform species own behaviour, resulting in improved animal welfare and animal health, and minimize the use of therapeutic interventions, including the reduction of the (preventive) use of antibiotics. Maintaining animal health without the use of therapeutic interventions is a major challenge for organic dairy farmers. In particular, udder health remains a major problem in both conventional and organic farming. In the QualityLowInputFood (QLIF) project udder health status and management were assessed in different production systems and European regions. These studies suggest that good udder health can be maintained in organic or low-input farming management systems. Novel strategies to control mastitis were evaluated and the potential of using internal teat sealers for the control of environment-associated pathogens was shown. Also oral application of a herd profile based single homeopathic remedy combined with homeopathic silica had a significant effect on cows with a relative low somatic cell count before drying-off. Suckling systems in calf rearing, as an integrated management approach, did not result in better udder health. None of the studies presented identified new variables affecting udder health. QLIF studies also demonstrated the importance of comparing udder health parameters in contrasting organic, low input and conventional production systems, since clear differences in antibiotic use against mastitis could be identified not only between organic and conventional systems, but also among dairy systems used in different EU-countries. Although alternative treatments used in organic systems could not be shown to be fully effective, results suggest that the use of individual or combined alternative strategies to improve udder health on organic or low-input farms warrants further investigation. Based on the results obtained it is recommended that future research should focus on identifying the reasons for variability in udder health between organic farms that use different management protocols to identify `best current practice' when carrying out this research.
Keywords: Organic dairy production; Udder health; Alternative treatments; Management strategies; Extension

Hans Marten Paulsen, V. Wichmann, U. Schuemann, B. Richter, Use of straight vegetable oil mixtures of rape and camelina as on farm fuels in agriculture, Biomass and Bioenergy, Volume 35, Issue 9, October 2011, Pages 4015-4024, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2011.06.031.
(http://www.sciencedirect.com/science/article/pii/S0961953411003552)
Abstract:
Possibilities for using straight vegetable oil (SVO) from Camelina sativa (L.) Crantz (camelina or false flax) and its mixtures with Brassica napus (rape) SVO as fuel in adapted diesel engines are described with chemical parameters, measurements in a test engine and a field test in a tractor. Camelina as a crop is attracting attention in organic farming and is often used in mixed cropping systems with low

competition to food production area. Camelina SVO has low oxidation stability. Its polymerization affinity limits the storage time and increase the risk of coking at hot motor components and of thickening processes in the lubricant oil of the engine. In mixtures with rape and camelina SVO, threshold limits for Conradson Carbon Residues and for oxidation resistance were exceeded. The oxidation resistance could be prolonged by the addition of commercial antioxidants. Camelina and rape SVO showed very similar burning characteristics at full-to-medium partial engine loads. Under low partial loads and idle load, the burning function of the various fuels was increasingly delayed, beginning with diesel fuel over pure rape SVO, then a mixture containing 700 dm3 m-3 rape SVO, and 300 dm3 m-3 camelina SVO, through to pure camelina SVO. The exhaust emissions of NOx-, CO-, particles and HC of rape SVO, camelina SVO and their described mixture were not significantly different. The typically higher NOx- and lower HC-emissions of SVO compared to diesel fuel were apparent. The results principally reveal the usability of a cold pressed, non-refined camelina-rape SVO mixture in adapted diesel engines.
Keywords: Organic farming; Self-sufficient farming system; Camelina sativa L. Crantz; Brassica napus L.; Mixed cropping; Biofuel

J.M. Febles-Gonzalez, A. Tolon-Becerra, X. Lastra-Bravo, X. Acosta-Valdes, Cuban agricultural policy in the last 25 years. From conventional to organic agriculture, Land Use Policy, Volume 28, Issue 4, October 2011, Pages 723-735, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2010.12.008.
(http://www.sciencedirect.com/science/article/pii/S0264837710001286)
Abstract:
Political, social, economic and environmental changes undergone in Cuba in recent decades have led to several well-differentiated production models or systems, and have led to profound transformation of Cuban farmland. This article analyses those changes and transformations in three key stages or chronological periods of Cuban agricultural policy, the Green Revolution, the Special Period and Economic Reanimation. The analysis emphasizes the environmental, social and economic effects of each period, and especially, the change from a conventional intensive to an alternative or organic farming system, which has become an example to be followed.
Keywords: Agricultural policy; Land management; Urban agriculture; Organic agriculture; Cuba

Marios C. Michos, Andreas P. Mamolos, George C. Menexes, Constantinos A. Tsatsarelis, Vasilios M. Tsirakoglou, Kiriaki L. Kalburtji, Energy inputs, outputs and greenhouse gas emissions in organic, integrated and conventional peach orchards, Ecological Indicators, In Press, Corrected Proof, Available online 31 May 2011, ISSN 1470-160X, DOI: 10.1016/j.ecolind.2011.05.002.
(http://www.sciencedirect.com/science/article/pii/S1470160X11001324)
Abstract:
Energy analysis in peach orchards is useful to decide best management strategies. The objectives of this study were to evaluate (a) the energy flow among conventional, integrated and organic farming systems and (b) the effect of farming system to greenhouse gas-emissions. Sixteen farms (four conventional, nine integrated, three organic) at six locations in northern Greece were selected randomly during the years 2008 and 2009. Multidimensional data analyses were used to detect (a) clusters of farming systems and (b) associations between farming

systems and production coefficients variables. Three groups of farming systems and three groups of variables were revealed. Farming systems in the same group respond more or less similarly to the production coefficients variables. Non-parametric tests concerning external variables (outputs, energy efficiency, fruit production, CO2, CH4 and N2O) showed that the variables in organic farming cluster were at average significantly lower. Similarities and/or dissimilarities among farming systems, can probably be related to farm topography, production coefficients and local farming practices. The results showed that organic farming could reduce inputs and gas-emissions.
Keywords: Agro-environmental indicators; Climate change; Energy budget; Hierarchical cluster analysis; Life Cycle Assessment; Principal component analysis

J. Oenema, H. van Keulen, R.L.M. Schils, H.F.M. Aarts, Participatory farm management adaptations to reduce environmental impact on commercial pilot dairy farms in the Netherlands, NJAS - Wageningen Journal of Life Sciences, Volume 58, Issues 1-2, June 2011, Pages 39-48, ISSN 1573-5214, DOI: 10.1016/j.njas.2010.08.001.
(http://www.sciencedirect.com/science/article/pii/S157352141000028X)
Abstract:
Regulations in the Netherlands with respect to nutrient use force dairy farmers to improve nutrient management at the whole-farm level. On experimental farm `De Marke', a coherent set of simple measures at farm level has been implemented, which has resulted in a drastic reduction in input of nutrients without affecting production intensity (milk production; kg milk per ha). To promote adoption of these measures in commercial dairy farming, the project `Cows & Opportunities' was initiated in which 16 commercial pilot farms participated. Data were collected over a 6-year period (1998-2003). This paper describes and analyses the different farm management strategies adopted on these farms, using two classifications of the farms at the start of the project (the base situation), one based on nitrogen (N) surplus (kg ha-1), the other on production intensity. In both classifications, the farms were split in two equal groups. Changes over time in farm characteristics (farm development) were described through linear regression for each group and the variance among farms within a group was used to test for differences between groups. Under the influence of economic driving forces, the pilot farms, on average, expanded land area and increased their milk quota. However, the most intensive farms could comply with regulations only by reducing production intensity. From 1998 to 2002, average nutrient surpluses on the pilot farms decreased by 33% for N and 53% for phosphorus (P). Important measures were reducing the use of inorganic fertilizer, optimizing the use of home-produced organic manure, reducing grazing time, reducing the number of replacement stock and lowering crude protein content in the ration. Over the years, variation in N surpluses among farms (inter-farm variation) remained almost constant. Differences in farm management strategy could not unequivocally be related to farm typology (high/low N surplus; high/low production intensity). It was concluded that decisions by individual farmers on farm development are not always based on `rational' arguments, but are co-determined by `emotional' perceptions.
Keywords: Farm development; Environmental legislation; Farming strategy; Technology adoption; Commercial farms; Dairy cattle

