ISSN: 0216-3713

INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

Volume 26, No. 2, 2009

Ministry of Agriculture
INDONESIAN CENTER FOR AGRICULTURAL LIBRARY AND TECHNOLOGY DISSEMINATION
Jl. Ir. H. Juanda 20, Bogor 16122, Indonesia

ISSN: 0216-3713

INDONESIAN AGRICULTURAL RESEARCH ABSTRACTS

Address :
Jl. Ir. H. Juanda 20, Bogor - 16122
Telephone No.: (0251) 8321746
Facsimile : (0251) 8326561
E-mail : pustaka@pustaka-deptan.go.id

PREFACE

Abstracts of Indonesian Agricultural Research Research contain the compilation of author abstracts which are synthesized based on subject and also authors name, and completed with Author Index, Subject Index, and Journal Index.

The Abstracts are disseminated to the users to keep them abreast of the information on the Indonesian research result in the field of agriculture.

Users who need full-text articles should look or ask for them to the local agricultural libraries or directly to the Indonesian Center for Agricultural Library and Technology Dissemination. They should write authors name, article title, journal or book title. These abstracts could also be searched through ICALTD web: http://www.pustaka-deptan.go.id.

Director of Indonesian Center for Agricultural Library and Technology Dissemination

TABLE OF CONTENTS

Page

TABLE OF CONTENTS i

E00 ECONOMICS, DEVELOPMENT AND RURAL SOCIOLOGY
E13 INVESTMENT, FINANCE AND CREDIT 99
E14 DEVELOPMENT ECONOMICS AND POLICIES 100
E16 PRODUCTION ECONOMICS 100
E20 ORGANIZATION, ADMINISTRATION, AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS 101
E21 AGRO-INDUSTRY 103
E70 TRADE, MARKETING AND DISTRIBUTION 103

F00 PLANT SCIENCE AND PRODUCTION
F01 CROP HUSBANDRY 104
F02 PLANT PROPAGATION 105
F03 SEED PRODUCTION AND PROCESSING 108
F04 FERTILIZING 109
F06 IRRIGATION 117
F07 SOIL CULTIVATION 117
F08 CROPPING PATTERNS AND SYSTEMS 118
F30 PLANT GENETICS AND BREEDING 119
F50 PLANT STRUCTURE 129
F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY 130
F62 PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT 132
F63 PLANT PHYSIOLOGY – REPRODUCTION 133

H00 PLANT PROTECTION
H10 PESTS OF PLANTS 133
H20 PLANT DISEASES 138

J00 POSTHARVEST TECHNOLOGY
J11 HANDLING, TRANSPORT, STORAGE, AND PROTECTION OF PLANT PRODUCTS 140

K00 FORESTRY
K10 FORESTRY PRODUCTION 142

L00 ANIMAL SCIENCE, PRODUCTION AND PROTECTION
L01 ANIMAL HUSBANDRY 146
L02 ANIMAL FEEDING 148
L10 ANIMAL GENETICS AND BREEDING 152
L50 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY 154
L53 ANIMAL PHYSIOLOGY – REPRODUCTION 155
L70 VETERINARY SCIENCE AND HYGIENE – GENERAL ASPECT 158
L72 PESTS OF ANIMALS 159

N00 AGRICULTURAL MACHINERY AND ENGINEERING
N20 AGRICULTURAL MACHINERY AND EQUIPMENT 160

P00 NATURAL RESOURCES AND ENVIRONMENT
P05 ENERGY RESOURCES MANAGEMENT 161
P33 SOIL CHEMISTRY AND PHYSICS 162

Q00 PROCESSING OF AGRICULTURAL PRODUCTS
Q02 FOOD PROCESSING AND PRESERVATION 163
Q04 FOOD COMPOSITION 164
Q60 PROCESSING OF NON-FOOD OR NON-FEED AGRICULTURAL PRODUCTS 165

T00 POLLUTION
T01 POLLUTION 162

AUTHOR INDEX 169
SUBJECT INDEX 175
JOURNAL INDEX 185

E13 INVESTMENT, FINANCE AND CREDIT

151 ASHARI.
[Perspective of agricultural bank establishment in Indonesia]. ***Perspektif pendirian bank pertanian di Indonesia***/Ashari; Friyatno, S. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Forum Penelitian Agro Ekonomi* ISSN 0216-4361 (2006) v. 24(2) p. 107-122, 3 tables; 24 ref.

AGRICULTURAL BANKS; CAPITAL; CREDIT; FINANCIAL INSTITUTIONS; INDONESIA.

The role of agricultural sector is very important to enhance the national economic development although its development is not fully supported by sufficient capital. The existing formal financial institutions tend to prioritize non-agricultural services which have high profit but low risk. In this context, efforts to establish agricultural bank institution that especially support agricultural activity services are highly recommended. This paper aimed at a review of the urgency, possibility, potential, and constraints of agricultural bank establishment in Indonesia. The result showed that conceptually and empirically, agricultural bank institution had a promising prospective in Indonesia. There are many options in respect to agricultural bank establishment in Indonesia, such as (1) Credit-agricole "France model', (2) "Bank Bukopin" model, (3) foreign direct investment model, (4) upgrading of "BUMN Bank" to be "Agricultural Bank" model, and (5) utilizing the financial institution that locally available and accessible by the people. For efficiency and effectiveness of the services, the agricultural bank should be designed based on agricultural characteristics and typical sectors of agricultural business.

