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PREFACE

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LILIUM LONGIFLORUM; ECONOMIC ANALYSIS; FARMING SYSTEMS; PRODUCTION COSTS; INCOME; LAND USE; PROFITABILITY; IMPORTS.

The aim of this research was to find out the cost and income, break event point and minimum acreage of lily businessman. This research was conducted in two locations, namely Ciputri experimental field, and farmer's field in Cisarua, Lembang and Salabintana, Sukabumi, West Java. The research done at Ciputri was a case study using survey method consisting of two steps, namely presurvey and survey, started from January to December 2003. Data were taken from primary and secondary sources. Primary data were taken from 15 farmers, by direct interview using prior prepared questionnaire. Secondary data were taken from institutions and references related to this study. Sample was taken with purposive random sampling. Data were analyzed using R/C ratio analyzing of break event point and minimum acreage. The result concluded that the biggest part of production cost spent for seeds e.g. 76.75% for local lily and 84.90% for imported lily. The break event point of local lily was prompted of price level of Rp 1,074.1 per piece, productivity of 9.700 flowers per 100 m^2. Production value was Rp 10,418,770 and cost production was Rp 10,418,500. The price of imported lily was about Rp 6,829,2 per piece, productivity of 4.009 piece per 100 m^2. Production value was Rp 27,378,263 per 100 m^2 and cost production was Rp 27,378,110 per 100 m^2. The minimum farm size area of local lily on lowest price was Rp 1,000 per piece, the minimum farm size area was negative. The minimum farmer size area of lily asiatic on lowest price Rp 8,500 per flowers was 55 m^2, which was still narrower than the average of 100 m^2. It means that the lowest price, the income target could still be achieved.

E12 LABOUR AND EMPLOYMENT

002 YUSDJA, Y.
Analisis peluang peningkatan kesempatan kerja dan pendapatan petani melalui pengelolaan usaha tani bersama. **[Analysis of opportunity in increasing employment and farmers' income through group farming systems]**/Yusdja, Y.; Basuno, E.; Ariani, M.; Purwantini, T.B. (Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian, Bogor (Indonesia)) 13 tables; 19 ref. Summaries (En, In). *Jurnal Agro Ekonomi* (Indonesia) ISSN 0216-9053 (2004) v. 22(1): p. 1-25.

AGRICULTURAL POLICIES; FARM INCOME; FARMING SYSTEMS; FARMER ASSOCIATIONS; EMPLOYMENT; COST BENEFIT ANALYSIS.

Poverty alleviation efforts are not only government responsibility, but also the responsibility of community in general, farmers in particular. This particular research aimed to analyse the benefit of group farming systems in increasing production, return and employment opportunity. For this purpose, mathematical programming is used to analyse the benefit of group farming system. Research was conducted in the PATANAS Villages, two in West Java and another two in Central Java. Results indicated that partnership among farmers could practically be implemented and could increase production by 5 to 10%, profit by 18 to 30% and employment opportunity by 20 to 30%. Therefore, farmers partnership could assist and speed up poverty alleviation program in the rural areas. This particular analysis in the same time also indicated that in facts an individual rice field farming is inefficient in terms the use of production cost, fertilizers application and also inefficient in land allocation. Policy implication of this study is that farmers was suggested to practice group farming system. It would assure increase in

productivity, farmers' income and employment opportunity. Government role should be placed in social innovation, provide subsidy and credit which can extend and establish this group farming system.

E20 ORGANIZATION, ADMINISTRATION, AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

003 ABDUH, U.

Integrasi ternak itik dengan sistem usaha tani berbasis padi di Kabupaten Sidrap Sulawesi Selatan. **[Duck-rice integration in farming system in Sidrap Regency, South Sulawesi]**/Abduh, U.; Ella, A.; Nurhayu, A. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)) 6 tables; 6 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop-livestock systems]. Prosiding Seminar Nasional Sistem Integrasi Tanaman-ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 234-239.

DUCKS; AGROPASTORAL SYSTEMS; ORYZA SATIVA; FEEDS; CONCENTRATES; EGG PRODUCTION; RATIONS; IRRIGATED LAND; ECONOMIC ANALYSIS; INPUT OUTPUT ANALYSIS.

The study was carried out in 2003 in Sidrap Regency, South Sulawesi aimed to obtain information on mutual utilization (interaction) of duck-rice farming system. Ten farmers were divided into two groups namely group I (treatment group), where each farmer has 100 ducks that herded at a hectare of rice field and fed with supplemental feed at the rate 150 g/h/d, and group II (control group) where the ducks were fed under the farmers' habit. Result showed that average egg production for group I was higher than that in group II, i.e. 60.2% HD and 34,2% HD. The average eggweight was 71.4 g vs 61.66 g, feed consumption 150 vs 100 g/h/d, and feed conversion 3.5 vs 4.4 g/g, respectively. Profit analysis indicated that group I was more profitable than group II, i.e. Rp 11,100,600.00 (B/C ratio = 2.7) vs Rp 3,779,500.00 (B/C ratio = 1.7). Rice production in treatment-I, where ducks fed with supplement were exist, was 6,197.5 kg/ha/season, while for treatment-II, where the ducks fed under farmers' habit was 6,197.5 kg/ha/season, and treatment-III (without duck herding) was 6,000 kg/ha/season. Input-output analysis for rice was Rp 3,779,500.00 (R/C = 3.43), Rp 3,717,875.00 (R/C = 3.39), and Rp 3,365,000.00 (R/C = 2.39) for treatment I, II and III, respectively. It can be concluded that integration of duck into rice field could increase benefit in better egg and rice production. There is a mutual benefit (interaction) derived from the integration.

004 BULO, D.

Integrasi sapi potong pada lahan sawah irigasi di Sulawesi Tengah. **[Beef cattle integration of the irrigated paddy field in Central Sulawesi]**/Bulo, D.; Agustinus N.; Kairupan; Munier, F.F.; Rumayar; Saidah (Balai Pengkajian Teknologi Pertanian Sulawesi Tengah, Palu (Indonesia)) 4 tables; 12 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop-livestock systems]. Prosiding seminar nasional sistem integrasi tanaman-ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 155-161.

BEEF CATTLE; ORYZA SATIVA; IRRIGATED LAND; AGROPASTORAL SYSTEMS; RICE STRAW; FEEDS; FERMENTATION; FARMYARD MANURE; BODY WEIGHT; FERTILIZER APPLICATION; ORGANIC FERTILIZERS; AGRONOMIC CHARACTERS; YIELDS; COST BENEFIT ANALYSIS; SULAWESI.

The rice field area in Central Sulawesi is 148,518 ha, 79.5% of which is rice field of technical irrigation. Increase of rice yield during last ten years, only reach 0.3 ton/ha (3.5 ton/ha in 1990 and 3.8 ton/ha in 2000). Monoculture system especially for farmer with limited area has not guaranteed in giving adequate income. This can be optimalize through application of integration from various branch of farming system at same farm. Constraint of farmer to raise cattle on rice field of technical irrigation is limited pasture,

forages, and workers, due to the intensive working capacity of paddy cultivation (2-3 times/year). Cost needed for the livestock is high enough, while traditional system will not give adequate profit. Results showed that on T0 (40% fermentated rice straw + 60% native grass); T1 (45% fermentated rice straw + 55% native grass); and T2 (50% fermentated rice straw + 50% native grass), the highest consumption of feed at T2 (10.3 kg/head/day; daily gain 0.70 kg/head/day; with economic value equal to Rp 7,600 (R/C ratio 2.19), while production of dry substance of manure equal to 3.8 kg/head/day. For rice variety C3 on 6 hectare area, wider special assessment unit of 20 m^2 with 3 treatments and 4 replications consist of T1 (120 kg urea + 60 kg SP36 + 60 kg KCl + 800 kg manure); T2 (100 kg urea + 50 kg SP36 + 50 kg KCl + 1000 kg manure); and T3 (140 kg urea + 70 kg SP36 + 70 kg KCl + 600 kg manure). The result for morphological growth (height and tillering) was greatest in T2 on 30; 45 and 60 days after planting, productivity of generative component for grain rice and length was 11.2 branch and 26.7 cm. Unhulled dry rice production was 6.9 ton/ha/postharvest with rice straw of 12.1 ton/ha/postharvest.

005 LAMUSA, A.
Faktor-faktor yang mempengaruhi produksi kelapa dalam di Desa Labuan Lele Kecamatan Tawaeli Kabupaten Donggala. **[Factors affecting coconut production in Labuan Lele Village, Tawaeli District, Donggala (Indonesia)]**/Lamusa, A. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 2 tables; 6 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 254-260.

SULAWESI; COCONUTS; PRODUCTION; FARM SURVEYS.

Factors affecting the production of coconut farm production were investigated in Tawaeli Subdistrict, District of Donggala. Thirty five farmers were taken randomly as samples to be surveyed. Data were collected by direct interviewing respondents using questionnaire. Data were then interpretated by regression analysis using Cobb-Douglas production function. The result showed that population size of the coconut trees, labour, fertilizer influenced coconut production; while garden tools, and age of coconut tree did not.

006 NURHERU
Pengembangan usaha tani tumpangsari wijen dan palawija pada kawasan hutan. **[Development of intercropping sesame and catch crops in forest area]**/Nurheru; Sudarmo, H.; Yasin (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 1 table; 9 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4): p. 131-134.

SESAMUM INDICUM; CATCH CROPS; FARM MANAGEMENT; INTERCROPPING; FARM INCOME; COST BENEFIT ANALYSIS; FOREST LAND.

Research of development of sesame intercropping was conducted in KPH Saradan forest area, Madiun from March to December 2001. The research used 10 ha of 3 years old hardwood tree forest area. There were 36 farmers involved, each of them had 0.25-0.5 ha to work on. The land was divided into 2 parts, one part was planted with sesame and cassava, while the other part was planted with cassava and corn. The technology offered to the farmer consisted of: the use of superior variety, good seed, on schedule plantation, thinning up to 2 plants/hole, proper fertilizer, dose and application, and weeding. Parameters observed consisted of comparing production input (i.e. seeds, fertilizer and pesticide) to the price, use of family worker and outside family worker to the salary rate, sesame and catch crops production to their selling prices. The result showed that the technology accepted by the farmer was Sumberrejo I superior sesame variety, superior sesame seed, schedule of seed planting, fertilizer dosage and application, and weeding. The recommended technology that was not accepted yet by the farmers was first fertilizer application at planting time and thinning of sesame. Area of sesame intercropped with cassava produced 657 kg of sesame and 3,210 kg of cassava per ha. Area of cassava intercropped with corn produced 3,350 kg of cassava and 1,220 kg of corn per ha. There was a profit of Rp 1,124,000 per ha in sesame + cassava intercropping with B/C ratio 1.40, while there was a financial lost of Rp 424,000 every ha in cassava + corn intercropping with B/C ratio 0.88.

E21 AGRO-INDUSTRY

007 BULU, Y.G.
Transfer dan kendala adopsi teknologi produksi sapi bali mendukung usaha agribisnis. **[Transfer and constraint of adoption of bali cattle production technology for agribusiness support]**/Bulu, Y.G.; Puspadi, K.; Panjaitan, T.S.; Sasongko W.R.; Muzani, A. (Balai Pengkajian Teknologi Pertanian Nusa Tenggara Barat, Mataram (Indonesia)) 5 tables; 9 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop-livestock systems]. Prosiding seminar nasional sistem integrasi tanaman-ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 240-248.

CATTLE; AGROINDUSTRIAL SECTOR; TECHNOLOGY TRANSFER; INNOVATION; FARM SURVEYS; PRODUCTION.

The number of bali cattle in West Nusa Tenggara has been decreasing by 9.4% from 1997-2001 because of low application of bali cattle production technology. It affected high mortality of calves and low birth rate of bali cattle. The number of bali cattle could be increased by application of ten components of bali cattle production technology through 447 bali cattle fance. The objectives of this study were to measure the impacts of bali cattle production technology demonstration, level of farmers understanding on bali cattle production technology and farmers learned of bali cattle production technology. Trace path analysis was applied for this study. Eighty seven respondents were chosen by purposive sampling technique. Complete data were analyzed by descriptive method. The results of this study showed that process of transfer and adoption of bali cattle production technology were affected by several factors namely application methods of innovation delivery, the users characteristics, and the useful of innovation. This study also showed that by bringing the farmers to the demonstration site affect the level of farmers understanding on bali cattle production technology. In general, respondents who well informed only 56.4% of ten component of bali cattle production technology. Farmers motivation for understanding bali cattle production technology were affected by relevance problems and the strongest farmers feel needs. The characteristics of bali cattle production technology needed by the farmers were more rapidly calving rate which able to decrease mortality rate, decreasing production cost, sell calves more rapidly, suitable for farmers socioeconomic background, simple technology, and appropriate to farmers habitual.

E71 INTERNATIONAL TRADE

008 MALIAN, A.H.
Permintaan ekspor dan daya saing panili di Provinsi Sulawesi Utara. **[Export demand and competitiveness of vanilla in North Sulawesi Province [Indonesia)]**/Malian, A.H.; Rachman, B.; Djulin, A. (Pusat Penelitian dan Pengembangan Sosial Ekonomi Pertanian, Bogor (Indonesia)) 1 ill., 8 tables; 20 ref. Summaries (En, In). *Jurnal Agro Ekonomi* (Indonesia) ISSN 0216-9053 (2004) v. 22(1): p. 26-45.

VANILLA PLANIFOLIA; EXPORTS; DEMAND; ECONOMIC COMPETITION; EXPORT POLICIES; SULAWESI.

The objective of the study is to analyze vanilla market structure and export demand markets of vanilla, and the competitiveness of vanilla. Primary data were collected from vanilla production centers in Minahasa District, North Sulawesi in April 2002. The respondents consisted of farmers, traders, processors, exporters and related institutions. Time series secondary data from CBS and FAO were also collected. A model of market demand and integration are applied to estimate export demand, while competitiveness is measured using policy analysis matrix (PAM). The results shows that the nature of Indonesian vanilla in US market is just a substitution for Madagascar and Komoro vanilla. Price integration between farmgate price and exporter price was weak and asymmetric. This findings were confirmed by marketing margin analysis indicating that vanilla farmers only gained 67% of fob prices. In the mean time, competitiveness analysis shows that vanilla farms in North Sulawesi have comparative and competitive advantages, with DRCR dan PCR less than one. To increase both production and productivity of Indonesian vanilla, price

incentive policy for inputs especially for fertilizers is required because the financial prices of fertilizers are higher than its social prices.

F01 CROP HUSBANDRY

009 DJUKRI

***Pengaruh naungan paranet terhadap sifat toleransi tanaman talas (Colocasia esculenta* (L.) Schott*). [Effect of paranets shade to tolerance characters of taro (Colocasia esculenta* (L.) Schott)]**/Djukri (Universitas Negeri Yogyakarta (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam); Purwoko, B.S. 2 ill., 2 tables; 25 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 17-25.

COLOCASIA ESCULENTA; LIGHT REQUIREMENTS; SHADE; SHADING; AGRONOMIC CHARACTERS; LEAF AREA; CHLOROPHYLLS.

The objective of the research was to determine the effect of paranet shading on physiological characters of taro. Two factors namely shade and clone were used. An experiment was carried out according to split plot design procedure. Shade as main plot consisted of four levels, i.e. without shade (0%), shade of 25%, 50%, and 75%, whereas clone as subplot consisted of 20 taro clones. Result of the experiment showed that under 25% of shading, 16 tolerant clones and 4 sensitive clones were obtained, 50% of shading, 9 tolerant clones and 11 sensitive clones were obtained, whereas in 75% of shading, 7 tolerant clones and 13 sensitive clones were obtained. Increase of leaf areas MS and level of chlorophyll a and b in tolerant clones was higher than those of sensitive clones. Decrease of chlorophyll a and b ratio, corm fresh weight, corm dry weight, corm starch content and leaf nitrogen content of sensitive clones was higher than those of tolerant clones.

010 EMMYZAR

***Pengaruh ketersediaan air terhadap pertumbuhan dan produksi dua klon nilam.* [Effect of water availability on the growth and production of two patchouli clones]**/Emmyzar (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)) 6 tables; 20 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4): p. 159-165.

POGOSTEMON CABLIN; WATER AVAILABILITY; GROWTH; PRODUCTION; SHOOTS; LEAVES.

Patchouli plant grows and produces very well in the area with high and everly rain fall through the year. Plants with continuous shortage of water would face water stress and affect physiological process, transpiration surface, leaf area and protoplasmic dehydration. Several levels of water needs were tested in this experiment, which was carried out in a glass house of Cimanggu Installation, Indonesian Spice and Medicinal Crops Research Institute, Bogor, from November 1999 to May 2000. The objective was to find out the effect of water availability on two clones of patchouli growth, production and oil content (rendement, colour and patchouli alcohol). The experiment was conducted in polybags using Cimanggu Latosols soil mixed with cow dung (3:1), 10 kg/polybag, arranged in a factorially completely random design with 3 replications. Plot size was 8 polybags/treatment. The first factor was two clones of patchouli; K1 = Sidikalang and K2 = Situak. The second factor was 4 levels of water availability: 25% (A1), 50% (A2), 75% (A3), and 100% (A4) field capacity (FC). Variables observed were percentage of shoot growth, plant height, leaf area, fresh weight and dry weight, oil content (rendement, colour and patchouli alcohol). The result showed that there was no interaction between the two factors for number of shoots. Clone of Sidikalang had higher plant height than that of Situak. The water availability of 75% (FC) gave optimum growth for the two clones, except the number of leaves. For Situak, the water availability of 100% (FC) gave the highest number of leaves. For Sidikalang, the water availability of 100% gave the highest dry weight of leaves. Oil rendement for Situak with 25% FC was the highest (4.0) with bright yellow colour. The content of patchouli alcohol for Situak was higher than that of Sidikalang (30%).

Therefore, it can be concluded that to obtain the optimum growth and the highest production it needed 75-100% (FC) water availability, while for high patchouli alcohol content, it needed buzer the water availability, i.e. 25-50% (FC).

011 NAJAMUDDIN, A.
***Evaluasi ekonomi beberapa varietas dan populasi tanaman jagung untuk produksi biomas segar.* [Economic evaluation of maize varieties and plant population for fresh biomass production]**/Najamuddin, A.; Akil, M.; Maamun, M.Y. (Balai Penelitian Tanaman Serealia, Maros (Indonesia)) 10 tables; 12 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 19-26.

ZEA MAYS; VARIETIES; PLANT POPULATION; PRODUCTION; BIOMASS; ECONOMIC ANALYSIS; ANIMAL FEEDING.

An experiment was conducted in 2003 at Takalar, South Sulawesi, to evaluate the effect of maize varieties and plant population on fresh biomass production. The experiment was designed in a split plot design with three replications. The main plots were three levels of plant populations (66,667; 133,333; and 200,000 plants/ha), while the subplots were five maize varieties (Bima-1, Semar-10, Lamuru, Sukmaraga, and Bisi-2). The plants were fertilized at the rate of 350 kg urea, 200 kg SP36 and 100 kg KCl/ha. The maize plants were harvested at 60, 65, and 70 days after planting (DAP) to produce fresh biomass. Economic analyses showed that plants of Bima-1 with a population 200,000 plants/ha, which were harvested at 60 DAP, produced the highest fresh biomass (44.7 t/ha) among other varieties. At this production level with a price of fresh-biomass Rp 60/kg, the net profit gained was Rp 358,000/ha. Postponement of the harvest time to 65 DAP on variety Bima-1 at population 200,000 plants/ha produced 82.5 t/ha fresh biomass with a net return Rp 2,626,000/ha and R/C ratio 2.13. Biomass harvest at 70 DAP reduced the net profit to Rp 1,400,000/ha. This achievement was followed by those of Semar-10 and Lamuru varieties. At 70 DAP, Lamuru at a plant population 200,000 plants/ha gave the highest fresh biomass (71.1 t/ha) and a net return Rp 2.1 million/ha, and R/C ratio 2.00, followed by Semar-10 and Bima-1. Planting maize for fresh biomass production was more profitable than that for grain.

012 PRAWOTO, A.A.
***Kajian agronomis, ekologis dan ekonomis terhadap konversi budi daya kakao anorganik ke organik.* [Agronomical, ecological and economical study of the conversion of inorganic to organic cocoa cultivation]**/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)) 14 tables; 18 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2003) v. 19(3): p. 104-125.

THEOBROMA CACAO; CULTIVATION; ORGANIC AGRICULTURE; SOIL MOISTURE CONTENT; ORGANIC FERTILIZERS; INORGANIC FERTILIZERS; PESTICIDES; RESIDUES; ECONOMIC ANALYSIS.

Market opportunity of organic product is prospective, rate of organic trade in European Union is twice than that of inorganic product. Trend of consumers to health and uncontaminated product and produced by sustainable system is increasing. A study of cocoa organic cultivation had been conducted since the end of 2000 at Kaliwining Experimental Station, Jember. Elevation of the study area is 45 m asl, rainfall type D (Schmidt and Ferguson), and soil type Regosols. The planting material was hybrid of ICS 60 X Sca 6, 10 years old, using planting distance 3 m x 3 m. Three types of cultivation methods were: utilizing dung, organic filter press cake and conventional (control), arranged by demo-plot design. The organic area was cultivated without pesticides (inorganic fertilizer). For control area, the cultivation used pesticides, inorganic fertilizer but without organic fertilizer. After three years, the result showed that application of organic fertilizer annually improved total C and N soil and the conservation of nitrogen and water was better. Cocoa performance was better, Forcipomyia population especially during dry season was higher than control, VSD infection was lower but Helopeltis infestation was not different compared to control. Pod yield improved 78% for filter press cake treatment, and 30% for dung treatment, though bean size tended to be smaller. Based on the similar postharvest processing, flavor of cocoa organic treatment was nutty but the inorganic one gave medium-high acidity. Pesticide residue was absent both in inorganic and organic beans. Organic cultivation did not affect butter content. Based on the direct inputs, filter press

cake treatment gave differential benefit/cost 5.2 and dung treatment about 15. It means that conversion of cocoa inorganic to organic cultivation gave opportunity to gain benefit 5 times for filter press cake and 15 times for dung to inorganic system. It is concluded that cocoa productivity was not decrease caused by organic cultivation but on the contrary increased yield and planters' income.

013 ROSMAN, R.
***Pengaruh periode pencahayaan terhadap pertumbuhan, hasil dan komponen minyak tanaman mentha (Mentha piperita* L.*).* [Effect of photoperiod on the growth, yield and component of peppermint oil]**/Rosman, R. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)); Harjadi, S.S.; Sudiatso, S.; Yahya, S.; Purwoko, B.S.; Chairul 6 tables; 19 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(1): p.12-20.

MENTHA PIPERITA; PHOTOPERIODICITY; GROWTH; YIELDS; ESSENTIAL OILS; MENTHOL; AGRONOMIC CHARACTERS; PHENOLOGY.

Research on the effect of photoperiod on the growth, yield and component of peppermints oil of *M. piperita* was carried out in the experimental garden of the Institute for Spice and Medicinal Crops, Lembang, West Java, from January to July 2000. The study was conducted in two steps, i.e. the first step was manipulation of photoperiod using TL lamps and the second step was distillation and analysis of peppermint oil from their products with gas chromatography and mass spectrometry. The experiment used five treatments, i.e. control or normal light period (1), four hours light supplement at the age of 30 days (2) and 60 days after planting (3), and one hour interruption of dark period at the age of 30 days (4) and 60 days (5). The result showed that the changes in light period affected the phenology of the crop. Four hours light supplement at the age of 30 days gave the best vegetative and reproductive growth (morphology of *Mentha piperita* i.e. flowering, erect stem, tall, wide, large stem, more internodes, leafy, and developed only few stolons). This morphology also resulted in the highest fresh material and oil product. The change of phenology as the effect of light periode manipulation could change oil component and finally the quality of menthol. Four hours light supplement at 30 days after planting showed the highest menthol content (54.89%) and the lowest menthofuran (7.83%).

014 SANTI, A.
***Perendaman dan kedalaman tanam umbi terhadap pertumbuhan dan produksi bunga sedap malam.* [Bulb immersion and depth of planting on growth and flower production of *Polianthes tuberosa*]**/Santi, A.; Kusumo, S.; Nuryani, W. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 5 tables; 7 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 420-426.

POLIANTHES; SETS; SOAKING; DEPTH; PLANTING; GIBBERELLIC ACID; GROWTH RATE; FLOWERING; CUT FLOWER; PRODUCTION.

Tuberose is one of cut flowers with unique flower and specific fragrant. With increasing demand of flower, flower productivity need to be improved to guarantee the continuity of flower supply. The aim of this research was to find out the method of inducing plant growth and flower production with immersion in water or gibberellic acid and different depth of planting. The research was conducted in Cianjur, started on June 1998 until March 1999. Factorial randomized block design was used in this research. Varieties (single and double flower) were used as the first factor, bulb immersion (without immersion, water immersion and GA3 immersion) as the second factor, and different depth of planting (4, 7, and 10 cm) as the third factor. The result showed that water or GA3 immersion tended to increase growth percentage, shoot number, plant height and induce earlier flowering and increase flower production/plot. Otherwise, the different varieties made the difference on growth percentage, shoot number, plant height, flower stalk length and flower spike length. Depth of planting just gave effect on growth percentage.

015 SULIANTI, S.B.

Stimulasi pertumbuhan multi tunas apikal pada tanaman lidah mertua (Sansevieria grandis) menggunakan zat pengatur tumbuh. **[Growth regulating of the apical shoot on *Sansevieria grandis* use growth hormone substances]**/Sulianti, S.B. (Pusat Penelitian dan Pengembangan Biologi, Bogor (Indonesia)) 7 ill., 1 table; 14 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 412-419.

SANSEVIERIA; PLANT GROWTH SUBSTANCES; CHLORMEQUAT; APICAL MERISTEMS; SHOOTS; GROWTH.

This research aimed to observe the influence of growth hormone regulator Cultar and Cycocel administered with various concentration of 100, 200, 300, 400 and 500 ppm to the apical shoot of buds. Observation had been carried out for 7 months. Growth substances divided into two groups e.g. soil and mixture substance of soil, sand, compost and manure (2:4:4:1) and it was done on randomized block design. Induction of Cultar gave significant difference of each treatments ($P \leq$ to 0.5). It could stimulated the growth of multi apical shoot of buds and gave significant effect to the number of leaves and apical shoot of buds, as well as the increase of Cultar concentration (100-400 ppm), but at concentration of 500 ppm, the number of leaves and apical shoot of buds returned decreasing. The results also showed that Cycocel did not give any difference of each treatments ($P \geq$ to 0.5) e.g. with same concentration was not gave any effect on shoot of buds stimulation.

016 SUMARWOTO

Pengaruh pemberian kapur dan ukuran bulbil terhadap pertumbuhan iles-iles (Amorphophallus muelleri* Blume*) pada tanah ber-Al tinggi. **[Effects of liming and bulbil sizes on the growth of iles-iles (*Amorphophallus muelleri* Blume) in high level of Al-exc soil]**/Sumarwoto (Universitas Pembangunan Nasional Veteran, Yogyakarta (Indonesia)) 6 tables; 10 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2004) v. 11(2): p. 45-55.

AMORPHOPHALLUS; LIMING; BULBS; GROWTH; ORGANIC MATTER; FARMYARD MANURE; APPLICATION RATES.

Iles-iles was found in the natural environment on 5.6-6.5 pH until neutral level (pH 6.6-7.5) of soil. In the other hand, Indonesia has wide lands that has some problems on low level of pH with high level of Al-exc. The objective of this research was to know the liming on soil media which have high level of Al-exc to the growth of plant origin from various bulbil size. The experiment was conducted at the Bogor Agricultural University experimental field, Darmaga at 250 m above sea level from November 2001 to April 2002. The experiment was done with two factors with three replications using the completely randomized block design. The level of lime were (0 Al-exc, 1 Al-exc, and 2 Al-exc) and bulbil size were (more than 2.5 cm, 1.5-2.5 cm, and less than 1.5 cm). The results showed that liming on high level of Al-exc soil was really needed, until 1 ton/ha liming level. The liming process until 40 tons/ha decreased growth and yield that caused by the unavailable P. All of size of bulbil can be used as seed, but in direct sowing, it was better to use more than 2.5 cm diameter of bulbil size. It was found that the highest Al level of tuber was found in the soil without liming. High Al-exc level of soil that have been added by organic matter with pH 4.55 could still produced iles-iles tuber.

017 SUTARYONO, Y.A.

Biomass production and quality of new forages for sowing under cashews in Dompu, West Nusa Tenggara (Indonesia)/Sutaryono, Y.A. (Universitas Mataram (Indonesia). Fakultas Peternakan) 2 ill., 7 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 211-213.

ANACARDIUM OCCIDENTALE; STYLOSANTHES HAMATA; ARACHIS PINTOI; SHADING; BIOMASS; PROTEINS; GROWTH; QUALITY; PRODUCTION; DIGESTIBILITY; FORAGE; SOWING; NUSA TENGGARA.

Second land cashew plantation areas owned by farmers offer great potential as sites for establishment of improved forages, which can provide high quality dry season forage. A trial was established to examine the potential growth and quality of two *Stylosanthes hamata* cultivars (Verano and Amiga) and one *Arachis pintoi* cultivar in interrow areas of cashew plantations, under three levels of shading (full sun, part shade, heavy shade). *Arachis pintoi* still grew relatively well under heavy shade while *Stylosanthes hamata* produced slightly more biomass in full sun. There were only small differences in crude protein levels and there was no significant effect on *in vitro* digestibility between the two sown legume species in response to shade.

F02 PLANT PROPAGATION

018 AVIVI, S.
***Mikropropagasi pisang abaka (Musa textilis* Nee*) melalui teknik kultur jaringan.* [Micropropagation on abaca (*Musa textilis* Nee) by tissue culture technique]**/Avivi, S. (Universitas Jember (Indonesia). Fakultas Pertanian); Ikrarwati 2 ill., 3 tables; 25 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2004) v. 11(2): p. 27-34.

MUSA TEXTILIS; MICROPROPAGATION; BA; NAA; TISSUE CULTURE; IN VITRO; GROWTH.

The objectives of this research were to find the micropropagation technique using benzylamino purin (BAP), kinetin, and naphthaleneacetic acid (NAA) on the micropropagation medium. The research was divided in 2 stages: (1) Micro shoot induction; and (2) Micro shoot rooting induction. Complete randomized design with five replications and four treatments of BAP and Kinetin was used in the first stage. The treatmens of BAP and Kinetin were 4, 5, 6 and 7 ppm. Factorial design and completely randomized design with one factor and three replications were used in the second stage. The factor consisted of four levels of NAA: 0, 1, 1.25, 1.50 ppm NAA. The first experiment showed that the best result was achieved on the medium supplemented with 6 ppm BAP or with 7 ppm Kinetin. This media could produce average 8.6 and 8.4 shoots, respectively. The second experiment showed that the best result of shoot rooting stage was obtained from media with 1 ppm NAA. In this level, the average number of root was 6.67 per explant and 1.24 cm average of root lenght.

019 PRAWOTO, A.A.
***Kajian agronomis dan anatomis hasil sambung dini tanaman kakao (Theobroma cacao* L.*). [Agronomical and anatomical study of resulted early cocoa (*Theobroma cacao* L.) grafting]**/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Qomariyah, N.; Rahayu, S.; Kusmanadhi, B. 8 ill., 7 tables; 31 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2005) v. 21(1): p. 12-30.

THEOBROMA CACAO; GRAFTING; CLONES; AGRONOMIC CHARACTERS; PLANT ANATOMY; GRAFT COMPATIBILITY.

Cocoa grafting and budding is usually carried out on 4-5 month old seedling, thus it needs 9-12 months to be ready tranplanted to the field. Effort to shorten time in the nursery can be done by early propagation. The aim of this research was to study effect of clones, tying and foliar application of grafsticks on the percentage of graftake. This study was carried out in Kaliwining Experimental Station, 45 m asl. and D climate type (Schmidt and Ferguson). First experiment was arranged in RCBD design and replicated 3 times, and factorial treatment of 4 x 3. The first factor were clones, i.e. TSH 858, ICS 13, ICS 60 and DR 2, the second factor was grafstick wiring, i.e. without, wiring 2 and 4 weeks before using. The 2nd experiment used RCBD design with 3 replications and factorial treatment of 3 x 3 x 2. The first factor was clones, i.e. KW 162, KW 163 and KW 165; the second ones was wiring, i.e. without, wiring 2 and 4 weeks before using, and the 3rd factor was foliar application, i.e. with and without foliar application.

Rootstock was ICS 60 seedlings of 30 days old, and grafting method was cleft grafting above cotyledons. Variables observed were C and N total of the grafstick, percentage of graftake, shoot length, diameter, wet and dry weight. The result showed that because the grafstick flush periodically, graftstick wiring was not effective to increase total nutrient (C and N) on the grafwick. Furthermore, their effect on the graftake was not significant. Until 30 days first, percentage of graftake was 90-100%, but then decreased sharply to 30-60% depend on the clones. From the first experiment, DR 2 showed the highest graftake (62%), and KW 162 (39%) was the second ones. Symptom on the death plants was started on the new leaves, that showed wilt, necrotic then fall. Isolation of those symptoms in the laboratory showed that plants were infected by *Rhizoctonia solani*, *Phytophthora palmivora* and *Colletotrichum gloeosporioides*. Anatomical analysis of the death graft union showed parenchymatous linked, weak and hollow when microtomised. Health union showed lignified accumulation that made tight union. It can be concluded that early cocoa grafting will success if the nursery is separated far from cocoa plantation, the medium is steril from soil borne disease, the grafstick is health, and tying of graft union must tight enough, then disease control must be done properly.