Mariela Navas, Marta Benito, Iraida Rodriguez, Alberto Masaguer, Effect of five forage legume covers on soil quality at the Eastern plains of Venezuela, Applied Soil Ecology, In Press, Corrected Proof, Available online 2 June 2011, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2011.04.017. (http://www.sciencedirect.com/science/article/pii/S0929139311000904)
Abstract:
At the Eastern planes of Venezuela, large to tracts of pastureland are sustained by low fertility acid soils that often lead to overgrazing, decreased pasture production, invasion by weeds, and soil compaction and erosion. The objective of this study was to evaluate the behavior of local forage legume species and its influence on chemical and biochemical properties of soil with the ultimate goal of identifying which one of these species have the potential to be used as cover in the establishment of a 'Ley farming' system. The study was conducted on an Oxisol and used five local species from the genus Centrosema (Centrosema brasilianum, Centrosema macrocarpum, Centrosema pascuorum, Centrosema rotundifolium and Centrosema molle) which were established as cover for a period of 3 years. Dry matter (DM) and soil samples were collected twice a year, during the dry season (April) and during the rainy season (October). The soil parameters evaluated were total nitrogen, organic matter, calcium, potassium, magnesium, pH, soil respiration, and enzymatic activities that include [beta]-glucosidase, arylsulphatase, phosphatase, urease, protease, dehydrogenase and catalase. The annual average data were used to identify indicators of soil quality through principal component analysis (PCA) that led to calculate a soil quality index (SQI). The results indicated that DM production varied among the different legume covers, showing C. macrocarpum the greatest productivity (1340 kg h-1). The PCA identified seven of the tested soil variables as quality indicators: total nitrogen, pH, calcium, soil respiration and arylsulfatase and [beta]-glucosidase activities. Total nitrogen, P and [beta]-glucosidase activity were the indicators showing the largest changes over time being able to discriminate between treatments. After the 3 year period of the trial the SQI of the soil tested raised from 0.17 (very low quality) to 0.30 (low quality) where C. brasilianun, C. pascuorum and C. molle were established and to 0.40 (moderate quality) where C. macrocarpum and C. rotundifolium were established. Thus, the legume crop covers influenced positively the soil quality. C. macrocarpum was the legume cover that showed the greatest soil improvement, having the best potential to be used as forage cover to establish a 'Ley farming' system at the Eastern planes of Venezuela.
Keywords: Ley farming; Savanna; Grassland; Soil quality indicators; Soil quality index; Enzymatic activities

Vassilios D. Litskas, Andreas P. Mamolos, Kiriaki L. Kalburtji, Constantinos A. Tsatsarelis, Eleni Kiose-Kampasakali, Energy flow and greenhouse gas emissions in organic and conventional sweet cherry orchards located in or close to Natura 2000 sites, Biomass and Bioenergy, Volume 35, Issue 3, March 2011, Pages 1302-1310, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2010.12.023. (http://www.sciencedirect.com/science/article/pii/S0961953410004812)
Abstract:
An energy analysis in orchards is useful to deciding best management strategies. The objective of this study was to evaluate, by selecting organic and conventional sweet cherry orchards located in/or close to Natura 2000 sites (a) the energy flow between the two farming systems and (b) the effect of farming system to gas emissions (CO2, CH4 and

N2O). Twenty farms [(2-conventional and 2-organic) x 5-locations] were selected during 2003-2004. Means averaged over all locations for insecticides and fungicides application, fuel, insecticides, fungicides, non-renewable energy inputs, energy shoot outputs, energy fruit outputs, energy shoot + fruit outputs, fruit production, shoot efficiency, fruit efficiency, shoot + fruit efficiency, non-renewable energy efficiency, gas emissions were higher in conventional than in organic orchards, while fertilizer application, harvesting, fertilizers, labor, total energy inputs, renewable energy inputs, intensity and non-renewable energy consumption were higher in organic orchards. Means averaged over two farming systems for fertilizer, insecticide and fungicide application were higher in GRL2 and GRL5. The means averaged over two systems for transportation had the highest value in GRL4 and the lowest in GRL5. Finally, means averaged over two farming systems for labor had the highest value in GRL2. Non-renewable energy inputs as percent of total inputs were 82.63 and 52.42% in conventional and organic sweet cherry orchards respectively. The results show that organic farming systems could reduce non-renewable energy inputs and gas emissions in an efficient way in areas related to Natura 2000 sites.
Keywords: Agro-environmental indicators; Energy budget; Greenhouse effect; Life cycle analyses; Natura 2000 network; Renewable energy

Nicolai V. Meyling, Kristian Thorup-Kristensen, Jorgen Eilenberg, Below- and aboveground abundance and distribution of fungal entomopathogens in experimental conventional and organic cropping systems, Biological Control, In Press, Accepted Manuscript, Available online 31 July 2011, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2011.07.017.
(http://www.sciencedirect.com/science/article/pii/S104996441100226X)
Abstract:
The below- and aboveground communities of fungal entomopathogens (Ascomycota: Hypocreales) were investigated in an experimental conventional and organic vegetable cropping system over two seasons in Denmark. The experimental design allowed for evaluating differences between farming practices in the occurrence of soil-borne fungal entomopathogens and as natural infections aboveground in arthropod hosts. Belowground, Metarhizium anisopliae dominated the agricultural field with Beauveria bassiana, Metarhizium flavoviride and Isaria fumosorosea being present at lower frequencies. Abundances of M. anisopliae were not different between conventional and organic soils. Aboveground, B. bassiana was the most common fungal entomopathogen in arthropod host cadavers. Infections of M. flavoviride, Isaria farinosa and Gibellula spp. were also recorded. Most mycosed cadavers were recovered in August and September from conventionally farmed plots. Cadaver sizes ranged from 1.9 mm to 23.6 mm with means of 3.7 mm to 4.1 mm. Among host functional groups, predators dominated (47% - 63%) over herbivores, parasitoids and nectar-feeders. No occurrence of M. anisopliae was recorded among >200 mycosed cadavers aboveground. The results therefore suggest that M. anisopliae is not involved in direct below- and aboveground interactions in the investigated agroecosystem. Conservation biological control strategies targeting M. anisopliae should thus be solely for controlling soil-dwelling pests in temperate regions as this fungus is unlikely naturally to infect aboveground hosts in the agroecosytem.
Keywords: Fungal community ecology; Spatio-temporal dynamics; Entomopathogenic fungi; Galleria bait method; Agricultural management

R. Papini, G. Valboa, F. Favilli, G. L'Abate, Influence of land use on organic carbon pool and chemical properties of Vertic Cambisols in central and southern Italy, Agriculture, Ecosystems & Environment, Volume 140, Issues 1-2, 30 January 2011, Pages 68-79, ISSN 0167-8809, DOI: 10.1016/j.agee.2010.11.013.
(http://www.sciencedirect.com/science/article/pii/S016788091000304X)
Abstract:
Land use strongly influences soil properties and unsuitable practices lead to degradation of soil and environmental quality. The aim of this study was to assess the impact of different land uses on some chemical properties of soils developed from Pliocene clays, within hilly environments of central and southern Italy. The areas investigated are located in Vicarello di Volterra (Pisa, Tuscany), S. Quirico d'Orcia (Siena, Tuscany) and Soveria Simeri (Catanzaro, Calabria). Within each area different land uses were compared, including a natural ecosystem (Mediterranean bush), a perennial grass or pasture and an intensive crop (wheat, as monoculture or in rotation). The soils were sampled at 0.0-0.1, 0.1-0.2 and 0.2-0.4 m depth and analysed for particle size, pH, bulk density, cation exchange capacity and exchangeable cations, total organic carbon (TOC) and humified carbon (HC) concentrations, organic carbon stock and total N. The stratification ratio of soil organic carbon was calculated to characterize soil organic carbon distribution with depth. At all sites, soil under Mediterranean bush contained the largest amounts of TOC (as both concentration and stock), HC, total N and exchangeable K, together with the highest cation exchange capacity and the lowest pH values. The decrease in soil OC stock with land use change from natural to agricultural ecosystem was 65-85% to 0.1 m depth, 55-82% to 0.2 m depth and 44-76% to 0.4 m depth, with the lowest decrements for perennial grass from S. Quirico and the highest decrement for continuous wheat from Soveria Simeri. Continuous wheat cropping, based on conventional tillage, proved to be the least sustainable land use. At Soveria Simeri, the organic carbon content under pasture was not significantly larger than under wheat cultivation, probably because of grazing mismanagement; however, organic carbon under pasture was more humified. At S. Quirico, the perennial grass resulted in a significant increase in soil organic carbon at the soil surface relative to the wheat cultivation, while at Vicarello no differences were observed between alfalfa/wheat rotation and perennial grass. Our results lead to the questioning of sustainability of intensive cereal farming and uncontrolled grazing in the considered environments, emphasizing the need for greater attention to conservative land managements.
Keywords: Continuous wheat; Land use; Mediterranean bush; Organic carbon; Pliocene clays

Josefine Nylinder, Maria Stenberg, Per-Erik Jansson, Asa Kasimir Klemedtsson, Per Weslien, Leif Klemedtsson, Modelling uncertainty for nitrate leaching and nitrous oxide emissions based on a Swedish field experiment with organic crop rotation, Agriculture, Ecosystems & Environment, Volume 141, Issues 1-2, April 2011, Pages 167-183, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.02.027.
(http://www.sciencedirect.com/science/article/pii/S016788091100065X)
Abstract:
High uncertainties are common in detailed quantification of the N budget of agricultural cropping systems. The process-based CoupModel, integrated with the parameter calibration method known as Generalized

likelihood uncertainty estimation (GLUE), was used here to define parameter values and estimate an N budget based on experimental data from an organic farming experiment in south-west Sweden. Data on nitrate (NO3-) leaching and nitrous oxide (N2O) emissions were used as a basis for quantifying N budget pools. A complete N budget with uncertainties associated with the different components of the N cycle compartments for two different fields (B2 and B4) is presented. Simulated N2O emissions contributed 1-2% of total N output, which corresponded to 7% and 8.7% of total N leaching for B2 and B4, respectively. Measured N2O emissions contributed 3.5% and 10.3% of total N leaching from B2 and B4, respectively. Simulated N inputs (deposition, plant N fixation and fertilisation) and outputs (emissions, leaching and harvest) showed a relatively small range of uncertainty, while the differences in N storage in the soil exhibited a larger range of uncertainty. One-fifth of the GLUE-calibrated parameters had a significant impact on simulated NO3- leaching and/or N2O emissions data. Emissions of N2O were strongly associated with the nitrification process. The high degree of equifinality indicated that a simpler model could be calibrated to the same field data.
Keywords: Agriculture; N budget; N2 fixation; soil; CoupModel; Calibration; Uncertainty estimations