152 EKOWATI, T.
Financial capital management on Maju Jaya member's group of duck farmer to develop duck enterprise in Brebes District, Brebes Region. ***Manajemen permodalan pada anggota KTTI Maju Jaya untuk pengembangan usaha ternak itik di Kecamatan Brebes, Kabupaten Brebes***/Ekowati, T.; Prasetyo, E.; Oxtovianto, H. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 830-835, 2 tables; 15 ref. 636:338.439/SEM/p

DUCKS; FARMERS ASSOCIATIONS; CAPITAL; PROFITABILITY; FARM INCOME; ECONOMIC VIABILITY; JAVA.

The objective of study was to determine the financial capital management on member's group of duck farmer. Research had been done on February-March, 2005 at Maju Jaya Duck Farmer Group in Limbangan Wetan Village, Brebes District, Brebes Region. Case study was used as a research method, sampling location was chosen by purposive based on majority of member's group; the duck farmer group have been operated more than 5 years and have the financial capital problem. Simple random sampling was used for sampling method to select 30 respondents. Primary and secondary data were obtained by interviewing and recording then was analysed by profitability, rentability and return on investment (ROI). Research result showed that number of duck farm scale were 533 ducks with the farm income was Rp 1.056,989/month. The value of profitability, own capital rentability, economic rentability and return on investment was 15.61%; 21.63%; 15.94% and 79.88%, respectively. According to analysis it can be said that duck farm was a benefit farm enterprise and usage of financial capital have been well operated eventhough the economic rentability was less than credit rate of interest. Financial capital planning have been done for building up the capital and used for duck eggs deposit by the farmer group. It has been implemented as a duck farm development base.

E14 DEVELOPMENT ECONOMICS AND POLICIES

153 HUTAHAEAN, L.
[Assessment of adoption and impact of integrated rice crop management in Central Sulawesi] (Indonesia). ***Kajian adopsi dan dampak pengkajian PTT padi di Sulawesi Tengah***/Hutahaean, L.; Sannang, Z. (Balai Pengkajian Teknologi Pertanian Sumatera Tengah, Palu (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 83-90, 4 tables; 23 ref. Appendix 631.152/SEM/p

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

The AIAT (Assessment Institute of Agricultural Technology) of Central Sulawesi has conducted a revision to help the problem solving on the slow improvement on the productivity of paddy in Central Sulawesi. The parameter on successive technology introduction was shown in the farmer's enthusiasm to adopt the technology. Providing the requirement in adopting revision and the impact on the technology which aimed at obtaining the adoption level of the technology on Integrated Crop Management (PTT), the impact of PTT technology towards productivity and farmers' earnings and also to receive feedback from the technology users. The survey method used in this project was the qualitative and quantitative approach. The data analysis used the analytical description analysis and the mathematical equation. The result indicated that the adoption level on the technology reached 45.31% and diffusion level of 30.03%. The impact of PTT technology on productivity improvement in paddy fields reached 21.45% and the earning indicated 37.69%. Whereas the feedback from the technology users were obtained in order to completing technology package.

154 MUKANI.
Identification of factors affecting slow technology transfer of virginia tobacco farming in Bojonegoro District. ***Identifikasi faktor penyebab lambannya alih teknologi pada usahatani tembakau virginia di Kabupaten Bojonegoro***/Mukani (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 71-77, 2 tables; 17 ref.

NICOTIANA TABACUM; FARMING SYSTEMS; TECHNOLOGY TRANSFER; JAVA.

Transfer of technology represents an indicator of the success of a research institute, because it can express the benefit of the research institute and at the same time it can give feedback from the consumers to the research institute to improve the technology. The technology of Virginia Tobacco of Bojonegoro from seeds to postharvest are available. Application of recommended technology at intensification of Virginia Tobacco program could increase the tobacco product and earnings per ha each of 2,529 kg and Rp 260,297/ha. The application of research technology on farmer farm could increase the tobacco product equal to 932 kg/ha followed by the increase of earnings equal to Rp 205,588/ha. However, the transfer of technology was still low, because it could not reduce the failure due to dryness and excessive water. Returning dried rice stalks as mulch for tobacco plantation was promising to lessen the risk.

E16 PRODUCTION ECONOMICS

155 DARAS, U.
Strategy and innovation of technology to increase cashew productivity in Nusa Tenggara (Indonesia). ***Strategi dan inovasi teknologi peningkatan produktivitas jambu mete di Nusa Tenggara***/Daras, U. (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Sukabumi

(Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26 (1) p. 25-34, 3 ill., 2 tables; Bibliography p. 33-34

ANACARDIUM OCCIDENTALE; PRODUCTIVITY; TECHNOLOGY; INNOVATION; MARGINAL LAND; NUSA TENGGARA.

West and East Nusa Tenggara are the important cashew growing areas in the eastern parts of Indonesia. The planted areas increase from year to year, however the average yield is low due to some factors like unselected planting materials used, infertile soils, pest and disease constraints, and low crop management. Cashew productivity may be increased by applying available technologies such as high yielding planting materials, amendment of soil fertility, pest and disease control, and improvement of cashew orchad management. To increase cashew productivity, two approaches could be implemented, namely, intensification by applying available technologies and development of cashew plantation areas merely having suitability rate from fair to highly suitable. In fact, growing cashew enables farmers to obtain return income during dry season while other crops do not.