020 ROOSTIKA, I.
***Penyimpanan ubi kayu (Manihot utilissima) secara kriopreservasi dengan teknik vitrifikasi.* [Preservation of cassava (*Manihot utilissima*) through cryopreservation by using vitrification technique]**/Roostika, I.; Mariska, I.; Sunarlim, N. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)) 7 ill., 2 tables; 17 ref. Summaries (En, In). *Jurnal Bioteknologi Pertanian* (Indonesia) ISSN 0853-8360 (2004) v. 9(1): p. 8-13.

MANIHOT ESCULENTA; PRESERVATION; BIOLOGICAL PRESERVATION; FREEZING; VITRIFICATION; CRYOPROTECTANTS.

Cryopreservation is a method of preserving seeds of plants that have recalcitrant seed or propagated through vegetative technique such as cassava. The new technique of cryopreservation that is commonly applied and developed is vitrification. The objective of the study was to obtain vitrification method on preservation of cassava by cryopreservation. The explants were shoot tip of cassava about ± 0.5 cm size. Explants were precultured at MS medium with addition of 0.3 M sucrose, then loaded in loading solution (LS) for 10, 20, and 30 minutes at room temperature. The loading solution contains MS medium + 2 M glycerol + 0.4 M sucrose. Subsequently, explants were exposed with cryoprotectant for 30, 45, and 60 minutes. The cryoprotectant used was PVS2 that contains MS medium + 30% glycerol + 15% etilen glycol + 15% DMS0 + 0.4 M sucrose. The dehydrated explants were plunged in liquid nitrogen at least for 1 hour, and subsequently thawed at 40^{o}C for 1 minute. The explants were then rinse with 1.5 ml solution of MS medium + 1.2 M sucrose for 20 minutes and grown at recovery medium. The result showed that the culture of cassava could be stored through cryopreservation by vitrification technique. The combination between loading duration for 10 minutes and exposure duration of PVS2 for 30 minutes caused the highest level of survival and regeneration (50%). However, the regrowth cultures were resulted from combination between duration of loading for 20 minutes and exposure of PVS2 for 30 minutes.

021 ROOSTIKA, I.
***Regenerasi tanaman sedap malam melalui organogenesis dan embriogenesis somatik*. [Regeneration of tuberose through organogenesis and embryogenesis]**/Roostika, I.; Mariska, I.; Purnamaningsih, R. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)) 4 tables; 13 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 233-241.

POLIANTHES; ORGANOGENESIS; EMBRYONIC DEVELOPMENT; SOMATIC EMBRYOS; CULTURE MEDIA; PLANT GROWTH SUBSTANCES.

Tuberose is for normally propagated by the tuber. The smaller the tuber size the longer time for plant to flower. The application of *in vitro* culture technique might be used for mass propagation. Up to know, the research of *in vitro* culture of tuberose in Indonesia has not been reported. The objective of the study was to find out media formulation for organogenesis and embryogenesis. The experiment consisted of 4 steps of (1) shoot induction, (2) shoot multiplication, (3) induction of embryogenic callus, and (4) regeneration

of embryogenic callus. The treatments for shoot induction were MS + BA 0 ppm, MS + BA 3 ppm, MS + BA 5 ppm, and MS + BA 7 ppm. The shoots were multiplied on media MS + BA 7 ppm + glutamine 100 ppm, MS + BA 7 ppm, DKW + TDZ 7 ppm, and DKW + TDZ 7 ppm + glutamine 100 ppm. For induction of embryogenic callus, the treatments were MS + 2.4-D 2.5 ppm, MS + 2,4-D 5 ppm, and MS + 2.4-D 10 ppm. For regeneration of embryogenic callus, the treatments were MS + BA 2 ppm + TDZ 0.2 ppm, MS + BA 3 ppm + TDZ 0.4 ppm, MS + zeatin 1 ppm + kinetin 1 ppm, and MS + zeatin 0.5 ppm + kinetin 2 ppm. The results showed that the highest shoot formation was obtained from media MS + BA 3 ppm but the earliest shoot initiation was obtained from media MS + BA 0 ppm. The media formulation of MS + BA 7 ppm + glutamine 100 ppm gave the highest number of shoot and root. The application of media MS + 2.4-D 5 ppm could induce embryogenic callus with high percentage of nodul formation (18.75%) and high number of nodul (3.6) with the best visual calli. After subculturing, the highest number of nodul (17) was obtained from media MS + BA 2 ppm + TDZ 0.4 ppm. The embryogenic callus from media MS + zeatin 0.5 ppm + kinetin 2 ppm could develop to form somatic seed.

022 SULIANTI, S.B.

***Kemampuan regenerasi daun pada dua jenis tanaman Sansevieria yang berdaun variegata.* [Regenerative ability of leaf on two species of Sansevieria with variegata leaves]**/Sulianti, S.B. (Pusat Penelitian dan Pengembangan Biologi, Bogor (Indonesia)) 4 ill., 2 tables; 13 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 406-411.

SANSEVIERIA; SPECIES; LEAVES; CUTTINGS; PLANT GROWTH SUBSTANCES; IBA; REGENERATIVE ABILITY; ROOTING; VARIEGATION.

Sansevieria is commonly cultivated by leaf cuttings. This experiment was conducted to observe the regeneration capability of leaf cuttings of two mother in law tongue species (*S. grandis hahnii* and *S. trifasciata laurentii*) with variegata leaves under influence of growth hormone regulator IBA (indole butyric acid). The part of leaf cuttings of each species was submerged in IBA solution (100 ppm) for 24 hours and then planted on sterilized sand medium with randomized method. The regeneration capability was observed every month for 3 months period. The results showed that both species could produce the green color buds of 19.44%, and it would be grown to be *S. grandis* and yellow color buds of 80.56%. The leaf cuttings of *S. trifasciata laurentii* only propagated buds likes original of 0.57%, while the green color buds of 88.82%, it will be became *S. trifasciata*, while the yellow color buds was 8.03% and it could not survive and will be dead. Statistical analysis showed that buds of leaf cuttings from both Sansevieria gave significant differences of each treatments ($P < 0.5$). It was concluded that the buds from leaf cuttings of both Sansevieria species could not propagate buds as well as the original, so this method can not be used for propagating *S. grandis hahnii* and *S. trifasciata laurentii*.

023 SUYADI, A.

***Penggandaan tunas abaca melalui kultur meristem.* [Multiplication of abaca bud through meristem culture]**/Suyadi, A. (Universitas Muhammadiyah, Purwokerto (Indonesia). Fakultas Pertanian); Aziz-Purwantoro; Trisnowati, S. 1 table; 13 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 11-16.

MUSA TEXTILIS; PLANT PROPAGATION; BUDS; MERISTEM CULTURE; PLANT GROWTH SUBSTANCES; BA; NAA; LEAVES; SHOOTS.

The study aimed at evaluating the effect of combination concentration of plant growth regulator of BAP and NAA, and determining the proper combination concentration to multiply the abaca bud in the abaca meristem culture. The study was conducted from October 2002 to April 2003 according to randomized completely block design to regulate the three-times treatment without any control. The treatment is made

up by two factors. The first factor is concentration of BAP consisting of four levels, i.e. 0 M (B0), 10^{-7} M (B7), 10^{-6} M (B6) and 10^{-5} M (B5). The second factor is concentration of NAA, consisting of three levels, i.e., 0 M (N0), 10^{-7} M (N7), and 10^{-6} M (N6). The result of the study proved that the combination of BAP and NAA gives a significant effect to the parameter of buds number, buds length and number of leaves in subculture I and subculture II. The treatment of B5N7 results in the highest buds number or in the number of leaves, i.e., 5.07 and 6.00 in subculture I and 4.37 and 6.25 in subculture II, respectively.

F03 SEED PRODUCTION AND PROCESSING

024 NURAENI

Pengaruh inokulasi mikoriza-arbuskular dan Rhizobium japonicum dengan pemberian N dan P terhadap hasil dan mutu fisiologis benih kedelai. **[Effects of arbuscular mycorrhizae and *Rhizobium japonicum* inoculation with low N and P fertilizers on the yield and physiological quality of soybean seed]**/Nuraeni (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 4 tables; 13 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 273-278.

GLYCINE MAX; SEED; VESICULAR ARBUSCULAR MYCORRHIZAE; BRADYRHIZOBIUM JAPONICUM; YIELDS; QUALITY; NITROGEN FERTILIZERS; PHOSPHATE FERTILIZERS.

An experiment was conducted to study effect of application of arbuscular mycorrhiza, *R. japonicum* with low N and P fertilizers on yield and physiological quality of soybean seed. The experiment was arranged in factorial completely randomized design with 3 factors, i.e. (1) arbuscular mycorrhiza of 2 levels, without and with mycorrhiza; (2) *R. japonicum* of 2 levels, without and with Rhizobium; (3) kind of fertilizer consisted of 4 levels, i.e. without fertilizer, 11.25 kg N/ha, 23 kg P_2O_5/ha and combination of 11.25 kg N/ha + 23 kg P_2O_5//ha. Results of the trial indicated that the inoculation of the arbuscular mycorrhiza combined with *R. japonicum* and application of 11.25 kg N + 23 kg P_2O_5//ha (equivalent to 25 kg urea + 50 kg TSP/ha) increased physiological quality of soybean seed and produced the highest yield (1.7 t/ha).

025 TATIPATA, A.

Pengaruh penyimpanan terhadap protein membran dalam mitokondria benih kedelai. **[Effect of storage on the membrane protein on soybean seed mitochondria]**/Tatipata, A. (Universitas Pattimura, Ambon (Indonesia)) 2 ill., 2 tables; 5 ref. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 251-257.

GLYCINE MAX; SEED; SEED STORAGE; PROTEINS; MEMBRANES; CRUDE PROTEIN; MITOCHONDRIA; MOISTURE CONTENT.

Activity of metabolism is based on protein of mitochondria membrane integrity. Functions of mitochondria membrane protein are transporter and enzyme catalyst. The experiment aimed to study mitochondria inner membrane protein of soybean seed both quantity and quality and to find out method of storage seed for keeping high protein content up to the end of storage. The experiment was carried out in Laboratory of Seed Technology of Agriculture Faculty and Microbiology of Biotechnology PAD UGM from May 2002 to August 2003. Randomized completely block design (RCBD) was used with three blocks as replications. The experiment consisting of three factors, i.e. moisture content of 8%, 10%, and 12%; kinds of bags, i.e. polyethylene plastic, wheat bag and aluminium foil; and storage period, i.e. without storage, storage for 1, 2, 3, 4, 5 and 6 months. The data were subjected to analysis of variance and correlations analysis. Record was made on content of mitochondria inner membrane protein and profile of protein as qualitative parameter. The result showed that there is fewer number of mitochondria inner membrane protein from other treatments than seed without storage and storage at 8% using polyethylene plastic bag during 6 months. Content of mitochondria inner membrane protein of seed stored in aluminium foil bag at 8% moisture content was not decreasing within four months.

F04 FERTILIZING

026 ABDOELLAH, S.
Penggunaan zeolit untuk meningkatkan efisiensi pemupukan amonium sulfat pada bibit kakao di media pasiran. **[Application of zeolite to increase ammonium sulphate fertilizing efficiency on cocoa seedlings at sandy medium]**/Abdoellah, S. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Trikoriantono, A. 3 ill., 2 tables; 16 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2004) v. 20(2): p. 66-74.

THEOBROMA CACAO; SEEDLINGS; ZEOLITES; AMMONIUM SULPHATE; FERTILIZER APPLICATION; SANDY SOILS.

An experiment on using of zeolite to increase efficiency of ammonium sulphate fertilization on cocoa seedlings at sandy medium had been conducted in a glasshouse of Indonesian Coffee and Cocoa Research Institute, Kaliwining, Jember, on altitude 45 m above sea level and D type of climate (Schmidt-Ferguson). Materials used were cocoa seedlings derived from ICS 60 clone, zeolite powder, sandy soil, and ammonium sulphate fertilizer. The experiment was arranged in factorially randomized completely block design in three blocks. Zeolite doses factor consist of five levels, i.e. Z0: no zeolite (control), Z1: 5% zeolite, Z2: 10% zeolite, Z3: 15% zeolite, and Z4: 20% zeolite. Factor of ammonium sulphate fertilization frequency consist of three levels, those are: N1: 1 gram/plant/week, N2: 2 gram/plant/2 weeks, and N3: 3 gram/plant/3 weeks. Observed variables were soil nitrogen, soil pH, CEC, plant nitrogen, plant height, stem diameter, leaves number, plant fresh weight as well as dry weight. Data were analyzed by variance and Duncan's multiple range test 5%. The results showed that the higher zeolite doses, the higher CEC and soil pH, but the lower soil nitrogen. The increase of zeolite doses caused an increase of root as well as stem growth, but reduce leaves number and plant water content. There was no significant effect of ammonium sulphate fertilization applied weekly by low doses application and three times doses per three weeks. Up to 20% by weight, there was no effect of zeolite application on the increase of ammonium sulphate fertilization and on the cocoa growth.

027 ISPANDI, A.
Efektivitas pupuk P, K dan frekuensi pemberian pupuk K dalam meningkatkan serapan hara dan produksi kacang tanah di lahan kering Alfisol. **[Effectivity of P, K fertilizers and frequency of KCl application on increasing nutrients absorption by plant and peanut production in Alfisol upland]**/Ispandi, A. (Balai Penelitian Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Munip, A. 11 tables; 17 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2004) v. 11(2): p. 11-26.

ARACHIS HYPOGAEA; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; APPLICATION RATES; NUTRIENT UPTAKE; LUVISOLS; UPLAND SOILS; DRY FARMING.

P and K nutrients are very important on producing peanut pod beside for metabolism process in the plant. Highly Ca ion concentration within the soil would decrease PK nutrients absorption by plant and decrease in producing the pod. For increasing the effectivity of PK fertilizer application in Alfisol upland, two set experiments were conducted in Malang, East Java at planting time 2002 and 2003. Factorial randomized block design with three replications were used in these experiments. The treatments of first trial were combination of two N fertilizer (Urea and ZA), three levels of P fertilizer (0, 50 and 100 kg SP36/ha) and three frequency of KCl fertilizer application (1; 2; and 3 times of application). The treatments of second trial were combination of two N fertilizers (Urea and ZA), three levels of K fertilizer (50, 100 and 150 kg KCl/ha) and three frequency of K fertilizer application same as first experiment. The dosage of N fertilizer was 12.5 kg N/ha. The treatment plot size was 4 m x 6 m. The result showed that application of ZA was better than Urea on P, K and S nutrients absorbtion by plant, and increased the dry pod yield about 51%. Application of P fertilizer did not effective on increasing peanut yield. Application of 50 kg SP36/ha increased P nutrient absorbtion by plant just only 15% and increasing dry pod yield just only 10%. Application of 100 kg SP36/ha increasing P nutrient absorbtion just only 7% and did not increase pod yield. The optimal dosage of KCl fertilizer for increasing the pod yield was 100 kg KCl/ha by one time application at planting time. Application of 100 kg KCl/ha increased K and P nutrients absorbtion by plant

about 10% and 15%, respectively if applied together with 50 kg SP36/ha, or 28% and 23%, respectively if applied together with 100 kg SP36/ha.

028 ISPANDI, A.
Pemupukan P, K dan waktu pemberian pupuk K pada tanaman ubi kayu di lahan kering Vertisol. **[P, K fertilization and frequency of K fertilizer application on cassava in Vertisols upland]**/Ispandi, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia) 2 tables; 18 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 35-50.

MANIHOT ESCULENTA; VARIETIES; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; FERTILIZER APPLICATION; DOSAGE EFFECTS; NUTRIENT UPTAKE; DRY FARMING; VERTISOLS; YIELDS.

Research of P, K fertilization and frequency of K fertilizer application on cassava in Vertisols upland was conducted in Wonosari Subdistrict, Gunungkidul Regency at planting season 2001. The objective of the research was to seek the technology for increasing P and K fertilization efficiency on cassava in Vertisol upland. The research consisted of two trials. The factorial randomized block design was used in these trials. The treatments of first trial were combination of three cassava varieties (Malang-4, Malang-1 and local variety), three rates of P fertilizer (0, 75 and 150 kg SP36/ha) and two rates of K fertilizer (0 and 100 kg KCl/ha). All treatments were fertilized by 200 kg Urea/ha. The treatments for second trial were combination of two kinds of N fertilizer (200 kg Urea/ha and 150 kg Urea + 100 kg ZA/ha), two rates of P fertilizer (0 and 100 kg SP 36/ha) and five times of K fertilizer application. The result showed that two introduced cassava varieties (Malang-1 and Malang-4) could not be used to substitute the local variety in that marginal upland. The application of 100 kg SP36/ha increased P nutrient absorption by plant and tuber yield than zero P fertilizer. The application of 100 kg KCl/ha increased K nutrient absorption which application was combined with P fertilizer (75 or 100 kg SP 36/ha), even though it did not increase tuber yield. Five times of K fertilizer application reduced K and P absorption by plant as well as tuber yield. The highest tuber yield was 20 t/ha and it was far lower than its potential yield and it needs a further research.

029 MASTUR
Respon tembakau madura terhadap dua tipe pupuk organik. **[Responses of madura tobacco to two types of organic fertilizers]**/Mastur; Murdiyati, A.S.; Djajadi; Istiana, H. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 7 tables; 18 ref. Appendix. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4): p. 142-148.

NICOTIANA TABACUM; ORGANIC FERTILIZERS; FARMYARD MANURE; SOIL CHEMICOPHYSICAL PROPERTIES; BYPRODUCTS; INDUSTRY; TOBACCO; YIELDS; QUALITY.

The research was conducted to find out the effect of the enriched organic fertilizer (POD) of industrial byproduct and farmyard manure (FYM) on soil physical properties, nutrient uptake, plant performance, yield, and quality of madura tobacco. Field experiment was conducted from April to September 2002 in upland field of Guluk-guluk Village, Guluk-guluk Subdistrict, Sumenep. The research used randomized completely block design (RCBD) with 9 combinations of organic fertilizer kinds and dosages and 4 replications. The results showed that the POD gave higher effect on nutrient contents than that of FYM. The POD could increase the field capacity, soil moisture and K biomass concentration. The best treatment of the POD was 5000 kg/ha, which gave yield 1156 kg dried sliced leaves/ha, quality index 73.4 and crop index 77.2. The application of the POD 1000 kg/ha produced 849 kg dried sliced leaves/ha, quality index 76.8, and crop index 60.0, which was better than that of FYM 5000 kg/ha. The application of POD 7000 kg/ha caused worse response of tobacco compared to that of 5000 kg/ha.

030 MUSTARING
Pengaruh dosis pemupukan bokashi terhadap pertumbuhan dan produksi rumput kerbau (Stenotaphrum secundatum). **[Effects of bokashi dosage on the growth and production of buffalo grass (*Stenotaphrum secundatum*)]**/Mustaring; Marsetyo (Universitas Tadulako, Palu (Indonesia).

Fakultas Pertanian) 2 tables; 16 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 308-312.

STENOTAPHRUM SECUNDATUM; GROWTH; YIELDS; ORGANIC FERTILIZERS; DOSAGE EFFECTS.

The influence of levels of organic fertilizer bokashi on the growth and production of buffalo grass (*Stenotaphrum secundatum*) was evaluated in field trial at the Cidera Research Station, Subdistrict of Sigi Biromaru, District of Donggala, Central Sulawesi. The design used was completely randomized design, with five levels of bokashi and each treatment repeated four times. The bokashi levels were 0; 3.5; 7.0; 10.5 and 14.0 ton/ha, respectively. Height, pols number, fresh and dry matter production were significantly affected ($P < 0.05$) by bokashi levels. Height of buffalo grass increased linearly ($P < 0.01$) with increasing levels of bokashi. Meanwhile, for pols number, fresh and dry matter production increased quadratically ($P < 0.05$), in which peak value was reached at level of 10.5 ton/ha of bokashi application. It is suggested that the optimum level of bokashi application for buffalo grass was 10.5 ton/ha.

031 PRIYANTI, A.
***Respon ekonomi penggunaan pupuk organik dan berbagai pola tanam pada sistem usaha tani di lahan kering.* [Economic liability for using organic fertilizer and cropping patterns in the dryland farming systems]**/Priyanti, A. (Balai Penelitian Ternak Ciawi, Bogor (Indonesia)); Prawiradiputra, B.R.; Lubis, D.; Djajanegara, A. 4 tables; 12 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop-livestock systems]. Prosiding seminar nasional sistem integrasi tanaman-ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 290-297.

FOOD CROPS; INTERCROPPING; FARMING SYSTEMS; ORGANIC FERTILIZERS; FARMYARD MANURE; COMPOSTS; TECHNOLOGY; YIELDS; ECONOMIC ANALYSIS; ARID ZONES; DRY FARMING.

A study to identify economic liability for using animal compost into different cropping pattern has been done in Dangiang Village, Cilawu, District of Garut, West Java. Three collaborative farmers had offered to use their land for the study, which divided into five cropping patterns, i.e. 100% peanut, 70% peanut and 30% kidney bean, 65% peanut and 35% kidney bean, 60% peanut and 40% kidney bean and 100% kidney bean. The average size of the land was 150 m^2 and each treatment of cropping pattern has used compost, unprocessed manure and commercial compost into the land. The compost was made by the farmers through the introduced technology, in which the farmer only used the unprocessed manure formerly. A randomized block design and gross margin estimation were used in the study. The results showed that there was no difference of cropping pattern to the yield, and the highest gross margin estimation was also achieved by cropping pattern of 70% peanut and 30% kidney bean, i.e. Rp 4,152,774/ha, Rp 2,349,053/ha and Rp 3,559,865/ha, respectively for farmer I, II and III.

032 RACHMAN, A.
***Pengaruh jenis pupuk dasar dan susulan terhadap produksi dan mutu tembakau cerutu besuki.* [Effect of basal fertilizers and side dressing fertilizers on the production and quality of besuki cigar tobacco]**/ Rachman, A.; Sholeh, M.; Purlani, E. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 5 tables; 24 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(1): p. 34-40.

NICOTIANA TABACUM; FERTILIZER APPLICATION; BASAL DRESSINGS; SIDE DRESSING; PRODUCTION; QUALITY; TOBACCO.

The experiment was conducted in Mangaran, Jenggawah District, Jember (at the altitude of 30 m). The objective was to study the effect of basal fertilizers and side dressing fertilizer on the production and quality of besuki cigar tobacco. Tobacco was planted in early dry season, in first week of July 2000 (named as besnota tobacco). The soil was alluvial with clay texture (44% clay, 20% silt, and 46% sand). Other characteristics of the soil was 0.67% C-organic, 0.14 % total-N, 10.64 cmol/kg available P, 0.45

cmol/kg available K, 7.30 cmol/kg Ca, and pH 6.62. The treatment consisted of two factors, i.e. basal dressing (NPK compound fertilizer and SP36 + urea) and side dressing (urea, CN, CN + CPN, CN + PN, and CSN). The treatments were arranged in a factorially randomized block design with 3 replications. Plant spacing was double row (110 cm + 90 cm) x 35 cm, 200 plants per plot. Tobacco variety was H382. The results of the experiment showed that the effect of NPK fertilizer was not significantly different from SP36 + urea, on the yield, leaf size, thickness of KAK and TNG leaf positions, wrapper + binder percentage and chemical content of the leaves. However, the tobacco crop received NPK fertilizer had positive characteristics, i.e. thinner leaves (KOS 3), longer burning duration (KOS 1 and KAK 3), higher K_2O/CaO ratio than SP36 + urea treatment. CN + CPN and CN + PN as side dressing treatments gave yield and N content higher than other treatments. Side dressing treatments did not affect the leaf size, thickness, burning duration, wrapper+binder percentage, P_2O_5, K_2O, and CaO content of the leaves. However, based on the quality analysis the fertilizers tested either as basal dressing or as side dressing can be used as an alternative for besuki cigar tobacco fertilization. Furthermore, the use of these alternative fertilization need to be socialized to the tobacco farmers.

033 SANTOSO, B.

Pengaruh bahan organik dan pupuk NPK terhadap hasil serat rosela di lahan Podsolik Merah Kuning Kalimantan Selatan. **[Effect of NPK fertilizer and organic materials on roselle fiber yield in Red Yellow Podzolic soil of South Kalimantan]**/Santoso, B. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 9 tables; 17 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(3): p. 85-92.

HIBISCUS SABDARIFFA; ROSELLE; NPK FERTILIZERS; ORGANIC MATTER; YIELDS; PODZOLS; KALIMANTAN.

Red Yellow Podzolic soil is potential for roselle development. The major problem of Red Yellow Podzolic soil is low fertility of soil, especially macro and micro elements, high content of Al and Fe and P fixation often happened. The soil capacity can be improved by application of ameliorant materials such as lime or organic materials. An experiment was conducted in Sabuhur II Village, Jorong Subdistrict, Tanah Laut District in South Kalimantan during growing season of January to December 2001 to find out the kind of organic materials and dosage of inorganic fertilizer which can support roselle fiber yield in Red Yellow Podzolic soil of South Kalimantan. The experiment was designed in split-plot with three replications. The main plots were source of organic materials: (1) cow manures, (2) chicken manures, (3) compost of rice hays, (4) compost of coarse grass, and (5) compost of roselle stems with dose 5 t/ha, respectively. The subplots were the dosage of NPK fertilizer, (A) zero fertilizer, (B) 45 kg N + 80 kg P_2O_5 + 60 kg K_2O/ha, and (C) 90 kg N + 80 kg P_2O_5 + 60 kg K_2O/ha. The roselle clone was CPI 115357 line, plot size 4 m x 6 m, and plant spacing of 20 cm x 20 cm. The result showed that the application of 5 tons chicken manures + 45 kg N + 80 kg P_2O_5 (rock phosphate) + 60 kg K_2O/ha gave the best plant height, stem diameter, fresh and dry fiber yield of roselle which were 262.33 cm; 17.65 mm; 47.76 tons and 2.83 tons, respectively.

034 SIMARMATA, T.

Pemanfaatan ekstrak organik untuk meningkatkan aktivitas bakteri tanah dan hasil tanaman tomat (Lycopersicon esculentum **Mill.*) pada Inceptisol di Jatinangor.*** **[Effects of organic fertilizer extracts on the activity of soil microbes and yield of tomato on Inceptisols in Jatinangor (Indonesia)]**/Simarmata, T. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Pertanian) 2 tables; 10 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 261-266.

LYCOPERSICON ESCULENTUM; ORGANIC FERTILIZERS; DENITRIFICATION; SOIL MICROORGANISMS; BACTERIA; AZOTOBACTER; YIELDS; JAVA.

The experiment on the concentrations effect of organic fertilizers extracts (OFE) on the activity of soil microbes and yield of tomato on Inceptisols Jatinangor was carried out in plastic house of Hydroponic Laboratory of Agriculture Faculty, Padjadjaran University, in Jatinangor. The experiment design used was randomized block design, consisted of 10 treatments (A = control/without OFE; B = OFE of chicken

manure, with concentration of 75%; C = OFE of chicken manure 50%; D = OFE of chicken manure 25%, E = OFE of waste oyster mushrooms media 75%; F = OFE of waste oyster mushrooms media 50%; G = OFE of waste oyster mushrooms media 25%; H = OFE of waste oyster mushrooms media + OFE of chicken manure 75%, I = OFE of waste oyster mushrooms media + OFE of chicken manure 50%; and J = OFE of waste oyster mushrooms media + OFE of chicken manure 25%) and provided with three replications. The results showed that organic fertilizers extracts influenced the total population of bacteria, denitrifiers, and *Azotobacter* sp. significantly, but the yield of population of bacteria about 355 - 1455 times, bacteria denitrifiers about 9 - 182 times and population of *Azotobacter* sp. about 2 - 7 times compared with control (without organic extract).

035 SUBHAN

***Penggunaan pupuk fosfat, kalium dan magnesium pada tanaman bawang putih dataran tinggi.* [Utilization of phosphate, potassium and magnesium on garlic on upland]**/Subhan; Nurtika, N. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 12 tables; 16 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2004) v. 11(2): p. 56-67.

ALLIUM ASCALONICUM; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; MAGNESIUM FERTILIZERS; UPLAND SOILS; YIELDS.

This research was conducted in Ciwidey, District of Bandung (1100 m asl). Randomized block design (RBD) was used with three replications. First factor was K fertilizer dosages of 75 kg K_2O/ha and 150 kg K_2O/ha, while second factor was K application method (1/2 K_2O (KCl) + 1/2 K_20 (ZK)) on 0, 15 and 30 days after planting. Third factor was dosage of phosphate fertilizer of 0 and 200 kg P_2O_5/ha, and fourth factor was dosage of magnesium fertilizer of 0 and 60 kg MgO/ha. Result indicated that phosphate fertilizer application (P_2O_5) and magnesium fertilizer (MgO) were still needed for vegetative and generative growth of garlic. Potassium fertilizer (ZK) on 30 days and 45 days after planting gave better growth and twice yield of garlic compared to potassium fertilizer (KCl) application for each application time.

036 SUMIATI, E.

***Pertumbuhan dan hasil kentang dengan aplikasi NPK 15-15-15 dan pupuk pelengkap cair di dataran tinggi Lembang.* [Growth and yield of potato treated with NPK 15-15-15 and foliar fertilizer supplement in highland Lembang [Indonesia]]**/Sumiati, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 4 tables; 25 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 270-278.

SOLANUM TUBEROSUM; NPK FERTILIZERS; LIQUID FERTILIZERS; FERTILIZER APPLICATION; DRY FARMING; GROWTH; YIELDS; HIGHLANDS; JAVA.

Productivity of potato plants have to be improved continuously. One of methods to improve the productivity is by the application of foliar fertilizer and NPK 15-15-15 fertilizer. The aim of this study was to find out the proper concentration of foliar fertilizer in combination with proper dosage of NPK 15-15-15 fertilizer to improve the growth and yield of potato. A split plot design with 3 replications was arranged in the field. The main plot was 2 levels of NPK 15-15-15 fertilizer, i.e. 0.5 t/ha and 1.0 t/ha, whereas the subplot was 5 concentrations of foliar fertilizer, i.e. 0.0, 2.3, 4.6, 6.8, and 9.0 mill. Foliar fertilizer solution was sprayed on the potato foliages twice, at 4 and 7 weeks after planting. NPK 15-15-15 was applied once at planting. Potato plants were cultivated by using black silver plastic mulch. Research results revealed that there were no phytotoxicity, chlorosis, and other abnormalities symptoms appeared on potato plants treated with foliar fertilizer of 2.3 up to 9.0 mill in combination with application of NPK 15-15-15 of 0.5 and 1.0 t/ha. Potato yield was significantly increased up to 72.94% by the application of NPK 15-15-15 of 1 t/ha in combination with foliar fertilizer 4.5 mill compared to application of NPK 15-15-15 of 1 t/ha per se. However, the optimum concentration of foliar fertilizer applied in this experiment was 5.5 mill at the rate of NPK 15-15-15 application of 1 t/ha.

037 SYAHID, S.F.

***Pengaruh NAA dan IBA terhadap perakaran purwoceng (Pimpinella pruatjan* Molk*.) in vitro.* [Effect of NAA and IBA on root induction of pruatjan (*Pimpinella pruatjan* Molk.) *in vitro*]**/Syahid, S.F.; Rostiana, O.; Miftakhurohmah (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)) 3 ill., 6 tables; 13 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 146-151.

PIMPINELLA; ROOTS; ROOTING; NAA; IBA; IN VITRO; PLANT RESPONSE.

Pruatjan (*Pimpinella pruatjan* Molk.) is one of endangered species which is potential to be developed as aphrodisiac source. To support pruatjan cultivation, it is needed to prepare the planting material. *In vitro* propagation of pruatjan is hampered by the difficulty in inducing the normal roots which affect the successful of plant acclimatization. The objective of this research was to obtain the root induction technique using two kinds of auxin (NAA and IBA) at several concentrations, i.e. 0; 0.1; 0.2; 0.4; 0.6; 0.8; 1.0; 1.5; and 2.0 mg/l. This experiment was conducted from January 2003 to February 2004 at the Tissue Culture Laboratory of Indonesian Spices and Medicinal Crops Research Institute (ISMECRI) in Bogor. The experiment was arranged in a completely randomized design with three replications. Each replication consisted of three shoots. The parameters observed were number of roots, length of roots, number of senescence leaves and culture performance. The result showed that NAA produced the greatest and the longest roots compared to that of IBA. The use of NAA 0.8 mg/l performed the best treatment to induce roots. The number of senescence leaves was neither affected by NAA nor IBA.