Wenqiang Xu, Xi Chen, Geping Luo, Qing Lin, Using the CENTURY model to assess the impact of land reclamation and management practices in oasis agriculture on the dynamics of soil organic carbon in the arid region of North-western China, Ecological Complexity, Volume 8, Issue 1, March 2011, Pages 30-37, ISSN 1476-945X, DOI: 10.1016/j.ecocom.2010.11.003. (http://www.sciencedirect.com/science/article/pii/S1476945X10000875)
Abstract:
Large-scale reclamation of arid land in North-western China over the past 50 years has converted the natural desert landscape into anthropogenic oasis, particularly in the lower part of watersheds. Drastic human activities may have caused the change of soil organic carbon (SOC) in anthropogenic oasis. This study employs the CENTURY model (Version 4.0) to investigate the effects of land reclamation and management practices in oasis agriculture on the dynamic of SOC at the lower part of Sangong river watershed, a typical anthropogenic oasis reclaimed at 50 years ago. Based on field investigation, history of crop rotations, and past farm practices in study area, land management practices were divided into five categories, corresponding five periods, 0-1958, 1959-1984, 1985-1992, 1993-1998 and 1999-2008. The model successfully simulated the SOC dynamics of the top layer soil (0-20 cm) in the different periods. The state of equilibrium of total SOC and the active, slow, and passive carbon pools were built by CENTURY model in 0-1959. Over the 50 years' cultivation (1959-2008), the mean change in total SOC exhibited complex ways. SOC increased rapidly in the first 2 years (1959-1960) after shrubland reclamation, and declined slowly during the period 1961-1984 and then decreased rapidly from 1985 to 1992. Between 1993 and 1998, it remained relatively stable, and climbed rapidly again during 1999-2008. The trend in total SOC showed 'N' shape, i.e., increase, decrease, then increase. Finally, total SOC is greater (8.2%) in 2008 than the original level of SOC under the natural desert shrub. The improvements of land management practices such as ploughing being replaced with no tillage, straw being crushed before returning it to soil, and reasonable application of fertilizers, played a key role in the change in total SOC. Especially, soil carbon sequestration was obviously increased since protective management

practices were implemented in 1993, such as no tillage, straw returning to soil, and the balanced fertilization technique. The results were different from the conclusions that loss of soil organic carbon would happen due to reclamation and continuous farming in tropical forests, semiarid grasslands of northern China and Nigerian semiarid Savannah.
Keywords: Land reclamation; Anthropogenic oasis; Crop rotation; Fertilization; No tillage; CENTURY model

J.E. Jelbart, M. Schreider, G.R. MacFarlane, an investigation of benthic sediments and macrofauna within pearl farms of Western Australia, Aquaculture, In Press, Accepted Manuscript, Available online 20 July 2011, ISSN 0044-8486, DOI: 10.1016/j.aquaculture.2011.07.011. (http://www.sciencedirect.com/science/article/pii/S0044848611005746)
Abstract:
The pearl oyster (Pinctada maxima) aquaculture industry in the Kimberley region of Western Australia has been established for decades. However, investigation of benthic sediments and macrobenthic communities within pearl farms for this region has not taken place until now. Pearl oysters may have the potential to foul the benthic layer under the farms through the deposition of faeces and pseudo-faeces from the cultured oysters and fouling organisms, and the fallout of debris from the long lines that suspend the pearl oysters. This organic waste and debris can accumulate in the sediments below the oyster long lines and potentially lead to organic enrichment and even eutrophication. Other aquacultures (such as some finfish and other shellfish) have caused eutrophication of marine sediments and a concurrent change in benthic macrofauna.
For two years we sampled the sediments below three Pinctada maxima pearl oyster farms in remote regions of the Kimberley coast. Sediment core samples were taken to measure physico-chemical variables (redox potential, nutrients loads and total organic matter) while grab samples collected the benthic macrofauna (> 1 mm in size). Each farm was compared to four control locations (total = 12 control locations) within the same region. At all three pearl farms there was no indication of eutrophication (nutrient enrichment). We concluded that the variability in benthic physico-chemistry beneath pearl farms was within the bounds of natural variability at reference locations. There were also no consistent differences in the benthic macrofauna assemblages below the pearl oyster farms when compared to control locations. There was considerable natural variability of the benthic macrofauna among all locations, but especially among the reference locations. The reference locations were as different from one another as they were from the farm locations, indicating that the diversity of benthic macrofauna taxa, and their relative abundances within sediments underlying the farms fell within the range of natural variability found at these spatial scales. The importance of robust assessment of potential environmental impact of aquaculture facilities is stressed.
Keywords: aquaculture; pearl farming; benthic macrofauna; benthic sediments; pearl oysters; Pinctada maxima; The Kimberley

Yushu Tang, Lei Wang, Jianwei Jia, Yanli Li, Wenquan Zhang, Hongli Wang, Ying Sun, Response of soil microbial respiration of tidal wetlands in the Yangtze River Estuary to different artificial disturbances, Ecological Engineering, Volume 37, Issue 11, November 2011, Pages 1638-1646, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2011.06.004. (http://www.sciencedirect.com/science/article/pii/S0925857411001820)

Abstract:
To clarify the effects of artifical disturbances on the soil microbial respiration (SMR) of existed tidal wetlands, the SMR of three typical areas in Chongming Dongtan and Jiuduansha of the Yangtze River Estuary, China, were evaluated. The causes of the differences in the SMR were also evaluated by analyzing the microbial activity factors and community structure, as well as the physical-chemical characteristics of the different wetland soils. The results showed that the SMR of the existed wetlands in the area of siltation promotion was significantly higher ($P < 0.01$) than that of the natural area. Different agricultural practices on the inner land also affected the SMR of the tidal wetlands. Overall, the results indicated that the difference in soil microbial characteristics between the artificially disturbed and natural tidal wetlands may be the primary cause of their different SMR. Path analysis indicated that the correlation between soil bacterial diversity and SMR were especially strong. Phylogenetic analysis showed that the bacterial microbial community structure in wetland soil that had been subject to artificial disturbance was changed due to the alteration of the soil physicochemical characteristics, and Pseudomonas sp., Bacillus sp., Uncultured Lactococcus sp. and Streptococcus sp., which have high heterotrophic metabolism or stress tolerance capability, became the dominant bacterial flora in the artificially disturbed wetland soil, ultimately strengthening the SMR. This may be the essential cause of the higher SMR in wetland soils that have been subjected to artificial disturbance, resulting in a low organic carbon accumulation capability.
Keywords: Chongming Dongtan; Jiuduansha; Microbial community structure; Siltation promotion; Farming land use models

Ailsa J. McKenzie, Juliet A. Vickery, Carlo Leifert, Peter Shotton, Mark J. Whittingham, Disentangling the effects of fertilisers and pesticides on winter stubble use by farmland birds, Basic and Applied Ecology, Volume 12, Issue 1, February 2011, Pages 80-88, ISSN 1439-1791, DOI: 10.1016/j.baae.2010.10.007.
(http://www.sciencedirect.com/science/article/pii/S1439179110001349)
Abstract:
Cereal stubbles are a preferred foraging habitat for overwintering granivorous farmland bird species. Levels of this habitat have declined in recent decades across much of western Europe with increasing agricultural intensification. Organic farms typically hold more stubble fields than conventional farms and thus may provide important refuges for wintering birds. However, while organic stubble fields often contain higher food densities than conventional stubble fields, the more complex vegetation structure associated with organic farming may decrease use by birds. Bird use, vegetation characteristics and seed densities were measured on stubble plots managed under four strategies (Organic [organic fertiliser only and no chemical pesticides], Conventional [inorganic fertiliser and chemical pesticides], NOFERT [organic fertiliser only and chemical pesticides) and NOPEST [inorganic fertiliser and no chemical pesticides]). Skylarks foraged most frequently on stubbles which received no pesticide applications which also had the highest weed seed densities. Plots receiving either inorganic or organic fertiliser applications did not differ in terms of use by skylarks, weed seed density or diversity, or vegetation structure. Plot use by yellowhammers was not significantly related to pesticide or fertiliser applications. Possible reasons for this are discussed. Results suggest that the main benefit of organic stubble

fields for birds is via reduced pesticide inputs. Use of inorganic fertilisers is also beneficial for birds via increased weed seed densities, but to a lesser extent.
Keywords: Fertilisers; Fertilizers; Herbicides; Organic; Birds; Foraging; Seed diversity; Farmland