E20 ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARM

156 ADNYANA, M.O.
Impact and farmer's perception towards integrated crop management (ICM) system for irrigated rice. ***Dampak dan persepsi petani terhadap penerapan sistem pengelolaan tanaman terpadu padi sawah***/Adnyana, M.O. (Pusat Penelitian dan Pengembangan Tanaman Pangan, Bogor (Indonesia)); Kariyasa, K. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 21-29, 2 ill., 7 tables; 6 ref.

ORYZA SATIVA; IRRIGATED RICE; FARMERS; FARM MANAGEMENT; FARMING SYSTEMS; PRODUCTIVITY; FARM INCOME; ECONOMIC ANALYSIS.

Research had been conducted in four provinces (North Sumatra, East Java, Bali, and NTB) involving 480 farmer samples. Stratified random sampling technique was used to select farmer samples with ex-ante vs. ex-post and cooperator vs noncooperator approach pattern. The research was focused to (1) determining impact of technology implementation to productivity and farmer's income; (2) calculating adoption cost of ICM; and (3) assessing the extent of adoption and evaluating farmer's perception towards ICM. Results pointed out that ICM was able to increase rice production and farmer's income. Adoption cost of ICM was below the actual price of rice, so that farmers were interested to implement the technology. Most farmers described that some of ICM components were rather new and simple, and they were suitable to their needs. ICM was sufficiently favorable even if it had not been completely applied due to technical problems and socio-economic condition of farmers. Improvement of rice production at national level through large-scale application of ICM could be considered be as a strategic program. Strong supports from local government units and good cooperation among related institutions are essential factors in determining the adoption of ICM by rice farmers on large scale.

157 ERMIATI.
[Feasibility study on *Orthosiphon grandiflorus* farming system in Sukabumi District]. ***Analisis kelayakan usahatani kumis kucing (Orthosiphon grandiflarus) di Kabupaten Sukabumi***/Ermiati; Hasanah, M.; Sukarman (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(2) p. 91-102, 3 tables; 12 ref.

DRUG PLANTS; FARMING SYSTEMS; FARM INCOME; FEASIBILITY STUDIES; JAVA.

Feasibility study on *Orthosiphon grandiflorus* farming system was conducted in Cirendeu, Girijaya Village, Nagrak Dstrict, Sukabumi from March until April 2004. The objective of this study was to evaluate the feasibility of *O. grandiflorus* farming system, include farmer income and minimum price for

farmer to obtain break event points (BEP). The research was conducted by survey methods. Cirendeu was chosen as research location based on the fact that it is one of the central production area of *O. grandiflorus*. Thirty farmer respondents were determined by simple random. Farmer income was determined by income analysis, while feasibility of farming system was determined by analysis of benefit cost ratio (B/C Ratio), net present value (NPV) and internal rate of return (IRR). The results indicated that farmer income was Rp 16,198,757/ha/2 years or Rp 674,948/month. Feasibility of farming system on *O. grandiflorus* up to the end of harvesting time (2 year old), based on interest 15%, were as follow : B/C Ratio was 3,14, NPV = Rp 16,198,757 and IRR = 52%. Based on the result of analysis it could be recommended that *O. grandiflorus* farming system in Cirendeu was feasible to be developed and profitable. The main constraint in developing *O. grandiflorus* farming system in Cirendeu is limitation of capital.

158 JARMANI, S.N.
Possibility of increasing smallholder dairy cattle farmers income independently through a better feeding management. *Kemungkinan menambah pendapatan mandiri peternak sapi perah rakyat melalui perbaikan manajemen pemberian pakan*/Jarmani, S.N.; Hidayati, N. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 333-339, 6 tables; 5 ref. 636:338.439/SEM/p

DAIRY CATTLE; FEEDING; MILK PRODUCTION; FARM INCOME; ECONOMIC ANALYSIS; SMALL FARMS.

Traditional management of dairy cattle under smallholder practices is characterized by constraint in feed supply that resulted in low productivity and income from milk selling. Technology to enrich the nutritive value of agricultural residues such as cassava has been developed, however it has not been carried out optimally in the field. Results of technology assessment of using fermented cassava has been carried out in dairy cattle farmers group in Koperasi Unit Desa (KUD) Tanjungsari, Sumedang, indicated that the use of 15% fermented cassava in the ration has increased the milk production to 1.32 liter with fat content of 1.1% resulting in the price of Rp 507 per liter. Farmers with 2 productive dairy cattle which produce an average of more than 13 liter of milk per day may generated an average monthly income of more than the standard poor farmer's income (Rp 400,000). Therefore, keeping dairy cattle may support a better life of villagers. The farmers will have an additional income, in the range of Rp 174,000 to Rp 349,000 per month if farmers also grow vegetables such as tomato and chilli, or Rp 43.000 to Rp 129.000 if farmers grow corn or cassava during the subsequent planting season after rice for self supporting production.