038 SYAM, A.

***Pengaruh pupuk organik (kompos kotoran sapi) terhadap produktivitas padi di lahan sawah irigasi.* [Effectiveness of organic fertilizers to the productivity of wetland rice]**/Syam, A.; Sariubang, M. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)) 7 tables; 23 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop-livestock systems]. Prosiding seminar nasional sistem integrasi tanaman-ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 93-103.

ORYZA SATIVA; IRRIGATED LAND; FERTILIZER APPLICATION; ORGANIC FERTILIZERS; FARMYARD MANURE; PRODUCTIVITY; AGRONOMIC CHARACTERS; YIELDS; ECONOMIC ANALYSIS; COST BENEFIT ANALYSIS.

The effort of increasing rice production through intensification had been supported by the use of inorganic fertilizers with high rate, and it was increased over the year. The excessive use of inorganic fertilizers could create problems dealing with texture of soil which is resulted in lower productivity, effectiveness of fertilizers used, and farmer's income. To improve productivity of wetland rice through integrated management which cover chemical, physical and biological aspects, the management of organic fertilizers should be taken as a main component. The aim of the research was to elaborate the effect of integrated organic and inorganic fertilizers to the yield. The research was carried out in Takalar District from May to August 2001. The variety use was Sintanur, with the spacing of 25 cm x 20 cm, 3 plants per hill. The treatments were assigned as randomized block design with four replications and ten treatments. The results showed that at 30 and 60 days after transplanting, the highest plant height was obtained at recommended rate of fertilizers application (J) compared with combination of organic and inorganic fertilizers. The treatments of integrated organic and inorganic (D), however, at 88 days after transplanting produced the highest plant, the highest tillers number, and the highest grain weight, and the highest straw compared to that of applied by recommended fertilizers; and the grain yield obtained was equal to the grain yield obtained from the recommended fertilizers treatments i.e., 6.38 t/ha. The treatments which applied by organic fertilizers 3 t/ha produced the lowest plant height, the lowest tiller number, the lowest panicle, the lowest 1000 grain weight, the lowest straw i.e, 3.98 t/ha and the lowest grain yield obtained i.e., 3.60 t/ha. Organic fertilizers produced the lowest crop growth and yield component, which could be overcome by the combination of organic and inorganic fertilizers.

039 YUNIAR, A.
***Pengaruh pemberian pupuk NPK dan intensitas pemberian jumlah air pada pertumbuhan dan hasil tanaman kacang hijau Phaseolus aureus sinonim P. radiatus* L. [Effects of NPK fertilizers and watering intensity on the growth and yield of mungbean]**/Yuniar, A.; Moenandir, J.; Soekartomo, S. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian) 6 tables; 10 ref. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 225-232.

VIGNA RADIATA RADIATA; NPK FERTILIZERS; WATERING; DIMENSIONS; PLANT RESPONSE; GROWTH; YIELDS.

The aims of this research were to study mungbean response at level of water and NPK fertilizers application. The research was done in greenhouse of University of Brawijaya, with an altitude of 505 m above sea level, with Alfisol type, pH 5.5-6.7. The research was done from November 2004 to January 2005. The experiment was arranged in factorial randomized block design with 3 replications. The first factor was watering intensity (A), A1: watering of 100 mm/season, A2: 300 mm/season, and A3: 600 mm/season. The second factor was NPK dosage (H), H1: 0 g/crop, H2: 3 g/crop, and H3: 6 g/crop. The results showed that at the production component, there was an interaction on treatment A3H3 which consisted of combination between fertilizer dosage of NPK 6 g/crop and watering of 600 mm/season at amount of beans/plant with average 137,750 g, dry weight of seed crop with average 35,558 g and average of seed crop 143,600 g. The highest harvest index was obtained at A2H3 with combination between dosage fertilizer of NPK 3 g/crop and giving of water 600 mm/season with average 2,495 g.

F07 SOIL CULTIVATION

040 WIROSOEDARMO, R.
***Pengaruh cara pengolahan tanah pada tingkat kandungan air tanah yang berbeda terhadap pertumbuhan dan hasil tanaman kedelai (Glycine max).* [Effect of tillage method at different ground water content level on the growth and yield of soybean]**/Wirosoedarmo, R. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian) 4 tables; 16 ref. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 233-240.

GLYCINE MAX; TILLAGE; SOIL WATER CONTENT; ROTARY CULTIVATORS; GROWTH; CROP PERFORMANCE; YIELD COMPONENTS.

An experiment was conducted based on the fact, that no parameter of soil tilth yet to measure the growth and production of soybean. The aim of the research was to find out a soil tilth indicator to the growth and production of soybean to some soil water content and rotary tiller. The experiment was conducted at Balai Benih Induk Palawija, Bedali Lawang, Malang, started from October 2002 to January 2003. The experiment was arranged in a randomized block design with the factor of soil water content and rotary speed with three replications. The results showed that the germination and leaf number were not affected by soil water content but there was a tendency affected by rotary speed treatment, and the height of plant at 60 days was affected by soil water content. The highest seed number per plant, weight of pod per plant, weight of 100 dry seeds and seed dry weight per plant were achieved at water content of 1.0 plastic limit with 90 rpm at the twice treatment. The soil tillage indicators that influenced soybean production were the depth of tillage, porosity, mean diameter of soil aggregate mass, soil penetration resistance, and soil shear strength that was showed by adjusted of determinant coefficient i.e. 85.80%.

F08 CROPPING PATTERNS AND SYSTEMS

041 SAHID, M.
***Penampilan beberapa klon kapuk sebagai tanaman lorong dengan tanaman sela ubi kayu.* [Performance of kapok clones as alley crops with cassava as their catch crops]**/Sahid, M.; Marjani; Basuki, T. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 3 tables; 11 ref.

Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(3): p. 123-127.

CEIBA PENTANDRA; KAPOK; CLONES; MANIHOT ESCULENTA; ALLEY CROPPING; PLANT RESPONSE; YIELDS; COST ANALYSIS; FARM INCOME.

Increasing of kapok productivity gives positive impact to farmers income and foreign exchange. One of the efforts to increase kapok productivity is by genetic potential improvement. Beside increasing the productivity, farmers income could be increased by utilization of land under kapok trees with catch crops. The objective of this research was to find out kapok clones having high yield and suitable as alley crops intercropped with cassava. The activity was conducted at Ngemplak Experimental Garden, Pati from January 2002 to December 2002. Kapok clones were planted on January 1998. This research was arranged in randomized block design with 3 replications. Twelve kapok clones of 4 years old were tested as alley crops with cassava as catch crops. The results showed that clones E22 was suitable as alley crop with cassava as catch crops. The yield of the clone was 1,143.8 kg pods per ha and cassava production was 13,896 kg/ha. The combinations of clone E22 as alley crop with cassava as catch crops gave income to the farmers of Rp 2,999,010 per ha.

042 SETYO-BUDI, U.
Adaptasi klon-klon rami di antara kelapa. **[Adaptation of ramie clones in coconut plantation]**/Setyo-Budi, U.; Hartati, R.S.; Purwati, R.D. (Balai Penelitian Tanaman Tembakau dan Serat Malang (Indonesia)) 2 ill., 3 tables; 12 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 140-145.

BOEHMERIA NIVEA; CLONES; COCOS NUCIFERA; PLANTATIONS; INTERCROPPING; ADAPTATION; PLANT RESPONSE; PRODUCTION INCREASE.

An experiment to find out the promising clones of ramie in coconut plantation was carried out in Mekarsari, Cimerak, West Java from April 1999 to March 2000. Coconut trees in the experiment location were planted in 1993/1994 with plant spacing 9 m x 9 m and have already produced. Twelve ramie clones, *viz*. Pujon 10, Pujon 13, Bandung A, Pujon 9, Pujon 902, Indochina, Kotaraja, Japan I, Hakuki, Padang 3, Jawa Timur 3-0 and Pujon 601, were evaluated using randomized block design (RBD) with three replications. Ramie rhizome was planted in 4 m x 9 m plot size with 50 cm x 80 cm plant spacing and one rhizome per hole. Lime (2 ton/ha) and organic manure (20 ton/ha) were applied during land preparation. Organic fertilizers which applied on 10 days after planting were 200 kg urea + 150 kg SP-36 + 100 kg KCl per hectare. The next fertilizing was conducted 7-10 days after every harvest with the same doses. The first harvesting time was 70 days after planting and the following harvest were conducted every two months. Parameters observed were plant height, stem diameter, plant number per scrub, biomass fresh weight, stem fresh weight and chinagrass dry weight. Research result indicated that ramie clones *viz*. Pujon 10, Pujon 13, Padang 3, Bandung A, and Indochina were more adaptable in coconut plantation in Ciamis, West Java up to the fourth harvest.

043 SUTRISNA, N.
Kajian sistem penanaman tumpangsari kentang (Solanum tuberosum* L.*) di lahan dataran tinggi Rancabali, Kabupaten Bandung. **[Assessment on intercropping system of potato (*Solanum tuberosum* L.) in highland of Rancabali, Bandung Regency (West Java, Indonesia)]**/Sutrisna, N.; Sastraatmadja, S.; Ishaq, I. (Balai Pengkajian Teknologi Pertanian Jawa Barat, Lembang (Indonesia)) 6 tables; 14 ref. Summaries (En, In). Jurnal *Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia) ISSN 1410-959X (2005) v. 8 (1): p. 78-87.

SOLANUM TUBEROSUM; INTERCROPPING; APIUM GRAVEOLENS; ALLIUM FISTULOSUM; MYZUS PERSICAE; HIGHLANDS; VARIETIES; GROWTH; YIELDS; ECONOMIC ANALYSIS; JAVA.

Assessment on intercropping system of potato was conducted during the dry season (May-September) in 2001 in Alamendah Village, Rancabali District, Bandung Regency, with the altitude of 1,400 m above sea

level. Randomized block design was used with three replications of five cropping system treatments, namely (1) potato; (2) potato + celery; (3) potato + welsh onion; (4) welsh onion; and (5) celery. The tested varieties were Granola for potato, Papak Kuningan for welsh onion, and Bamby for celery. The plant spacing used for the two potato systems were as follows: 70 cm x 30 cm for monoculture, and 70 cm x 50 cm for intercropping. The plant spacing of celery and welsh onion both planted in intercropping and monoculture methods were each of 20 cm x 20 cm. The areas of all treatments were each of 60 square m. Results of the assessment showed that: (1) average plant height of potato were not significantly different between those intercropping systems of potato-celery and potato-welsh onion; (2) average number of shoots per plant and visually observed plant vigor of welsh onion and celery were greater for monoculture system than that of intercropping; (3) yields of both potato intercropped with celery and welsh onion were lower than those of monoculture, but when yield of the intercropping was made equivalent to potato, the land productivity would be greater if intercropped with potato-celery or potato-welsh onion with the highest land equivalent ratio (NKL) of more than one and the highest land equivalent ratio obtained by potato + celery intercropping was 1.19; (4) intercropping system of potato + celery was able to lessen attack intensity of thrips (44%) and *Myzus persicae* (55.6%); and (5) potato-celery intercropping was the most profitable with marginal return level of 81.45%.

F30 PLANT GENETICS AND BREEDING

044 ABDULLAH, B.
Pembentukan padi varietas unggul tipe baru Fatmawati. **[Development of Fatmawati: the new plant type of rice in Indonesia]**/Abdullah, B.; Tjokrowidjojo, S.; Kustianto, B.; Daradjat, A.A. (Balai Penelitian Tanaman Padi, Sukamandi (Indonesia)) 1 ill., 8 tables; 8 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 1-7.

ORYZA SATIVA; HIGH YIELDING VARIETIES; CROSSBREEDING; SELECTION; VARIETY TRIALS; AGRONOMIC CHARACTERS.

In the past decade, an effort to increase rice productivity and production was stagnant. One of the reasons was that existing rice varieties have reached their maximum productivities. Modifications of the plant architecture enable to increase the rice yield potential. In 1989, IRRI has designed new plant architectures of rice to alleviate the yield potential and known as the new plant type (NPT) of rice. In Indonesia, the development of new plant type of rice was started in 1995. A number of NPT promising rice lines were produced; one of them was BP364B-MR-33-3-PN-5-1. This line was released as the first variety of NPT named Fatmawati. This variety derived from a cross between upland rice line BP68C-MR-4-3-2 and an improved lowland rice variety Maros. Variety Fatmawati has the characteristics of sturdy stem, low to medium number of all productive tillers, long and dense panicle, early maturing, moderately resistant to brown planthopper and bacterial blight, and have good grain and eating quality. In a multilocation trial, Fatmawati produced grain yield comparable to that of IR64. In an integrated crop management trial, however, the variety yielded 30% more than IR64. This variety was suitable to be grown on lowland rice fields in low to medium elevation areas. The variety has a medium tillering capacity, thus it can be planted at a close plant spacing (20 cm x 20 cm or closer) or by direct seeding. Due to its medium grain shattering character, Fatmawati may be used to reduce grain losses at harvest time and suitable for regions where power thresher was used for grain threshing.

045 AGUNG D.H., T.
Perakitan varietas unggul padi gogo berdaya hasil tinggi dan aromatik untuk meningkatkan produksi dan nilai ekonomi padi gogo. **[Improvement of aromatic and high yielding upland rice varieties to increase production and economic value of upland rice]**/Agung D.H., T.; Suwarto; Sunarto; Darjanto; Soesanto, L. (Universitas Jenderal Soedirman, Purwokerto (Indonesia). Fakultas Pertanian) 1 ill., 3 tables; 11 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 298-303.

ORYZA SATIVA; UPLAND RICE; SELECTION; HIGH YIELDING VARIETIES; PRODUCTION; ECONOMIC VALUE; GENETIC STABILITY.

An aromatic and high yielding upland rice variety is important for increasing rice production, yield quality, and farmer's income. The new variety may be obtained through breeding activities consisted of: studying on physiology and genetic of the interest characters, transferring of interest genes, selecting and developing of pure lines, yield testing of the lines, and multilocation test. The specific objectives of the research were to obtain: the information on genetic of aromatic characteristic, the information on environmental effect on physical characteristic and nutritional content of rice, the high yielding upland rice variety which has good taste and aromatic. The general objectives were to improve upland rice productivity, economic value of upland rice, and to contribute in food security especially in the rural area. Until the end of 2003, several results have been obtained as followed. (1) Aromatic rice character controlled by simple gene recessively, (2) Low amylose content was character controlled by simple gene recessively. (3) Rice taste and aromatic were stable characters across environmental. (4) Amount of 168 F5 seeds was obtained from crossing of DT X MW, PS X MW, RL X DL, WL X DT, and RL X PS. These seeds were subjected for research in 2004 to obtain lines. In the third year (2004) the further research has been conducted as followed: (1) Developing of pure lines of high yielding aromatic upland rice; (2) Observation of new rice type from aromatic pure lines progeny of crossing between subspecies Indica X Javanica; (3) Preliminary yield test of high yielding aromatic upland rice lines; (4) Resistance test of the selected lines on main pest; (5) Physical and chemical quality test of the selected lines. Conclusions of the third year research were as followed: (1) Amount of 22 lines from crossing of DT X MW and PS X MW were obtained with high yielding and aromatic characteristics, namely: G3, G8, G12, G13, G14, G18, G19, G21, G22, G25, G31, G33, G35, G37, G49, G66, G71, G121, G133, G136, G143 and G149. Those lines are now being subjected for yield testing; (2) Amount of 19 lines from crossing of RL X DT, WL X DT, and RL X PS was obtained and 5 of the 19 lines have high yielding, namely G7 (10,786 t/ha), G2 (10,018 t/ha), G8 (9,611 t/ha), G18 (9,293 t/ha) and G3 (8,685 t/ha); (3) Information on physical and chemical characteristic, and pest resistance of the selected lines is now studying from the on going research until February 2005. Further yield test and multilocation test, pest resistance test, and physical and chemical quality test on the selected lines are necessary before released as a new high yielding aromatic upland rice variety. The lines also may be used as a gene source for further rice breeding programs.

046 AMBARWATI, A.D.

***Optimasi parameter teknik transformasi dengan gen gus melalui penembakan partikel pada ubi jalar*. [Optimization of gus gene transformation in sweetpotato by the particle bombardment technique]**/Ambarwati, A.D.; Sisharmini, A.; Santoso, T.J.; Herman, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)) 4 tables; 22 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 40-45.

IPOMOEA BATATAS; GENETIC TRANSFORMATION; INJECTION; VARIETIES; EXPLANTS; IN VITRO CULTURE.

Knowledge of transformation techniques is the one key factors contributing the success of genetic engineering to produce transgenic plants. The optimization of the transformation techniques facilitates further transformation with a target gene. A trial was done to optimize transformation technique by particle bombardment using a gene gun (Biolistic PDS 1000/He). The transformation was conducted on leaf and petiole explants of sweet potato genotype Jewel. The parameters tested were number of bombardments (1 and 2 times), distances of the target (7 cm - 7 cm, 7 cm - 9 cm, and 9 cm - 9 cm), ages of explants (5, 7, 9, and 11 days), osmotic compounds (maltose and mannitol-sorbitol), explant positions in the bombardment area (central and edge), and antibiotics (hygromycin and basta). The transformation was conducted using the standard condition (vacuum 27 in Hg, Helium pressure 1100 psi) with pRQ6 plasmid containing the gus reporter gene and a selection marker gene (hpt). The transformation efficiency was evaluated based on the gus gene expression on the explants one day after the bombardment. The results indicated that: two times bombardment with a 7 cm - 7 cm target distance for leaf explants and 7 cm - 9 cm target distance for petiole explants, on 5-days old explants, using maltose as an osmotic compound, and with a position of explant at the edge of the bombardment area gave the most efficient transformation. Further works is needed to determine the hygromycin concentration (< 5 mg/l) and basta concentration (< 1 mg/l) that give the minimum lethal dose.

047 AMBARWATI, E.
Keragaan stabilitas hasil bawang merah. **[Performance of yield stability of shallot]**/Ambarwati, E.; Yudono, P. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Pertanian) 3 tables; 18 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 1-10.

ALLIUM ASCALONICUM; VARIETIES; GENETIC STABILITY; ADAPTABILITY; GENOTYPE ENVIRONMENT INTERACTION; CROP PERFORMANCE; YIELDS.

Eight varieties of shallot, i.e. Probolinggo, Parman, Kuning, Biru-sawah, Biru-pasir, Tiron-sawah, Tiron-pasir and Bima, were tested for their yield potential at two different locations (sand-dune and rice-field) during wet season and dry season in 2002. The experiments were arranged in randomized completely block design with three blocks as replication. The experimental unit consisted of 100 plants planted with 15 cm x 20 cm spacing. The aim of this research was to identify the stability and adaptability of the tested materials. Adaptability and yield stability of each variety were determined based on stability model of Eberhart and Russell (1966) and Finlay and Wilkinson (1963) with a regression coefficient (β i), deviation from regression (δi^2)and yield of each variety as stability and adaptability parameters. The results showed that varieties Probolinggo, Tiron-sawah and Biru-pasir were well adapted over all testing environments and their yields were stable. On the other hand, Parman and Kuning varieties were categorized as unstable varieties and well adapted in favorable environment, i.e. in the rice-field during dry season. Biru-sawah and Tiron-pasir varieties were adapted to unfavorable environment, especially in the sand-dune during dry season. Variety Bima was not well to all the testing environments and the yield was susceptible to the environmental changes.

048 BASUKI, R.S.
Evaluasi daya hasil 7 genotip kentang pada lahan kering bekas sawah dataran tinggi Ciwidey**. [Tuber yield evaluation of 7 potato genotypes on dry land after irrigated rice field of highland Ciwidey [Indonesia]]**/Basuki, R.S.; Kusmana (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 2 tables; 16 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 248-253.

SOLANUM TUBEROSUM; GENOTYPES; PADDY SOIL; YIELDS; DRY FARMING; JAVA.

The experiment was conducted on April until August 2002. The experimental design was RCBD with 4 replications. An experimental unit consisted of 30 hills/plot. The objective of the research was to select one or more potato genotypes adapted to rice field of highland. The results indicated that the highest yield were obtained from clones 380584.3 (43.3 t/ha), Atlantic (37.6 t/ha), and Panda (36.5 t/ha) which were significantly higher than Granola (27.6 t/ha) as control.

049 BERMAWIE, N.
Peningkatan keragaman genetik tanaman lada (Piper nigrum* L.*) dengan iradiasi sinar gamma**. [Inducing genetic variability of black pepper (*Piper nigrum* L.) by gamma irradiation]**/Bermawie, N. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)) 5 ill., 1 table; 23 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4) p. 166-172.

PIPER NIGRUM; GENETIC VARIATION; GAMMA IRRADIATION; RAPD.

Genetic variability of black pepper germplasm in Indonesia is low. To broaden genetic variability, newly growth shoot tips from *in vitro* culture of black pepper var. LDL were gamma irradiated with doses 0, 0.3, 0.6, 0.9, 1.2 and 1.5 krad. The treatments were designed in a completely block with five replications. The irradiated plantlets were grown on MS medium. Response of the variety is described by recording an increase in leaves, shoots and node numbers, plantlet height, and morphological abnormality in the first vegetative mutation generation (MV1) and the second vegetative mutation generation (MV2). After 6 weeks, the plantlets were subcultured and the leaves of MV2 were used for RAPD analysis. Six random primers were used for the study, i.e. OPC-01 (TTCGAGC-CAG), OPC-02 (GTGAGGCGTC), OPC-04 (CCGCATCTAC), OPC-05 (GATGACCGCC), OPC-06 (GAACGGACTC) and Abi 117.17 (GCTCGTCAAC). The results showed that the lowest average value on the increase of leaves, shoots,

nodes and plantlets height at MV1 are resulted at dose 1.5 krad, whereas dose 0.3 krad increased average value on shoots and plantlet height. The highest percentage of abnormal leaves is resulted at dose 1.2 krad. After subculture, the MV2 plantlets showed higher average value for almost all parameters observed than the untreated plantlets. The number of scoreable bands varied from 2-5 bands with molecular weight 0.4-12 kb. Thirty three bands were detected from the six primers, with OPC-01, OPC-04 and OPC-06 showed polymorphisms with 8 (24%) polymorphic bands. In OPC-01 one band with DNA size 1-1.5 kb was absence from the treated plants at dose 0.9-1.5 krad, while with OPC-04, one band size 1.5 kb present only at 1.2 krad and with OPC-06 one band size 12 kb absence from 0.6 and 0.9 krad, and 3-5 bands size 1.5, 1.8 and bands with size 3-12 kb disappeared at dose 1.2 and 1.5 krad. The appearance and disappearance of bands may be related to the genetic changes due to gamma irradiation, and further exploration may be needed to find how much genetic variation induced by irradiation in field and the relationships with the changes in plant characters.

050 BETY, Y.A.

Ketahanan genotipe dan perkembangan penyakit pada padi sawah tadah hujan. **[Genotypes resistance and disease development on rainfed rice]**/Bety, Y.A.; Jatmiko, S.Y.; (Loka Penelitian Pencemaran Lingkungan Pertanian, Jakenan (Indonesia)); Ismal, B.P. 4 ill., 2 tables; 20 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 33-39.

ORYZA SATIVA; DISEASE RESISTANCE; GENOTYPES; PYRICULARIA; COCHLIOBOLUS MIYABEANUS; CERCOSPORA ORYZAE.

Resistance of rice genotypes to diseases can be identified by measuring the disease severity at a critical time. The disease development on resistant rice genotypes could be different from those of the susceptible ones. The disease severity was influenced by the rice genotypes, plant ages, plant health, inoculums of pathogens, and environmental conditions. An experiment was conducted in the rainy season of 2003 at Meteseh, Rembang, Central Java. The experiment was aimed at obtaining rice genotypes resistant to blast (*Pyricularia grisea*), Helminthosporium leaf spot (*Helminthosporium oryzae*), Cercospora leaf spot (*Cercospora oryzae*), and sheath blight (*Rhizoctonia solani*) and to study the pattern of the disease progress in the rice plant. Fifteen rice genotypes were evaluated for their resistance to the diseases, and the disease progresses on each genotype was figured out by measuring the disease severity at 45, 60, and 75 days after dibibling (DAB). The experiment was arranged in a randomized block design using three replications. Result of the experiment showed that BP785-12-4-1 was resistant to blast, Cercospora leaf spot, sheath blight, and moderately resistant to Helminthosporium leaf spot. Pattern of disease development on the 15 genotypes showed that the blast intensity at 60 DAB was high (i60 = 11.8%, r45-60 = 0.099 units/day) and disappeared at 75 DAB (i75 = 0.4%, r60-75 = -0.29 units/day). A similar pattern was found in the development of Cercospora leaf spot; the disease intensity decreased at 75 DAB (i75 = 11.2%, r60-75 = 0,006 units/day). In contrastly, intensity of Helminthosporium leaf spot (i45 = 14.4%, r45-60 = 0.089 units/day) (i75 = 31.6%, r60-75 = 0.06 units/day) and sheath blight (i45 = 2.7%, r 45-60 = 0.214 units/day) (i75 = 22.0%, r60-75 = 0.112 units/day) increased until harvest. The disease development in most genotypes were slowing down with the plant ages. Severity and development of the diseases on resistant genotypes were generally lower than those on the susceptible ones.

051 HARSONO, A.

Ketahanan dan aktivitas fisiologi beberapa genotipe kacang tanah pada cekaman kekeringan. **[Tolerance and physiological activities of groundnut genotypes grown under drought stress]**/Harsono, A.; Adisarwanto, T. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Tohari; Indradewa, D. 5 ill., 4 tables; 21 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 51-62.

ARACHIS HYPOGAEA; GENOTYPES; DROUGHT RESISTANCE; ADAPTATION; PHOTOSYNTHESIS; TRANSPIRATION; EFFICIENCY; WATER USE; SOIL MOISTURE CONTENT; YIELDS.

The average yield of groundnut in Indonesia (1.1 t/ha) is below than its potential yield (2.0 t/ha), one of the causes is drought stress, particularly for plants grown in dry season on the upland. The objective of this

study was to determine tolerance levels and physiological characters of four groundnut genotypes grown under drought stress. The trial was conducted on Alfisols, located in glasshouse of Balitkabi, Malang and in the Experimental Farm of Probolinggo during the 2002 dry season. The trial in the glasshouse was arranged in the factorial completely block design with five replications. The first factor was groundnut genotypes namely LMG/TBN-93-B-54, Singa, ICGV/TBN-93-B1/31 and JPR/ICGV 87123-93-B1-34. The second factor was soil moisture regime with 100%, 80%, 60%, 40% and 20% of field capacities. One plant was grown in each pot filling with 8 kg of soil. Meanwhile, the strip plot with three replications was used for the field experiment in Probolinggo. The vertical factor was amount of water added consist of 47.5 mm of water added immediately after seedling, water added of 125 mm, 250 mm, 375 mm and 500 mm dividing into nine times of application during the growth period. The plot size was 3 m x 4 m, plant spacing was 15 cm x 40 cm, one plant per hill. Basal fertilizer application for both experiments were 75 kg Urea + 50 kg SP-36 + 50 kg KCl/ha. The results showed that Singa genotype was the most tolerant to drought stress among the four groundnut genotypes studied. However, below of 60% field capacity among the genotypes were no significant difference in drought tolerance. Under drought stress condition, tolerant genotype showed lower transpiration, higher photosynthesis rate, more efficient on using soil moisture and gave higher pod yield compared to susceptible genotypes.

052 KARTIKANINGRUM, S.
Keragaman genetik plasma nutfah anggrek Spathoglottis. **[Genetic variability of the germplasm of Spathoglottis]**/Kartikaningrum, S.; Effendie, K. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 8 tables; 12 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 260-269.

ORCHIDACEAE; GERMPLASM; GENETIC VARIATIONS; HERITABILITY.

Orchid need to be kept as a species or cultivar to avoid from totally extinct. They can be used as the source of genetic variability in developing new superior varieties. Variability of the crop is very important in plant breeding program to improve plant genetic quality in the future. The research was conducted in Indonesian Ornamental Crops Research Institute (IOCRI) from July 2004 to February 2005. The aim of the research was to study the genetic variability and heritability of germplasm collection of Spathoglottis orchid. Randomized completely design was used consisted of 15 orchid genotypes. Five clones from each genotype were used as replication. The result indicated that wide genetic variability was related to length and width of leaf, number of shoot increment, length and width of flower, length and width of lip. Plant characters, such as number of shoot increment, length and width of leaf, length and diameter of flower stalk, length and width of lip, ratio of lip length-width, length and width of flower showed high heritability value.

053 KRISMAWATI, A.
Uji adaptasi varietas dan galur kenaf (Hibiscus cannabinus **L.*) di lahan pasang surut Kalimantan Tengah.*** **[Adaptation test of kenaf (*Hibiscus cannabinus* L.) varieties and lines at tidal swamps land of Central Kalimantan]**/Krismawati, A. (Balai Pengkajian Teknologi Pertanian Kalimantan Tengah, Palangkaraya (Indonesia)) 3 tables; 11 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(3): p. 107-111.

HIBISCUS CANNABINUS; KENAF; PURE LINES; VARIETY TRIALS; ADAPTATION; SWAMPS; KALIMANTAN.

The area of tidal swamps in Central Kalimantan is approximately 5.5 million hectare and parts of that area can be developed by kenaf plant. The adaptation test of several kenaf varieties and lines was conducted in Samuda Village, Mentaya Hilir Selatan District, Kotawaringin Timur, Central Kalimantan. The experiment used a randomized block design with three replications and six treatments consisting of two kenaf varieties (Hc G-4 and Cuba 108/II) and four kenaf lines (No. 85.9.75; No. 85.9.40.1; No. 85.9.42; No. 85.9.66.1). Parameters observed were plant height, stem diameter at 40, 75 and 105 days after planting, on 10 random plants per plot, fresh biomass, dried fiber, and dried adventive root weight. The results showed that two lines, namely Hc 85.9.66.1 and Hc 85.9.75 performed the optimal vegetative growth as their plant height and stem diameter at harvesting time reached 265.25 cm and 260.25 cm, 2.17

cm and 2.10 cm, respectively. The fiber yields of the two lines were 2.40 and 2.30 ton/ha, respectively, while the control line Hc G-4 was only 2.25 ton/ha.

054 KUSMANA
Uji stabilitas hasil umbi 7 genotip kentang di dataran tinggi Pulau Jawa. **[Yield stability evaluation of 7 potato genotypes in highland of Java Island]**/Kusmana (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 5 tables; 14 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 254-259.

SOLANUM TUBEROSUM; GENOTYPES; YIELDS; HIGHLANDS; JAVA.

The aim of the research was to observe tuber yield stability of 7 potato genotypes at different environment of Java Island. Multilocation trials were located at Pangalengan and Garut for 2 seasons, Lembang, Cipanas, Ciwidey, Magelang, Banjarnegara, and Pasuruan (1 season), respectively. The experiment was arranged in a randomized completely block design with 4 replications, consisted of 30 plants per plot. The results of the experiment indicated that genotypes of 1-1085 were stable to all location, showed by $b = 1$ and $\delta ij = 0$. Whereas, Atlantic was adapted to favorable environments showed by $b > 1$. Panda was adapted to unfavorable environment showed by $b < 1$. The highest tuber yield were obtained from genotypes 380584.3 (33.5 t/ha) and FBA-4 (28.1 t/ha), with $b = 1$, but $\delta ij = 0$.

055 KUSWANTO
Seleksi galur-galur harapan kacang panjang (Vigna sesquipedalis **L. Fruwirth*) Unibraw.*** **[Selection of Unibraw yardlong bean (*Vigna sesquipedalis*) promising lines]**/Kuswanto; Soetopo, L.; Hadiastono, T. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian); Kasno, A. 2 tables; 16 ref. Appendix. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 258-269.

VIGNA UNGUICULATA SESQUIPEDALIS; PROGENY; SELECTION; YIELDS; GENETIC VARIATION.

The research was carried out to evaluate yield potential and resistance to CABMV, and also to select the Unibraw promising lines. The selected lines will be evaluated on adaptation test. The experiments was conducted at Research Station of Brawijaya University, Jatikerto, Kromengan, Malang during November 2004 to March 2005. The materials were 177 promising lines and 4 parent genotypes. The promising lines had genetic variation on yield potential and other variable. Eighteen lines had been selected which have high yield potential and resistant to CABMV, those are Unibraw 34039, Unibraw 34061, Unibraw 34042, Unibraw 34053, Unibraw 24068, Unibraw 24034, Unibraw 34041, Unibraw 14008, Unibraw 24035, Unibraw 24017, Unibraw 24089, Unibraw 24071, Unibraw 24088, Unibraw 14023, Unibraw 24062, Unibraw 24191, Unibraw 24041 and Unibraw 14017, respectively.

056 MANSYAH, E.
Variabilitas genetik antara tanaman induk manggis dan keturunannya. **[Genetic variability between mangosteen mother plants and their offsprings]**/Mansyah, E.; Syah, M.J.A.; Usman, F.; Purnama, T. (Balai Penelitian Tanaman Buah, Solok (Indonesia)) 2 ill.; 1 table; 26 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(4): p. 229-237.

GARCINIA MANGOSTANA; MOTHER PLANTS; GENETIC VARIATION; PROGENY; DNA; IDENTIFICATION.