Hyun Ee Ok, Sung-Wook Choi, Hyun Joo Chang, Myung-Sub Chung, Hyang Sook Chun, Occurrence of five 8-ketotrichothecene mycotoxins in organically and conventionally produced cereals collected in Korea, Food Control, Volume 22, Issue 10, October 2011, Pages 1647-1652, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2011.03.023.
(http://www.sciencedirect.com/science/article/pii/S0956713511001101)
Abstract:
A total of 188 cereal samples, consisting of conventionally (n = 99) and organically (n = 89) produced rice, brown rice, barley and corn were analyzed by gas chromatograph-electron capture detector for five 8-ketotrichothecenes (deoxynivalenol (DON), nivalenol (NIV), 3-acetyldeoxynivalenol (3ADON), 15-acetyldeoxynivalenol (15ADON) and fusarenone-X (FUS-X)). Recoveries of these five toxins spiked at 200 [mu]g/kg in barley and corn ranged from 73% to 96% with a relative standard deviation of 2.6%-10.8%. The overall incidence of DON, NIV, 3ADON, 15ADON and FUS-X was 38%, 40%, 14%, 43% and 9% for conventionally produced cereals and 40%, 63%, 30%, 41%, and 18% for organically produced cereals, respectively. The mean levels of DON, NIV, 3ADON, 15ADON and FUS-X in the toxin-positive samples were, respectively, 46.7, 23.3, 4.1, 6.6 and 10.7 [mu]g/kg for conventionally produced cereals and 59.3, 32.4, 4.1, 9.9 and 7.3 [mu]g/kg for organically produced cereals. No significant differences in DON, 3ADON, 15ADON and FUS-X concentrations were found between conventionally produced and organically produced cereals. However, the levels of NIV in organically produced rice and brown rice were significantly higher than those in the corresponding conventional samples. These data indicate that the contamination of cereals with 8-ketotrichothecenes may vary greatly according to the type of cereals grown as well as to the production method, such as organic farming.
Keywords: 8-ketotrichothecenes; Deoxynivalenol; Nivalenol; Organic; Conventional; Cereals

Sukallaya Kasem, Gopal B. Thapa, Crop diversification in Thailand: Status, determinants, and effects on income and use of inputs, Land Use Policy, Volume 28, Issue 3, July 2011, Pages 618-628, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2010.12.001.
(http://www.sciencedirect.com/science/article/pii/S0264837710001213)
Abstract:
Following the national policy, the Department of Agriculture of Thailand has implemented a crop diversification program in several provinces of the country. This study, which was conducted in Nakhon Pathom Province, analyzed the extent of crop diversification and its determinants using primary information collected from 245 farm households using a structured questionnaire, and from selected farmer leaders and agricultural development officials. The study also assessed the effects of crop diversification on income and the inputs used. The findings of the study revealed that nearly three fourths of the land is still being used for rice mono-cropping, indicating little success in the promotion of the crop diversification program. Paddy fields, including farms for cultivating rice under mono-cropping and diversified system, still account for 90% of the total farmland in the

country. The limited impact of the program on the farming sector is attributed primarily to the variation in land and labor resources available at the farmers' disposal as well as soil suitability. The farmers' attendance in training and interaction with farmer groups are the other influential factors. Although cropping diversification has provided attractive financial return particularly to the small farmers, it has also accelerated the use of inorganic fertilizers and pesticides. Broad policy instruments are therefore suggested for the effective implementation of future crop diversification programs in Thailand and perhaps elsewhere in Southeast Asia.
Keywords: Crop diversification; Rice mono-crop; Vegetables; Financial return; Inorganic fertilizers and pesticides; Organic fertilizers; Bio-pesticides; Thailand

Daniele Nizzoli, David Thomas Welsh, Pierluigi Viaroli, Seasonal nitrogen and phosphorus dynamics during benthic clam and suspended mussel cultivation, Marine Pollution Bulletin, Volume 62, Issue 6, June 2011, Pages 1276-1287, ISSN 0025-326X, DOI: 10.1016/j.marpolbul.2011.03.009.
(http://www.sciencedirect.com/science/article/pii/S0025326X1100138X)
Abstract:
Effects of suspended mussel and infaunal clam cultivation on sediment characteristics, and benthic organic and inorganic nitrogen and phosphorus fluxes were compared in a shallow coastal lagoon. The two species had different impacts on sediment features, but both created 'hotspots' of nutrient fluxes with annual N and P regeneration rates being 4.9 and 13.5 (mussel) and 4.5 and 14.9 (clams) fold greater than those of unfarmed control sediments. Mussel farming also caused considerable nutrient regeneration within the water column with the mussel ropes contributing ~25% of total inorganic N and P production and at times dominating the sediments (e.g. 95% of SRP production in summer and 45% of DIN production in winter). Such nutrient regeneration rates seriously question the proposal that suspension-feeding bivalves act as a eutrophication buffer, especially during summer when nutrient regeneration rates are maximal, but other nutrient sources (freshwater run-off and unfarmed sediments) are at their lowest.
Keywords: Ruditapes philippinarum; Mytilus galloprovincialis; Nitrogen; Phosphorous; Coastal lagoon; Eutrophication

Yunhui Liu, Meichun Duan, Zhenrong Yu, Agricultural landscapes and biodiversity in China, Agriculture, Ecosystems & Environment, In Press, Corrected Proof, Available online 12 July 2011, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.05.009.
(http://www.sciencedirect.com/science/article/pii/S0167880911001496)
Abstract:
Looking back at a history of more than 7000 years of agricultural production, Chinese agriculture had succeeded in supporting China's ever-increasing human population without changing the stability of the agro-landscape. The traditional biodiversity-friendly management of agricultural landscapes incorporated various elaborate techniques such as the use of organic manure, traditional integrative farming approaches like dyke-pond and rice-fishery systems, crop rotations and intercropping as well as the preservation of traditional agricultural landscapes including diverse natural and semi-natural elements. These systems were developed to maintain landscapes with healthy soil quality, a complex structure and diverse habitat composition, which favoured the sustenance of diverse species and a stable ecosystem

functioning. While many biodiversity-friendly elements of traditional agriculture have been maintained, further developed or extended in modern agricultural practices in some regions, the biodiversity conservation in the agricultural landscapes is generally lacking of efficient policy support. Challenges and potential measures for biodiversity conservation in the context of Chinese agricultural landscapes are discussed.
Keywords: Agricultural landscape; Agriculture history; Biodiversity; Conservation; Traditional agriculture; Intensive agriculture

Susanne Freidberg, Lissa Goldstein, Alternative food in the global south: Reflections on a direct marketing initiative in Kenya, Journal of Rural Studies, Volume 27, Issue 1, January 2011, Pages 24-34, ISSN 0743-0167, DOI: 10.1016/j.jrurstud.2010.07.003.
(http://www.sciencedirect.com/science/article/pii/S0743016710000409)
Abstract:
Amidst booming scholarship on alternative food networks (AFNs) in the global North, research on AFN in the global South remains scarce. Partly this is because explicitly alternative initiatives are themselves scarce, except for those focused on export markets. Yet in countries such as Kenya, urban consumers and rural smallholders have good reason to want alternatives to agrichemical dependency, insecure marketing channels, and food of dubious safety. This article describes one attempt to provide an alternative. A pilot box scheme launched by the Kenya Institute of Organic Farming (KIOF) in 2007 aimed to connect organic smallholders to consumers in Nairobi, the capital city. It did not last long, and we reflect on the reasons why. In particular, we argue that efforts to build AFN in 'developing' countries must take account of the problematic history of development itself, both as an ideology and as a set of institutions, policies and activities. In the case of the Kenyan box scheme, the pervasive yet often ineffectual presence of aid-dispensing non-governmental organizations, in particular, influenced different actors' perceptions and participation in ways we did not fully anticipate. More broadly, this article emphasizes the need to appreciate the macro-historical and socioeconomic contexts that inform on-the-ground practices and understandings of alternative food.