159 KUSNADI, U.
Role and function of buffalo in farming system in Banten Province (Indonesia). *Fungsi dan peranan kerbau dalam sistem usaha tani di Propinsi Banten*/Kusnadi, U.; Kusumaningrum, D.A.; Sianturi, R.G.; Triwulanningsih, E. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 316-322, 3 tables; 9 ref. 636:338.439/SEM/p

WATER BUFFALOES; FARMING SYSTEMS; FARM INCOME; LAND OWNERSHIP; JAVA.

The Province of Banten is the second populous of buffalo in Indonesia after Aceh. Buffalo, one of the large ruminants, has an important role because of their great contribution in Indonesian beef industry. In general, farmers rear buffaloes used for beef production and draught power in rice field. However, in this decade, buffalo population has been significantly decreased. It may be caused by diminishing function and role of buffalo in supporting farming system and the land for forages. Besides, farmers are not willing to increase number of buffaloes probably due to less profit in raising buffalo. Due to this matter, a study

was conducted to evaluate the function and role of buffalo in supporting farming system in Lebak and Pandeglang District that has the most populous of buffalo in the Province of Banten. This study was carried out by using survey method utilizing questioners. Total of the respondents were 60 farmers consisted of 30 farmers from Lebak and 30 farmers from Banten District. Analysis of simple correlation using R value was performed to estimate factors influenced farm size. The results showed that the role and function of buffalo in farming system in the Lebak and Pandeglang District used as draught power were 53 and 30% respectively; as source of income 37 and 67%, respectively; as savings 20 and 25% respectively; as animal fertilization 20 and 15% respectively; social status 8 and 12%, respectively and as recreation 3% in each district. The average of farm size was 13 heads and 6 heads buffalo per farmer for Lebak and Pandeglang District, respectively. The own-land size were 0.2 ha and 0.4 ha for Lebak and Pandeglang District, respectively. There was a positive correlation between farm size and land size which meaning the farm size increased as the land size increased with the coefficient correlation R = 0.35 and R = 0.65 for Lebak and Pandeglang District, respectively. The farmer's income were Rp 2,730,000 and Rp 1,050,000 per year for Lebak and Pandeglang District, respectively contributed to their farming system about 56% and 48% for Lebak and Pandeglang District, respectively.

E21 AGRO-INDUSTRY

160 KASNO, A.
Profile of agribusiness and technological support on peanut development in Indonesia. ***Profil agribisnis dan dukungan teknologi dalam pengembangan kacang tanah di Indonesia***/Kasno, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 21-32, 10 tables; 38 ref.

ARACHIS HYPOGAEA; AGROINDUSTRIAL SECTOR; CULTIVATION; TECHNOLOGY; PRODUCTION; INDONESIA.

Groundnut on dryland contributed 60% to farmers income. By this reason, groundnut is continously grown by farmers although little respected by stakeholders and beneficiaries. The annual growth rate of 1.3% of planting area indicated the limitation for developing the primary industry. The low access of technology was indicated by the rate of productivity, namely 0.5% annually. The increase of input and labour cost since 2005 seriously affected the capability of farmers to adopt the technology. Indeed, productivity of groundnut at farmers level of 1.5-1.7 t/ha of dry pod could be increase to 2.4-3.0 t/ha or by 30-80% using the improved technology. However, these of improve technology are labour and capital intensives not accessible by small farmers. Efficiency of groundnut farming in short term could be done by reducing the amount of seed from 100-150 kg/ha in broadcast planting to 80-90 kg/ha by planting in the furrow with spacing of 40 cm between furrows of plow. Harvest and postharvest activities that consume 20% of the labour could be given to local trader, due to limited labour, drying floor, and storage at the farmers level. Groundnut development in the short term using the improve technology should be a priority in the main area of groundnut in Central Java (Pati) and South Sumatra. Regarding to the global market, the socialization of the standart quality could not be ignored.

E70 TRADE, MARKETING AND DISTRIBUTION

161 IRAWAN, A.
Analysis on rice market integration in Bengkulu (Indonesia). ***Analisis integrasi pasar beras di Bengkulu***/Irawan, A.; Rosmayanti, D. (Universitas Bengkulu (Indonesia)). *Jurnal Agro Ekonomi* ISSN 0216-9053 (2007) v. 25 (1) p. 37-54, 11 table; 7 ref.

RICE; MARKET; MARKET PRICES; MARKET RESEARCH; SUMATRA.

The goals of this research were to analyze spatial integration and vertical integration in Bengkulu rice markets dan its implication for policy application. Four rice markets were evaluated including Bengkulu Municipality, Rejang Lebong Regency, North Bengkulu Regency and South Bengkulu Regency. Weekly

series data of 2001 to 2005 were used as sample data in analyzing spatial integration test. The vertical integration used weekly data of the period of 2002 to 2005 for Kota Bengkulu. Series data of 2001 to 2005 were used for Rejang Lebong, 2004 to 2005 for South Bengkulu and 2002 to 2005 for North Bengkulu. Quantitative methods used in this study were Johansen Cointegration Test, Vector Error Correction Model, and Granger Causality Test. The results indicate that: (1) Rice market in Bengkulu was imperfect on its spatial integration market, from which a shock price in Bengkulu Municipality market could be transmited to South Bengkulu Regency and North Bengkulu markets, but not to Rejang Lebong market. Policy implication of this result gave indication that to stabilize local rice markets in Bengkulu Province, priority intervention of local government was to stabilize in Bengkulu Municipality market, because price stabilization in Bengkulu Municipality could be transmitted to other markets in the most districts in Bengkulu Province. (2) Vertical market integration in Bengkulu Municipality and South Bengkulu Regency was imperfect, but statistically such integration was proved significantly in Rejang Lebong Regency and North Bengkulu.