The research was conducted on January until May 2002 at Molecular Biology and Immunology Laboratory of Estate Biotechnology Experimental Unit Bogor. The objective of this study was to determine the genetic variability between mangosteen mother plants and their offsprings. Plant materials used were three mangosteen mother plants from West Sumatra i.e. Balai Baru (including in Padang municipality), Padang Laweh, and Subarang Sukam (both including in Sawahlunto/Sijunjung Regency) and their offsprings. The offsprings were one year old seedling which was derived from each mother plants. Genetic variability was observed by using RAPD technique and five selected primers i.e.: SB-13 (AGTCAGCCAC), SB-19 (CAGCACCCAC), OPH-12 (ACGCGCATGT), OPH-13 (CACGCCACAC),

and OPH-18 (GAATCGGCCA). The results showed that there were genetic variabilities between the mother plants and their offspring as indicated by dissimilarieties of DNA banding patterns. The average of genetic variability for the offspring was 56.35%. This results would support the information about the presence of genetic variability on mangosteen and leading to varietal improvement opportunity through selection of indigenous population.

057 PARDAL, S.J.

***Transfer gen proteinase inhibitor II pada kedelai melalui vektor Agrobacterium tumefaciens untuk ketahanan terhadap hama penggerek polong (Etiella zinckenella* Tr.*).* [Transfer of the proteinase inhibitor II gene into soybean through *Agrobacterium tumefaciens* vector for pod borer resistance]**/Pardal, S.J.; Listanto, E.; Herman, M.; Slamet (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Wattimena, G.A.; Aswidinnoor, H. 5 ill., 3 tables; 27 ref. Summaries (En, In). *Jurnal Bioteknologi Pertanian* (Indonesia) ISSN 0853-8360 (2004) v. 9(1): p. 20-28.

GLYCINE MAX; AGROBACTERIUM TUMEFACIENS; PEST RESISTANCE; GENE TRANSFER; ETIELLA ZINCKENELLA.

Pod borer (*Etiella zinckenella* Tr.) is one of the most important pests in soybean and still difficult to be managed conventionally. The use of resistant cultivars is the best strategy and relatively safe, but the source of resistance gene to pod borer is not found in soybean germplasm so far. The development of transgenic soybean resistant to pod borer is an alternative way to solve the problem. The objectives of this research were to obtain the best protocol for soybean transformation through *Agrobacterium tumefaciens* and resistance soybean plants to pod borer. On the first experiment, young embryos and cotyledons of soybean explants cv. Wilis and Tidar were inoculated with *A. tumefaciens* strain EHA 105 contained plasmid pCambia 1301 with gus gene in t-DNA region. The treatments were included an optical density inoculation time, cocultivation time, and type of explant. Result indicated that the best protocol for inoculation was using young cotyledon as explants with 1 x 10^8 cell/ml of *A. tumefaciens* for 90 minutes inoculation and 5 days cocultivation. On the second experiment, 1,539 young cotyledon explants from Wilis and 984 explants from Tidar were inoculated with *A. tumefaciens* contained pinII gene on plasmids pGApinII construct. Result indicated that Wilis was better than Tidar. Wilis explants produced eight plants (AW1 - AW8), while Tidar only produced one plant (AT1) on media with 200 mg/l kanamycine. Molecular analysis using PCR indicated that only event AT1 was positive (containing pinII gene), while eight plants from event AW were all negative. Bioassay of first generation of event AT1 (AT1R1) to pod borer larvae indicated that transformed plants showed a lower in pod damages (58.8%) compared to control plants (95.5%).

058 QOSIM, W.A.

***Evaluasi karakter ketahanan beberapa kultivar krisan pot (Chrysanthemum morifolium* Ram.*) terhadap penyakit karat.* [Evaluation of resistance to rust disease character on several cultivars of pot Chrysanthemum]**/Qosim, W.A.; Carsono, N.; Ruminta (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Pertanian) 2 ill., 6 tables; 14 ref. Summaries (En, In). *Bionatura*: *Jurnal Ilmu-ilmu Hayati dan Fisik* (Indonesia) ISSN 1411-0903 (2005) v. 7(2): p. 80-90.

DENDRANTHEMA MORIFOLIUM; ORNAMENTAL PLANTS; DISEASE RESISTANCE; RUSTS; PUCCINIA; VARIETIES.

The research was conducted to evaluate resistance of 22 cultivars of pot chrysanthemum on leaf rust disease character. The experiment was arranged in randomized block design with 22 cultivars as a treatment and replicated three times. The results showed that resistance to leaf rust disease character of 22 cultivars were found nine cultivars that immune, those are Tawn Falk, Tiger, Reagen Rossy, Pink Mambo, Yellow Boaldi, Autumn Glory, Yellow Kettay, Stroika and White Boaldi; and only one cultivar that resistant (White Reagan), while others cultivars showed moderately susceptible and susceptible.

059 SANJAYA, L.

Pengujian pertumbuhan dan stabilitas genetik 21 klon harapan lili (Lilium longiflorum). **[Growth and genetic stability tests of 21 clones of *Lilium longiflorum*]**/Sanjaya, L.; Marwoto, B.; Supriyadi, Y.; Febrianty, E. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 4 tables; 25 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 292-300.

LILIUM LONGIFLORUM; CLONES; INTERSPECIFIC HYBRIDIZATION; F1 HYBRIDS; GENETIC STABILITY; SELECTION; AGRONOMIC CHARACTERS; GENOTYPE ENVIRONMENT INTERACTION.

Lilium longiflorum is one of the most popular ornamental plants producing cut flower in the world. Cultivation of the species has faced many problems, the most important is the dependence of the introduced varieties. Other constrainst found in the farmer's level is that the existing varieties are susceptible to bulb rot disease caused by *Fusarium oxysporum f.sp. lilii*. To solve those problems, development of new superior varieties is necessary. Interspecific hybridization of *L. longiflorum* was conducted in 1999 resulted in longiflorum hybrids. Among of them known to be resistant to the disease and producing novel flowers. In order to release the clones, a test of growth and of genetic stability were really important. Based on the trials conducted in the separate places with different altitudes (900, 1000 and 1100 m above sea level) proved that 18 hybrids of the total 21 F1 population were selected as being promising materials. They are all potential to be released in the near future.

060 SASTROSUPADI, A.

Kajian model stabilitas hasil secara kualitatif dan kuantitatif untuk uji multilokasi musim pada tembakau virginia rajangan Bojonegoro. **[Study of qualitative and quantitative yield stability model for season multilocation test of Bojonegoro sliced virginia tobacco]**/Sastrosupadi, A.; Suwarso; Herwati, A. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 6 tables; 11 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 134-139.

NICOTIANA TABACUM; TOBACCO; PURE LINES; GENOTYPES; QUANTITATIVE ANALYSIS; QUALITATIVE ANALYSIS; MODELS; ENVIRONMENTAL FACTORS; ADAPTATION.

Study of quantitative and qualitative stability model for multilocation-season test of Bojonegoro sliced virginia tobacco was conducted in three locations: Kedungadem, Pekuwon and Sugihwaras, East Java in 1997; 1998; 1999, and 2001. The selected locations were the area of the virginia tobacco development. The locations were 15-20 km apart from one another. Fourteen of sliced virginia tobacco tested were the result of selection since 1990, tested in three locations and four growing seasons. The experiment used a randomized block design with three replications in each location. Plot size was 8.6 m x 6.75 m, plant distance was 90 cm x 45 cm, one plant per hole. The stability parameters were measured by qualitative model according to Yau and Hamblin (1994) and quantitative ones were measured according to Perkins and Jinks (1968). The result of the analysis using qualitative model showed that lines No. 13, 7, 10, 6, and 5 were stable genotypes with the yield above its average, while based on quantitative model, lines No. 9, 11, 14, 6, dan 10 were stable genotypes with the yield above its average. Measurement of yield stability using quantitative model was more informative compared to qualitative model.

061 SETYO-BUDI, U.

Ketahanan beberapa aksesi kenaf terhadap nematoda puru akar (Meloidogyne* spp*). **[Resistance of kenaf accessions to root knot nematodes]**/Setyo-Budi, U.; Hartati, R.R.S.; Suhara, C. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 4 tables; 14 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 129-133.

HIBISCUS CANNABINUS; KENAF; SPECIES; MELOIDOGYNE; NEMATODA; GENETIC RESISTANCE; GERMPLASM.

Root knot nematode (*Meloidogyne* spp.) is the main pest of kenaf both in the field and nursery. This reduced kenaf farmers income because it decreased the productivity. One of the solutions to eliminate this problem is utilization of resistant variety. Evaluation of germplasm is one of the methods to identify tolerant accessions to root knot nematode. The experiments aimed at screening the level of resistance of kenaf and allied fibre accessions to root knot nematodes (RKN). The activity was conducted at the laboratory and the greenhouse of Indonesian Research Institute for Tobacco and Fibre Crops, Malang from August to December 2003. The experiment used modified Taylor and Sasser method, while to determine level of plant resistance used Canto-Saenz method. Kenaf seeds were planted in polybag consisting of media soil-sand-cattle manure (5:3:2) of 10 kg polybag and the replicated ten times. Number of RKN larvae tested were 40 larvae/100 ml soil or 4000 larvae/polybag, which were inoculated 15 days after planting on the numbers of galls on root, population of RKN in the soil root, plant height and stem diameter. Research result showed that three accessions from allied fibre of kenaf, namely SSRH/1010 H (*H. asetosela*), SSRH/1023 H (*H. asetosela*) and Kal II (*H. radiatus*) were resistant to RKN, while all of 23 accessions of kenaf (*H. cannabinus*) were susceptible to highly susceptible to RKN. These three accessions can be used as resistant parent on interspecific hybridization.

062 SETYOBUDI, L.
Evaluasi daya hasil 21 kultivar pisang introduksi. **[Yield potential of 21 introduced banana cultivars]**/ Setyobudi, L. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian) 4 tables; 9 ref. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 270-277.

MUSA PARADISIACA; VARIETIES; INTRODUCED VARIETIES; GENOTYPES; YIELD COMPONENTS; PRODUCTIVITY; EVALUATION.

Evaluation of 21 banana cultivars is part of the IMTP phase II world wide program. The purpose of this experiment is to examine the productivity of the cultivars under rainfed field condition of Aripan, Solok, West Sumatra. The 21 banana cultivars evaluated were SH-3481, SH-3565, SH-3649, SH-4444, PV 03.44, PA 0322, GCTCV 119, GCTCV 215, Burro Cemsa, P. Mas, Saba, P. Nangka, Cv. Rose, Yangambi Km5, P. Jari Buaya, P. Lilin, Bluggoe, Williams, P. Ceylan, Calcutta 4, Gros Michel, and P. Kepok as local cultivar. The results showed that most of the improved genotypes had equal or shorter cycles from planting to shooting than the local cultivars (248 days), except SH 4444 (400 days) and GCTCV 119 (456 days). For the duration days from planting to harvest only SH 4444 had a longer cycle on average with 499 days. All other improved cultivars had values which did not greater at a significant level. The local cultivar had an average bunch weight of 5.5 kg. Most genotypes had equal or lower yield than the local cultivar except SH 3481 (11.3 kg) and SH 3565 (14.3 kg).

063 SUHENDI, D.
Daya hasil dan daya adaptasi beberapa klon harapan kakao lindak. **[Yielding and its adaptability of several promising bulk cocoa clones]**/Suhendi, D.; Mawardi, S.; Winarno, H. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)) 5 tables; 13 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2005) v. 21(1): p. 1-11.

THEOBROMA CACAO; CLONES; ADAPTATION; YIELD COMPONENTS; GENETIC STABILITY; SELECTION CRITERIA.

Yielding and its adaptability are considered to be an important criteria for clones recommendation. An experiment to evaluate yield and its adaptability of several promising bulk cocoa clones has been executed during 1996-2003 in three locations having different altitude and type of climate, consisted of Jatirono (450 m asl., B type of climate), Kalisepanjang (275 m asl., C type of climate) and Kalitelepak (145 m asl., B type of climate). Randomized completely block design (RCBD) was used in each location with 14 promising clones and four replications. Recommended clones of ICS 60 and GC 7 were used as standard. The promising clones were originated from mother trees which are selected with the main criteria of yield. Observations were conducted on yield and its components as well as bean characteristics. Determination

of adaptability of each clone was carried out by using yield performance and its stability. Statistical analysis was done by using combined analysis. The results showed that KW 30 and KW 48 perform higher yield (2.3 ton/ha) than that of standard clone (1.7 ton/ha) as well as consistent yield stability between location and over years. Therefore, the clones performed good adaptability. KW 30 and KW 48 also perform good yield components and high percentage of fat content of 55%. So, those clones are potential to be recommended for commercial planting materials.

064 SUHENDI, D.
Daya hasil dan daya adaptasi beberapa klon harapan kakao mulia. **[Yielding and its adaptability of several promising lines of cocoa clones]**/Suhendi, D.; Mawardi, S.; Winarno, H. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)) 6 tables; 13 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2004) v. 20(2): p. 54-65.

THEOBROMA CACAO; CLONES; SELECTION; YIELDS; ADAPTATION; ENVIRONMENT.

Yielding and its adaptability are considered to be an important criteria for clones recommendation. An experiment to evaluate yield and its adaptability of several promising lines of cocoa clones had been conducted during 1996-2002 in three locations which had different altitude and type of climate, consisted of Jatirono Estate (high altitude, wet climate), Ngrangkah Pawon Estate (high altitude, dry climate) and Banjarsari Estate (low altitude, wet climate). Randomized completely block design (RCBD) was used in each location with 14 promising clones and four replications. Recommended clones of DR 2 and DRC 16 were used as standard. The promising clones were originated from mother trees selection on an open pollinated progenies in Penataran Division of Bantaran Estate (Blitar, East Java) planted in 1938. The selection was carried out during 1993-1994 with the main criteria of colour and size of bean. Observations were conducted on yield and its components as well as bean characteristics. Determination of adaptability of each clone was carried out by using yield performance and stability. Statistical analysis was done by using combined analysis. The results showed that KW 118 and KW 109 performed higher yield than standard clone as well as of consistent yield stability between locations and over years. Therefore, those clones showed good adaptability, KW 118 and KW 109 also performed high percentage of white bean (more than 99%) and large bean size (more than 1.25 g/bean). So, those clones are potential to be recommended for commercial planting materials.

065 SUPRIJONO
Stabilitas hasil beberapa galur wijen. **[Yield stability of sesame lines]**/Suprijono; Mardjono, R.; Sudarmo, H. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 3 tables; 11 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4): p. 127-130.

SESAMUM INDICUM; PROGENY; YIELDS; GENETIC STABILITY.

The experiment was conducted at four locations of sesame development area, viz. Lumajang, Bojonegoro, Nganjuk and Sragen Districts, in 2003 planting season. The aim of this experiment was to find out the sesame lines having high productictivity and suitable for the development areas. Twelve promising lines, namely SI.14, SI.16, SI.18, SI.20, SI.21, SI.24, SI.25, SI.26, SI.28, SI.31, SI.13, SI.40, and two control varieties (Sumberrejo 1 and Sumberrejo 2) were evaluated in randomized block design with three replications. The result found out 4 superior lines (SI.14, SI.16, SI.18, and SI.24) that have the same potential as Sumberrejo.I variety and gave broad adaption to all locations (stable lines). Nevertheless, the other four lines evaluated showed as the specific location lines. Those lines are SI.21 and SI.25 that are appropriate for Nganjuk and Sragen; SI.20 appropriate for Bojonegoro and Nganjuk, and SI.28 appropriate for Lumajang.

066 SUTARYO, B.
Heterosis standar hasil gabah dan analisis lintasan beberapa kombinasi persilangan padi pada tanah berpengairan teknis. **[Standard heterosis for grain yield and path analysis of some F1 rice combinations in field irrigation]**/Sutaryo, B.; Purwantoro, A.; Nasrullah (Universitas Gadjah Mada,

Yogyakarta (Indonesia). Fakultas Pertanian) 1 ill., 3 tables; 14 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 70-78.

ORYZA SATIVA; F1 HYBRIDS; INTERGENERIC HYBRIDIZATION; HETEROSIS BREEDING; HIGH YIELDING VARIETIES; YIELD INCREASES; IRRIGATED LAND.

Experiment to evaluate the performance of some F1 hybrids was conducted in field irrigation, Sukamandi (15 m above sea level), Subang, West Java, on the dry-season of 2003. The trial consisting of fourty eight F1 hybrids (30 indica x indica and 18 indica x japonica), two check F1 hybrids (Maros and Rokan), and four inbrid checks namely IR64, Ciherang, Situ Bagendit, and IR53942 was designed using augmented design. Data indicated that F1 hybrids such as IR68888A/Maros, IR68888A/Krueng Aceh, IR68897A/Situ Bagendit, IR58025A/Cisokan, IR68888A/KF-9, IR68888A/Code, IR68888A/Situ Bagendit, and IR62829A/Cisokan showed yield superiority over the best check IR64, with standard heterosis ranged from 29.57 to 41.43%. Panicle number and panicle length contributed the most to increasing standard heterosis in grain yield. Among 18 hybrids derived from indica x japonica tested, IR68888A/KF6-9 and IR68885A/Fatmawati were found to be the best hybrids.

H10 PESTS OF PLANTS

067 AMIR, A.M.

***Evaluasi ketahanan beberapa aksesi jambu mete (Anacardium occidentale* L.*) terhadap hama Helopeltis antonii* Sign. (Hemiptera: Miridae). [Evaluation of resistances of some cashew lines (*Anacardium occidentale* L.) to *Helopeltis antonii* Sign. (Hemiptera: Miridae)]**/Amir, A.M.; Karmawati, E.; Hadad, E.A. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)) 3 tables; 21 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(4): p. 149-153.

ANACARDIUM OCCIDENTALE; GENETIC RESISTANCE; HELOPELTIS ANTONII; PEST RESISTANCE; PURE LINES.

The research on the evaluation of resistances of some cashew lines (*Anacardium occidentale* L.) to *Helopeltis antonii* Sign. (Hemiptera: Miridae) was conducted in the Pests and Diseases Laboratory and Greenhouse of Indonesian Spice and Medicinal Crops Research Institute Bogor, from April to December 2004, to test the resistances of some cashew lines to *H. antonii*. The treatment consisted of nine cashew lines that is: (1) Balakrisnan (B-02), (2) Madura (L3-3), (3) Jatiroto Jambon (III/4-5), (4) Gunung Gangsir 180, (5) Madura (M4-2), (6) Jogya Putih (XII/8), (7) Mojokerto (XIII/8), (8) Tegineneng (A3-2), and (9) Wonogiri (C6-5). The research consisted of (a) preferences without choice, compiled in a randomized completely block design (RCBD) replicated 5 times, and (b) preferences with choice, compiled in a randomized completely block design (RCBD) replicated 3 times. The result indicated that cashew lines of Mojokerto (XIII/8) and Balakrisnan (B-02) were resistant and tolerant to *H. antonii*.

068 INDRAYANI, I G.A.A.

***Kompatibilitas kombinasi HaNPV dan SBM serta pengaruhnya terhadap mortalitas dan aktivitas biologi penggerek buah kapas Helicoverpa armigera* Hubner. [Compatibility of HaNPV and SBM combinations and its effects on the mortality and biological activities of cotton bollworm *Helicoverpa armigera* Hubner]**/Indrayani, I G.A.A.; Winarno, D.; Subiyakto (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 3 ill., 1 table; 27 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(1): p. 28-33.

GOSSYPIUM; NUCLEAR POLYHEDROSIS VIRUS; HELICOVERPA ARMIGERA; MORTALITY; NEEM EXTRACTS; BOTANICAL INSECTICIDES; LARVAE.

There were many ways increasing the effectiveness of HaNPV against insect pests. Combination of HaNPV and other control method, namely using neem seed powder (SBM) which reduced the insect immunity system, was one way to increase the effectiveness of HaNPV. Synergistic combination of SBM

to HaNPV not only increased the effectiveness of insect control but SBM itself could also substitute HaNPV which was unavailable commercially. The study was carried out in the Entomology Laboratory of Indonesian Tobacco and Fiber Crops Research Institute (ITOFCRI) in Malang from March to July 2002. The objective was to find out the compatibility and efficacy of HaNPV+SBM combination against cotton bollworm and its impacts to larval mortality and biological activities. The treatment tested were combinations of HaNPV+SBM based on both sublethal (LC25) and lethal (LC50) concentrations, viz. (1) Control (untreated), (2) SBM(LC25), (3) SBM(LC50), (4) HaNPV(LC25), (5) HaNPV(LC50), (6) HaNPV(LC25) + SBM(LC25), (7) HaNPV(LC25) + SBM(LC50),(8) HaNPV(LC50) + SBM(LC25), (9) HaNPV(LC50) + SBM(LC50). Each treatment was arranged in a randomized block design (RBD) with four replications. Results showed that the combinations of HaNPV and SBM at different concentrations proved to be additive and synergistic interaction. The synergistic interaction was significant when HaNPV(LC50) was combined with + SBM(LC50) with caused ± 80 % of larval mortality. Reducing in larval weight and prolong the larval age were effectively influenced by HaNPV and SBM either alone or combination.

069 INDRAYANI, I G.A.A.

***Pengaruh kerapatan bulu daun pada tanaman kapas terhadap kolonisasi Bemisia tabaci* Gennadius. [Role of trichome density of cotton leaf to colonization of *Bemisia tabaci* Gennadius]**/Indrayani, I G.A.A.; Sulistyowati, E. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 2 ill., 2 tables; 29 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(3): p. 101-106.

GOSSYPIUM; BEMISIA TABACI; LEAVES; TRICHOMES; DENSITY; TISSUE ANALYSIS; LEAF AREA; PEST RESISTANCE; PEST CONTROL.

Trichome-based host plant resistance offers the potential to reduce chemical insecticides used in insect pest control. Cotton whitefly, *Bemisia tabaci* can be controlled by using resistant variety based on trichome density as plant morphological characteristics. The study on the role of trichome density of cotton accessions on the colonization of *B. tabaci* was carried out at Pasirian Experimental Station at Lumajang, and at Entomology Laboratory of Indonesian Tobacco and Fiber Crops Research Institute (IToFCRI) in Malang from April to July 2005. Treatments included 11 cotton accessions, viz. (1) KK-3 (KI 638), (2) Kanesia 1 (KI 436), (3) A/35 Reba P 279 (KI 257), (4) Acala 1517 (KI 174), (5) Asembagus 5/A/I (KI 162), (6) 619-998xLGS-10-77-3-1 (KI 76), (7) DP Acala 90 (KI 23), (8) TAMCOT SP 21 (KI 6), (9) Kanesia 8 (KI 677), (10) CTX-8 (KI 494), and (11) CTX-1 (KI 487). The experiment was arranged in completely randomized design with ten replications. Parameters observed were trichome density, number of eggs and nymphs on one cm square of leaf and adult of *B. tabaci* on third highest leaf cotton plant. The result showed that trichome density was positively correlated with *B. tabaci* colonization (R = 0.9701) in which higher trichome density of cotton leaf has resulted in great colonization of *B. tabaci*. *Bemisia tabaci* colonization was higher on CTX-1, CTX-8, Kanesia 8, and KK-3 (150-250 individuals/cm^2 of leaf) due to dense trichome (150-300 trichomes/cm^2 leaf) as compared with other accessions, viz. TAMCOT SP 21, DP Acala 90, 619-998xLDS-10-77-3-1, Asembagus 5/A/1, Acala 1517, A/35 Reba P 279, and Kanesia 1 which showed less density of leaf trichome (0-100 trichomes/cm^2 of leaf) and *B. tabaci* colonization (< 100 individuals/cm^2 of leaf).

070 KARMAWATI, E.

***Peranan semut (Oecophylla smaragdina dan Dolichoderus* sp.*) dalam pengendalian Helopeltis* spp., *dan Sanurus indecora pada jambu mete.* [Role of ants (*Oecophylla smaragdina* and *Dolichoderus* sp.) in controlling *Helopeltis* spp. and *Sanurus indecora* on cashew plant]**/Karmawati, E.; Siswanto; Wikardi, E.A. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)) 1 ill., 4 tables; 12 ref. Appendix. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(1): p. 1-7.

ANACARDIUM OCCIDENTALE; OECOPHYLLA; FORMICIDAE; PEST CONTROL; HELOPELTIS; PREDATORS.

Insects have important roles in cashew growth and productivity. In Lombok, West Nusa Tenggara, more than 90 kinds of insects have been identified including pest, natural enemies and pollinators. *Helopeltis* spp. and *S. indecora* are the main pests in this area. Ants were found as the predator of *Helopeltis* spp. Nowadays the three kinds of insects sometime exist in one plant, therefore the objective of this research was to find out the interaction among *Helopeltis* spp., *S. indecora* and ants. The research was carried out in Sambik Rindang and Sambik Jengkel, West Lombok from May to November 2003. There were 3 activities of research (a) field trial, (b) semi-field trial, and (c) glasshouse trial. In the field trial, the environment conditions were not treated as fixed variables, the observations were done by sampling. This field trial was supported by semifield trial, only one factor was used as a treatment (ants population) that had 3 levels: 0, 5, and 10 colonies per 5 plants. The semifield trial was also supported by glasshouse trial. In this trial 3 factors were used as treatments: ants population, *Helopeltis* spp. and *Sanurus indecora* population. The result showed that the main pest found in Sambik Jengkel was different from the main pest found in Sambik Rindang. In Sambik Jengkel, *Helopeltis* spp. was dominant, while in Sambik Rindang *S. indecora*. Ants had an important role in controlling Helopeltis population. The data obtained up to October 2003 revealed that the percentage of damaged shoots was less in the ants-infested plant than that without ants. Meanwhile, the population of *S. indecora* was not affected by ants incidence, however the number of flowers attacked by *S. indecora* were more in the shoots without ants. If shoots were previously attacked by *S. indecora*, the ants would not bother the insects, but when there was no *Helopeltis* spp. in the plant, the ants would attack the nymphs of *S. indecora*.

071 MARYAM-ABN

Evaluasi insektisida nabati terhadap hama Palpita unionalis pada tanaman melati. **[Evaluation on the efficacy of some botanical insecticides against *Palpita unionalis* on Jasminum sp.]**/Maryam Abn.; Omoy, T.R.; Mulyana, T. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 2 tables; 13 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 386-391.

JASMINUM; LEAF EATING INSECTS; BOTANICAL INSECTICIDES; SEED EXTRACTS; ANNONA MURICATA; ANNONA RETICULATA; ANNONA SQUAMOSA; PEST CONTROL; MORTALITY.

An evaluation on the efficacy of some botanical insecticides on *P. unionalis* was held in Entomology Laboratory and in the field of Segunung Horticultural Research Station. The evaluation consists of two main activities: (1) Efficacy in the laboratory and (2) efficacy in the field. The botanical insecticides tested consisted of formulation containing extracts of pond apple seeds (*Annona squamosa*), buah nona/local pond apple seeds (*A. reticulata*), soursop seeds (*A. muricata*), neem leaves (*Azadirachta indica*), mahogany seeds (*Swietenia macrophylla*), leaves of *Toona sureni*, leaves of *Tithonia diversifolia*, tobacco leaves (*Nicotiana tabacum*), leaves of *Lantana camara* and Cinchona bark. The treatments were arranged in a randomized block design with three replications. The result showed that pond apple seeds, buah nona seeds and soursop seeds were the most effective against *P. unionalis* in laboratory condition and in the field. The results could provide additional support in developing IPM on Jasminum.

072 MOEKASAN, T.K.

Kelayakan teknis dan ekonomis penerapan teknologi pengendalian hama terpadu pada sistem tanam tumpanggilir bawang merah dan cabai. **[Technical and economical feasibility of integrated pest management technology on intercropping system of shallot and hot pepper]**/Moekasan, T.K.; Suryaningsih, E.; Sulastrini, I.; Gunadi, N.; Adiyoga, W.; Hendra, A. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)); Martono, M.A.; Karsum 6 ill., 12 tables; 12 ref. Summaries (En,In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(3): p. 188-203.

ALLIUM ASCALONICUM; CAPSICUM ANNUUM; INTERCROPPING; INTEGRATED PEST MANAGEMENT; ECONOMIC VIABILITY; COST BENEFIT ANALYSIS.

A field experiment using a paired treatment comparison was conducted at Bojong Nagara Village, Ciledug Subdistrict, Cirebon District, West Java (approx. 5 m asl) from June until December 2002. The purpose of this study was to compare the technique and economic feasibility of IPM technology found by Indonesian Vegetables Research Institute with farmer's system on shallot and hot pepper in relay planting system. The experiment used comparison design with four replications. The plot size was 100 m^2. The results on shallot showed that IPM implementation gave more economically advantages than the farmer's system, because R/C ratio on IPM plot was 1.47 and R/C ratio on farmer's plot was 0.84, respectively. On hot pepper, the plant damage in IPM plot was lower than that in farmer's plot, but the yield on IPM plot was lower than that on farmer's plot. Implementation of IPM could suppress the use of insecticides and fungicides ca. 61.53 and 100%, respectively on shallot and 72.72 and 90.90%, respectively on hot pepper. In IPM plot, insecticide and fungicide residue in the soil decreased ca. 23.06% inhibition and 50.72% inhibition, respectively. In the other hand, the insecticide residu in the soil in farmer's plot increased ca. 8.14% inhibition, but the fungicide residue decreased ca. 20.37% inhibition. Diversity of fauna in the plantation in IPM plot was higher (22.03%) than the diversity in farmer's plot. Predators population in IPM plot was higher (11.54-55.5%) than that in farmer's plot. Population of *Bacillus* sp. and *Trichoderma* sp. in IPM plot was higher (35.31 and 58.35% respectively) than that in farmer's plot. Pesticide residue in shallot bulbs and hot pepper fruits in IPM plot was at the lower level than threshold level, but the residue in farmer's plot surpassed the threshold level.

073 MOEKASAN, T.K.

Pencampuran *Spodoptera exigua* Nuclear Polyhedrosis Virus dengan insektisida kimia untuk mortalitas larva *Spodoptera exigua* Hbn. di laboratorium. [Mixtures of SeNPV and chemical insecticides against larvae mortality of *Spodoptera exigua* Hbn. in laboratory]/Moekasan, T.K. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 8 tables; 14 ref. Summaries (En,In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(3): p. 178-187.

ALLIUM CEPA; SPODOPTERA EXIGUA; NUCLEAR POLYHEDROSIS VIRUS; TOXICITY; INSECTICIDES; SYNERGISM; LARVAE; MORTALITY.

A laboratory study has been conducted at Indonesian Vegetables Research Institute, Lembang (± 1,250 m asl), from August to November 1999. The aim of the study was to determine the effect of binary mixtures, their efficacy and lethal time against second/third instar of *S. exigua* larvae. Sample of *S. exigua* larvae were collected from farmers' field in Brebes, Central Java and mass production done in a screenhouse. A dipping method of cutting shallot leaves in a formulated of tested insecticides was used. The formulated concentration of insecticides, alone and mixtures was tested to thirty *S. exigua* larvae in a plastic cup with four replications. Mortality of *S. exigua* larvae was observed at 24 hours after exposures and repeatedly every 24 hours up to 168 hours of exposures. The mortality data was analyzed using probit analysis to determine the LC50 values. Based on LC50 value of insecticides mixtures, the addition of chlorfluazurone, betacyfluthrine, fifronile, profenofos, dimethoate, deltamethrine, lamda sihalothrine, and tebufenozide to the SeNPV, indicated synergism and increased their efficacy by 18.9; 24.3; 19.0; 19.3; 19.5; 22.3; 16.3; and 7.0 fold higher, respectively, compared to SeNPV singly. In addition, the LC50 value were ranging from 86.4 up to 136.8 hours or 4 to 6 days.

074 MOEKASAN, T.K.

***Status resistensi lima strain Plutella xylostella* L. *terhadap formulasi fipronil, deltametrin, profenofos, abamektin, dan Bacillus thuringiensis.* [Resistance study in five strains of *Plutella xylostella* (L.) to fipronil, deltamethrin, *Bacillus thuringiensis*, profenofos, and abamectin formulated products]**/Moekasan, T.K.; Sastrosiswojo, S. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)); Rukmana, T.; Sutanto; Purnamasari, I.S.; Kurnia, A. 2 tables; 11 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(2): p. 84-90.

CABBAGE; CONTROL METHODS; PLUTELLA XYLOSTELLA; BACILLUS THURINGIENSIS; INSECTICIDES; PEST RESISTANCE.