B. Gomez-Munoz, R. Bol, D.J. Hatch, R. Garcia-Ruiz, Carbon mineralization and distribution of nutrients within different particle-size fractions of commercially produced olive mill pomace, Bioresource Technology, In Press, Accepted Manuscript, Available online 10 August 2011, ISSN 0960-8524, DOI: 10.1016/j.biortech.2011.08.009.
(http://www.sciencedirect.com/science/article/pii/S0960852411010959)
Abstract:
Composting is a realistic option for disposal of olive mill pomace (OMP) by making it suitable as a soil amendment for organic farming. The chemical and physical characteristics and contribution of particle-size fractions to total nutrients and carbon mineralization of seven commercial composts of OMP (COMP) were investigated. Higher proportions of manure, co-composted with OMP, reduced the organic matter (OM), total carbon and C:N ratio of the product, but increased the content of nutrients and fine particles. The fine particles had higher nutrient contents, but less OM and carbon and, unlike larger particles, did not exhibit any phytotoxicity. Less than 1.5 % of added carbon was mineralized in whole compost, but a lower rate was found with larger particles. Separation of COMP by particle size fractionation and

application as a soil conditioner is recommended for better optimization of COMP with the < 1 mm fraction providing the higher quality compost.
Keywords: Composted olive mill pomace; C mineralization; particle-size fraction; By-products

J. Constantin, N. Beaudoin, M. Launay, J. Duval, B. Mary, Long-term nitrogen dynamics in various catch crop scenarios: Test and simulations with STICS model in a temperate climate, Agriculture, Ecosystems & Environment, In Press, Corrected Proof, Available online 12 July 2011, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.06.006.
(http://www.sciencedirect.com/science/article/pii/S0167880911001976)
Abstract:
The long term effects of repeated catch crops on N dynamics in arable farming were assessed using mid-term experiments and long-term simulations. The soil-crop model STICS (v6.9) was tested against a database provided by three experiments (13-17 years) carried out in Northern France, including treatments with or without repeated catch crops. STICS performance was checked for crop biomass, N uptake, soil water content and mineral N at harvest of main crops, drained water, N leaching and mineralization rates. The model satisfactorily reproduced these variables, except for soil mineral N and N leached at one site. N leached was predicted with a slight bias, between -3 and +7 kg N ha-1 yr-1, and soil N mineralized was simulated with a bias lower than 7 kg N ha-1 yr-1. The model simulated correctly the N uptake by catch crops and the kinetics of extra N mineralization due to catch crops. Seven scenarios varying in the presence of catch crops, fertilization rate and climate were simulated on long-term (60 years); their effects on N uptake, soil N storage, N mineralization and nitrate leaching were compared by difference with a control scenario. Repeated catch crops lead to reduce N leaching, sequester organic N and increase N mineralization. The model indicated that the sequestered N reached a maximum of 430-750 kg N ha-1 after 23-45 years depending on site. The extra-mineralization due to catch crops progressively increased up to 38-65 kg N ha-1 yr-1. A strategy of constant N fertilizer rate resulted in raising the N uptake of main crops and slowing down the abatement of nitrate leaching. Conversely, when N fertilization rates were reduced by 20-24 kg N ha-1 yr-1, crop production remained stable and catch crops reduced N leaching on the long term by 33-55%. Therefore catch crop is a promising technique for controlling the N cascade.
Keywords: Cover crop; Nitrate; Leaching; Mineralization; Sequestration; Fertilization; Climate change; Modelling; Simulation

Mattia Fumagalli, Marco Acutis, Fabrizio Mazzetto, Francesco Vidotto, Guido Sali, Luca Bechini, An analysis of agricultural sustainability of cropping systems in arable and dairy farms in an intensively cultivated plain, European Journal of Agronomy, Volume 34, Issue 2, February 2011, Pages 71-82, ISSN 1161-0301, DOI: 10.1016/j.eja.2010.11.001.
(http://www.sciencedirect.com/science/article/pii/S1161030110000961)
Abstract:
In Lombardy region (northern Italy) agricultural systems are mostly based on cereals and forage crops, and are normally intensively cultivated. To monitor and analyse the most important agri-environmental issue of this area (water pollution by nitrates and plant protection products, non-renewable fossil energy exploitation, weed dynamics), we conducted an integrated agronomic, environmental and economic assessment of arable and dairy farming using indicators.

The structural and management data about farming and cropping systems were collected by periodic interviews over a 3-year period in seven (three arable and four dairy) representative farms.
The nitrogen surplus calculated at field scale ranged from low (27 kg N ha-1) to high (339 kg N ha-1) values, depending by the amount of chemical and organic fertilisers applied. Fossil inputs ranged from 11.2 to 46.0 GJ ha-1; the highest values were due to the high use of machinery and chemical inputs. The efficiency factor in energy transformation (an indicator of the dependence of food and feed production on non-renewable energy) ranged from 5.0 to 12.2. Large variability was also observed for economic performance (gross margin; from -364 to 1078 [euro] ha-1). The lowest values were observed where the total costs of production (fixed and variable) were elevated. The simplification of cropping systems was responsible for a high probability of weed populations development. The values of Load Index, an indicator describing the potential toxicity of plant protection products on non-target organisms, showed an elevated use of active substances due to the dominance of maize.
The indicator-based assessment, founded on a relatively simple data collection procedure, described crop management by combining different aspects into few quantities and highlighted its critical environmental issues. The work represents a starting point for improving cropping system management in the study area; the same procedure could be re-applied if data about improved management scenarios were available.
Keywords: Economic performances; Energy; Integrated assessment; Intensive agriculture; Nitrogen; Plant protection products

A.-M. Kasselaki, D. Goumas, L. Tamm, J. Fuchs, J. Cooper, C. Leifert, Effect of alternative strategies for the disinfection of tomato seed infected with bacterial canker (Clavibacter michiganensis subsp. michiganensis), NJAS - Wageningen Journal of Life Sciences, In Press, Corrected Proof, Available online 20 August 2011, ISSN 1573-5214, DOI: 10.1016/j.njas.2011.07.001.
(http://www.sciencedirect.com/science/article/pii/S157352141100039X)
Abstract:
Currently there is a lack of effective seed treatments for bacterial pathogens, with Cu-based compounds (the only chemical treatments permitted under organic farming standards) only providing partial control. The aim of this study was to quantify the effect of alternative treatments for the control of bacterial canker (Clavibacter michiganensis subsp. michiganensis), a major seed-borne bacterial disease in tomato. Treatments assessed were acidified nitrite (a treatment previously shown to control the seed-borne fungal disease Didymella lycopersici), antagonistic strains of Bacillus spp. and compost extracts, which were not previously evaluated as treatments for seed-borne diseases. Efficacy of treatments was determined in a seed disinfection assay. Ten-minute immersion of seed in 300 mmol l-1 acidified nitrite resulted in 98% being pathogen free. Copper hydroxide, certain strains of Bacillus spp. and all compost extracts resulted in 100% pathogen free seed.
Keywords: Bacterial canker of tomato; Seed-borne Clavibacter michiganensis subsp. michiganensis; Acidified nitrite; Compost extracts; Bacillus antagonists

E.C. Keessen, A.J. van den Berkt, N.H. Haasjes, C. Hermanus, E.J. Kuijper, L.J.A. Lipman, The relation between farm specific factors and prevalence of Clostridium difficile in slaughter pigs, Veterinary

Microbiology, In Press, Corrected Proof, Available online 2 July 2011, ISSN 0378-1135, DOI: 10.1016/j.vetmic.2011.06.032.
(http://www.sciencedirect.com/science/article/pii/S0378113511003609)
Abstract:
Foodborne ingestion through pork products of Clostridium difficile has been suggested a possible route of transmission of C difficile from pigs to humans. To determine whether C. difficile bacteria are present in the intestines of slaughter pigs, rectum contents of 677 slaughter pigs from 52 farms were collected at the slaughterhouse. Data on farm specific factors were collected and the association of these factors with the presence of C. difficile in pig herds from 39 farms was assessed. The prevalence of C. difficile and the ribotypical diversity that were found in this study were much higher than previously reported in literature, with an overall C. difficile prevalence of 8.6% (58/677). Sixteen distinct C. difficile ribotypes were identified, predominantly type 078 (31.0%, 18/58). This type is also commonly found in humans with C. difficile infection (CDI). Both on individual pig level and on herd level, no significant difference between the prevalence of C. difficile in pigs derived from conventional or organic farming types was detected. Farm system, size, and presence of other animal species on the farm did not result in significant different prevalences of C. difficile.
Keywords: Pigs; Clostridium difficile

Carlos Sanz-Lazaro, Maria Dolores Belando, Francisco Navarrete-Mier, Arnaldo Marin, Effects of wild fish and motile epibenthic invertebrates on the benthos below an open water fish farm, Estuarine, Coastal and Shelf Science, Volume 91, Issue 2, 20 January 2011, Pages 216-223, ISSN 0272-7714, DOI: 10.1016/j.ecss.2010.10.023.
(http://www.sciencedirect.com/science/article/pii/S0272771410003653)
Abstract:
A manipulative caging experiment was carried out to evaluate the role of wild fish and motile epibenthic invertebrates on the benthic system influenced by an open water fish farm. Chemical and biological parameters of the sediment were measured as indicators of the ecological benthic status. The combination of wild fish and currents notably lowered aquaculture waste sedimentation below the fish farm. The limited waste sedimentation rate could have limited the scavenger and predation activity of wild fish on the benthos, whose role may be taken over by motile epibenthic invertebrates. The interaction of these motile epibenthic invertebrates with the sediment differed from that observed with fish. The motile epibenthic invertebrates led to more reduced conditions with lower redox values, significantly decreased the number of species of macrofaunal benthic assemblages and significantly modified macrofaunal benthic assemblages. Therefore, epibenthic invertebrates do not seem to have an ameliorative effect on the benthic status produced by fish farming. Since the effects of epibenthic species on the benthic system can greatly vary according to their identity, further experiments should be performed to better understand the drivers that influence the epibenthic species identity that modulate the benthic system affected by fish farming.
Keywords: aquaculture; macrofauna; predation; sediment biogeochemistry; organic matter enrichment