F01 CROP HUSBANDRY

162 IRAWATI, A.
Performance of production of new plant type rice variety and new plant rice variety in Lampung (Indonesia). ***Keragaan produksi padi varieties unggul baru tipe baru (VUTB) dan varietas unggul baru (VUB) di Lampung***/Irawati, A. (Balai Pengkajian Teknologi Pertanian Lampung, Bandar Lampung (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigno, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Ungaran (Indonesia). Bogor: BBP2TP, 2007: p. 152-156, 1 ill., 2 tables; 4 ref.

ORYZA SATIVA; HIGH YIELDING VARIETIES; PRODUCTION.

The new type of superior varieties has the yield potential 30-50% higher than new plant rice variety ± 5%. The aim of this assessment was to know yield production performance of new plant type rice variety and new plant rice variety in Rama Indra Village, Central Lampung and Bulu Rejo village, Tanggamus, in dry season 2004 (April/May - August) . The result of the assessment shown that production of Fatmawati in Central Lampung and in Tanggamus lower than Ciherang, Cigeulis and Gilirang. Performance between new plant rice varieties shown that production of Ciherang lower than Cigeulis and Gilirang in Central Lampung but higher in Tanggamus. Production of Cigeulis higher than Gilirang in Central Lampung and Tanggamus. The alternative of postharvesting for Gilirang was rice packaging to increasing added value for farmers group and strengthening group capital.

163 JAMIL, A.
[Soil characteristic during direct sowing rice plantation period in North Sumatra] (Indonesia). ***Karakteristik tanah selama masa pertanaman padi tabur benih langsung di Sumatera Utara***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 143-149, 3 tables; 14 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; DIRECT SOWING; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILIZER; SOIL CHEMICOPHYSICAL PROPERTIES; SUMATRA.

Most of rainfed areas have low soil fertility status due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. The purpose of study was to evaluate the effects of

phosphorus fertilizer and organic matter as cow manure in order to improve soil fertility status of rainfed lowland rice, particularly in North Sumatra. The experiment was conducted from October, 2004 to February, 2005. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications and soil organic carbon content, available water, and soil bulk density as parameters measured. Results showed that application of both phosphorus and organic matter significantly increased soil organic carbon and available water in the soil and significantly decreased soil bulk density. Based on the results obtained, it could be concluded that both phosphorus and cow manure have positive effect to improve soil fertility status, especially under rainfed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

164 RIAJAYA, P.D.
Cotton planting times in Central Java. ***Waktu tanam kapas di Jawa Tengah***/Riajaya, P.D.; Sholeh, M.; Kadarwati, F.T. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2005) v. 11(2) p. 52-59, 2 ill., 2 tables; 18 ref.

GOSSYPIUM HIRSUTUM; PLANTING DATE; HIGHLANDS; SOIL CHEMICOPHYSICAL PROPERTIES; JAVA.

Climatic elements particularly rainfall strongly influences successful prediction of rainfed cotton yield. Rainfall variability varies amongst the seasons. Longterm rainfall data were required for rainfall analysis to get reliable probabilities. The rainfall analysis was done using markov chain first order probability and dryspell probability methods. Initial and conditional probabilities of rainfall for selected amounts (10, 20, 30, 40 and 50 mm/week) were analysed. Rainfall probabilities over 60% to have 20-30 mm rainfall per week were used to identify cotton planting times. The rainfall data were collected from 31 rainfall stations in Central Java (Grobogan, Wonogiri, Blora, Pemalang, Tegal, and Brebes). The planting times varied from the first week of December to the first week of January for Grobogan and Wonogiri. The planting times in Blora, Pemalang, Tegal, and Brebes ranged from early to late January. The majority of land used for cotton has high clay content with high water holding capacity which is sufficient to meet the cotton water requirement.

F02 PLANT PROPAGATION

165 DJAUHARIYA, E.
Effect of cutting materials and growth media on the growth of cubeba cuttings. ***Pengaruh macam setek dan media tumbuh terhadap vigor bibit kemukus (Piper cubeba Linn.)***/Djauhariya, E.; Rahardjo, M.; Sudirman, A.; Sukarman (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 67-72, 3 ill., 3 tables; 18 ref.

PIPER CUBEBA; DRUG PLANTS; CUTTINGS; GROWING MEDIA; VIGOUR; GROWTH.

In Indonesia, cubeba pepper plant (*Piper cubeba* Linn.) has been known for years as a traditional medicine, spice, fragrant, and seasonings. In Central Java, it is usually propagated by using eight or fourteen node cuttings which is not an economical practice. The research on cutting materials and growth media was conducted in Cimanggu Experimental Garden of the Indonesian Spice and Medicinal Crops Research Institute from September to December 2003. The objective of the research was to find out an appropriate propagation technology of cubeba. The research used two factors and three replications which was arranged in a randomized completely block design. The first factor was three kinds of cutting nodes, i.e. (1) attached-rooted cuttings, (2) vegetative branch, and (3) generative branch. The second factor was three kinds of media compositions of soil, dung manure and sand, i.e. (1) 1:1:1, (2) 2:1:1, and (3) 3:1:1. Observations were conducted on the percentage of budding, length of bud, number of leaves, number of roots, length of root, dry weight of the roots, and the shoot. The results of the research indicated that the vigour of seedlings which was expressed by germination percentage, growth of seedlings, and growth of root, did not significantly affected by the interaction between kinds of cuttings and media composition.