The toxicity of fipronil, deltamethrin, profenofos, abamectin, *Bacillus thuringiensis* subsp./var kurstaki strain EG 7841 (crymax WDG), and *B. thuringiensis* subsp./var. kurstaki strain HD-7 (dipel WP), was

assessed in the laboratory against field strains of diamond back moth (DBM), *Plutella xylostella* (L.) from Lembang, Pangalengan, Kejajar/Dieng, Batu, and Berastagi cabbage growing areas using a leaf-dip bioassay using second or third instar larvae. Results indicated that there were differences in DBM susceptibility depending upon their origin. In general, Lembang, Pangalengan, Kejajar/Dieng, and Batu DBM strains were highly resistant to deltamethrin and profenofos except for Berastagi DBM strain was unknown, based on their LC50 values. All DBM field strains (Lembang, Pangalengan, Kejajar/Dieng, Batu, and Berastagi) were susceptible to fipronil and *B. thuringiensis* subsp./var strain kurstaki EG 7841 (crymax WDG), except for Pangalengan strain indicated slightly resistant to crymax WDG. Highly resistant was shown by DBM strains from Lembang, Pangalengan, and Berastagi to *B. thuringiensis* subsp./var kurstaki strain HD-7 (dipel WP), and moderate resistant was shown by DBM strains from Kejajar/Dieng and Batu to abamectin. Results from laboratory bioassay suggest that populations of *P. xylostella* from the centers of most vegetable growing areas have evolved resistance to deltamethrin and profenofos, and partly to *B. thuringiensis* and abamectin. This study also proved that routine monitoring on the development of DBM resitance to commonly used of insecticides by cabbage farmers is very important. Result of this study is useful to establish baseline data of LC50 and strategy for insecticide resistance management.

075 PRAYOGO, Y.

***Integrasi antara cendawan entomopatogen Verticillium lecanii dengan predator Oxyopes javanus* Thorell (Araneida: Oxyopidae) *untuk mengendalikan hama pengisap polong kedelai Riptortus linearis.* [Integration of entomopathogenic fungi *Verticillium lecanii* with *Oxyopes javanus* to control pod sucking *Riptortus linearis* on soybean]**/Prayogo, Y.; Suharsono (Balai Penelitian Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)) 1 ill., 2 tables; 33 ref. Summaries (En, In). *Habitat* (Indonesia) ISSN 0853-5167 (2005) v. 16(4): p. 241-250.

GLYCINE MAX; RIPTORTUS; VERTICILLIUM LECANII; OXYOPES; PREDATORS; BIOLOGICAL CONTROL AGENTS; MORTALITY.

A study on the compatibility of entomopathogenic fungi *Verticillium lecanii* and generalist predation *Oxyopes javanus* to pod sucking bug *Riptortus linearis* was conducted at plant protection laboratory of Indonesian Legumes and Tuber Crops Research Institute (ILETRI) during January to June 2005. The research consisted of: (1) the effect of *V. lecanii* on the survival rate of *O. javanus*, and (2) the effect of application of *V. lecanii* in predation of *O. javanus* to the nymph of *R. linearis*. The result showed that the application of *V. lecanii* at concentration 10^7 - 10^{11} conidia/ml did not affect the survivorship of *O. javanus*. The fungus conidia on the *O. javanus* integument was dried and died. The *O. javanus* did not prefer to feed on fungal-infected pod sucking bug nymph. It is presumed that integration of *V. lecanii* and predator *O. javanus* was recommended.

076 PURBADI

***Pemanfaatan agen hayati untuk pengendalian nematoda bengkak akar pada tanaman krisan.* [Use of biological agent to control root knot nematodes (*Meloidogyne* spp.) on Chrysanthemum]**/Purbadi; Marwoto, B. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 1 table; 15 ref. Summary (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 287-291.

DENDRANTHEMA MORIFOLIUM; MELOIDOGYNE; PAECILOMYCES; BIOLOGICAL CONTROL AGENTS; MICROBIAL PESTICIDES; DOSAGE EFFECTS.

Root knot nematode (*Meloidogyne* spp.) is one of production constraints in chrysanthemum cultivation. So far some efforts have been made to control the nematode by using synthetic chemicals which is potentially cause environmental damage. Therefore, other control measures which more effective have to be determined. In this study *P. lilacinus* fungi was used as biological control of *Meloidogyne* spp. applied in three formulations. The experiment was conducted in laboratory and greenhouse of Segunung Research

Institute of Ornamental Plant from January until December 2001. The aim of the research was to obtain effective formulation and easy to apply in the field. The biological agent consist of three kinds of formulations i.e. pellet, compost and suspension. Efficacy evaluation of the formula were conducted in the plastic pots filled with one liter sterilized soil media. Every formula with certain dosage to be infested to the soil media. The soil media in the pot which have been infested with biological agents formula were immediately infested with 1000 populations of second stage larvae of *Meloidogyne* spp. each pot and then incubated in the room temperature. After seven days incubation, Chrysanthemum seedling were planted in the pot. The experiment was conducted in a completely randomized design (CRD) with three replications. *P. lilacinus* as biological agent was applied in three kinds of formulations and three levels of dosages. Evaluation of the antagonistic activities between the biological agent and *Meloidogyne* spp. based on the number of galls formation in every 10 gram of fresh root. The number of galls were evaluated on 40 days after planting. The result showed that compost and suspension formula with 9 gram/pot were effective to reduce root knot nematode attack in chrysanthemum.

077 SETIAWATI, W.
***Parasitoid E. argenteopilosus sebagai agen pengendali hayati hama H. armigera, S. litura, dan C. pavonana pada tumpangsari tomat dan brokoli.* [*Eriborus argenteopilosus* as a biocontrol of *H. armigera*, *S. litura*, and *C. pavonana* on tomato and broccoli cropping system]**/Setiawati, W.; Uhan, T.S.; Somantri, A. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 5 ill., 7 tables; 14 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 279-287.

LYCOPERSICON ESCULENTUM; BRASSICA OLERACEA; BIOLOGICAL CONTROL AGENTS; PARASITOIDS; CROCIDOLOMIA; SPODOPTERA LITURA; HELICOVERPA ARMIGERA; NATURAL ENEMIES; CROPPING SYSTEMS.

Yield loss due to *H. armigera* is up to 52%. Chemical pesticide has been intensively used in pest control, but did not totally control the pests. Integration of parasitoid with insecticide can reduce population of pests. The purpose of this experiment was to know the efficacy of *E. argenteopilosus* against *H. armigera*, *S. litura*, and *C. pavonana* on tomato and broccoli cropping system. The experiment was conducted in the field of Indonesian Vegetables Research Institute from June to November 2002. Split plot design was used in this experiment with 4 replications. Released of parasitoid was used as main plot, consisted of released and without released of parasitoid. Insecticide was used as subplot, consisted of without insecticide, Deltamethrin and Spinosad insecticide. The results of this experiment indicated that augmentation released of *E. argenteopilosus* parasitoid can reduce population of *C. pavonana* and *S. litura* on broccoli 24.71 and 97.24%, respectively and *H. armigera* on tomatoes up to 18.45%. The use of Spinosad can reduce population of *C. pavonana* and *S. litura* on broccoli 95.41 and 100%, respectively and *H. armigera* on tomatoes up to 94.83%. The highest parasitism was found on *H. armigera* of 38.96%, *C. pavonana* 25.83% and *S. litura* 24.44%. Augmentation released of parasitoid and the use of insecticide gave the highest yield compare to control. The use of insecticide can reduce population of parasitoid up to 3.27% for Spinosad and 50.42% for Deltamethrin. Pest control using integration of parasitoid with selective insecticide could promote environmental and food safety.

078 SETIAWATI, W.
***Pengendalian kutu kebul dan nematoda parasitik secara kultur teknik pada tanaman kentang.* [Cultural practices control technique of whitefly and parasitic nematode on potato]**/Setiawati, W.; Asandhi, A.A.; Uhan, T.S.; Marwoto, B.; Somantri, A.; Hermawan (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 1 ill., 4 tables; 30 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 288-296.

SOLANUM TUBEROSUM; BEMISIA TABACI; MELOIDOGYNE; NEMATODA; PEST CONTROL; CROPPING SYSTEMS; INTERCROPPING.

Bemisia tabaci and *Meloidogyne* spp. are important pests on potato. Cultural practices are alternative control to these pests. This study was conducted at Indonesian Vegetables Research Institute (IVEGRI) from June to November 2002. The purpose of this experiment was to determine effectiveness of cultural practices control technique for *B. tabaci* and *Meloidogyne* spp. nematode which environmentally and food

safety concern. Split plot design was used in this experiment with 4 replications. Soil management was used as main plot, consisted of without solarization and without subsoiling; and solarization and subsoiling. Cropping system used as subplot were potato monocrop, potato-bunching onion, potato-marigold and potato-radish. The results showed that cultural practices control (soil management and cropping system) could reduce population of pests on potato. Population of pests such as *B. tabaci*, *M. persicae*, *P. operculella*, *T. palmi* and nematode were lower on cropping system between potato-bunching onion, potato-marigold, and potato-radish. The use of subsoiling, solarization and cropping system between potato and marigold could reduce population of *B. tabaci*, *M. persicae*, *P. operculella*, *T. palmi* up to 46.25, 78.65, 31.48, and 35.38%, respectively. The use of subsoiling, solarization, and cropping system between potato and marigold suppressed population of *Meloidogyne* spp. and other nematoda such as *Rotylenchulus* sp., *Helicotylenchus* sp., *Tylenchulus* sp., *Xiphynema* sp., and *Trichodorus* sp. on potato and gave the highest yield up to 9.36-10.05 t/ha compared with other treatments. Soil management and use of antagonistic or trap crops in cropping system could effectively retard the population of pests and diseases on potato.

079 SIHOMBING, D.

***Preferensi kutu daun dan distribusinya di dalam tanaman pada beberapa genotipe mawar bunga potong.* [Aphid preference and its distribution inside plant on some cut rose genotypes]**/Sihombing, D.; Suhardi (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 1 table; 10 ref. Summaries (En,In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 370-373.

ROSA; CUT FLOWERS; GENOTYPES; MACROSIPHUM ROSAE; LEAF EATING INSECTS; POPULATION DISTRIBUTION; GENETIC RESISTANCE; PLANT RESPONSE.

Aphids are the major pests on cut roses. To find out this aphids preference to some genotypes of cut roses and aphids within-plant distribution on cut roses, an experiment was done at Segunung Ornamental Research Station, from May to December 1998. Randomized block design was used with four replications. In this experiment, 10 genotypes of cut roses, i.e. Alhambra, American Beauty, Apollo, Holland, Mario Callas, Misty, Mr. Lincoln, Queen Elizabeth, clone no. 91012-5 and 91032-1 were tested. The result showed that Alhambra and Holland tend to more resistant to aphids than the other genotypes. The aphid populations would spread out to all of leaves (top, middle and bottom leaves).

080 SUNARTO, D.A.

***Interaksi antara Trichogrammatoidea bactrae* N. *dan Trichogrammatoidea armigera* N. *pada telur hama penggerek buah kapas Helicoverpa armigera* Hbn. [Interaction of *Trichogrammatoidea armigera* N. and *Trichogrammatoidea bactrae* N. on cotton-bollworms *Helicoverpa armigera* Hbn. eggs]**/Sunarto, D.A.; Nurindah; Sujak (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 7 tables; 16 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 152-158.

GOSSYPIUM; HELICOVERPA ARMIGERA; TRICHOGRAMMATOIDEA; BIOLOGICAL CONTROL AGENTS; PREDATORS; PARASITOIDS.

Cotton bollworms *Helicoverpa armigera* Hubner. (Lepidoptera: Noctuidae) and *Pectinophora gossypiella* Saunders (Lepidoptera; Gelechiidae) are two of cotton pests in Indonesia. Inundation releases of *Trichogrammatoidea armigera* N. could control *H. armigera* population, but not *P. gossypiella*. The potential egg parasitoid of *P. gossypiella* is *Trichogrammatoidea bactrae* N. The objective of this research is to study the interaction between *T. bactrae* (emerged from *P. gossypiella* collected from Lamongan (*T. bactrae* - L) and collected from Asembagus (*T. bactrae* - A) with *T. armigera*. The study was conducted in Biological Control Laboratory of ITOFCRI, March - December 2002. The tested interactions were (1) adult interaction with different density of parasitoids and the host *H. armigera* eggs; (2) pre-adult interactions in *H. armigera* eggs with subsequently exposed the eggs to *T. armigera* and *T. bactrae* - A/*T.*

bactrae - L. The results showed that *T. armigera* dominates the adult interaction with *T. bactrae* - A /*T. bactrae* - L. Total domination of all treatments was 6:95 or the probability of higher proportion of *T. armigera* to parasitize *H. armigera* than that of *T. bactrae* was 0.94. *T. armigera* also dominates pre-adult interaction with *T. bactrae* - A, but *T. bactrae* – L dominates *T. armigera*. The dominance value of *T. armigera* against *T. bactrae* - A was 0:21 or probability of the higher proportion of *T. armigera* survival than that of *T. bactrae* - A was 1. The dominance value of the higher proportion of *T. bactrae* – L survival than that of *T. armigera* was 0.84. Based on the results, prospective biocontrol agent of *P. gossypiella* is *T. bactrae* - A. Mass release of *T. bactrae* - L may interfere the effectiveness of *T. armigera* on *H. armigera* eggs.

081 YULIANI, S.
***Efektivitas lilin penolak lalat (repelen) dengan bahan aktif limbah penyulingan minyak nilam.* [Effectiveness of repellent candle with the extract solution of patchouli distillation waste as the active component]**/Yuliani, S.; Usmiati, S.; Nurdjannah, N. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)) 1 ill., 5 tables; 23 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v. 2(1): p. 1-10.

POGOSTEMON CABLIN; DISTILLING; SOLID WASTES; WASTE UTILIZATION; REPELLENTS.

The effectiveness of repellent candle was examined at laboratory of Indonesian Center for Agricultural Postharvest Research and Development and Entomology Laboratory of Veterinary Faculty of Bogor Agricultural University. Patchouli distillation waste was extracted using methanol with ratio of 1:4 and then formulated into 9 formulas of candle. The combination of active compound in the formula were: (a) mixing of patchouli distillation waste and citronella oil (1:1) with of 12.5%; 25% and 50% concentration; (b) mixing of patchouli distillation waste and clove oil (1:1) with 12.5%; 25% and 50% concentration; (c) citronella oil (25%); (d) clove oil (25%) and (e) without active compound as control. The effectiveness determination of repellent activity on flies was conducted using 12 hours decayed shrimp. The trial was using 25 flies 2-5 days age which already fully fed with sugar solution. The observation was conducted every minute in glass chamber by counting flies which lied on the decayed shrimps, for the period of 60 minutes. The results showed that the optimum formula was combination of active compound of distillation waste from patchouli and clove oil (concentration 50%) with 87.6% repellent activity at the tenth minutes and 100% at the sixtieth minutes.

H20 PLANT DISEASES

082 GUNAWAN, O.S.
***Uji efektivitas biopestisida sebagai pengendali biologi terhadap penyakit antraknosa pada cabai merah.* [Effectivity of biopesticides as biological control to anthracnose disease on red pepper]**/Gunawan, O.S. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 2 tables; 14 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2005) v. 15(4): p. 297-302.

CAPSICUM ANNUUM; PSEUDOMONAS FLUORESCENS; BACILLUS SUBTILIS; COLLETOTRICHUM; BIOPESTICIDES; DOSAGE EFFECTS.

Objectives of the experiment was to determine the effect of various concentration formulations of *Pseudomonas fluorescens* PfMBO 001 50 WP and *Bacillus subtilis* BsBE 001 50 WP to anthracnose disease on red pepper. The experiment was conducted at the greenhouse of Indonesian Vegetables Research Institute Lembang from September to December 2003. Jetset variety of pepper was used. The experiment was arranged in a randomized block design, consisted of 8 treatments, i.e. PfMBO 001 50 WP (concentration: 0.7 g/l, 0.35 g/l, 0.175 g/l), BsBE 001 50 WP (concentration: 0.7 g/l, 0.35 g/l, 0.175 g/l), fungicide Bion 1/48 WP 2 g/l, and control using water, with 4 replications. Results of this study showed that application of biopesticide formulation of PfMBO 001 50 WP and BsBE 001 50 WP 0.7 g/l, gave the best result to suppress the intensity of anthracnose disease at 2.60% and 2.76% and was not significantly different with standard fungicide Bion 1/48 WP 2 g/l (2.07%), and significantly different with the other treatments.

083 HANUDIN

Pemanfaatan Pseudomonas fluorescens, Gliocladium dan Trichoderma untuk mengendalikan penyakit layu fusarium pada krisan. **[Utilization of *Pseudomonas fluorescens*, *Gliocladium* sp. and *Trichoderma* sp. to control *Fusarium oxysporum f.sp. tracheiphilum* on Chrysanthemum]**/Hanudin; Nuryani, W.; Kardin, K.; Marwoto, B. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 5 tables; 24 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 271-278.

DENDRANTHEMA MORIFOLIUM; BIOLOGICAL CONTROL AGENTS; FUSARIUM OXYSPORUM; MICROBIAL PESTICIDES; PSEUDOMONAS FLUORESCENS; TRICHODERMA; GLIOCLADIUM; DISEASE TRANSMISSION.

Fusarium wilt on chrysanthemum caused by *Fusarium oxysporum* f.sp. tracheiphilum is serious problem on chrysanthemum cultivation. Nowaday, farmer use synthetic chemical fungicides to control the disease. However, the effect was not satisfy. So that, it is necessary to find out the other alternatives. One of the alternatives is to apply antagonist microbes like *Pseudomonas fluorescens*, *Gliocladium* sp. and *Trichoderma* sp. The research was carried out at laboratory and under UV plastics at Indonesian Ornamental Crop Research Institute (IOCRI, Cianjur) at 1,100 m asl, from June to December 2002. The laboratory activities included identification of *P. fluorescens*, while the effectiveness of those antagonist microbes to the pathogen was tested in the green-house using bioassay method. The purpose of study was to determine the effectiveness of *Pseudomonas fluorescens*, *Gliocladium* sp., and *Trichoderma* sp. against *Fusarium oxysporum* f.sp. tracheiphilum. The treatments were *P. fluorescens* strains number PF 4a, Pf 9, and MR 96 which were streaked on King's B medium containing 0.01 M FeCl3, incubated at $30^0C \pm 2^0C$ for 24 hours. Then they were harvested and suspended onto 0.1 M $MgSO_4$ solution. Chrysanthemum var. Yellow Fiji were used. Each treatment consisted of 20 plants. The experiment was designed in randomized completely block design with three replications. The treatments were PF 4a, Pf 9, and MR 96 streaked on King's B medium containing 0.01 M FeC13 and non, then they were suspended to 0.1 M $MgSO_4$ solution. While *Gliocladium* sp. and *Trichoderma* sp. on five days old were suspended on to sterile water. The antagonist microbes were applied with dipping and drenching method to the chrysanthemum roots, then applied at 7 days intervals. The results indicated that all of the Pf isolates were produce fluorescens pigment. According to Gramm test, Pf 01 and 02 were positive reaction, while the other isolates were negative. Pf 4a streaked on King's B medium containing 0.01 M FeC13, then suspended to 0.1 M $MgSO_4$ showed the widest inhibition zones (average was 0.95 cm) and also consistently suppress *Fusarium oxysporum f.sp. tracheiphilum* on Chrysanthemum up to 72.51%.

084 RAHARDJO, I.B.

Pengaruh vaksin CARNA 5 untuk memproteksi virus mosaik ketimun (CMV) pada tanaman krisan varietas Remix Red. **[Effect of vaccine CARNA 5 to protect cucumber mosaic virus (CMV) on Chrysanthemum Remix Red variety]**/Rahardjo, I.B.; Sulyo, Y.; Diningsih, E. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 2 tables; 13 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 279-285.

DENDRANTHEMA MORIFOLIUM; VARIETIES; VACCINES; CUCUMBER MOSAIC CUCUMOVIRUS; DISEASE CONTROL; SYMPTOMS; MORBIDITY; GRAFTING.

One of virus that attack chrysanthemum is CMV. The alternative of CMV control on plant is the use of vaccine CARNA 5. The objective of the experiment was to find out the effect of CARNA 5 application at different plant ages for controlling CMV on chrysanthemum of Remix Red variety. The experiment was conducted in Virology Laboratory of IOCRI in Segunung, Pacet, Cianjur, West Java, from January to December 2002. Split-plot design with 3 replications was used. The main plot was grafting on plant age:

(1) 0 week after planting, (2) 2 weeks after planting, (3) 4 weeks after planting. The subplot was treatment of vaccine and CMV: (1) without vaksin and CMV, (2) CMV, (3) vaccine, and (4) vaccine and CMV. The result showed that: (1) Chrysanthemum treated with vaccine application and control plants were not showed mosaic symptom, (2) Treatment of grafting on plant age (0, 2 and 4 week after planting) were not significantly different, (3) Parameter of plant height, flower diameter and virus absorbance value were not significantly different, but flower number on without treatment was significantly different compared to treatments of CMV, vaccine, vaccine + CMV, (4) The color quality of the flower showed that all treatments did not make breaking color, but CMV treatment on Remix Red variety showed abnormal flower form, (5) The vaccine application was able to protect chrysanthemum plants from CMV.

085 RAHARDJO, I.B.

Uji kepekaan gamma-globulin antiserum poliklonal cucumber mosaic virus untuk deteksi cepat CMV dengan metode ELISA tidak langsung pada tanaman tapak dara. **[Sensitivity test of gamma-globulin of cucumber mosaic virus polyclonal antiserum for rapid detection of CMV with indirect ELISA on *Vinca* sp.]**/Rahardjo, I.B.; Sulyo, Y.; Diningsih, E. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 2 tables; 11 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(2): p. 101-106.

CATHARANTHUS ROSEUS; CUCUMBER MOSAIC CUCUMOVIRUS; ELISA; DISEASE CONTROL METHODS; IMMUNOGLOBULINS; POLYCLONAL ANTIBODIES.

Cucumber mosaic virus is one of the major pathogens on some horticulture crops including *Vinca* sp. A rapid detection method should be developed to support the evaluation of initial infection of the virus on crops. A serological method commonly used for rapid detection of plant viruses is ELISA. The objectives were to produce purified gamma-globulin of CMV antiserum and to determine the optimum concentration for rapid detection of the virus. The experiment was done in Virological Laboratory of lndonesian Ornamental Crops Research Institute in Segunung, from January to December 2001. A polyclonal CMV antiserum had been produced by injections of purified CMV into rabbit with the concentration of 1 mg/ml, each injection from previous research. Clark and Adam method for gamma-globulin purification was followed. Gamma-globulin concentration was measured with spectrophotometer on wave length of 280 nm. The test of gamma-globulin sensitivity was carried out with indirect ELISA method. The results showed that the gamma-globulin concentration obtained in this study was 1 mg/ml. The optimum concentration of the gamma-globulin for CMV detection with indirect ELISA was 1 µ gram/ml with 1/25,000 and 1/100 of enzyme conjugated goat antirabbit dilution and samples, respectively, or the optimum concentration of the gamma-globulin was 1 µ gram/ml with 1/10,000 and 1/100 of enzyme conjugated goat antirabbit dilution and samples, respectively.

086 SUPRIADI

Patogenisitas isolat Phellinus noxius pada jambu mete dan beberapa jenis tanaman berkayu lainnya. **[Pathogenicity of *Phellinus noxius* isolated from diseased cashew and other woody plants]**/Supriadi; Adhi, E.M.; Rahayuningsih, S.; Karyani, N. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)); Dahsyat, M. 1 table; 12 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v. 10(1): p. 8-11.

ANACARDIUM OCCIDENTALE; WOODY PLANTS; PATHOGENICITY; PHELLINUS NOXIUS.

Brown root rot symptom on cashew in Sumbawa, especially in Pekat District, Dompu, West Nusa Tenggara is associated with the attack of *Phellinus noxius*. The pathogenicity of this fungus has not been proven scientifically. This experiment was aimed to analyse the result of pathogenicity test of *P. noxius* isolate on the seedlings of cashew and 6 other woody plants. This research was done in 2003 in the laboratory and glasshouse of the Indonesian Spice and Medicinal Crop Research Institute. The *P. noxius* isolate was obtained from the infected cashew in Pekat District, Dompu, West Nusa Tenggara, then multiplied in the mixture of rice and corn medium in the 250 ml jam bottle. The one month fungus culture was inoculated on the stem base of the seven woody plants, namely cashew (*Anacardium occidentale*) Balakhrisnan cultivar, cinnamon (*Cinnamommum cassia* and *C. burmanii*), coffee (*Coffea arabica*), castor (*Jatropha curcas*), kapok (*Ceiba pentandra*), and cassava (*Manihot utilissima*) grown in plastic pots. The

result of this experiment indicated that the six kinds of plants inoculated with *P. noxius* showed disease symptoms, such as wilting and yellowing of the leaves and died in about 2 - 3 weeks up to 2 months after inoculation. The only plant that was not died, but showed different symptom was cassava, its growth was very stunted but not died. The two plants, i.e. cashew and castor were new host plants for *P. noxius*. Considering the viciousness of *P. noxius* attack on the inoculated seedlings, therefore the awareness to prevent the spread of this disease to other cashew plantations in West Nusa Tenggara should be raised.

H60 WEEDS AND WEED CONTROL

087 MAHFUDZ
Periode kritis tanaman jagung terhadap pengendalian gulma. **[Critical period of weed control in maize plantation]**/Mahfudz (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian); Chozin, M.A.; Soekisman, T.; Sudarmiyati, S. 4 ill., 3 tables; 10 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(13): p. 221-228.

ZEA MAYS; WEED CONTROL; GROWTH; YIELDS.

This research aimed at investigating the critical period of weed control in maize plantation. The experiment was conducted from January to April 2003 in Wanga, North Lore, Poso District at approximately 1127 m above sea level. The critical period of weed control in maize plantation was determined by establishing a weed-free condition for certain period of time and also allowing weed and the maize to grow together for certain period of time. The experiment was laid out in a single factor randomized complete block design. Weeded and weed-free plantation were then compared, each consisting of seven treatments. The results indicated that both weeded and weed-free periods significantly affected the growth and yield of maize. Period of 20-50 days after planting was critical period for weed control. Allowing weed to grow up to 60 days after planting reduced up to 86.8% yield of maize.

J11 HANDLING, TRANSPORT, STORAGE, AND PROTECTION OF PLANT PRODUCTS

088 ROOSTIKA, I.
Teknik penyimpanan kentang hitam secara kultur in vitro. **[*In vitro* technique for preservation of *Coleus tuberosus* (L.) Bth.]**/Roostika, I.; Sunarlim, N.; Arief, V.N. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)) 6 ill., 6 tables; 14 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 46-52.

COLEUS PARVIFLORUS; POSTHARVEST TECHNOLOGY; STORAGE; PACLOBUTRAZOL; GROWTH RETARDANTS.

Coleus tuberosus is a minor tuber crop, which is useful for food and medicine. The plant is vegetatively propagated, thus it is suitable to be conserved through *in vitro* culture. The minimal growth technique is one of the *in vitro* preservation technique, which is done by using an osmotic regulator, growth retardants, dilution of basal medium and sucrose, or application of poor nutrient medium. The experiment was divided into three trials: (1) *in vitro* preservation by using osmotic regulator mannitol (0, 2, 4, 6 and 8%). (2) *in vitro* preservation using a retardant either ancymidol (0, 1, 2, and 3 mg/l) or paclobutrazol (0, 1, 3, and 5 mg/l), and (3) *in vitro* preservation using combination between dilution of basal media (MS and 1/4 MS) or poor nutrient media (KH and K) with dilution of sucrose (0, 1.5, and 3%). Each trial was done using a completely randomized block design, with five replications for the first trial; seven replications for the second trial, and three replications for the third trial. The results showed that paclobutrazol was more effective as retardant for preserving the culture of *Coleus tuberosus* than mannitol and ancymidol. An increase of paclobutrazol concentration up to 5 mg/l in the medium caused a higher growth inhibition to the culture. Paclobutrazol at concentration 5 mg/l maintained the cultures for 10 months. A combination between 1/4 MS and MS media, without or between KH and K media, with 3% sucrose could be used as

an alternative technique for *in vitro* preservation of *Coleus tuberosus*. MS medium without sucrose enable to preserve the cultures for more than 12 months.

089 TATIPATA, A.
***Kajian aspek fisiologi dan biokimia deteriorasi benih kedelai dalam penyimpanan.* [Study on physiology and biochemistry aspects of soybean seed deterioration in storage]**/Tatipata, A. (Universitas Pattimura, Ambon (Indonesia). Fakultas Pertanian); Yudono, P.; Aziz-Purwantoro; Mangoendidjojo, W. 8 tables; 15 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2004) v. 11(2): p. 76-88.

GLYCINE MAX; SEED; STORAGE; PLANT PHYSIOLOGY; BIOCHEMISTRY; MOISTURE CONTENT.

One of a major constraint of soybean seed in storage is rapid deterioration of its quality, especially in the tropic. The experiment aimed to study physiology and biochemistry aspects of its deterioration during storage and to find method of seed storage for keeping the quality of soybean seed. A Randomized completely block design was used in the experiment, with three factors. The first factor was moisture content, consisted of three levels i.e. 8%, 10%, and 12%. The second factor was three kinds of bag, i.e. polyethylene plastic, wheat bag and aluminium foil. The third factor was storage period, consisted of seven levels, i.e. without storage, 1, 2, 3, 4, 5 and 6 months. The results showed that the content of phospholipids of seed stored at 8% moisture content did not significantly decrease until 6 months, while protein content of membrane, inorganic phosphor and specific activity of succinate dehydrogenase decreased after 3 and 4 months. Specific activity of cytochrome oxidase and respiration rate of seed without storage at 12% moisture content and stored in wheat bag is higher than the other treatments. The germination and vigor of seed stored at 8% and 10% moisture content in all kinds of bags did not significantly decrease up to 6 months and higher as compared to the 12% moisture content.

090 YUSNAWAN, E.
***Pengaruh ekstrak kasar bahan nabati terhadap pertumbuhan Aspergillus flavus.* [Effect of botanical fungicide crude extracts on the development of *Aspergillus flavus*]**/Yusnawan, E.; Sumartini (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)) 5 ill., 2 tables; 19 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1) p. 27-32.

GROUNDNUTS; BOTANICAL PESTICIDES; ASPERGILLUS FLAVUS; PLANT EXTRACTS; ONIONS; GARLIC; GINGER.

A research aimed to obtain crude extract of botanical fungicides and their concentrations to inhibit the development and sporulation of *Aspergillus flavus* was done in the Mycology Laboratory of the Indonesian Legumes and Tuber Crop Research Institute (ILETRI), Malang, from August to December 2003. *Aspergillus flavus* and parasiticus agar (AFPA) medium, groundnut kernels, *A. flavus* isolates, and crude extracts of garlic, onion, and ginger as botanical fungicides were used in the experiment. A factorial completely randomized design with eight replications was used to determine effectiveness of the crude extracts of botanical fungicides on the development, sporulation time, and ability of *A. flavus* to produce aspergillic acid on the AFPA medium. Factor A was the botanical fungicides (crude extracts of garlic, onion, and ginger, and sterile distilled water) and factor B was concentrations of the botanical fungicides (10%, 15%, 20% and 25%). A further experiment to obtain information on effectiveness of the botanical fungicide on the development of *A. flavus* in groundnut kernels was arranged in a factorial completely randomized design with three replications. The results indicated that 10% of garlic crude extract in the AFPA medium was more effective against *A. flavus* than 10% of onion or ginger crude extracts. At 10% concentration, all the botanical fungicides inhibited the *A. flavus* colony development, sporulation, and aspergillic acid production. The colony diameter in the third day after treatment was 1.5 mm with a rate of colony development 0 mm/day. The use of 20% of garlic crude extract reduced groundnut kernel infection by *A. flavus* by 16.7%, from 26.3% to 7.0%.

J15 HANDLING, TRANSPORT, STORAGE, AND PROTECTION OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS

091 YULIANINGSIH
Pengaruh larutan kimia untuk mempertahankan kesegaran bunga mawar potong. **[Influence of chemical solution on freshness of cut rose flower]**/Yulianingsih; Amiarsi, D. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)) 1 ill., 1 table, 11 ref. Summaries (En,In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 380-385.

ROSA; CUT FLOWERS; SOLUTIONS; SOAKING; PRESERVATION; THIABENDAZOLE; SUGAR; CITRIC ACID; KEEPING QUALITY; FLOWERING.

Chemical solution is commonly used to prolong vaselife cut flowers by dipping the flower stems in a solution containing sugars and germicides before delivery to give energy and prevent the pluging of stems by microbial growth. Experiment was conducted to determine the appropriate composition of pulsing solutions to prolong the vaselife of rose cut flowers. In this experiment, five kinds and three concentrations of pulsing solutions were tested (10 ppm, 20 ppm, 30 ppm $AgNO_3$); 5 ppm, 15 ppm, 20 ppm Thiabendazole; 20 ppm, 30 ppm, 40 ppm tetracycline; 100 ppm, 200 ppm, 300 ppm tannin; 400 ppm, 500 ppm, 600 ppm gambier). Experiment was arranged in completely randomized design with three replications. The results indicated that pulsing solution of 5 ppm thiabendazole + 5% sugar + 320 ppm citric acid in the dipping period of 24 hours was the best treatments resulting in 11 days vaselife (6 days longer than control), and bud opening of 90% during expose. Availability of cut flower market can be take care of with this technological application.

092 YULIANINGSIH
Pengaruh sukrosa dan suhu penyimpanan dalam memperpanjang masa peragaan bunga mawar potong. **[Effect of sucrose solution and storage temperature on the vaselife of rose cut flower]**/Yulianingsih; Amiarsi, D. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)); Mulyawanti, I. 5 tables; 7 ref. Summaries (En, In). [Proceedings of the national seminar of floriculture: to develop floriculture industry which have competitive ability through national potential-based technology innovation application]. Prosiding seminar nasional florikultura: membangun industri florikultura yang berdaya saing melalui penerapan inovasi teknologi berbasis potensi nasional/Balai Penelitian Tanaman Hias, Cianjur. Cianjur: Balithi, 2004: p. 374-379.