Anna Taglienti, Paolo Sequi, Caterina Cafiero, Sara Cozzolino, Mena Ritota, G. Ceredi, Massimiliano Valentini, Hayward kiwifruits and Plant Growth Regulators: Detection and effects in post-harvest studied by

Magnetic Resonance Imaging and Scanning Electron Microscopy, Food Chemistry, Volume 126, Issue 2, 15 May 2011, Pages 731-736, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2010.11.050.
(http://www.sciencedirect.com/science/article/pii/S0308814610014688)
Abstract:
We used Magnetic Resonance Imaging spectroscopy to reveal the use of two Plant Growth Regulators (PGRs), i.e. cytokinin and auxin, on Hayward kiwifruits, at any stage of cultivation, and post-harvest ripening and storage. The internal morphology was non-destructively determined in order to depict structural features related to hormones treatments and we found that T2-weighted MRI images showed different internal tissue organisations depending upon the use and the type of PGR. Transverse relaxation times allowed the recognition of cytokinin-treated samples, whilst image analysis was used to identify auxin-treated kiwifruits. We also exploited the post-harvest conditions, i.e. normal refrigeration and controlled atmosphere, on PGRs treated kiwifruits, and found that auxin shortened the shelf-life, with normal refrigeration exerting a stronger effect. The kiwifruit pulp was also investigated by means of Scanning Electron Microscopy, highlighting significant differences at a cellular level amongst treatments, in terms of pore size and vacuoles number, both probably playing a fundamental role in the evaporation activity.
Keywords: Kiwifruits; Synthetic hormones; MRI; Non-destructive analysis; SEM; Post-harvest quality

F. Morari, E. Lugato, R. Polese, A. Berti, L. Giardini, Nitrate concentrations in groundwater under contrasting agricultural management practices in the low plains of Italy, Agriculture, Ecosystems & Environment, In Press, Corrected Proof, Available online 2 April 2011, ISSN 0167-8809, DOI: 10.1016/j.agee.2011.03.001.
(http://www.sciencedirect.com/science/article/pii/S0167880911000855)
Abstract:
In groundwater vulnerability assessment, it is assumed that groundwater closer to the soil surface is at greater risk of contamination by pollutants, including nitrate. However, this is not always the case, since low nitrogen (N) concentrations and losses from cultivated fields have been measured in shallow ground waters. This study aimed to evaluate the water and N balances in two low plain areas of the Veneto Region (NE Italy), characterized by a shallow water table (<5 m) and identified as Nitrate Vulnerable Zones (NVZs). In each of the two NVZs, three fields were managed with conventional (C), integrated (I) and organic (O) farming systems. Water and N fluxes through the vadose zone were monitored during the years 2004-2006. Water samples were collected from water-table wells and suction microlysimeters, whereas soil moisture and tension were measured with sets of TDR probes and dial-gauge tensiometers installed along the soil profiles. Surface runoff was also collected by gutters and diverted into containers where water volumes were quantified and sampled for chemical analysis. Water was analyzed for total N bound to sediment (only runoff) and total N and nitrate in solution. To evaluate the N in/out fluxes of the root zone (0.9 m depth), the upflux/percolation volumes were quantified by applying the water balance method. Upflux was one of the most important items of the water balance. The highest values were observed during summer (>200 mm), when upflux contributed an average of up to 65% of the evapotranspiration (ET). Percolation volumes were reduced as a consequence, with a net flux ranging from 118 to 292 mm y-1 on average. Upflux also strongly influenced the N balance, reducing potential

leaching. We estimated that, on average, 59% of the leached N returned to the root zone by upward movement. Shallow groundwater conditions also affected the proportions of N forms. Nitrate fraction decreased markedly in groundwater with respect to percolation water, most probably due to the enhancing effect of denitrification processes. Following the indications in the EU 91/676 Directive, large areas of the central and low plain of the Veneto Region have been designated as NVZs. However, agricultural impact on water quality does not appear to be very high in many parts of these areas, as evidenced by the N balance of these experimental fields.
Keywords: Nitrogen; Shallow groundwater; Upward water movement; Gas losses; Leaching; Nitrate Vulnerable Zone

Pieter Pypers, Jean-Marie Sanginga, Bishikwabo Kasereka, Masamba Walangululu, Bernard Vanlauwe, Increased productivity through integrated soil fertility management in cassava-legume intercropping systems in the highlands of Sud-Kivu, DR Congo, Field Crops Research, Volume 120, Issue 1, 14 January 2011, Pages 76-85, ISSN 0378-4290, DOI: 10.1016/j.fcr.2010.09.004.
(http://www.sciencedirect.com/science/article/pii/S0378429010002340)
Abstract:
Smallholder farmers in sub-Saharan Africa are confronted by low productivity and limited investment capacity in nutrient inputs. Integrated soil fertility management (ISFM) aims at increased productivity through the combined use of improved germplasm, judicious fertilizer application and organic matter management, adapted to the local farming conditions. We hypothesize that the application of these different ISFM components can result in significant increases in productivity and economic benefits of cassava-legume intercropping systems. Participatory demonstration trials were conducted in the highlands of Sud-Kivu, DR Congo with 12 farmer groups during 3 seasons. Treatments included the farmers' common practice (local common bean and cassava varieties, seed broadcast and manure addition) and sequentially added ISFM components: improved bean and cassava germplasm, modified crop arrangements, compound NPK fertilizer application and alternative legume species (groundnut or soybean). The use of improved germplasm did not result in yield increases without simultaneous implementation of other ISFM components. Modifying the crop arrangement by planting cassava at 2 m between rows and 0.5 m within the row, intercropped with four legume lines, increased bean yields during the first season and permits a second bean intercrop, which can increase total legume production by up to 1 t ha-1 and result in an additional revenue of almost 1000 USD ha-1. Crop arrangement or a second legume intercrop did not affect cassava storage root yields. Fertilizer application increased both legume and cassava yield, and net revenue by 400-700 USD ha-1 with a marginal rate of return of 1.6-2.7. Replacing the common bean intercrop by groundnut increased net revenue by 200-400 USD ha-1 partly because of the higher market value of the grains, but mostly due to a positive effect on cassava storage root yield. Soybean affected cassava yields negatively because of its high biomass production and long maturity period; modifications are needed to integrate a soybean intercrop into the system. The findings demonstrate the large potential of ISFM to increase productivity in cassava-legume systems in the Central-African highlands. Benefits were, however, not observed in all study sites. In poor soils, productivity increases were variable or absent, and soil amendments are required. A better understanding of the

conditions under which positive effects occur can enable better targeting and local adaptation of the technologies.
Keywords: Crop arrangement; Economic benefits; Fertilizer; Grain legume; Improved germplasm

Ernesto F. Viglizzo, M. Florencia Ricard, Esteban G. Jobbagy, Federico C. Frank, Lorena V. Carreno, Assessing the cross-scale impact of 50 years of agricultural transformation in Argentina, Field Crops Research, In Press, Corrected Proof, Available online 25 June 2011, ISSN 0378-4290, DOI: 10.1016/j.fcr.2011.05.014.
(http://www.sciencedirect.com/science/article/pii/S037842901100164X)
Abstract:
Given the increasing number of actors related to farming that make decisions at different scales (plot, farm, region, etc.), knowledge about patterns and processes that behave hierarchically is increasingly needed. This is necessary in countries like Argentina, where cultivation expanded at increasing pace during the last 50 years over an area of 1.47 million km2. Relying on different sources of existing data, the purpose of this work was to assess the cross-scale dependence of patterns and processes related to the expansion of cultivation in Argentina. The study involved indicators of (i) carbon, nitrogen and phosphorous stocks, (ii) energy productivity, fossil energy consumption, C, N and P balances, water consumption and greenhouse gases fluxes, and (iii) impacts related to pesticide contamination, habitat intervention and soil erosion. Three scales involving (i) regions, (ii) macro-regions and (iii) the whole country were analyzed. Principal Components, Correlation and Regression Analysis were used to identify and quantify meaningful relationships between the different scales. The expansion of annual crops affected C-N-P stocks significantly at the regional scale, whereas it influenced energy and matter flows, and contamination across all scales. This finding explains conflictive responses to land use and management when different scales are considered and shows that scale dependency needs to be considered when their effects on the environment are explored and quantified.
Keywords: Cultivation expansion; Cross-scales dependencies; Indicators (of stocks; fluxes and impacts)