However, the kinds of cuttings significantly affected all variables, except the number of leaves. Cubeba seedlings originated from attached-rooted cuttings and vegetative branch had higher germination percentage i.e. 68.40% and 62.00%, length of shoot 2.87 cm and 4.70 cm, dry weight of shoot 0.13 g and 0.14 g, number of roots 5.95 and 5.76, length of root 7.32 cm and 7.27 cm, and dry weight of root 0.05 g and 0.05 g, compared to the cubeba seedlings originated from generative branch. Media composition was significantly effected only on dry weight of shoots. The highest dry weight of shoot was resulted from composition of soil, dung manure and sand 1:1:1 (0.14 g), while the lowest was found on ratio media composition of soil, dung manure and sand 3:1:1 (0.11 g).

166 HERAWAN, T.
Invitro tissue culture of three species of hybrid mulberry. ***Kultur jaringan tiga species murbei hasil persilangan***/Herawan, T.; Hardi T.W., T. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 17-24, 4 tables; 8 ref.

MORUS ALBA; SPECIES; IN VITRO CULTURE; HYBRIDS; CROSSBREDS.

A study on vegetative propagation of three hybrids of mulberry, namelly *M. australis* x *M. indica* (ASI), *M. nigra* x *M. indica* (NI) and *M. multicaulis* x *M. indica* (MI) was carried out in Laboratory of Tissue Culture Central for Forest Plantation Research and Development, Yogyakarta. The objective of this study was to evaluate the effect of the concentration of growth regulator, BAP (derivating of citocinin) on vegetative propagation of three hybrids of mulberry. The result showed that concentration 0.5 ml/l water of BAP produced the best axillar shoot growth of hybrid of *M. australis* x *M. indica* (ASI).

167 MARYANI, Y.
Multiplication of chrysanthemum bud through tissue culture. ***Penggandaan tunas krisan melalui kultur jaringan***/Maryani, Y; Zamroni (Universitas Sarjanawiyata Tamansiswa, Yogyakarta (Indonesia). Fakultas Pertanian). *Ilmu Pertanian* ISSN 0216-4214 (2005) v. 12(1) p. 51-55, 2 tables; 6 ref.

CHRYSANTHEMUM; BUDS; TISSUE CULTURE; PLANT GROWTH SUBSTANCES.

The study on chrysanthemum bud through tissue culture was aimed at studying the effect of combination between BAP and IAA plant growth substances and determining the appropriate concentration of BAP and IAA for multiplication of chrysanthemum bud through tissue culture. This study was carried out in the tissue culture laboratory, Balai Benih Induk (BBI), Salaman, Magelang Regency, Central Java Province. This study used factorial experiment arranged in completely randomized design (CRD). The treatment consisted of 2 factors. The first factor was the BAP concentration, consisted of four levels, i.e. 0 ppm (B1); 0.5 ppm; 1 ppm, and 1.5 ppm. The second factor was IAA concentration, consisted of four levels, i.e. 0 ppm; 0.5 ppm, 1 ppm, and 1.5 ppm. Based on the analysis result, it showed that the combination of BAP 1 ppm and IAA 1 ppm gave the highest number of bud multiplication. The treatment of BAP concentration did not affect the bud length. Similarly, IAA concentration did not affect the bud length as well.

168 MIFTAKHUROHMAH.
[Effect of several concentrations of BA on shoot multiplication of *Mesona palustris*]. *Pengaruh beberapa taraf konsentrasi BA terhadap multiplikasi tunas cincau hitam (Mesona palustris) in vitro*/Miftakhurohmah; Syahid, S.F. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2006) v. 17(1) p. 6-12, 2 ill., 3 tables; 13 ref.

DRUG PLANTS; SHOOTS; PLANT PROPAGATION; IN VITRO; TISSUE CULTURE; BA; SHOOT.

Mesona palustris is one of the medicinal plant which is potential to be developed. Recently, the agribusiness of this plant commodity is considered to be potential. To support the availability of plant material, propagation by tissue culture technique being a good alternative for mass production. This

experiment was conducted from January to April 2005 at the Tissue Culture Laboratory of Indonesian Spices and Medicinal Crops Research Institute (ISMECRI) in Bogor. The objective of this research was to find out the effect of several concentrations of BA on shoot multiplication of *Mesona palustris*. The treatments tested were several concentrations of BA, e.g. 0.0 (control); 0.2; 0.4; 0.6; and 0.8 mg/l. Experiment was arranged in a completely randomized design with six replications. The parameters observed were number of shoots, length of shoots, number of leaves, and percentage of rooting shoots, at 3, 5, and 9 week after culture (WAC). The result showed that the use of 0.2 mg/l BA performed the best shoots growth multiplication with a relatively high rate of increased shoots number and percentage of rooting shoots, at 3 to 9 WAC. Abundant shoots number (21.00 shoots), with length of shoots of 5.92 cm, leaves number of 13.00, and percentage of rooting shoots of 83.33% was obtained on MS + BA 0.2 mg/l, 9 WAC.