ROSA; CUT FLOWERS; SUCROSE; BENZOIC ACID; STORAGE; TEMPERATURE; SOLUTIONS; KEEPING QUALITY; PRESERVATION.

Experiment was conducted to determine the appropriate composition of sucrose solution to prolong vaselife of rose cut flower. In this experiment, two kinds of sucrose solution were tested, i.e. of 2.5% sucrose and 2.5% sucrose + 100 ppm benzoic acid. The storage temperatures were 20-23 ^{0}C and 5-10 ^{0}C. Experiment was arranged in a completely randomized design with five replications. The results indicated that sucrose solution of 2.5% sucrose + 100 ppm benzoic acid was the best treatment with vaselife of 28 days (9 days longer than control) with bud opening of 83-100%. The result implied of this research can be exploited to arrange cut flower supply to market.

K10 FORESTRY PRODUCTION

093 SYAMSUDDIN
Pengaruh penerapan sistem mutu ISO-9000 terhadap kinerja operasional industri kayu berskala besar di Kota Palu. **[Effect of ISO-9000 system on operational performance of large-scale timber industry in Palu (Indonesia)]**/Syamsuddin (Universitas Tadulako, Palu (Indonesia). Fakultas Ekonomi) 1 ill., 2 tables; 14 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 284-290.

WOOD INDUSTRY; QUALITY; STANDARDS; SULAWESI.

This study aimed to find out the effect of ISO-9000 system in the production system, role and implementation of management on the operational performance of large-scale timber industry in Palu. The investigation showed that the industry performance was affected by ISO-9000 system as much as 73.8%. The rest effect was contributed by external factors. Partial effect of ISO-9000 system was found to be as large as 39.5, 21.7, and 12.6% on production system, management implementation, and management role, respectively.

094 UMAR, S.
Nilai ekonomi strata tegakan agroforest pampa pada zone pemanfaatan tradisional Taman Nasional Lore Lindu. **[Economic value of agroforest pampa stand strata in traditional use zone of Lore Lindu National Parks (Indonesia)]**/Umar, S. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 2 ill., 1 table; 8 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 249-253.

SULAWESI; AGROFORESTRY; ECONOMIC VALUE; TRADITIONAL USES; NATIONAL PARKS.

The aim of this research was to calculate the direct economic value of agroforest pampa stand based on its stratification. Stratification was established by applying Ogawa method to inventory results from the area of agroforest-pampa stand of one ha located in Traditional Use Zone of the Lore Lindu National Park in Palolo Subdistrict. Economic evaluation methods (Market Price Approach, Direct and Indirect Substitution Approaches) were applied to find out the direct economic value of each stratum of the stand. The relation between numbers of stratum with the direct economic value was analyzed by using Least Square Regression. The largest annual direct economic value (Rp 17,214,200/ha) was obtained from the seventh strata and the second largest (Rp 4,520,000/ha) was found on sixth strata. Regression equation shows that addition or subscription of one stratum in the stand would result in 0.000004 unit of changes in the seventh strata economic value and 0.000006 unit of changes in the sixth strata economic value.

L01 ANIMAL HUSBANDRY

095 RAHIM, L.
Pengaruh bangsa dan umur terhadap sifat-sifat karkas sapi yang diukur dengan ultrasonografi. **[Effect of breed and age on carcass traits of cattle with ultrasonography measurement]**/Rahim, L. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan) 2 tables; 24 ref. Summaries (En, In). *Buletin Ilmu Peternakan dan Perikanan* (Indonesia) ISSN 0853-3555 (2005) v. 9(1): p. 33-40.

CATTLE; CARCASSES; FATTENING; HIGH YIELDING BREEDS; AGE ; ECHOGRAPHY; ULTRASONICS; CARCASS COMPOSITION.

The ultrasonic estimates of carcass traits were collected from 101 cattle on fattening at PT Perkebunan Nusantara XIV, Takalar Regency, South Sulawesi in 2002. The aim of research was to clarify effects of breed and age on carcass traits of cattle using ultrasonography. All animals were ultrasonically scanned to estimate the longissimus muscle area (OLD) between the ribs 6 and 7, subcutaneous fat thickness (LSC) and intramuscular fat thickness (LIM). The data of carcass traits were statistically analyzed according to analysis of variance of completely randomized design using statistical package SPSS 10.0 version for windows. The results indicated that OLD area, LSC thickness, and LIM score for Santa Gertrudis were higher ($P < 0.05$) than those for Brahman Cross and bali cattle. Across age groups, age more than 3-4 years had OLD area, LSC thickness, and LIM score higher ($P < 0.05$) than those for 1-2 years and more than 2-3 years both for Brahman Cross and bali cattle.

096 ZAKARIA, S.
Kualitas telur ayam buras yang dipelihara dengan sistem pemeliharaan intensif dan semi intensif. **[Egg quality of native chicken raised on intensive and semi intensive system]**/Zakaria, S. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan) 1 table; 10 ref. Summaries (En, In). *Buletin Ilmu Peternakan dan Perikanan* (Indonesia) ISSN 0853-3555 (2005) v. 9(1): p. 61-69.

CHICKENS; EGGS; QUALITY; LAYING PERFORMANCE; POULTRY FARMING.

Research was conducted to investigate egg quality of native chicken raised from either intensive or semi intensive care system with different ratio of cock and hen. The experiment was conducted factorially (2 x 3) according to completely randomized design. The first factor was the care system, namely intensive and semi intensive and the second factor was different sex ratio (cock : hen), namely 1:5, 1:7, and 1:9. Each treatment combination was repeated twice. Eighty four of native hens were randomly allocated into 12 roof cages, 6 cages for intensive and semi intensive care system respectively. The number of hens for each cage was either 5, 7, or 9 depending on the allocation for the sex ratio treatment with one cock for each cage. Dimension of the cage was 2 m x 2 m. Additional space of 2 m x 4 m surrounded by bamboo fence was provided in front of each cage for semi intensive system which served as an exercise yard during the day. For egg quality evaluation, 180 eggs, 90 eggs from each system were used. Analysis of variance indicated that the care system, sex ratio, and interaction between care system and sex ratio did not affect ($P > 0.05$) egg weight, egg index, air shell, egg shell weight, egg shell thickness, albumen index, albumen weight, egg yolk viscosity, and egg yolk weight. However, care system affected ($P < 0.05$) the color of egg yolk which the yolk color from the semi intensive system was darker than that of intensive system (8.22 ± 0.35 vs 7.22 ± 0.50).

L02 ANIMAL FEEDING

097 BINTANG, I.A.K.
Pengaruh tingkat penambahan bioaktif lidah buaya terhadap produksi telur ayam. **[Effect of *Aloe vera* bioactive level as feed additive on the egg performances of laying hens]**/Bintang, I.A.K.; Sinurat, A.P.; Purwadaria, T. (Balai Penelitian Ternak, Bogor (Indonesia)) 1 table; 18 ref. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 85-89.

LAYER CHICKENS; RATIONS; BODY WEIGHT; EGG PRODUCTION; FEED ADDITIVES; LAYING PERFORMANCE; ALOE BARBADENSIS; FEED INTAKE.

A study on the use of *Aloe vera* bioactives as feed additive in layer ration was conducted. One hundred and twenty pullets strain Isa Brown were allocated into 5 treatments with 6 replicates and 4 birds/replicate. The treatments were: control, control+antibiotic (50 ppm zinc bacitracin), and control+*Aloe vera* at three levels (0.25; 0.50 and 1.00 g/kg). The treatments were conducted in a completely randomized design. Parameter measured were first initial body weight, age at 1st lay, feed intake, egg weight, hen day (% HD) and feed conversion ratio. The results showed that antibiotic and *Aloe vera* used as additive for 9 months production did not significantly ($P > 0.05$) affect all parameter measured, except feed intake of hens fed diet containing 0.5 g/kg *Aloe vera* was significantly ($P < 0.05$) higher than control. The addition of *Aloe vera* at 1.0 g/kg significantly ($P < 0.05$) reduced the feed intake as compared with the control, *Aloe vera* 0.25 and 0.50 g/kg. The use of *Aloe vera* (1.00 g/kg) produced egg weight significantly ($P < 0.05$) higher than the control, and feed conversion ratio was significantly ($P < 0.05$) better than the control and *Aloe vera* (0.25 g/kg). It is concluded that the best treatment was the diet with *Aloe vera* level at 1.00 g/kg. This treatment improved feed efficiency 8.40%.

098 ELLA, A.
Respon pemberian bioplus serat dan jerami fermentasi terhadap pertumbuhan ternak sapi bali bakalan pada pengembangan sistem integrasi padi-ternak (SIPT). **[Response of bioplus fiber and rice straw fermentation on the growth of young bali cattle in the program of crop livestock system (CLS)]**/Ella, A.; Nurhayu, A.; Pasambe, D. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)) 4 ill., 1 table; 14 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop

livestock systems]. Prosiding seminar nasional sistem integrasi tanaman ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 142-147.

CATTLE; ORYZA SATIVA; FEEDS; RATIONS; RICE STRAW; FERMENTATION; PROBIOTICS; AGROPASTORAL SYSTEMS; BODY WEIGHT.

An experiment was conducted to look at the effect of bioplus fiber to the intake of the high fiber feed. Sixteen young bali cattle were used, divided into four blocks, each block consisted of four head of cattle and four treatments with four replications. The treatments were (A) 150 g bio plus + 2 kg rice bran + rice straw, (B) 200 g bioplus + 2 kg rice bran + rice straw, (C) 250 g bioplus + 2 kg rice bran + rice straw, and (D) Control (farmer condition) in program of crop livestock system (CLS). Results showed that the highest daily gain was on treatment C (0.55 kg/head/day) which was given 250 g bioplus fiber, and there were significant different with other treatments. Average of body weight from treatment C (0.056 cm/day) was not significantly different with other treatments. The increased body length in treatment B (0.088 cm/day) was significantly different from treatment A, but not from treatment C and D. The average of the chest girth from all treatments were not significantly different. There were correlation between body weight, body length and chest girth, with daily gain.

099 KRISNAN, R.

***Pengaruh pemberian ampas teh (Camellia sinensis) fermentasi dengan Aspergillus niger pada ayam broiler.* [Effect of application of tea (*Camellia sinensis*) waste fermented with Aspergillus niger on broiler]**/Krisnan, R. (Loka Penelitian Kambing Potong, Galang (Indonesia)) 2 tables; 18 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 1-5.

BROILER CHICKENS; RATIONS; FEEDS; CAMELLIA SINENSIS; WASTES; FERMENTED PRODUCTS; BODY WEIGHT; PROXIMATE COMPOSITION; PROTEIN QUALITY.

The purpose of this experiment is to find out the effect of *Aspergillus niger* fermented tea (*Camellia sinensis*) waste in feed on body weight gain, protein efficiency and percentage of carcass of broiler. The experiment was conducted in a completely randomized design using 100 day old chicks (DOC) Avian CP-707 strain. The animal were devided into five treatments of ration. Each treatment was replicated four times. All dietary treatments were formulated based on fermented tea-waste content, namely: R0 (0.0%), RI (2.5%), R2 (5.0%), R3 (7.5%), and R4 (10.0%). The results indicated that broilers gave the best responses to the RI (2.5% fermented tea-waste) to all measured parameters. Positive responses also observed in broilers given ration containing fermented tea-waste up to the level 7.5%, however, at the level 10.0% decreased body weight gain, but the protein efficiency and the carcass percentage were equal to the R0 (control ration).

100 MAHMILIA, F.

***Perubahan nilai gizi tepung eceng gondok fermentasi dan pemanfaatannya sebagai ransum ayam pedaging.* [Change of the nutritional value of the fermented *Eichhornia crassipes* Mart. meal as broiler rations]**/Mahmilia, F. (Loka Penelitian Kambing Potong, Galang (Indonesia)) 4 tables; 17 ref. *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 90-95.

BROILER CHICKENS; RATIONS; EICHHORNIA CRASSIPES; NUTRITIVE VALUE; FERMENTATION; WEIGHT GAIN.

Eichhornia crassipes Mart. is one of the water plants which grows in the rivers, rice fields, water reservoirs or dams. This plant is often considered as water weeds that harm people. This weed can be used for feeding animal, but it has high crude fiber. Fermentation technology could be done to overcome the problem. *E. crassipes* Mart. is grounded into meal and solidly fermented by mixing minerals and *Trichoderma harzianum* for 4 days at room temperature. The fermentation increases the nutritional value. The crude protein increases for 61.81% (from 6.31 to 10.21%) and crude fiber decreases for 18% (26.61 to 21.82%). The *in vivo* experiment was conducted based on completely randomized design using 80 day old broiler chicks with 5 replication. They were allotted to 4 diets containing one control without fermented *E.*

crassipes Mart., 5, 10 and 15% of fermented *E. crassipes* Mart. Diets were fed *ad libitum* for 6 weeks. Feed intake, weight gain and feed conversion ratio, carcass and abdominal fat were observed as parameters. Result showed that no parameter were significantly affected by treatments, although the nutritional values were slightly decreasing in higher fermented *E. crassipes*. The fermented *E. crassipes* Mart can be used up to 15% in broiler rations

101 NATSIR, A.
Pengaruh perubahan secara mendadak dari pakan hijauan ke pakan biji-bijian terhadap pH rumen dan tingkat kecepatan degradasi rumen dari jerami barley pada sapi perah. **[Effects of abrupt change from roughage based feeding to high grain feeding on rumen pH and rumen degradation rate of barley straw in dairy cows]**/Natsir, A. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan) 1 ill., 2 tables; 24 ref. Summaries (En, In). *Buletin Ilmu Peternakan dan Perikanan* (Indonesia) ISSN 0853-3555 (2005) v. 9(1): p. 21-32.

DAIRY CATTLE; FEED GRASSES; FEED LEGUME; BARLEY STRAW; RUMEN; PH; BIODEGRADABILITY; RUMEN DIGESTION; PROXIMATE COMPOSITION.

Effects of abrupt change from roughage based feeding to high grain feeding on rumen pH and rumen degradation rate of barley straw were investigated using three cannulated dairy cows, average body weight of 576 ± 42.9 kg. The experiment was divided into two periods, a preliminary period (P) which lasted for 4 weeks (day 1-28) and a challenge period (C) conducted over 3 days (day 29-31). During P, each cow was given ryegrass hay *ad libitum.* In C, which followed immediately, each cow received crushed barley as follows: on the first day (day 29), 5 kg crushed barley was given at 08:00; on the second day (day 30), 5 kg grain at 09:00 and another 5 kg at 10:00. On the last day of C, the cows were given ryegrass for recovery. Degradation characteristics of barley straw in the rumen was determined using nylon bag technique. Barley straw samples were incubated in the rumen of each cow for both periods. The bags containing the samples were then withdrawn from the rumen at 6, 12, 24, 48, and 72 h after the commencement of the incubation. The results indicated that during P, the rumen pH was well maintained around 6.80; while during C, the rumen pH significantly fluctuated. The average rumen pH during this period was 6.10. Dry matter disappearance (DMD) and fractional degradation rate (FDR) of barley straw was significantly affected by the diets. In each incubation time, the DMD for P was higher ($P < 0.01$) than that for C. Similarly the FDR for P was higher ($P < 0.01$) than that for C up to the incubation time of 24-48h. But during the last incubation time (48-72h), the FDR for C was more than five times higher than that for P. In conclusion, changing the diet abruptly from roughage to high grain feeding markedly decreased rumen pH to a critical point which in turn decreased significantly DM degradation rate of barley straw in the rumen.

102 PURBOWATI, E.
Feed cost per gain domba yang digemukkan secara feedlot dengan pakan dasar jerami padi dan level konsentrat berbeda. **[Feed cost per gain of sheep on feedlot system with different level of rice straw and concentrate as basal diet]**/Purbowati, E. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan); Baliarti, E.; Budhi, S.P.S. 3 tables; 15 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop livestock systems]. Prosiding seminar nasional sistem integrasi tanaman ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 169-174.

SHEEP; FEEDLOTS; FEEDS; RICE STRAW; CONCENTRATES; FATTENING; PROXIMATE COMPOSITION; BODY WEIGHT; ECONOMIC ANALYSIS.

The research was conducted to evaluate the effect of different level of concentrate given to sheep kept in feedlot system and fed rice straw as basal diet on feed cost per gain (FC/G). Nine male sheep of about 1 year old with 19.72 ± 2.16 kg of initial weight were randomly devided into three groups namely T1, T2, and T3. The T1, T2 and T3 groups were fed 3 different basal diets comprising of 40% rice straw and 60% concentrate (T1), 30% rice straw and 70% concentrate (T2), and 20% rice straw and 80% concentrate (T3), respectively. Parameter obtained were total dry matter (DM), rice straw DM and concentrate DM intake, average daily gain (ADG), feed conversion, and feed cost per gain. Data were analyzed using

analysis of variance, except for FC/G was analyzed using descriptive analysis. The result showed that total DM intake, rice straw DM intake, ADG and feed conversion were not significantly different ($P > 0.05$) between the treatments. The total DM intake of T1, T2 and T3 were 86.75, 99.80, and 96.61 g/kg $BW_{0.75}$, respectively. The rice straw DM intake were 23.75, 22.87 and 11.36 g/kg $BW_{0.75}$ for T1, T2, and T3, respectively. ADG of sheep was 69.60 g (T1), 104.57 g (T2), and 98.73 g (T3). The feed conversion of each treatment was T1 of 13.12, T2 of 10.43 and T3 of 11.06. Concentrate DM intake was significantly different ($P < 0.05$) between the treatments (T1 = 63.01 g/kg $BW_{0.75}$, T2 = 75.79 g/kg $BW_{0.75}$, and T3 = 85.22 g/kg $BW_{0.75}$). The lowest feed cost per gain of sheep was T2 of Rp 6,693.36/kg, followed by T3 of Rp 7,666.01/kg and T1 of Rp 8,025.57/kg). It was concluded that 70% concentrate of rice straw gave the best feed cost per gain.

103 ROTIB, L.A.

Penggunaan zeolit alam pada ayam arab dengan jenis kelamin berbeda. **[Use of zeolite for arab chicken with different sex]**/Rotib, L.A. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan) 2 tables; 15 ref. Summaries (En, In). *Buletin Ilmu Peternakan dan Perikanan* (Indonesia) ISSN 0853-3555 (2005) v. 9(1): p. 54-60.

CHICKENS; ZEOLITES; SEX; RATIONS; BODY WEIGHT; NUTRITIVE VALUE; ANIMAL PERFORMANCE; PROXIMATE COMPOSITION.

The purpose of the research was to investigate the use of zeolite on performance of arab chicken with different sex at the grower phase. Research used 60 heads for male and female respectively. The experimental diet contained 16.73% protein and 2669.0 kcal/kg metabolic energy. The experiment was conducted factorially according to completely randomized design. The first factor was 4 levels of zeolites (0%, 1%, 2%, and 3%) added into the experimental ration and the second factor was sex (male and female). Each treatment combination was replicated five times and the number of chicken for each experimental unit was three. Parameters measured were weight gain, feed consumption and feed conversion. The results indicated that use of zeolite and interaction between zeolite and sex did not affect ($P > 0.05$) performance (weight gain, feed consumption and feed conversion) of the arab chicken. However performance of male was better ($P < 0.0l$) than that of female.

104 RUSDY, M.

Pengaruh komposisi tanaman dan interval defoliasi terhadap daya saing dan nilai gizi rumput bahia dan alang-alang. **[Effects of plant composition and defoliation interval on competitive ability and nutritive value in bahia grass and cogon grass]**/Rusdy, M. (Universitas Hasanuddin, Makassar (Indonesia). Fakultas Peternakan) 1 table; 13 ref. Summaries (En, In). *Buletin Ilmu Peternakan dan Perikanan* (Indonesia) ISSN 0853-3555 (2005) v. 9(1): p. 47-53.

IMPERATA CYLINDRICA; PASPALUM NOTATUM; DEFOLIATION; AGRONOMIC CHARACTERS; NUTRITIVE VALUE; MIXED CROPPING.

An experiment was conducted to evaluate competitive ability of cogon grass (*Imperata cylindrica*) and bahia grass (*Paspalum notatum*) defoliated at different intervals. The experiment was arranged in a factorial combination of four plant compositions: pure cogon grass (100% : 0%), cogon grass predominant (66.7% : 33.3%), bahia grass predominant (33.3% : 66.7%), and pure bahia grass (0% : 100%) as the first factor; and three cutting intervals: 25, 50 and 100 days as the second factor. Results of this experiment showed that the plant composition had no consistently effect on competitive ability and nutritive value in cogon grass and bahia grass, but cutting intervals had a significant effect. In the three cutting intervals, competitive abilities in bahia grass were higher than those of cogon grass. Fifty days defoliation interval appeared to maximize competitive ability in bahia grass, but minimize competitive ability in cogon grass. Increasing cutting interval reduced crude protein content and digestibility in both species. In the three cutting intervals, digestibilities of bahia grass were higher than those of cogon grass. It can be concluded that although difficult to eradicate, the growth of cogon grass can be controlled by growing together with more aggressive species such as bahia grass followed by light to moderate defoliation.

0105 SALOKO, F.
***Pengaruh tingkat pemberian kulit buah kakao fermentasi dengan Trichoderma sp. terhadap kecernaan zat-zat makanannya pada kambing lokal.* [Effects of different inclusion level of cocoa pod husk fermented with *Trichoderma* sp. on the digestibility of crude fibre, nitrogen free extract and organic matter on local goats]**/Saloko, F. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 3 tables; 9 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 304-307.

GOATS; COCOA HUSKS; FERMENTATION; TRICHODERMA; DIGESTIBILITY; ORGANIC MATTER; RATIONS.

This experiment was intended to study the effects of different inclusion level of cocoa pod husk fermented with *Trichoderma* sp. (KBKF) into a diet with a basal feed of maize forage on the digestibilities of crude fibre, nitrogen free extract and organic matter of the KBKF. The inclusion levels of the KBKF were R1 = 90% maize forage (MF) + 10% KBKF, R2 = 80% MF + 20% KBKF; R3 = 70% MF + 30% KBKF and R4 = 60% MF + 40% KBKF. Results showed that the digestibilities of crude fibre, nitrogen free extract and organic matter of the KBKF were not affected by its inclusion level of up to 40% in diet.

L10 ANIMAL GENETICS AND BREEDING

106 INOUNU, I.
Relative superiority analysis of garut ram and its crossbred/Inounu, I.; Subandriyo; Tiesnamurti, B.; Hidayati, N. (Balai Penelitian Ternak, Bogor (Indonesia)); Nafiu, L.O. 2 ill., 6 tables; 23 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 17-26.

SHEEP; CROSSBREEDING; LITTER SIZE; WEIGHT.

To increase the productivity of Garut sheep, Indonesian Research Institute for Animal Production has crossed Garut sheep (GO) with St. Croix sheep (HH) having high frame body size and adaptable to the hot climate (in 1995) and with Moulton Charollais sheep (MM) that has high body weight gain and good milk production to raise multiple birth (in 1996). The objective of this research was to evaluate the ewe productivity of Garut sheep and its crosses with St. Croix and Moulton Charollais. This research was conducted at Animal Research Station, Bogor from 1995 to 2002. In this study the crossing was done using frozen semen of M. Charollais and ram of St. Croix so that the real performance of these sheep under Indonesian condition is not known. So that the relative superiority of these crosses is calculated from the percentage of the differences between traits mean of crossbred and purebred divided by trait means of purebred Garut, except for the threeway crosses (MHG and HMG) is calculated from the difference between the means of threeway crossbred trait with the means of two parents (MO and HG). It is concluded that HG and MHG show higher ram productivity than GG, it can be seen from their litter weight at birth and weaning. In poor feed condition GG showed higher productivity than the crossbred sheep (MG and HG), but MHG/MHG showed higher relative superiority compare to their parents (MG and HG). In good feed condition HG and MHO/HMO sheep showed higher productivity than Garut sheep. The relative superiority of HG sheep is 26.40% over GG and for MHG/HMG is 11.24% over their parents (MG and HG).

107 SUPARYANTO, A.
***Ekspresi gen homosigot resesif (c/c) pada performan telur pertama itik mojosari.* [Expression of recessive homozygote gene (c/c) on the quality of first eggs in mojosari duck]**/Suparyanto, A.; Setioko, A.R.; Prasetyo, L.H.; Susanti, T. (Balai Penelitian Ternak, Bogor (Indonesia)) 3 tables; 14 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 6-11.

DUCKS; HOMOZYGOTES; RECESSIVE GENES; EGGS; EGG PRODUCTION; QUALITY.

Recessive homozygote gene (c/c) in poultry is usually expressed in white plumage, and thought to affect growth and egg production. This effect is still under discussion because can be positive or negative. In order to study further the expression of the recessive gene on mojosari duck, this study was aimed at

investigating the quality of first egg from ducks with brown and white plumage. The result showed that weight of first egg of ducks with dominant gene (c/c), was 52.91 g higher than that of duck with homozygote recessive gene (c/c) which 51.43 g. For other variable, there was no significant different between ducks with dominant gene (c/c) and with recessive gene (c/c), i.e. weight of egg yolk (14.99 vs 14.94 g), weight of egg white (31.34 vs 29.94 g), weight of wet shell (6.62 vs 6.56 g), and thickness (0.36 vs 0.34). However there was significant different between the two group for score of Haugh Unit (89.67 vs 101.12) and egg yolk color (7.30 vs 5.35). It is obvious that the expression of the recessive homozygote gene (c/c) did not give any significant difference to the quality of first egg, except for the color which need to be confirmed with more and longer observations.

L50 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

108 PURBA, M.

***Pola rontok bulu itik betina alabio dan mojosari serta hubungannya dengan kadar lemak darah (trigliserida), produksi dan kualitas telur.* [Moulting patterns of alabio and mojosari ducks and their relation on blood lipids (triglycerides), egg production and egg quality]**/Purba, M.; Prasetyo, L.H. (Balai Penelitian Ternak, Bogor (Indonesia)); Hardjosworo, P.S.; Ekastuti, D.R. 5 tables; 23 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 96-105.

DUCKS; MOULTING; TRIGLYCERIDES; EGG PRODUCTION; QUALITY; LAYING PERFORMANCE.

Moulting is a biological condition that can happen in poultry. It is resulted from the complex interaction which involves the function of thyroxine hormone. Moulting can reduce or even stop the egg production. A study was conducted to observe the moulting patterns of local ducks (alabio and mojosari) and to determine the relation of moulting with blood lipids (triglycerides), egg production and quality. Each breed consisted of ten female ducks that were observed for moulting pattern, blood triglycerides, egg production and quality. Fourty ducks were used for simulation of egg production. Data from moulting patterns, egg production and quality were analyzed using t-based on Least Square means with Statistical Analysis System. The relation of breeds and moulting patterns with triglycerides were analyzed using Analysis of Variance (ANOVA) for a completely randomized design in a factorial arrangement of 2x2. The main factor was kind of breeds, while the subfactor was the period of moulting, before and during moulting. There was no interaction in every variables between both factors. The average moulting period of alabio was significantly ($P < 0.05$) shorter than that of mojosari (69 vs 76 days). There were 40% of alabio ducks moulting for 61-70 days, while 40% of mojosari ducks moulting for 71-80 days. Egg production of alabio ducks before and after moulting were higher than those mojosari ducks. The triglycerides content of alabio and mojosari ducks were decreased during moulting, in alabio ducks they were 32.02 and 27.64 μ g/ml before and during moulting, while in mojosari ducks they were 32.83 and 29.32 μ g/ml, respectively. Egg weight, albumin weight, yolk weight, and haugh unit of the two breeds increased after moulting, while yolk colour decreased. The average yolk colour of alabio ducks before and after moulting were 6.90 and 5.11, while in mojosari ducks they were 7.90 and 4.60, respectively.

L52 ANIMAL PHYSIOLOGY – NUTRITION

109 TAMBUNAN, R.D.

Conformation and component parts of the carcass of Philippine native goat/Tambunan, R.D. (Balai Pengkajian Teknologi Pertanian, Lampung (Indonesia)); Roxas, N.P.; Pamungkas, D. 3 tables; 10 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 113-117.

GOATS; CARCASSES; MEAT PERFORMANCE; MEAT CUTS; CARCASS COMPOSITION; BODY WEIGHT.

Limited work has been done to assess the potential of Philippines native goat in terms of conformation and component parts of the carcass. An experiment has been conducted at Institute of Animal Science, University of the Philippines Los Banos, Philippines to determine carcass and lean-fat-bone yield of different cuts of chevon from Philippine native goat. Result showed that among the wholesale cuts of chevon, shoulder had significantly higher separable lean content (8.80% of LW) than leg, loin, rib, and neck. Based on percentage of wholesale cuts (WC), however, the leg had significantly higher value (69.18%) than the other chevon cuts. Loin had significantly higher separable fat (1.67% of LW) than the other chevon cuts. Shoulder had significantly higher separable bone (4.62% of LW). Based on percentage of WC, however, rib had significantly higher separable bone (53.36%) than the other cuts. The shoulder had significantly higher boneless recovery (9.39% of LW) than other chevon cuts.

L53 ANIMAL PHYSIOLOGY - REPRODUCTION

110 ISMAIL, M.

Penggunaan hormon gonadotropin untuk meningkatkan angka ovulasi dan populasi folikel domba betina lokal Palu. **[Application of gonadotropin hormone to increase ovulation number and follicle population of local ewes from Palu (Indonesia)]**/Ismail, M. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 3 tables; 12 ref. Summaries (In, En). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(13): p. 318-322.

EWES; HORMONES; GONADOTROPINS; SUPEROVULATION; OVARIAN FOLLICLES; SULAWESI.

This experiment was done in the experimental farm of Department of Animal Husbandry, Faculty of Agriculture, University of Tadulako involving 12 ewes of Palu breed. There were 3 phases during experiment including: introduction and injection. In the injection phase, the hormone of gonadotropin was injected to the animals. There were three treatments of hormone used as follow: H1 (250 IU HCG injected on day 16 of oestrous), H2 (750 IU PMSG injected on day 12 of oestrous), H3 (750 IU PMSG injected on day 12 of oestrous followed by injection of 250 IU HCG on day 16 of oestrous, and phase of obtaining ovarium sample). The parameters measured were (1) ovulation number, (2) total population of follicle of the surface of ovarium. The result showed that treatment H3 had higher ovulation number than H2 and H1. This was assumed as result of combination between hormone HCG and PMSG in stimulating growth of follicle and induction of ovulation maximally. Treatment H3 also showed highest total population of follicle followed by treatment H2 and H1 respectively. This was assumed that the combination of PMSG and HCG influenced the growth of follicle. Results of this experiment showed that the gonadotropin did not affect the ovulation rate. Treatment H3 showed better ovulation rate than H2 and H1. This was possibly due to a combination of HCG-PMSG in stimulating the follicle growth and inducing a maximal ovulation. The gonadotropin, however, affected follicle population, in which H1 was different from H2 and H3, but H2 and H1 remained similar. The number of follicle on ovarian surface for H3 was followed by H2 which was due to the ability of PMSG and combination of PMSG and HCG in stimulating growth and development of follicle. It can be concluded that gonadotropin did not significantly affect the ovulation rate, while the follicle population on ovarian surface was affected by PMSG.

111 KOSTAMAN, T.

Laju pertumbuhan kambing hasil persilangan antara kambing Boer dengan peranakan etawah pada periode pra-sapih. **[Preweaning growth of Boer x etawah bred goats]**/Kostaman, T.; Sutama, I K. (Balai Penelitian Ternak, Bogor (Indonesia)) 3 ill., 33 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 106-112.

GOATS; PREWEANING PERIOD; BIRTH WEIGHT; BODY WEIGHT; QUALITY.

An experiment was conducted to study the growth patterns of Boer x Peranakan Etawah (PE) crossbred during preweaning period, at the Indonesian Research Institute for Animal Production, Ciawi, Bogor. Sixty-one does kids were used in this experiment. They were reared with their mothers in group pen (3 m x 4 m), with each pen contained 6-7 does. Does were fed of 2.5 kg freshly chopped king grass and 0.7 kg

concentrate/head/day. Research results showed that birth weight of Boer x PE does (group A) were significantly higher than those of PE does (group B) (4.29 ± 0.63 vs 3.71 ± 0.89 kg/head, $P < 0.05$). However, average preweaning daily weight gain (ADG) (116.40 ± 49.95 vs 105.29 ± 28.36 g/head, $P > 0.05$) and weaning weight (14.64 ± 4.56 vs 13.30 ± 2.71 kg/head, $P > 0.05$) were not significantly different between the groups. Preweaning mortality of the does was relatively high in both group A (25%) and B (21,21%). While sex ratio (male : female) was 57.14 : 42.86% in group A and 51,52 : 48,48% in group B.

112 SALMIN
Deskripsi anatomi reproduksi dan profil ovarium domba betina lokal Palu. **[Description of reproductive system anatomy and ovarium profile of local ewes from Palu (Indonesia)]**/Salmin (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 1 ill., 2 tables; 12 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 313-317.