G.C. Waghorn, R.S. Hegarty, Lowering ruminant methane emissions through improved feed conversion efficiency, Animal Feed Science and Technology, Volumes 166-167, Greenhouse Gases in Animal Agriculture - Finding a Balance between Food and Emissions, 23 June 2011, Pages 291-301, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2011.04.019.
(http://www.sciencedirect.com/science/article/pii/S0377840111001386)
Abstract:
Improvements in feed conversion efficiency (FCE) can be applied to individual animals as well as to production from land, as in a farm system. Our focus relates mainly to food production from individual animals within any animal population where there is divergence in the efficiency that individuals use ingested feed for maintenance and production; primarily due to differences in digestion and metabolism. Intake variation from the predicted mean for individuals of a similar size and level of production in a population has been termed residual feed intake (RFI), with low values indicating an efficient animal. Efficient animals require less feed than average and can be expected to produce less CH4 and N2O per unit product than the population average at a similar level of production. Selection for this trait will lower

CH4 emissions per animal, unless more animals are kept to eat the feed not required by efficient animals. There are few published evaluations of CH4 yields from animals with divergent RFI and there is little evidence that efficient animals have a different CH4 yield expressed as CH4/kg dry matter (DM) intake. Of equal or greater importance than RFI is the need to select high producing animals, as this will reduce emissions/unit of product, referred to as emissions intensity (Ei). Research should identify productive individuals that have a low RFI to minimise Ei and maintain food production. The extent to which CH4 can be reduced by selection for RFI will depend on the heritability of efficiency, dispersal of efficient animals through all populations and their resilience in a production system (i.e., robustness). The benefit of RFI to lowering greenhouse gas (GHG) emissions is its application, irrespective of farming system (i.e., confined, intensive, extensive grazing), especially because efficient animals are likely to increase farm profitability. Efficient animals are already in all herds and flocks and research must identify and remove inefficient individuals, while retaining and ensuring efficient ones are fit to purpose. However, the biggest benefits to reducing emissions and increasing production will be associated with good animal management practice (e.g., appropriate genetics, reproductive performance, longevity) with efficient animals superimposed. Good animal systems management will improve profitability, and apply to both intensive and extensive systems to increase food production and lower Ei. One dilemma for agriculturists will be the practice of feeding grains to ruminants, as gains in animal efficiency, especially in reduction of Ei, are likely to be biggest with high energy density rations, but feeding grain to ruminants may become an unsustainable practice if food supplies for humans are limited.
This paper is part of the special issue entitled: Greenhouse Gases in Animal Agriculture - Finding a Balance between Food and Emissions, Guest Edited by T.A. McAllister, Section Guest Editors: K.A. Beauchemin, X. Hao, S. McGinn and Editor for Animal Feed Science and Technology, P.H. Robinson.
Keywords: Feed efficiency; Methane; Residual feed intake; Emissions intensity; RFI

A.D. Moore, M.J. Robertson, R. Routley, Evaluation of the water use efficiency of alternative farm practices at a range of spatial and temporal scales: A conceptual framework and a modelling approach, Agricultural Systems, Volume 104, Issue 2, Methods and tools for integrated assessment of sustainability of agricultural systems and land use, Conference on Integrated Assessment of Agriculture and Sustainable Development: Setting the Agenda for Science and Policy, February 2011, Pages 162-174, ISSN 0308-521X, DOI: 10.1016/j.agsy.2010.05.007.
(http://www.sciencedirect.com/science/article/pii/S0308521X10000764)
Abstract:
Water is the principal limiting resource in Australian broadacre farming, and the efficiency with which farmers use water to produce various products is a major determinant both of farm profit and of a range of natural resource management (NRM) outcomes. We propose a conceptual framework based on multiple water use efficiencies (WUEs) that can be used to gain insight into high-level comparisons of the productivity and sustainability of alternative farming practices across temporal and spatial scales. The framework is intended as a data aggregation and presentation device. It treats flows of water, biomass

and money in a mixed farming system; economic inefficiencies in these flows are tracked as they are associated with a range of NRM indicators.
We illustrate the use of the framework, and its place in a larger research programme, by employing it to synthesise the results from a set of modelling analyses of the effect of land use choices on long-term productivity and a range of NRM indicators (frequency of low ground cover, deep drainage, N leaching rates and rate of change in surface soil organic carbon). The analyses span scales from single paddocks and years to whole farms and have been carried out with the APSIM and GRAZPLAN biophysical simulation models and the MIDAS whole-farm economic model.
In single wheat crops in one study, different land uses in preceding years affect grain yield primarily by affecting the harvest index. When the scale changes to cropping rotations, the critical factor affecting overall water use efficiency is found to be the proportion of stored soil water that is transpired by crops. When ordinated in terms of their water use efficiencies, a set of 45 modelled rotation sequences at another location are differentiated mainly by the proportion of pasture in the rotation; when rotations are ordinated using key NRM indicators, the proportion of lucerne pasture is the main distinguishing factor. Finally, we show that for whole crop-livestock farms at three different locations across southern Australia, the pattern of water use efficiencies in the most profitable farming systems changes in similar ways as cropping proportion is altered. At this scale, land use choices affect multiple water use efficiency indices simultaneously and commodity prices determine the balance of the resulting economic tradeoffs.
Limitations to the use of the WUE framework arising from its relative simplicity are discussed, as are other areas of farming systems research and development to which it can be applied.
Keywords: Water use efficiency; Drainage; Ground cover; APSIM; GRAZPLAN; MIDAS

B.K. Boogaard, L.J.S. Boekhorst, S.J. Oosting, J.T. Sorensen, Socio-cultural sustainability of pig production: Citizen perceptions in the Netherlands and Denmark, Livestock Science, Volume 140, Issues 1-3, September 2011, Pages 189-200, ISSN 1871-1413, DOI: 10.1016/j.livsci.2011.03.028.
(http://www.sciencedirect.com/science/article/pii/S1871141311001351)
Abstract:
Many sustainability studies of animal production consider three pillars: the economic, environmental and socio-cultural. Farmers and animal scientists tend to put most emphasis on the economic and environmental pillar and largely ignore the socio-cultural pillar. Socio-cultural sustainability refers to social perceptions of animal farming, including social appreciations and concerns of animal production systems. Integration of social demands and values in the production sector is a prerequisite to justify animal production within a society. The objective of the present study was therefore to gain further insights into socio-cultural sustainability of pig production. Many citizens may not know what contemporary pig production actually entails. To give people a real life experience with pig production, we conducted farm visits with citizen panels with 18 respondents in the Netherlands and 8 respondents in Denmark. In both countries, respondents were divided over two panels and each panel visited a conventional and an organic pig farm. During the farm visits

respondents noted their sensory experiences -- what do you smell, hear, see and feel? In addition, each respondent made pictures of six positive and six negative aspects on the farms for which they had to write a motivation. The qualitative analysis resulted in seven socio-cultural themes (SCT) of pig production namely: 1) meat production, 2) farm activities, 3) farm income, 4) animals, 5) housing system, 6) environment and nature, and 7) culture and landscape. Each SCT included several socio-cultural aspects (appreciations, SCA) and socio-cultural issues (concerns, SCI). We identified 31 SCAs in the Netherlands and 33 SCAs in Denmark, of which 29 were SCIs in both countries. Although many issues were associated with animal welfare, the results also showed that social concerns of pig production extended beyond animal welfare. In general it can be stated that citizens are strongly concerned about overexploitation of animals in contemporary pig production systems, but at the same time they appreciate the dynamism in a pig farm including certain modern developments.
Keywords: Citizens; Real life experience; Social perceptions; Values

Roberta Farina, Giovanna Seddaiu, Roberto Orsini, Evelyn Steglich, Pier Paolo Roggero, Rosa Francaviglia, Soil carbon dynamics and crop productivity as influenced by climate change in a rainfed cereal system under contrasting tillage using EPIC, Soil and Tillage Research, Volume 112, Issue 1, March 2011, Pages 36-46, ISSN 0167-1987, DOI: 10.1016/j.still.2010.11.002.
(http://www.sciencedirect.com/science/article/pii/S0167198710002175)
Abstract:
The issue of soil C sequestration is of special interest in Mediterranean areas, where, due to climatic conditions and agricultural practices, SOC (soil organic carbon) content is low, and is likely to be affected by climate change. Besides, losses of SOC have a relevant role in decreasing agricultural soil quality and could have a negative effect in productivity. Therefore, it is crucial to estimate whether modifying traditional soil management would have beneficial effects under future climate conditions. We used the EPIC model to simulate the interactive effect of climate change, CO2 enrichment, soil management (conventional tillage--CT vs. no tillage--NT) and two crop rotations, durum wheat-sunflower and durum wheat-maize, on crops yields and SOC in central Italy. The model was calibrated using soil and crop yield data collected from a long-term field experiment run in central Italy with CT and NT treatments. Maize and sunflower grain yields were significantly reduced by NT, primarily because of poor establishment, while durum wheat was almost not affected by tillage treatments. Projected durum wheat (Dw) and maize (Ma) grain yields were negatively affected by climate change (up to -25% and -10% respectively) while sunflower (Sf) yield increased. Tillage effects appear to be the most important factor in sequestering/releasing C. No-tillage practices sequestered in all profile (0-100 cm depth) from 0.03 to 0.2 t ha-1 y-1 in 30 years, depending on climate scenario and plant C input, while conventional tillage (CT) led to massive C loss rates (up to -0.9 t ha-1 y-1). Beyond all uncertainties in the use of models, the results demonstrated that soil tillage and, to a certain extent, crop rotation, can play a relevant role in reducing (NT) or reinforcing (CT) the impact of climate change on SOC. No-tillage farming, if sufficient C input is ensured by the cropping system, could effectively contribute to increase soil C sequestration in Mediterranean rainfed environments.
Keywords: No tillage; Carbon sequestration; Maize; Wheat; Sunflower; Climate change