169 PRAWOTO, A.A.

Role of auxin and microclimate on the success of rooted cuttings of cocoa. ***Peranan auksin dan iklim mikro dalam keberhasilan penyetekan kakao (Theobroma cacao L.)***/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao, Jember (Indonesia)) Arifin; Bachri, S.; Setyaningtyas, K.C. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 17-37, 4 ill, 9 tables; 32 ref.

THEOBROMA CACAO; CUTTINGS; AUXINS; MICROCLIMATE.

In Indonesia, cocoa reproduction by cuttings is undeveloped yet because the available technology is more expensive than the other clonal reproduction methods. The success of cocoa cuttings is influenced by genetic and environmental factors. The purpose of this research is to study effect of endogenous auxin content, effects of light intensity and exogenous auxin application on the rooted cuttings. The second research purpose is to study effects of PVP (Polyvinylpyrrolidon) and IBA (a-indole-buzyric acid), clones, and microclimate. The experiment was conducted in Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute in Jember (45 m asl and D rainfall type according to Schmidt Ferguson). The design for the first experiment was split-split plot, replicated three times. The main plot was light intensity inside the roof, i.e. 15%, 30% and 45% to direct sun radiation. The subplot was cocoa clones, i.e. DR 2 and ICS 13, and the sub-subplot was IBA concentration, i.e. 0 ppm, 1500 ppm, 3000 ppm and 4500 ppm. The second experiment was designed factorial 3 x 3 of CRD, replicated 3 times. Clones of KW 163, KW 162 and KW 165, and IBA at 0, 3000, and 6000 ppm were the factors. In the same time, effect of IBA 6000 ppm, PVP 6000 ppm IBA + PVP 6000 ppm, and control were observed using KW 165 clone, and designed in completely randomized design (CRD), replicated 3 times. The result showed that auxin content of ICS 13 was higher than DR 2 (62.67 ppm vs 40.90 ppm) so that gave higher rooted cuttings and more root number. Exogenous application of IBA improved auxin content of the cutting materials and promoted root growth. The optimum IBA concentration for root number was 3500 ppm. Light intensity of 45% improved number of rooted cuttings three times compared to 15%, however compared to the second research, percentage of rooted cuttings was still very low. Cocoa cutting method to gain rooted cuttings 80-90% has been obtained. The method was using IBA 3000 ppm or 6000 ppm mixtured with or without PVP 6000 ppm, conducted during rainy season, the nursery using permanent shade trees of *Leucena sp*., temperature of 24-27°C and relative humidity was 78-87%. PVP was supposed inhibit oxidation of IBA so that the effect of IBA was more optimum. The rooting response of KW 162, KW 163 and KW 165 clones were similar. Rooted cuttings during dry season were low due to the less fresh of cutting materials and high temperature inside the bed roof.

170 SRILESTARI, R.

Peanut embryo somatic induced on several vitamins and sucrose. ***Induksi embrio somatik kacang tanah pada berbagai macam vitamin dan sukrosa***/Srilestari, R. (Universitas Pembangunan Nasional Veteran, Yogyakarta (Indonesia). Fakultas Pertanian). *Ilmu Pertanian* ISSN 0216-4214 (2005) v. 2(1) p. 43-50, 3 tables; 21 ref.

ARACHIS HYPOGAEA; EMBRYONIC DEVELOPMENT; PANTOTHENIC ACID; SUCROSE; TISSUE CULTURE.

More variable usage of peanut lead to increasing demand of peanut by year to year. At present, peanut national demand can not be met by domestic production. Regeneration of peanut plant through somatic embryogenesis is the most effective way for plant propagation. Somatic embryogenesis is an embryo development which is not resulted from fusion of gametes but from any somatic cell. Research on peanut somatic embryogenesis so far is quite limited, so this research aimed at determining the most effective combination of vitamin and sucrose in promoting peanut somatic embryogenesis. A 2 x 3 factorial experiment augmented was initiated in completely randomized design. The first factor, B5 and MS vitamin. The second one is sucrose concentration which ranged from 20, 30 and 40 g/l. Collected data were subjected to an analysis of variance followed by mean separation based on Duncan's Multiple Range Test. The result showed that application of B5 vitamin and 40 g/l sucrose produced somatic embryo at considerable number in relatively short time and there was no any interaction between them.

F03 SEED PRODUCTION AND PROCESSING

171 PRAWOTO, A.A.
Response of selected clones of cocoa seedlings in the nursery against high soil water content. ***Respons semaian beberapa klon kakao di pembibitan terhadap kadar lengas tanah tinggi***/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Zainunnuroni, M.; Slameto. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 90-105, 7 ill., 4 tables; 25 ref.

THEOBROMA CACAO; CLONES; SEEDLINGS; SELECTION RESPONSES; WATERLOGGING; WATER TOLERANCE; PLANT RESPONSE; SOIL MOISTURE CONTENT.