EWES; REPRODUCTION; ANIMAL ANATOMY; OVARIES; SULAWESI.

The purpose of this study was to describe the characteristics of reproductive system anatomy and ovarium profile of local ewes from Palu. Observation and measurements were made on length of vagina, length and diameter of cervix, length of uterine body, length of right and left uterine horn, length of right and left oviduct, weight and diameter of right and left ovary, number of follicles, and corpus luteum on the ovary surface. It was discovered that although there were variation in the anatomy characteristics, the variation in the normal range and no anatomic abnormality, was found on the organ observed.

113 WATTIMENA, J.
Pengaruh serum domba dan serum domba oestrous terhadap tingkat maturasi dan fertilisasi oosit domba in vitro. **[Effect of sheep serum and oestrous sheep serum on *in vitro* maturation and fertility rate of ewe oocyte]**/Wattimena, J.; Veerman, M.(Universitas Pattimura, Ambon (Indonesia). Fakultas Pertanian) 2 tables; 25 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 12-16.

EWES; BLOOD SERUM; OESTROUS CYCLE; MATURATION; IN VITRO FERTILIZATION.

The main objective of this research was to obtain the effect of sheep serum (SS) and oestrous sheep serum (ESS) on *in vitro* maturation oocyte and ovine fertilization. This study was carried out in experimental laboratory in Animal Reproduction Laboratory, Faculty of Animal Husbandry, Padjadjaran University. Results showed that treatments significantly ($P < 0.05$) influenced on maturation rate for germinal vesicle (GV), germinal vesicle breakdown (GVBD), metaphase-I (M-I) and metaphase-II (M-II), but no significantly ($P > 0.05$) results observed on ovine *in vitro* fertilization (1, 2 and more than 2 pronuclei). Concentration of 10-20% ESS in CRlaa media were significantly ($P < 0.05$) better than that of SS on maturation rate of ovine oocyte.

L70 VETERINARY SCIENCE AND HYGIENE – GENERAL ASPECTS

114 GORDA, I W.
Waktu pemulihan anestesi xylazin-ketamin hidroklorida dengan zolazepam-tiletamin pada anjing. **[Recovery time of xylazine-ketamine hidrochloride anesthesia with zolazepam-tiletamin anesthesia in dog]**/Gorda, I W.; Dada, I K.A. (Universitas Udayana, Denpasar (Indonesia). Fakultas Kedokteran Hewan) 2 tables; 12 ref. Summaries (En, In). *Jurnal Veteriner* (Indonesia) ISSN 1411-8327 (2004) v. 5(4): p. 149-153.

DOGS; XYLAZINE; KETAMINE; ANAESTHESIA.

This research intend to know the comparison of recovery time of anesthesia combination xylazine-ketamine hidrochloride with combination of zolazepam-tiletamin in dog. This research used completely randomized design (RAL = Rancangan Acak Lengkap) with two treatments, i.e. XK = 2; 15 (Treatment use dose 2 mg/kg body weight xylazine with 15 mg/kg body weight ketamine HCl) and ZT = 20

(treatment use dose 20 mg/kg body weight zoletil (zolazepam-tiletamin)). Fifteen minutes before anesthesia, atropin sulfat was offered as premedication with dose 0.04 mg/kg body weight with subcutan on the both of treatment. Any treatment use five dogs as the repetition, until the equal dog in use is ten dogs. Data was analyzed with t test. Average of the recovery time of anesthesia for each treatment is 55.40 minutes and 176.60 minutes. Data analyzed with t test indicated the significant point ($P < 0.01$) of using combination of zolazepam-tiletamin compare with the combination of xylazine-ketamine HCl for recovery time in dog. Combination of xylazine-ketamine have a short recovery time compare with combination of zolazepam-tiletamin. It is happened because zolazepam and tiletamin have stronger sedation-hipnotik and anesthetic effect compare with xylazine-ketamine HCl.

115 TARIGAN, S.
Protective value of immune responses developed in goats vaccinated with insoluble proteins from *Sarcoptes scabiei*/Tarigan, S. (Balai Penelitian Veteriner, Bogor (Indonesia)) 5 ill., 13 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 118-126.

GOATS; VACCINATION; SARCOPTES SCABIEI; DOSAGE; IMMUNE RESPONSE; INSOLUBILIZATION; PROTEINS.

Vaccines developed ITom certain membrane proteins lining the lumen of arthropod's gut have been demonstrated effective in the control of some arthropod ectoparasites. A similar approach could also be applied to *Sarcoptes scabiei* since this parasite also ingests its host immunoglobulins. To evaluate immune protection of the membrane proteins, insoluble mite proteins were fractionated by successive treatment in the solutions of 1.14 M NaCl, 2% SB 3-14 Zwitterion detergent, 6 M urea, 6 M guanidine-HCl and 5% SDS. Five groups of goats (6 or 7 goats per group) were immunised respectively with the protein fractions. Vaccination was performed 6 times, each with a dosage of 250 micro g proteins, and 3 week intervals between vaccination. Group 6 (7 goats) received PBS and adjuvant only, and served as an unvaccinated control. One week after the last vaccination, all goats were challenged with 2000 live mites on the auricles. The development of lesions were examined at 1 day, 2 days, and the every week 1 to 8. All animals were bled and weighed every week, and at the end of the experiment, skin scrapings were collected to determine the mite burden. Antibody responses induced vaccination and challenge were examined by ELISA and Western blotting. The result showed that vaccination with the insoluble-protein fractions resulted in the development of high level of specific antibodies but the responses did not have any protective value. The severity of lesions and mite burden in the vaccinated animals were not different from those in the unvaccinated control.

L73 ANIMAL DISEASES

116 DAMAYANTI, R.
***Infeksi alami malignant catarrhal fever pada sapi bali: sebuah studi kasus.* [Natural infection of malignant catarrhal fever in bali cattle: a case study]**/Damayanti, R.; Wiyono, A. (Balai Penelitian Veteriner, Bogor (Indonesia)) 3 ill., 4 tables; Bibliography (p.157-159). Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 150-159.

CATTLE; MALIGNANT CATARRHAL FEVER VIRUS; INFECTION; PATHOLOGY.

Malignant catarrhal fever in Indonesia is caused by bovine herpes virus 2 and considered as a disease with high mortality rate causing degenerative and lymphoproliferative disease in cattle, buffalo and other ruminants. A total number of fifteen bali cattle were naturally infected by malignant catarrhal fever (MCF). Those cattle were meant to be experimental animals of research on infectious bovine rhinotracheitis (IBR), septicaemia epizootica (SE), and bovine brucellosis. The clinical signs of those animals were sudden high fever, depression, anorexia, corneal opacity, mucopurulent oculo-nasal discharges and diarrhoea. Six of them were dead and the remaining cattle were slaughtered at extremis. On the basis of clinical, gross-pathological and histopathological findings, all cases were shown to be consistent and pathognomonic of MCF cases. These cases were regarded as an outbreak of MCF affecting bali cattle which occurred during wet season and while in other paddock in that area there were a number

of lambing sheep. This result confirms that bali cattle is a very susceptible animal of MCF and the cases were very likely due to the spread of MCF virus from lambing sheep.

117 DHARMAYANTI, N.L.P.I.
Karakterisasi molekuler virus avian influenza isolat Indonesia. **[Molecular characterization of Indonesian avian influenza virus]**/Dharmayanti, N.L.P.I.; Damayanti, R.; Indriani, R.; Wiyono, A.; Adjid R.M., A. (Balai Penelitian Veteriner, Bogor (Indonesia)) 1 ill., 2 tables; 32 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 127-133.

POULTRY; AVIAN INFLUENZA VIRUS; ISOLATION; MOLECULAR GENETICS.

Avian influenza outbreaks in poultry have been reported in Java island since August 2003. A total of 14 isolates of avian influenza virus has been isolated from October 2003 to October 2004. The viruses have been identified as HPAI H5N1 subtype. All of them were characterized further at genetic level and also for their pathogenicity. Phylogenetic analysis showed all of the avian influenza virus isolates were closely related to avian influenza virus from China (A/Duck/China/E319-2/03(H5N1). Molecular basis of pathogenicity in HA cleavage site indicated that the isolates of avian influenza virus have multiple basic amino acid (B-X-B-R) indicating that all of the isolates representing virulent avian influenza virus (highly pathogenic avian influenza virus).

118 GHOLIB, D.
Pengembangan teknik serologi untuk pemeriksaan Aspergillosis ayam. **[Development of serological technique for examination of Aspergillosis in chicken]**/Gholib, D. (Balai Penelitian Veteriner, Bogor (Indonesia)) 2 ill., 27 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 143-149.

CHICKENS; ASPERGILLUS FUMIGATUS; IMMUNOLOGICAL TECHNIQUES; ANTIGENS; ELISA.

Aspergillosis detection by using serological method has not been reported in Indonesia. In this case, a study was conducted by using mycelium extract of *A. fumigatus* as the antigen. Rabbits and chickens were injected with the antigen to produce positive serum (antiserum). The antigen and antiserum were tested serologically by immunodiffusion/agar gel precipitation (AGP), ELISA and immunoblot. Chicken serum of broiler and layer collected from field were also included in the test. All positive serum of the experimentally animals gave positive results with all methods of serological tests. No bands of precipitation reaction in AGP test with chicken serum from the field. Both chicken and rabbit positive serum with ELISA test showed high optical density (OD), while field chicken serum from broiler commonly gave lower OD compared to layer. Immunoblot test of chicken positive serum showed bands of reaction with the antigen in nitrocellulose membrane, approximately on 33, 38, 44, 52, 70, 77, 97, and 110 kDa, meanwhile field chicken serum with high OD in ELISA test, showed bands approximately on 16, 18, 33, 38, 44, 47, 52, 70, 77, 84, 97, and 110 kDa. It means that the field chicken serum contain immunoglobulin molecules has spesific antibody of aspergillus antigen. It is concluded that the ELISA test can be used for screening on chicken aspergillosis in serological method.

119 NATALIA, L.
Penggunaan probiotik untuk pengendalian clostridial necrotic enteritis pada ayam pedaging. **[Utilization of probiotics for controlling clostridial necrotic enteritis in broiler chickens]**/Natalia, L.; Priadi, A. (Balai Penelitian Veteriner, Bogor (Indonesia)) 2 ill., 4 tables; 36 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 71-78.

BROILER CHICKENS; PROBIOTICS; VACCINES; CLOSTRIDIUM PERFRINGENS; PATHOLOGY; BODY WEIGHT.

Clostridial necrotic enteritis (CNE) is a common disease among rapidly growing broiler chickens. The purpose of this trial was to study the utilization of probiotics in controlling experimental CNE in broiler chickens. Chicken normal gut bacterial flora (mucosal starter culture selective/MCS) was used as a

competitive exclusion treatment in broiler chicken and its influence to the occurrence of clostridial necrotic enteritis were observed. The study comprised of 4 broiler cages treatments of probiotics (2 different dose of MCS, commercial probiotic, 1 cage untreated as control). Probiotics were given orally upon arrival. All groups were given live coccidial vaccine (as predisposing factor for CNE) and challenged with 108 *Clostridium perfringens* tipe A and C spores on day 10 and 12. The results showed that the probiotics could reduce the incidence and severity of CNE after challenge and improved the performance of chickens treated. Untreated group showed 40% of the mortality due to CNE, and 30% of the chicken showed subclinical necrotic enteritis (SNE).

120 SENDOW, I.

***Studi patogenitas isolat lokal virus bluetongue pada domba lokal dan impor.* [Pathogenicity study of local bluetongue virus isolates in local and imported sheep]**/Sendow, I. (Balai Penelitian Veteriner, Bogor (Indonesia)) 5 tables; 18 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 51-62.

SHEEP; PATHOGENICITY; BLUETONGUE VIRUS; ANTIBODIES; IMMUNODIAGNOSIS; SEROTYPES.

Bluetongue is one of arboviruses that caused economical impact to sheep farmers. Six local bluetongue virus (BT) serotypes isolates were obtained from sentinel cattle blood in West Java and Irian Jaya (Papua), but its pathogenicity has not been identified. Propagation of viraemic blood inoculum from 3 local BT serotypes such as serotypes 1,9 and 21, that had been conducted in Merino sheep, will be used for pathogenicity study. The study was devided into 3 groups, each group contained local and imported sheep as control and infected sheep. All sheep had been tested as negative BT antibodies. Observation on clinical signs had been conducted twice daily for 28 days. Heparinised blood and sera were collected everyday to obtain the viraemia period by Ag-C-ELISA test and antibody respons by C-ELISA test. The clinical signs produced were varied from normal to very mild in local sheep and very mild to mild-moderate in Merino sheep.The lowest severe degree of clinical signs was BT 9 followed by BT I and BT 21. No dead, neither local and Merino sheep occurred. Viraemia in Merino sheep occurred between 3-5 days and in local sheep between 4-7 days postinoculation (DPI). Antibody respons occurred as quick as 10 DPI in Merino sheep and 9 DPI in local sheep, and stayed until the end of experiment. This study showed that local BT isolates were not pathogen and not producing classical BT infection.

121 TARIGAN, S.

Ingestion of host immunoglobulin by *Sarcoptes scabiei*/Tarigan, S. (Balai Penelitian Veteriner, Bogor (Indonesia)) 2 ill., 20 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 35-40.

HUMAN DISEASES; VETERINARY MEDICINE; IMMUNOGLOBULINS; SARCOPTES SCABIEI.

Scabies is one of the most important diseases in human and veterinary medicine. The available control measures that rely on acaricides are unsustainable, costly and environmentally unfriendly. Vaccination which is supposedly the most attractive alternative control, is sustainable, potentially cheap and environmentally friendly. Recent development in protein biochemistry and recombinant technology have facilitated the development of anti-parasite vaccine which in the past was impossible. One prerequisite for the antiparasite vaccine development is that the parasite has to ingest its host immunoglobulin. This study, therefore, was designed to determine whether *Sarcoptes scabiei*, a non blood-feeding parasite that resides on the vascular cornified layer of the skin, ingest its host immunoglobulin. Sections of routinely processed mites and skin from a mangy goat were probed with peroxidase-conjugated-anti-goat IgG and the immune complex was visualised with diaminobenzidine solution. To determine whether the ingested IgG was still intact or had been fragmented by the proteolytic enzymes, immunoblotting analysis of SDS-PAGE-fractionated proteins extracted from washed mites was performed. Quantification of IgG was done by an Elisa using purified goat IgG as control. This study showed that IgG in the mites confined to the mite's gut only, and only a fraction of mite population ingested the IgG. The ingested IgG, as shown by immunoblot

analysis, was mostly still intact. This study indicates that development of anti-scabies vaccines is reasonable.

122 WAHYUWARDANI, S.
***Perubahan patologi secara makroskopi dan mikroskopi pada ayam pedaging yang diinfeksi reovirus isolat lokal.* [Macroscopic and microscopic patology changes on broiler infected with local reovirus isolate]**/ Wahyuwardani, S.; Parede, L. (Balai Penelitian Veteriner, Bogor (Indonesia)); Huminto, H. 8 ill., 18 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 63-70.

BROILER CHICKENS; PATHOLOGY; REOVIRUS; MALABSORPTION; MICROSCOPY; INFECTION; BODY WEIGHT.

Local reovirus isolate is the virus which could be isolated from runting and stunting syndrome. The ability of local reovirus isolate to induce runting and stunting syndrome in broilers chicken was investigated. The day old chicks (DOC) were infected with local reovirus isolate assessed clinically and pathologically at 1, 2 and 3 weeks postinoculation. A total of 40 DOC were divided into two groups. The first group (20 DOC) was orally infected with ± 2 x 10^3 local reovirus isolate particle and the other used as negative control group. The results showed that the isolate caused wet droppings, stunting, enteritis, pancreatitis, malabsorbtion, bursal atrophy and spleenic hypertrophy, which similar to runting and stunting syndrome (RSS) disease in chicken. The body weight was reduced to 14.7% on the inoculated group at 4 weeks postinoculation.

123 WARDHANA, A.H.
***Efektivitas ekstrak biji srikaya (Annona squamosa* L.*) dengan pelarut air, metanol dan heksan terhadap mortalitas larva caplak Boophilus microplus secara in vitro.* [Effectiveness of *Annona squamosa* L. seeds extracted by diverse organic solvents: water, methanol and hexane against mortality of tick larvae, *Boophilus microplus in vitro*]**/Wardhana, A.H.; Husein, A.; Manurung, J. (Balai Penelitian Veteriner, Bogor (Indonesia)) 3 ill., 3 tables; 24 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(2): p. 134-142.

LIVESTOCK; ANNONA SQUAMOSA; SEED EXTRACTION; BOOPHILUS MICROPLUS; MORTALITY; METHANOL; IN VITRO.

Boophilus microplus is the most important pest in livestock industries. The use of synthetic chemical acaricides is the main method of tick control, however, chemical acaricides are expensive, and they are harmful to environment and cause strain resistance. The aim of study was to investigate the effectiveness of *Annona squamosa* L. seeds extracted by diverse organic solvents such as water, methanol and hexane against mortality of *Boophilus microplus* larvae *in vitro*. Five hundred and fifty larvae were used in this study and divided into three groups e.g. water (3%, 4% and 5% concentration), methanol and hexane extract groups (0.25%, 0.50%, and 0.75% concentration). Coumaphos (0.50%) was used as a positive control. The larvae were dipped into extract solution for 10 seconds and dried using filter paper. Their mortality was observed from one to five hours. The mortality data were transformed to Abbot formula and analyzed using probit analysis with 95% significant level. This study showed that the active compound of *Annona squamosa* L. seeds had effectively contact toxic property for *B. microplus* larvae at 5%, 0.50%, and 0.75% for water, methanol and hexane extractions, respectively. The lethal concentrations of methanol extract (LC50, LC90, and LC95) were lower than hexane extract e.g. 0.32%, 0.86%, and 1.13%, respectively and for hexane extract were 0.35%, 1.11%, and 1.54%, respectively at fifth hour. The lethal times of methanol extract on 0.50% concentration were shorter than hexane extract e.g. 3.12 hours (LT50), 5.86 hours (LT90), and 7.00 hours (LT95) and for hexane extract on 0.75% concentration were 3.26 hours (LT50), 6.21 hours (LT 90), and 7.45 hours (L T95). Water extract of 5% concentration was effective for traditional farmer in rural area due to easy and cheap method. The lethal concentrations of water extract on fifth hour were 2.02% (LC50), 4.00% (LC90), and 4.85% (LC9S) and the lethal time on 5% concentration were 2.54 hours (LT50), 4.13 hours (LT90), and 4.75 hours (LT95).

124 WARDHANA, A.H.
***Identifikasi senyawa volatil dari luka myasis dan responnya terhadap lalat Chrysomya bezziana.* [Identification of volatile compounds from myiasis wounds and its responses for *Chrysomya bezziana*]**/Wardhana, A.H.; Sukarsih (Balai Penelitian Veteriner, Bogor (Indonesia)); Urech, R. 1 ill., 4 tables; 25 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 41-50.

CATTLE; MYIASIS; VOLATILE COMPOUNDS; CHRYSOMYA; IDENTIFICATION; GAS CHROMATOGRAPHY.

Development of attractant for screwworm fly was required in myiasis control on livestock. The purpose of this study is to identify volatile compounds from myiasis wound infested with Chrysomya bezziana larvae including to assess their responses in both cage and room assays. Both Friesian-Holstein heifer (FH) (animal 1) and Bali cattle (animal 2) were used as myiasis model. The artificial wounds (8-10 cm) were conducted on the rump of both animals and infested with about 200 eggs of *C. bezziana*. Odours from the infested wound were collected on day 1 and 3 for animal I and day 3 and 5 for animal 2, post *C. bezziana* larvae infestation. Two different collection devices were used: firstly, absorption onto Tenax kept in steel tubes, which was attached to a collected bowl. The volatile organic compounds were collected from the wound and the surrounding animal hide by flowing the air through the inlet and outlet. Secondly, a solid phase micro extraction (SPME) device was inserted into bowl with passive (no air flow) odour collection. Gas chromatography/mass spectrometry was used to identify volatile compounds from wound. The compounds of the wound on animal 1, collected on day 1, produced only minor quantities of compounds (nonanal, decanal, hexanal and heptanal). Minor components such as DMDS and DMTS were only detected on day 3. The compounds of the wound on animal 2 was more varied and had a peculiar strike-like smell on day 3 and 5. They included indole, phenol, acetone, various sulfides (DMS, DMDS, DMTS), alcohols (butanol, 3-methylbutanol), aldehydes and acids. These compounds were selected and formulated into attractant (B92) then tested in both cage and room assays using SL-2 as control. Respond of flies was analyzed by ANOVA 5% (cage assay) and T test 5% (room assay). The result showed that the fly response to B92 was very low compared to SL-2 in cage assays ($P < 0.05$). The addition of B92 to SL-2 could not increase the catch of flies in the cage assays (SL-2+B92=IO:I; 10:3), there was no difference between SL-2 and B92/SL-2 in room assay, the fly response still low ($P > 0.05$).

L74 MISCELLANEOUS ANIMAL DISORDERS

125 BAHRI, S.
***Efek aflatoksin B1 (AFB1) pada embrio ayam.* [Effect of aflatoxins B1 (AFBI) on chick embryo]**/Bahri, S.; Widiastuti, R. (Balai Penelitian Veteriner, Bogor (Indonesia)); Mustikaningsih, Y. 4 ill., 3 tables; 23 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) V. 10(2): p. 160-168.

CHICKENS; ANIMAL EMBRYOS; AFLATOXINS.

Aflatoxins are toxic compounds which occurred in cereals especially low qualities corn and peanuts. Aflatoxins are mutagenic, teratogenic and carcinogenic. The presence of aflatoxin in food including derived food in Indonesia had been observed, however, the observation on its toxicity effect is still limited. This research was conducted to study the effect of innoculation of aflatoxin B1 (AFB1) on the development of embryonic chicken egg, mortality and hatchability. The AFB I was innoculated 10 micro I in each 5 days age embryonic egg through air sacs dosaged 0; 15.6; 31.2; 62.5; 125 and 250 ng. The results showed that hatchability of those embryos were 66%, 28%, 26%, 16%, 0%, and 0% each for 0; 15.6; 31.2; 62.5; 125 and 250 ng innoculation of AFB1, respectively. Innoculation of AFB1 caused malformation of the embryos, malabsorbtion of the yolk egg. The weight of hatched eggs was not significantly different in each group, eventhough there was a tendency that high AFB1 inoculation will decrease the live weight.

P33 SOIL CHEMISTRY AND PHYSICS

126 UTAMI, S.N.H.
Sifat kimia Entisol pada sistem pertanian organik. **[Chemical properties in organic and conventional farming system]**/Utami, S.N.H.; Handayani, S. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Pertanian) 2 tables; 11 ref. Summaries (En, In). *Ilmu Pertanian* (Indonesia) ISSN 0126-4214 (2003) v. 10(2): p. 63-69.

ORGANIC AGRICULTURE; ALTERNATIVE AGRICULTURE; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; LAND PRODUCTIVITY.

Agricultural system which use high input energy such as fertilizer and pestisides could destroy soil physical and chemical properties and followed by decreasing soil productivity for the future. The alternative agricultural system which use low input energy is believed able to save the fertility and give advantage to the soil, so it could increase the soil productivity. The organic agricultural system use the organic matter and waste recycling. The aim of the study is to find out the change of soil properties after organic agricultural system was applied. Soil sampling are taken from 2 farmer's land using organic agricultural system and 4 using conventional agricultural system. The results showed that there are significantly differences of the soil chemical properties (cation exchange capacity, pH, available P and K, total N, and carbon, humic and fulvic acid content, and physical properties (agregat stability, permeability) between organic agricultural system and conventional system. The better value is belong to the organic agricultural system.

P34 SOIL BIOLOGY

127 SIMARMATA, T.
Derajat infeksi, serapan P, jumlah bintil dan hasil dua kultivar kacang tanah (Arachis hypogaea* L.*) yang diberi inokulan cendawan mikoriza arbuskula (Glomus fasciculatum dan Gigaspora margarita) pada Inceptisol di Jatinangor. **[Roots infection, P-uptake, number of effective nodule, and grain yield of two peanut cultivars (*Arachis hypogaea* L.) as affected by the inoculation of arbuscular mycorrhizal fungi (*Glomus fasciculatum* and *Gigaspora margarita*) on Inceptisols in Jatinangor [Indonesia]]**/Simarmata, T. (Universitas Padjadjaran, Bandung (Indonesia)); Tachro 3 tables; 11 ref. Summaries (En, In). *Bionatura: Jurnal Ilmu-ilmu Hayati dan Fisik* (Indonesia) ISSN 1411-0903 (2005) v. 7(2): p. 137-145.

ARACHIS HYPOGAEA; VARIETIES; GLOMUS FASCICULATUM; GIGASPORA MARGARITA; PHOSPHORUS; NUTRIENT UPTAKE; ROOTS; INFECTION; YIELDS.

The experiment to study the roots infection, P-uptake, number of effective nodule, number of pods, dry weight of 25 grain and grain yield/plant of two peanut cultivars as affected by the inoculation of arbuscular mycorrhizal fungi (AMF) on Inceptisols was conducted from August to November 2002 at greenhouse of Agricultural Faculty Padjadjaran University, Jatinangor. The experimental design used was randomized block design in factorial pattern and provided with four replications. The first factor was AMF inoculant (M) consisted of three levels (control, inoculation with *Glomus fasciculatum*, or *Gigaspora margarita*). The second factor was peanut cultivars (K) consisted of two levels (Kelinci and Jerapah). The results showed that the interaction between AMF and peanut cultivars gave a nonsignificant effect on all observed variables. Either the applications of *Glomus fasciculatum* or *Gigaspora margarita* influenced root infection degree, P-uptake, effective root nodule, dry weight pods/plant, dry weight of 25 grain/plant and dry weight of grain yield/plant. The application of *Glomus fasciculatum* gave the highest number of effective nodule and dry weight of 25 grain or grain yield/plant than other treatments. In contrast, both cultivars resulted a nonsignificant different on all observed variables except on the number of pods/plant.

P35 SOIL FERTILITY

128 SYAFRUDDIN
Status hara tanah lahan sawah irigasi di Kecamatan Sigi Biromaru Kabupaten Donggala, Sulawesi Tengah. **[Irrigated lowland nutrient status in Sigi Biromaru, Donggala, Central Sulawesi (Indonesia)]**/Syafruddin; Saidah; Chatijah (Balai Pengkajian Teknologi Pertanian Sulawesi Tengah, Palu (Indonesia)) 1 ill., 2 tables; 24 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 214-220.

ORYZA SATIVA; IRRIGATED RICE; NUTRITIONAL STATUS; SOIL CHEMICOPHYSICAL PROPERTIES; SULAWESI.

Levelling off reported to occur in several rice producing centres in Java and Sumatra was presumably caused by accumulation of certain elements as a result of excessive use of synthetic fertilizers for relatively long period of time. To avoid facing the problem in Central Sulawesi, it is crucial to monitor the soil nutrient status in this area. The work aimed at investigating the nutrient status of several essential nutrients, and some other elements as well. Soil sample collection was conducted compositely at 0-20 cm deep and every sample represented 100 ha area. Analyses of the nutrient status was done in the Soil Chemical Laboratory of The Agroclimate and Soil Research and Development Center. The investigation was conducted from September 2002 to February 2003. The results showed that a proportion of 81.82% - 100% of the sample were very high in total P and K, but very low exchangeable P. Total N and organic C were found in very low and low status. Exchangeable bases varied from low to very high and exchangeable cation capacity was low to middle with pH of the soil was slightly acid and slightly alkaline.

P36 SOIL EROSION, CONSERVATION AND RECLAMATION

129 BASONG, A.
Analisis potensi aliran debris Sungai Sombe Lewara, Palu. **[Analysis of flood surface of the catchment areas of Sombe Lewara River, Palu (Indonesia)]**/Basong, A. (Universitas Tadulako, Palu (Indonesia). Fakultas Teknik) 5 tables; 7 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 279-283.

SULAWESI; EROSION; RIVERS; WATERSHEDS; RAIN.

This study aimed at analyzing the flood surface of the catchment areas of Sombe Lewara River. Empirical data on river width and surface flood map were collected. The study found that flood surface was caused by land sliding on the right as well as left riverbank, erosion on the river base and the presence of sediment rock on the river base. The flood may occur with 13 mm rainfall/hour.

130 DJAJADI
Efektivitas teknik konservasi lahan dalam menekan erosi dan penyakit lincat. **[Effectiveness of land conservation technique in reducing soil erosion and lincat plant diseases]**/Djajadi; Mastur; Dalmadiyo, G.; Murdiyati, A.S. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)) 3 ill., 3 tables; 14 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2004) v.10(4): p. 135-141.

NICOTIANA TABACUM; SOIL CONSERVATION; SETARIA (GRASS); FLEMINGIA; EROSION CONTROL; PLANT DISEASES; ASPERGILLUS FUMIGATUS; BACILLUS CEREUS; TERRACES; SOIL CHEMICOPHYSICAL PROPERTIES.

Field trial was conducted in Glapansari Village, Parakan, Temanggung District from March to December 2001 to evaluate the effect of land conservation by controlling soil erosion and plant disease on soil erosion, soil physical characteristics, soil pathogens population, dead tobacco plant, and tobacco yield. The treatments were soil conservation technique by planting of Setaria grass on the terrace edge and planting *Flemingia congesta* on the riser, and digging of sediment trap on the base of terrace ditch. The

treatments were planting tobacco line (BC3-C51) tolerant to lincat disease combined with the application of antagonistic microbes (*Aspergillus fumigatus* and *Bacillus cereus*). The research used complete randomized block design with two treatments and six replications. Each experimental units composed of plot sized 22 m x 4 m and soil erosion collector. Results showed that the land conservation technique reduced soil erosion from 30.2 to 16.7 tons/ha or 44.8%. This technique reduced soil pathogen population and dead tobacco plant 53.6%. The land conservation technique increased significantly tobacco fresh leaves yield 41.7% and dried sliced tobacco yield 42.1% compared to that of control.

131 FAIZAL

Kajian prediksi erosi pada daerah aliran sungai Tawaeli. **[Erosion prediction in Tawaeli (Central Sulawesi, Indonesia) watershed area]**/Faizal (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 4 tables; 14 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 236-241.

SULAWESI; EROSION; LAND USE; SLOPING LAND; WATERSHEDS.

A study on erosion prediction at watershed scale was carried out at Tawaeli watershed, Central Sulawesi from August to November 2004. The objective of this study was to predict erosion at Tawaeli watershed using survey method. The result showed that soil erosion intensity ranged from 1.91 to 693.83 ton/ha/year. This value was above of the tolerable range (Etol) (16.83 ton/ha/year). The factors contributing to the high erosion intensity were land coverage condition and the degree of land slope.

132 THAHA, A.R.

Tingkat kerusakan sumber daya lahan di daerah aliran sungai Lolitasiburi. **[Land resource degradation level in Lolitasiburi (Donggala, Indonesia) watershed area]**/Thaha, A.R. (Universitas Tadulako, Palu (Indonesia). Fakultas Pertanian) 5 tables; 10 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 229-235.

SULAWESI; LAND USE; EROSION; SLOPING LAND; LAND RESOURCES; DEGRADATION; WATERSHEDS.

Land resources degradation in the watershed area of Lolitasiburi River resulted in wide implication in various losses due to flood, drought, and lower land productivity. The investigation was carried out to determine the level of land degradation in the above watershed area. A survey was done to prepare land unit maps and to take disturbed and undisturbed soil samples. There were indications that Lolitasiburi area was already in the critical level of degradation. The factors identified as contributing to the degradation were community activities, slope degree and low vegetation coverage.

Q02 FOOD PROCESSING AND PRESERVATION

133 HISTIFARINA, D.

Teknik pengeringan dalam oven untuk irisan wortel kering bermutu. **[Dehydration technique using an oven for qualified dried sliced carrot]**/Histifarina, D.; Musaddad, D.; Murtiningsih, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 3 tables; 14 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(2): p. 107-112.

CARROTS; PROCESSING; DRYING; PROXIMATE COMPOSITION; QUALITY.

The aim of this research was to study the effect of temperature and drying duration on the dried carrot quality characteristics. The research was conducted at Postharvest Physiology Laboratory of lndonesian Vegetables Research Institute, Lembang from July to October 2000. The experiment was laid in a factorial randomized block design with three replications and two factors. The first factor was the temperature (40, 60

50, and 60 ^{0}C) and the second factor was drying duration (17, 22, 27, and 32 hours). The result showed that the drying duration of 32 hours combined with drying temperature of 50^{0}C gave the best dried carrot characteristics based on water content (9.15% b/b), beta carotene content (0.019%), the highest dehydration capacity (520.44%), and sensorically best color and texture.

134 HISTIFARINA, D.

Pendugaan umur simpan kentang tumbuk instan berdasarkan kurva isotermi sorpsi air dan stabilitasnya selama penyimpanan. **[Predicting the shelflife of mashed potatoes instant based on sorption isotherms curve and its stability during storage]**/Histifarina, D. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)) 5 ill., 7 tables; 13 ref. Summaries (En, In). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2004) v. 14(2): p. 113-120.