Lula T. Ghebremichael, Mary C. Watzin, Identifying and controlling critical sources of farm phosphorus imbalances for Vermont dairy farms, Agricultural Systems, Volume 104, Issue 7, September 2011, Pages 551-561, ISSN 0308-521X, DOI: 10.1016/j.agsy.2011.04.004.
(http://www.sciencedirect.com/science/article/pii/S0308521X11000588)
Abstract:
Lake Champlain, located between Vermont, New York, and Quebec exhibits eutrophication mainly due to continuing phosphorus (P) losses from upstream nonpoint source areas. Several state and local agencies have initiated efforts aimed at assessing and identifying critical sources areas for P loss. To augment these efforts, accounting of farm P inputs (in purchased animal feed and fertilizers) and P outputs (in milk, meat, or off-farm sales of harvested crops or other products) is needed as a means of determining potential P build-up in farm soils. When farm P inputs exceed P outputs, P surplus occurs on the farm. This leads to potential soil-P accumulations and risk of P loss in runoff, negatively impacting the quality of receiving water bodies. In this study, a combination of farm record data and a model-based approach, using the Integrated Farming System Model (IFSM), was used to estimate farm P inputs and outputs, identify root causes of farm P imbalances, and explore viable P balancing strategies. Three Vermont dairy farms with varying farm systems (grass-based organic farm, fully confined farm, and a mixed system farm with high-producing confined dairy cows and grazing heifers) were studied. These farms were found to have P surpluses ranging from 5.5 kg/ha to 18.7 kg/ha on annual basis. This study also identified critical causes of P imbalances for each farm and suggested farm specific alternative strategies needed to address the P imbalances. By balancing farm P inputs and outputs, potential accumulation of soil-P can be prevented. As a result, maximum benefits can be obtained from land treatment measures implemented to control off-field P loss without the additional concern of continuing P build-up that could reduce their effectiveness.
Keywords: Dietary phosphorus; Farm modeling; Forage management; Mass nutrient balance; Phosphorus

Dulce Infante Mata, Patricia Moreno-Casasola, Carolina Madero-Vega, Gonzalo Castillo-Campos, Barry G. Warner, Floristic composition and soil characteristics of tropical freshwater forested wetlands of Veracruz on the coastal plain of the Gulf of Mexico, Forest Ecology and Management, Volume 262, Issue 8, 15 October 2011, Pages 1514-1531, ISSN 0378-1127, DOI: 10.1016/j.foreco.2011.06.053.
(http://www.sciencedirect.com/science/article/pii/S0378112711004270)
Abstract:
We studied the influence of geomorphological setting and soil properties on the vegetation structure, composition and diversity of five forested coastal wetlands in Veracruz on the Gulf of Mexico. These swamps are located on floodplains and in dune depressions. We recorded 109 woody and herbaceous species. The most frequent species were the trees Pachira aquatica, Annona glabra, Diospyros digyna and Ficus insipida subsp. insipida, the lianas Dalbergia brownei and Hippocratea celastroides and the hemi-epiphyte Syngonium podophyllum. The Shannon-H diversity index varied from 2.659 to 3.373, density from 1750 to 2289 stems ha-1 and basal area from 32.7 to 76.42 m2 ha-1. The classification analysis defined two groups: one corresponded to forested wetlands along the floodplain (Apompal, Cienaga, Chica) and the other included Mancha and Salado, in dune depressions. PCA

ordination of soil parameters during the rainy season explained 67.0% and during the dry season 69.1% of the total variance. In the rainy season Mancha and Salado samples remain close together because they have lower Mg, Na, K, % Total C and % Total N values. Apompal and Chica samples remain close to each other because of their high levels of % Total C, % Total N, Mg, Na and high soil water content. Cienaga samples are separated from the others because of high values of P, Ca and Eh as well as high water levels. In general, soil parameter ordination during the dry season showed that redox potential, P, water level and water content decreased in the forested wetlands and Na values increased in Chica. The soil textures identified were clay, sandy clay loam, sandy loam and clay loam; clay texture dominated alluvial processes in the floodplain (e.g., Cienaga). The forested wetlands in the floodplains had similar vegetation and the same happened in the dune depressions but soil characteristics were more variable in both cases. Plant diversity in floodplains tends to be relatively high, and the presence of adjacent tropical forests probably increases its richness, except in cases in which there are stressing factors, such as salinity. The forested wetlands studied showed dominant floristic elements, which extend north into Florida such as A. glabra and Ficus aurea. Other dominant elements such as P. aquatica are also found in Central and South America. The forested wetlands studied are subjected to continuous deforestation to transform the land into farming or ranching activities, this being a common practice throughout the distribution range of these forests.
Keywords: Annona glabra; Lianas; Pachira aquatica; Plant diversity; Redox potential; Water level

Ali Ashraf Amirinejad, Kalpana Kamble, Pramila Aggarwal, Debashis Chakraborty, Sanatan Pradhan, Raj Bala Mittal, Assessment and mapping of spatial variation of soil physical health in a farm, Geoderma, Volume 160, Issues 3-4, 15 January 2011, Pages 292-303, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2010.09.021.
(http://www.sciencedirect.com/science/article/pii/S0016706110002922)
Abstract:
Productivity rating systems are important tools to quantitatively assess soil health. In precision farming such information is required for planning appropriate soil and crop management strategies. In order to demonstrate a proper procedure for assessing the soil physical health of a farm, an experiment was conducted in a rice-wheat field. Spatial variability analysis of soil physical properties measured on a rectangular grid (30 m x 45 m) was carried out by using geostatistical analyst extension of Arc GIS software. Indicators for soil physical health assessment included bulk density (BD), field saturated hydraulic conductivity (Kfs), available water retention capacity (AWRC), organic carbon content (OC) and non capillary porosity (NCP). Rating values of soil physical parameters were different for wheat and rice as the optimum physical environment for both systems were different. Physical rating index (PI) at each sampling point was determined by multiplying the rating values for all five parameters. Results revealed that for BD, Kfs, OC and soil physical health index (PI), major and minor ranges of semivariogram varied between 300-380 m and 55-90 m, respectively. Whereas for NCP and AWRC, they were relatively short (major range between 114-140 m and minor around 60 m). Results also revealed that BD and PI for both surface and subsurface layers showed strong spatial dependence whereas the rest of the parameters showed moderate spatial dependence. Rating maps of mentioned parameters for wheat and rice

cultivations were prepared as series of coloured contours by using kriging or other appropriate interpolation techniques and suitable semivariogram models. Overall soil physical health of the farm was medium to good for paddy cultivation but was not suitable for succeeding wheat crop mainly because of increased BD and reduced Kfs, NCP and AWRC of the farm during wheat growth. Correlations between PI and grain yield of both wheat and rice were fairly good (r2 = 0.67). The results thus supported earlier findings that good soil physical health is essential for optimum sustained crop production.
Keywords: Soil physical health; Spatial variability analysis; Physical rating index

R. Lal, Sequestering carbon in soils of agro-ecosystems, Food Policy, Volume 36, Supplement 1, The challenge of global food sustainability, January 2011, Pages S33-S39, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2010.12.001.
(http://www.sciencedirect.com/science/article/pii/S0306919210001454)
Abstract:
Soils of the world's agroecosystems (croplands, grazing lands, rangelands) are depleted of their soil organic carbon (SOC) pool by 25-75% depending on climate, soil type, and historic management. The magnitude of loss may be 10 to 50 tons C/ha. Soils with severe depletion of their SOC pool have low agronomic yield and low use efficiency of added input. Conversion to a restorative land use and adoption of recommended management practices, can enhance the SOC pool, improve soil quality, increase agronomic productivity, advance global food security, enhance soil resilience to adapt to extreme climatic events, and mitigate climate change by off-setting fossil fuel emissions. The technical potential of carbon (C) sequestration in soils of the agroecosystems is 1.2-3.1 billion tons C/yr. Improvement in soil quality, by increase in the SOC pool of 1 ton C/ha/yr in the root zone, can increase annual food production in developing countries by 24-32 million tons of food grains and 6-10 million tons of roots and tubers. The strategy is to create positive soil C and nutrient budgets through adoption of no-till farming with mulch, use of cover crops, integrated nutrient management including biofertilizers, water conservation, and harvesting, and improving soil structure and tilth.
Keywords: Soil quality; Adaptation and mitigation of climate change; Food security; Soil restoration; Carbon sequestration