POTATOES; PROCESSED PRODUCTS; SORPTION; KEEPING QUALITY; PROXIMATE COMPOSITION; STORAGE.

The objective of this research was to find out the critical moisture content based on sorption isotherms curve and to study stability of mashed potatoes instant during storage and its shelflife prediction. The experiment was conducted at Engineering Laboratory of Food Process and Pilot Plan PSPG IPB from February until September 2002. Atlantic variety was used in this experiment. The experiment consists of two steps i.e. moisture content equilibrium of mashed potato instant and predicting the shelflife of packaged mashed potatoes instant. The first stage was to find out moisture equilibrium by absorption method using 21 kinds of salt saturated solution. The second experiment was comparing three types of packages those were PET 12/Aluvo 7/LLDPE 40, PET 12/LLDPE 25, and HDPE. The result showed that the package of PET 12/Aluvo 7/LLDPE 40 gives the longer shelflife (209 days) based on change of moisture content and thiobarbiturat acid value with moisture content value was 10.435% d/b and thiobarbiturat acid value was 1.072 mg/kg sample during 8 weeks of storage.

135 IRIANI, E.S.

Pengaruh konsentrasi penambahan pektinase dan kondisi inkubasi terhadap rendemen dan mutu jus mangga kuini (Mangifera odorata **Griff.*).* [Effects of pectinase concentration and incubation condition on yields and quality of kuini mango (*Mangifera odorata* Griff.) juice]**/Iriani, E.S.; Setyadjit (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Said, E.G.; Suryani, A. 2 ill., 6 tables; 13 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v.2(1): p.11-17.

MANGOES; FRUIT JUICES; POLYGALACTURONASE; FERMENTATION; QUALITY; MANGIFERA ODORATA.

Kuini is kind of fruit found abundant in Indonesia that have exotic flavor and attractive color. Kuini also have high vitamin A and C as well as fibre. To reduce the fibre, pectinase was added to produce kuini mango juice. The study was conducted to discover effect of concentration, time and temperature of pectinase on yields and quality changes of mango juices. The research was carried out at Indonesian Center for Agricultural Postharvest Research and Development (ICAPRD) from July 2003 to June 2004. Mangoes from Bogor, West Java were mashed and the pulp was reacted with pectinase. The incubation times applied were 0 to 180 minutes at preliminary research. One hour incubation time was able to give the best result in juice yields, therefore 60 minutes was used at the main research. Design experiment used at the main research was randomized factorial design with factor (1) pectinase concentration: 0, 500, 750 and 1000 ppm, and factor (2) temperature: 45 ^{0}C and 55 ^{0}C with three replications. Parameter analyzed were yields, pH, total soluble solid (TSS), viscosity, reduction sugar, titratable acidity, ascorbic acid and volatile component of kuini. Pectinase of 1000 ppm at 55 ^{0}C gave the highest juice yields of 94% compared to 83% at 0 ppm. There were significant changes in pH, TSS and viscosity of kuini juice, but not in the reducing sugar, total titratable acidity and vitamin C. Pectinase changed the flavor profile of kuini juice. The higher pectinase added could reduce monoterpene components such as alpha-pinene and myrcene.

136 NURDJANNAH, N.

***Pembuatan serbuk pala (Myristica fragrans* Houtt*) instan dengan menggunakan alat pengering semprot.* [Instant nutmeg (*Myristica fragrans* Houtt) powder formulation using spray dryer]**/Nurdjannah, N. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)) 13 tables; 25 ref. Summaries (En, In). *Jurnal Penelitian Tanaman Industri* (Indonesia) ISSN 0853-8212 (2005) v. 11(4): p. 159-170.

MYRISTICA FRAGRANS; NUTMEGS; POWDERS; SPRAY DRYING; DEXTRINS; MALTODEXTRINS; ORGANOLEPTIC ANALYSIS; CHEMICAL COMPOSITION.

The main product of nutmeg (*Myristica fragrans* Houtt) are nutmeg seed (mature and immature) and fuly. The meat is the biggest part of nutmeg fruit (about 83.3%) only small portion is used for sweet products. The other opportunity is to process it for instant powder beverage. The objective of this experiment was to formulate the instant nutmeg powder using spray dryer with dextrin and maltodextrin as the filler substances. The activity consisted of preliminary and main experiments. The aim of the preliminary experiment was to find out the optimum inlet temperature of spray drying process to obtain nutmeg instant powder, the ratio of nutmeg and water to make nutmeg juice, the ratio of nutmeg juice and glucose syrup to make nutmeg syrup, type and concentration of filler substances which would be used in the main experiment. From the preliminary experiment, it was found out that the optimum inlet temperature was 180^0C. The ratio of nutmeg shell and water to make nutmeg juice 1:1 (w/w). The ratio of nutmeg juice and glucose syrup to make nutmeg syrup was 1:1 (w/w). Based on the preliminary experiment, the treatments applied in the main experiment were type of filler substances (A1 = dextrin and A2 = maltodextrin) and concentration of filler substances (B1 = 5%, B2 = 10%, and B3 = 15%). The experiment used randomized block design with three replications. The parameters observed were yield, water content, ash content, vitamin C content, pH and solubility. The organoleptic test was done to 20 panelists to find out the consumer preferences. The result showed that type and concentration of filler substances and also replication influenced the consumer preferences. Based on the high yield of the instant nutmeg powder, its characteristics and consumer preferences, the best treatment was dextrin as the filler substance with 15% concentration.

137 USMIATI, S.

***Mikroba susu fermentasi sejenis kefir menggunakan starter kombinasi penyusunan granula kefir dan Bifidobacterium longum.* [Microbes of fermented kefir-like using combination of kefir grain and *Bifidobacterium longum*]**/Usmiati, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Ram, R. 1 ill., 8 tables; 30 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 27-34.

MILK PRODUCTS; CULTURED MILK; VOLATILE COMPOUNDS; BIFIDOBACTERIUM.

The objectives of research were to find out physico-chemical characters and to detect flavor volatile compound of kefir-like. Material used was skim milk TS 9.5% which was heated at 85^0C for 30 minutes and cooled at 22^0C before inoculation of the starter. Microorganisms used were (a) *Lactobacillus acidophilus* P 155110, (b) *Lactobacillus delbrueckii* subsp. bulgaricus NCIMB 11778, (c) *Lactococcus lactis* P155610, (d) *Leuconostoc mesenteroides* subsp. dextranicum NCIMB 3350, (e) *Acetobacter aceti* P 154810, (f) *Bifidobacterium longum* BF I, and (g) *Saccharomyces cerevisiae* P 156252. The treatments consist of P1 = without (b); P2 = without (a); and P3= used (a) until (g). The physicochemical characters identified were lactic acid and lactose percentage, pH, viscosity, organoleptic test for intensity of kefir-like sensory attributes. Results indicated that *B. longum* was potential bacterium use for starter combination on kefir-like making. The use starter P1 combination has high acidity and viscosity, low pH and lactose percentage, and high intensity on attribute creamy-white color, soft and curdle consistency, and kefir specific aroma on kefir-like. Volatile compound acid group were dominated by high acidity character on kefir-like resulted from starter P1 combination. Compound of 3-hydroxi-2-butanone (acetoin) was affecting butter-like of P3 character. This compound resulted from which is a character of fermented milk flavor was not detected on P1 kefir-like.

Q03 FOOD CONTAMINATION AND TOXICOLOGY

138 ASRIANI
***Kajian efek sinergi metabolit bakteri asam laktat-monoasilgliserol minyak kelapa terhadap bakteri patogen.* [Synergism effect of lactic acid bacteria metabolite and coconut oil monoacylglycerol on human pathogenic bacteria]**/Asriani (Institut Pertanian Bogor (Indonesia). Sekolah Pascasarjana); Jenie, B.S.L.; Sudirman, I.; Yasin, S. 6 ill., 22 ref. Summaries (En, In). *Jurnal Agroland* (Indonesia) ISSN 0854-641X (2005) v. 12(3): p. 242-248.

LACTIC ACID BACTERIA; COCONUT OIL; ACYLGLYCEROLS; MONO AND DIGLYCERIDES; PATHOGENS.

The objective of this study was to investigate synergism effect of lactic acid bacteria (LAB) metabolite and coconut oil monoacylglycerol (MAG) on human pathogenic bacteria. The metabolite from 6 species of LAB (Lb. plantarum kik, Lb. plantarum pi 28a, Lb. plantarum sa28k, Lb. acidophilus, Lb. brevis 1,6AE, and Lb. coryneformis) were obtained and assayed. The antimicrobial activity of LAB metabolite in combination with MAG against 4 pathogenic bacteria (*L. monocytogenes*, *B. cereus*, *S. typhimurium* and *E. coli*) was assayed using well diffusion and contact method. The result showed that combination of LAB metabolite and MAG had an antibacterial activity toward *L. monocytogenes*, *B. cereus*, *S. typhimurium* and *E. coli*. The combination was found to show the highest antibacterial activity at the ratio of 1:0.6 and at MIC value 1.2%, 1.4%, 2.5% and 3%, for *L. monocytogenes*, *B. cereus*, *S. typhimurium* and *E. coli*, respectively. Bacterial cell leakage was observed highest at dose 2 MIC. The antimicrobial activity was higher at pH 4-5 than at PH 6-7 and also was stronger against gram positive than against gram negative bacteria.

139 RUSDI, U.D.
***Efek ekstrak kayu secang (Caesalpinia sappan* L.*) terhadap daya simpan bungkil kacang tanah.* [Effect of wood extract of secang to preservation of groundnut cake]**/Rusdi, U.D.; Hidayati, Y.A. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Peternakan); Widowati, W. 3 tables; 23 ref. Summaries (En, In). *Bionatura: Jurnal Ilmu-ilmu Hayati dan Fisik* (Indonesia) ISSN 1411-0903 (2005) v. 7(2): p. 165-178.

GROUNDNUT MEAL; PRESERVATION; CAESALPINIA; EXTRACTS.

This research aimed to find out the effect of wood extract of secang (EKS) to preservation of groundnut cake, which showed by totalizing mushroom colony, sour number and number of iodine. Research was conducted using factorial completely randomized design of 7 x 5 with replication of three times. The variables measured was totalizing mushroom colony, sour number and number of iodine. Result of research indicated that treatment of EKS effectively delayed increase of mushroom colony and sour number and delayed degradation of iod number at groundnut cake. EKS as preservative was better than treatment of butylated hydroxytoluene (BHT) 0.1% and natrium benzoate (NB) 0.1% as well.

140 SRI-MULATO
***Pelarutan kafein biji kopi robusta dengan kolom tetap menggunakan pelarut air.* [Water extraction of caffeine in robusta coffee using a fixed bed column]**/Sri-Mulato; Widyotomo, S. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Lestari, H. 10 ill., 25 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2004) v. 20(2): p. 97-109.

ROBUSTA COFFEE; CAFFEINE; EXTRACTION; DECAFFEINATION.

The deterious effect of caffeine on the human health is widely recognized. In the long term this assumption could decline the interest of the people to drink coffee and finally could affect the domestic coffee consumption as well. The study has therefore been carried out to develop a simple technique to reduce the caffeine content in coffee enable the small and medium-scale industry to adopt it and consequently the price of low-caffeine coffee is affordable by wide spectrum of coffee drinkers. Caffeine was removed from coffee beans by using a circulated hot water at 100^0C for approximately 7 hours. A

batch of coffee beans was loaded into a vertically fixed bed reactor, which was provided with a water heater. The beans were initially pre-treated with steam to swell the beans, to increase their surface area and to make the caffeine ready for further extraction. Consecutively the swollen beans were brought into contact with hot water. The ratio between the bean and the water was 1:5. Three different sizes of Robusta coffee beans, i.e. 5.50 mm, 6.50 mm and 7.50 mm were used for the experiment. The results showed that the lowest final caffeine content, 0.30% dry based (db) was obtained in the coffee bean with 5.50 mm size after 6 hours decaffeination process, whereas at the same time the caffeine content in the coffee bean with 6.50 mm and 7.50 mm remained 0.50% and 0.70%, respectively. However, several compounds responsible for the flavor development of the coffee such as chlorogenic acid and triglonelline content in the green coffee decreased as well from initially 7.60% and 1.70% to 0.80% and 0.29% dry based (db), respectively. As the chemical composition of decaffeinated coffee altered, the flavor and aroma also changed. The further research is required to reabsorb the flavor compounds that were lost during the extraction into the decaffeinated coffee.

141 YUNINGSIH

Analisis cepat residu pestisida lindan (insektisida organoklorin) dalam produk ternak (daging dan susu) dengan teknik ekstraksi fase padat dan khromatografi gas. **[Rapid, solid phase extraction (SPE) technique for the extraction and gas chromatographic determination of lindane pesticide in tissue and milk]**/ Yuningsih; Yuliastuti, S. (Balai Penelitian Veteriner, Bogor (Indonesia)) 3 tables; 10 ref. Summaries (En, In). *Jurnal Ilmu Ternak dan Veteriner* (Indonesia) ISSN 0853-7380 (2005) v. 10(1): p. 79-83.

ANIMAL PRODUCTS; MEAT; MILK; PESTICIDES; RESIDUES; GAS CHROMATOGRAPHY.

Organochlorine pesticide contamination in feed can cause residue in animal product (tissue and milk), so its become a problem in food safety. Solid phase extraction (SPE) has been carried out for determination organochlorine pesticide residues in food animal production. The technique was rapid, not costly and produce limited amount of hazardous-waste. Samples were homogenized with acetonitrile through cartridge C 18, eluted in fluorocyl column with 2% ether-petroleum or acetonitrile for tissue and milk samples, respectively. The recoveries of tissue sample by addition lindane standard solution: 0.50 and 1.00 micro g are 85.10% and 103.10%, respectively, while that of milk/with the addition of 0.50, 1.00 and 1.50 micro g are 83.80%, 88.69% and 91.24%, respectively. Three replicates were carried out for every sample. According of validation criteria of FAO/IAEA the recovery for analysis of pesticide residues was 70-110%. Therefore, the method is applicable.

Q04 FOOD COMPOSITION

142 GINTING, E.

Karakteristik pati beberapa varietas ubi jalar. **[Characteristics of starch from selected sweetpotato varieties]**/Ginting, E.; Widodo, Y.; Rahayuningsih, S.A.; Jusuf, M. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)) 3 ill., 4 tables; 45 ref. Summaries (En, In). *Penelitian Pertanian Tanaman Pangan* (Indonesia) ISSN 0216-9959 (2005) v. 24(1): p. 8-16.

SWEET POTATOES; STARCH; VARIETIES; FOOD TECHNOLOGY; PROXIMATE COMPOSITION.

Starch is an intermediate product of sweetpotato. In Indonesia, however, it is less known than that of cassava, corn or arrowroot. Physical and chemical characteristics of starch varied based on their raw material. These dictate the utilization of a certain starch as an ingredient for food and non-food products. A study on physical and chemical characteristics of starch from four selected sweetpotato varieties with different flesh colors, namely Sukuh (white), Sari (cream), Pakhong (light yellow) and Ayamurasaki (dark purple) was performed in the Postharvest Laboratory of the Indonesian Legumes and Tuber Crops Research Institute (ILETRI), Malang, from March to July 2003. The trial was arranged in a completely randomized design with three replications. Observations were done on physical and chemical characteristics of the sweet potato fresh roots and their respective starch contents, including yield recovery

of the starch and its gelatinization properties. Flesh color of the sweetpotato roots influenced whiteness level of the starch significantly, with the highest value on Sari variety (91.20%). The yield recovery of starch was positively correlated with the starch content of the fresh roots, with the highest values on Sukuh (14.49%) and Ayamurasaki (14.20%), respectively. The highest levels of gel consistency and strength were obtained by the starch of Sukuh variety; this was due to its high amylose content (39% db). Times and temperatures needed for starch gelatinization varied with the sweetpotato varieties, the highest value was on that of Sukuh variety (39 min; 88.5 ^{0}C.), while the highest value of peak viscosity (1420 BU) was on that of Sari variety. Starch derived from the four varieties seemed to be suitable for preparations of food products that need starches with high amylose content and gel stability, such as transparent noodle and vermicelli. Starches from varieties Pakhong, Ayamurasaki, and Sari are also suitable for products that need starches with high viscosity when treated at relatively lower temperatures. With respect to yield recovery, Sukuh is suitable source for production of sweetpotato starch, although whiteness level of its starch needs to be improved. Ayamurasaki is also suitable for source of starch, particularly for products which do not need bright color as a quality criterion.

143 KAILAKU, S.I.

Analisis mutu dan penerimaan konsumen terhadap permen tablet dengan formulasi konsentrasi pengisi, pemanis dan gambir. **Quality analysis and consumers preference on tablet candy with formulations of filler, sweetener and gambier**/Kailaku, S.I. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Udin, F.; Pandji, C.; Amos 4 ill., 2 tables; 17 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v. 2(1): p. 34-40.

UNCARIA GAMBIR; CONSUMER BEHAVIOUR; CANDYING; QUALITY; ORGANOLEPTIC PROPERTIES.

Traditionally, gambier, which is healthyful for teeth and gums, is well known as a mixture for betel chew. It is proper to develop this benefit into a candy product. Tablet candy (compressed-tablet lozenges) was chosen because it is not too sweet, fresh, and has low calorie. These characteristics are not contradictive with gambier's characteristics and benefit. The objective of this research is to discover the best formula in the making of gambier lozenge tablet candy. Materials used were amylum (filler and binder), saccharine (sweetener), magnesium stearic (lubricant), gambier, peppermint oil, strawberry flavor, and coloring agent (food grade). This research arranged in completely randomized factorial design with two factors and three replicates. The factor of the ratio between sweetener and filler consisted of three levels, namely: 3.5 : 96.5 (A1), 5.5 : 94.5 (A2), and 8 : 92 (A3). The second factor was the quantity of gambier used in the formula (w/w), consisted of three levels, namely: 3% (B1), 5% (B2), and 7% (B3). The best formula resulted from this research was A1B1 (3% gambier (w/w) with 3.5 : 96.5 ratio of sweetener and filler). The specification of product resulted from this formula was moisture content 2.65%; ash content 2.07 %; and 4.475 mm/10 sec/50 g hardness value. Result of hedonic test showed that panels gave high rank for A1B1 on taste, color, texture and aroma.

144 WIDANINGRUM

Pengayaan tepung kedelai pada pembuatan mie basah dengan bahan baku tepung terigu yang disubstitusi tepung garut. **[Soybean flour enrichment in wet noodle made of wheat flour substituted with arrowroot flour]**/Widaningrum; Widowati, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Soekarno, S.T. 4 ill., 5 tables; 19 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v. 2(1): p. 41-48.

MARANTA ARUNDINACEA; PASTA; WHEAT FLOUR; SOYBEAN FLOUR; NONCEREAL FLOUR; PROXIMATE COMPOSITION.

Indonesia has been importing wheat flour for domestic consumption for a long time. The total import of wheat flour from January to December 2003 was 344,200 tons equal to US$ 75.4 million (Rp 677.9 billion). The exploration of local carbohydrate resources is a choice to preserve the foreign currency deposit. One alternative of crops which could substitute wheat flour in many usages is arrowroot tuber, by processing it to flour. The aim of this research was to increase protein content in wet noodle by enriching soybean flour into wet noodle made of 20% of arrowroot flour and 80% of wheat flour. Soybean flour was

added in 0; 5; 10; and 15% concentration. This research was initiated by producing arrowroot and soybean flours, then analyzing their physicochemical characteristics. The result showed that addition of soybean flour was proven increasing protein content and improving the colour of wet noodle. The description test applied to texture, colour, odor and taste of wet noodle showed that panelists still accepted wet noodle made of wheat flour substituted with 20% of arrowroot flour with addition 10% of soybean flour. This product contains 27.4% of moisture; 0.7% of ash; 9.7% of protein; 10.1% of fat, 3.4% of crude fiber and 52.2% of carbohydrate. Based on description test including its physicochemical characteristics, this product has fulfill the requirement of wet noode standard of SNI 01-2987-1992.

145 YUSIANTO
Karakter fisik dan cita rasa kopi hasil penyangraian sistem pemanasan langsung. **[Physical and flavor characters of coffee roasted by direct firing system]**/Yusianto (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)) 3 ill., 8 tables; 39 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2003) v. 19(3): p. 152-170.

COFFEE; ROASTING; CHEMICOPHYSICAL PROPERTIES; FLAVOUR; POSTHARVEST EQUIPMENT; ORGANOLEPTIC PROPERTIES; ECONOMIC ANALYSIS.

Indonesia coffee production is 500.000 tons/year, but domestic consumption still only 0.50 kg/person/year or 100.000 tons/year. Therefore. diversification and research on the end product is prospective. Coffee powder is a simple product and marketable, and potential for increasing domestic consumption. The crucial process in producing coffee powder was roasting. The objective of this research was to evaluate process and product of direct firing roaster with liquid petroleum gas (LPG) fuel. The LPG was burned in the perforated steel pipe under steel plate. The roaster drum was a hexagonal shape of perforated steel walls with some lifter. Rotation speed of the drum was 41 rpm by 3 phase electrical motor of 1 HP-1700 rpm. The roasted coffee beans was lied on the upper side of container, afterwards fall and roll on heated steel plate and touch heated air, repeatedly. This research was arranged in randomized completely block design, replicated 7 times. The factors were 4 kinds of coffee beans. The parameters were temperature, yield, swelling volume, color, and flavor of the roasted beans. The research was conducted during 12 months. The result showed that roaster with direct firing type using LPG fuel could produce good roasted coffee both of Arabica or Robusta. The average roasting capacity was 38.17 kg of green coffee, and the roasting time was 48.92 minutes. Each tank of 50 kg LPG could be used for 1,303 kg green coffee or for 34-35 times. The average yield of roasted coffee was 82.93%, with bulk density was 0.44, and volume swelling was 24.06%. The best quality of roasted coffee was wet processed of Arabica, followed by wet processed of Robusta and dry processed of Robusta. Score of aroma and flavor were medium-good and the acidity of Arabica were low-medium. Body and bitterness of roasted Robusta was more than that of Arabica. The off-flavors of Arabica was green, sour, astringent, and earthy, but Robusta was astringent and green.

Q60 PROCESSING OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS

146 RISFAHERI
Optimasi komposisi kardanol dari minyak kulit mete sebagai substitusi fenol dalam formulasi perekat fenol formaldehida. **[Optimation of cardanol composition from cashew-nut shell liquid as phenol substitute in phenol formaldehyde adhesives formulation]**/Risfaheri (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Irawadi, T.T.; Nur, M.A.; Sailah, I.; Mas'ud, Z.A.; Rusli, M.S. 6 ill., 5 tables; 17 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v. 2(1): p. 24-33.

CASHEWS; SHELL; LIQUIDS; CROP RESIDUES; PHENOLIC COMPOUNDS; ADHESIVES; FORMALDEHYDE.

The cashew nut shell liquid is a byproduct obtained from the cashew nut processing, contains phenolics compound mainly cardanol. The objective of the research was to find out the optimum cardanol composition as phenol subtitute in phenol formaldehyde adhesives formulation. The experiment was

carried out in several stages as followed: (1) optimation of mole composition of the phenolics and mole ratio of the phenolics to formaldehyde, and reaction time; (2) optimation of mole composition of the phenolics and pH reaction; and (3) the resin structure analysis using FTIR (Fourier Transform Infrared Spectroscopy). The optimum formulation of adhesive synthesis as followed: the composition of phenol portion (1 mole cardanol : 1 mole phenol), the mole ratio of formaldehyde to total phenol (1.5 : 1.0). The optimum condition of polycondensation reaction was achieved at pH 10 for 1 hour. Cardanol could substitute phenol as much as 70% in the fenol formaldehyde adhesives formulation. The average of the bond strength of plywood produced using the adhesives in dry and wet condition (after boiled 72 hours) was 15.36 kg/cm^2 and 13.61 kg/cm^2, respectively. Requirement of the bond strength in Indonesian National Standard 06-4567-1998 is minimum 10 kg/cm^2 (the result test on dry condition) and 8 kg/cm^2 (the result test on wet condition). There are synergism of cardanol and phenol in reaction with formaldehyde, so therefore reaction of formaldehyde and cardanol did not only happen at the aromatics ring but also at unsaturated chain C15 of cardanol which caused an increase in the bond strength of plywood.

147 SUYANTI

***Pengaruh cara ekstraksi dan musim terhadap rendemen dan mutu minyak bunga melati.* [Effect of extraction method and season on the yield and quality of jasmine absolute]**/Suyanti; Prabawati, S.; Yulianingsih; Setyadjit (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Unadi, A. 2 ill., 3 tables; 15 ref. Summaries (En, In). *Jurnal Penelitian Pascapanen Pertanian* (Indonesia) ISSN 0216-1192 (2005) v. 2(1): p. 18-23.

JASMINUM; DISTILLING; CLIMATIC FACTORS; JASMINE OIL; YIELDS; QUALITY; EXTRACTION;

Utilization of jasmine flower was limited. Traditionally, the flower is used for ritual offerings, decoration and tea fragrance. Through extraction, jasmine flower could produce jasmine oil which was useful for perfume, soap, medicine, other fragrant product, and aroma therapy. Jasmine absolute for that purposes have been imported with high price. This research aimed to find out the optimum extraction technology, higher yield and quality of absolute and maximum solvent recovery. Fresh flower of *Jasminum officinale* harvested at Purbalingga regency, Central Java, were extracted using hexane. Randomized block design was used as experimental design on the study and the treatments were: one stage of extraction, two stages of extraction, and leaching of the waste flower continued by extraction of fresh flower conducted at rainy and dry season. The results showed that, one stage of extraction was the best treatment. The highest yield of absolute was of 0.15-0.17%. The absolute yield produced in dry season were higher than that of rainy season and characterized by good quality due to higher total component. The refractive index was 1.45-1.46, acid number 9.60-11.80, ester number 129.07-130.73. The essential oil composition were benzyl acetate (6.74-7.90%), benzyl benzoate (2.58-4.11%), cis-jasmone (8.49-9.53%), methyl jasmonate (0.81-0.86%), linalool (3.59-5.40%). The result of this study could be used as an appropriate method for jasmine oil extraction.

Q70 PROCESSING OF AGRICULTURAL WASTES

148 BAON, J.B.

***Laju dekomposisi dan kualitas kompos limbah padat kopi: pengaruh aktivator dan bahan baku kompos.* [Rate of decomposition and quality of solid coffee waste composts: effects of composting activators and raw material]**/Baon, J.B.; Nurkholis (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Sukasih, R. 4 ill., 3 tables; 14 ref. Summaries (En, In). *Pelita Perkebunan* (Indonesia) ISSN 0215-0212 (2005) v. 21(1): p. 31-42.

COFFEA; AGRICULTURAL WASTES; COMPOSTING; QUALITY; DEGRADATION; RAW MATERIALS; INORGANIC COMPOUNDS; SOLID WASTES.

In the last three decades, soil organic matter content of many coffee plantations in Indonesia has reached levels of low until very low. Soil productivity and sustainability of coffee production are controlled by

adequate content of soil organic matter. Solid waste of coffee industry has a potency used as source of soil organic matter after being decomposed, because carbon: nitrogen ratio of coffee pulp is about 40, while that of coffee parchment is about 140 which is too high compared to C/N ratio of soil. Composting of the solid coffee waste has to be carried out to hinder negative effect to plants. The objective of this study was to investigate the effect of inorganic and bio-activators for composting and raw material on the rate of composting and on the quality of the solid coffee waste composts produced. Raw materials tested were coffee pulp, coffee parchment and their mixture, while composting activators tested were two commercial products of bioactivators containing active decomposting bacteria and fungi, and two inorganic activators of ammonium sulphate and superphosphate, and control (without composting activator). The treatment combinations as 3 x 5 factorial were set up in randomized competely block design with three replications. Result of this study indicated that application of inorganic activators, especially ammonium sulphate, rather than bioactivators produced better composting rates and quality. Coffee pulp produced compost in better quality and rate of composting compared to other raw materials tested. Rate of composting to reach C/N ratio of less than 15 for coffee pulp as raw materials was only 4 weeks, whereas for coffee parchment was more than 8 weeks.

149 HIDAYATULLAH

***Pengelolaan limbah cair usaha peternakan sapi perah melalui penerapan konsep produksi bersih.* [Liquid waste management of dairy farm through application of cleaner production concept]**/Hidayatullah; Gunawan; Mudikdjo, K. (Balai Pengkajian Teknologi Pertanian Bengkulu (Indonesia)); Erliza, N. 14 tables; 11 ref. Summaries (En, In). *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian* (Indonesia) ISSN 1410-959X (2005) v. 8 (1): p. 124-136.

DAIRY CATTLE; LIQUID WASTE MANAGEMENT; DAIRY FARM; MIXED FARMING; ECONOMIC ANALYSIS; JAVA.

Development activities should take into account the environment capacity and quality. Dairy farm business with scale more than 20 cattles and located in same place tends to pollute environment, but better waste management applied will give an additional benefit to the environment. Dairy farm system applying cleaner production was an alternative in minimizing cattle waste. This study aimed to evaluate the benefit of dairy farm system life cycle applying cleaner production and how much the pollutant concentration in liquid waste could be minimized. Data collected were life cycle process of dairy farm system, waste management system and characteristics of liquid waste of dairy farm. Water samples collected three times from liquid waste tanks were analyzed in Chemistry Laboratory Faculty of Mathematics and Life Sciences, University of Sebelas Maret, Solo. The results were compared to the quality standard of liquid waste. The result showed that integrated farming system applying cleaner production was able to increase additional benefit for the farming system (B/C ratio more than 1) and reduced the liquid waste discharged to the environment. The result of water quality were (pH) = 7.25; total dissolved suspension (TDS) = 804 mg/l; total solid suspension (TSS) = 356 mg/l; chemistry oxygen demand (COD) = 483 mg/l; biology oxygen demand (BOD) = 240 mg/l; Nitrite = 0.06 mg/l; Nitrate = 0.09 mg/l; NH3-N = 0.39 mg/l; H2S = 0.54 mg/l). These concentrations were still below the maximum quality standard allowances.

150 INDRANINGSIH

***Pemanfaatan limbah pertanian organik untuk meningkatkan kualitas produk ternak melalui sistem pertanian terpadu.* [Byproducts of organic crops for quality improvement of animal products in crops-livestock system]**/Indraningsih; Sani, Y.; Widiastuti, R. (Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia)); Masbulan, E. 9 tables; 23 ref. Summaries (En, In). [Proceedings of national seminar on integrated crop livestock systems]. Prosiding seminar nasional sistem integrasi tanaman ternak/Haryanto; Mathius, I W.; Prawiradiputra, B.R.; Lubis, D.; Priyanti, A.; Djajanegara, A. (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2004: p. 257-267.

AGROPASTORAL SYSTEMS; AGRICULTURAL WASTES; DAIRY CATTLE; FOOD CROPS; PESTICIDES; RESIDUES; ORGANIC FERTILIZERS; FEEDS; ORGANIC FARMING; MILK PRODUCTION; MEAT; QUALITY.

The use of organic crops byproducts has been conducted to investigate its effects on the quality of animal products. The study is an integrated farming between agriculture (cabbage and corn) and livestock where its byproducts were used as animal feed. Residue analysis of pesticides was undertaken for rice straw, corn and cabbage (both organically and non-organically) collected from Yogyakarta, Pangalengan and Lampung. Pesticide residues were not detected in milk of dairy cattle fed with organic cabbages for 7 days. On the other hand, lindane was detected in milk of cattle fed on non-organic cabbages at 76.7 ppb (day-0); 49.6 ppb (day-1) and 10.2 ppb (day-7). Pesticide residues were also not detected in inner layer (for consumption) of organic cabbages, but endosulfan (0.1 ppb) was detected in outer layer (byproducts). However, lindane was detected from both layers of non-organic cabbage at 3.4 ppb (inner) and 0.3 ppb (outer). There was only lindane (2.5 ppb) detected in organic corn, while lindane (7.9 ppb) and heptachlor (7.3 ppb) detected in its byproducts. Before planting, soils were contaminated by lindane (2.7 ppb) and heptachlor (0.9 ppb). Feeding on byproduct of corn to Onggole cattle resulted to residues of lindane in sera at 0.26 ppb (week-1); 0.39 ppb (week-2); and 0.25 ppb (week-3). Lindane (3.89 ppb) was detected from organic rice straw of Yogyakarta, while the non-organic rice straw were contaminated by lindane (1.58 ppb); heptachlor (0.93 ppb); diazinon (7.95); and chlorpyriphos-methyl (12.09 ppb). Pesticide residues were still detected in commercial organic corn including lindane (9.6 ppb); heptachlor (1.1 ppb); chlorpyriphos-methyl (7.5 ppb) and diazinon (21.7 ppb); the organic cabbages were contaminated by lindane (0.53 ppb); heptachlor (1.8 ppb); and diazinon (14.2 ppb). The study showed that the quality of animal feed may affect animal products. Organic farming is an alternative to minimize pesticide residues in animal feed and products. It is necessary to select low pesticide residues of byproducts as animal feed in implementing crop livestock system.

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