Since 2001 to 2005, cocoa bean price is high, this condition accelerates farmers to plant and enlarger their cocoa areas. The impact of this euphoria is the possibility that the planting area will be more marginal, i.e. high water table or soil with continuously high water content. This study was to evaluate cocoa planting materials tolerance to those condition. The experiment was conducted in glass house of Indonesian Coffee and Cocoa Research Institute using RCBD, replicated 3 times. The treatments were factorial 10 x 4. The propelegitimate seedlings of 10 clones were the first factor, i.e. KW 165, KW 162, DR 2, DRC 16, GC 7, ICS 13, 1CS 60, KW 163, Sca 12, and TSH 858. The second factor were soil water content, that were 100% (field capacity = control), 125%, 150%, and 175%. Watering method was gravimetric, once a month the volume was corrected by wet weight of the seedlings. The study was terminated after 5 month old. The result showed that growth of stem diameter, root dry weight and leaf number were still normal until soil water content 25% above field capacity. At that condition, seedling dry weight dropped 13% below control, whereas at 175% treatment the decreasing of seedling dry weight was 34% below control. According to seedling and root dry weight, and chlorophyll content, by using cluster analysis it could be obtained a group of seedlings tolerant to high soil water content, i.e. DRC 16, GC 7, and ICS 60. Meanwhile, a group of seedlings susceptible to high water content were KW 165, KW 163, and DR 2. Stem diameter and chlorophyll content was good indicator for water logging tolerance reaction for cocoa seedling, its correlation to seedling dry weight were positive and tight.

172 RAHARDJO, P.
Effect of storage period on the viability of bare root cocoa seedlings. ***Pengaruh lama penyimpanan terhadap daya tumbuh bibit kakao cabutan***/Rahardjo, P. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 106-112, 2 ill., 1 table; 13 ref.

THEOBROMA CACAO; SEED; BARE ROOT PLANTING; SEED LONGEVITY; VIABILITY; STORAGE.

An experiment to study the storage of bare root cocoa seedling was conducted as an effort to obtain alternative technology to transport cocoa seedling. The experiment used randomized completely design with 4 replications; and the treatment was the storage period, i.e. 2, 3 and 4 days. Each replication was used 25 seedlings. The results showed that bare cacao seedling storage for 2, 3 and 4 days decreased wet

weight 1-2 g, and leaf number 2-4. Seedling viability percentage for 2, 3 and 4 days storage was 90, 97.5 and 75%, respectively.

173 SUMIATI, E.
Effect of cultivar and seed bulb size of introduced onion on the growth, flowering, and seed yield. ***Pengaruh kultivar dan ukuran umbi bibit bawang bombay introduksi terhadap pertumbuhan, pembungaan, dan produksi benih***/Sumiati, E.; Sumarni, N. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 12-20, 6 tables; 19 ref.

ALLIUM CEPA; VARIETIES; BULBS; FLOWERING; GROWTH; YIELD COMPONENTS.

Low air temperature of 5-12°C is needed to stimulate flower initiation of onion, while in tropical regions it can be done by vernalizing the onion mother bulbs at 10°C for 2 months. Flower initiation was stimulated by low temperature interacts with several factors, such as genetic, physiological age, and size of mother bulbs. The experiment was conducted at highland Lembang Bandung 1,250 asl. The aims of this study were (1) to find out the proper size of the onion mother bulbs in order to get the highest yield of flowers, seed, and bulb, (2) to study kind of natural gibberellins and their concentrations which stimulate flower initiation of introduced onion cultivars. A split plot design with 3 replications was set up in the field. The main plot was two introduced onion cultivars, i.e. cultivar no. E-537, and no. Z-512. The subplot was size of onion mother bulbs, i.e. > 40 g, 25-40 g, and < 25 g per bulb. Research results revealed that the highest total seed yield was gained from cultivar no. Z-512 with the size of mother bulb of more than 25 g. Flower initiation was stimulated by de novo natural gibberellin with kind and concentration depend on cultivars and the size of mother bulb. The bigger mother bulb size (>25 g) the higher the concentration of natural gibberellin and the higher the flowers/umbels and seed yield produced. Kind of natural gibberellins synthesized by onion cultivar no. E-537 were GA3, GA7, and GA45, while from cultivar No. Z-5I2 were GA3, GA21, and GA45. The highest onion bulb yield was gained from cultivar no. E-537. The mother bulb size >25->40 g did not affect the total onion bulb yield for both cultivars.

F04 FERTILIZING

174 ELFIANI.
Requirement of SP-36 and KCl fertilizer in lowland rice at Rambah Samo, Subdistrict, Rokan Hulu, Riau (Indonesia). ***Kebutuhan pupuk SP-36 dan KCl untuk lahan sawah di Kec. Rambah samo, Rokan Hulu, Riau***/Elfiani (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru(Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 27-32, 4 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED LAND; SUPERPHOSPHATE; POTASH FERTILIZERS; SOIL FERTILITY; NUTRITIONAL REQUIREMENTS; FERTILIZER APPLICATION; SUMATRA.

The experiment aimed to know the fertilizer necessity of SP-36 and KCl based on nutrient status on lowland rice was conducted at Rambah Samo Subdistrict, Rokan Hulu Regency, Riau Province in 2003. The P and K status of rice fields were determined using 25% of HCI extract and P and K contents were grouped into three classes i.e. low, medium and high content of P and K concentrations of less than 20, 20-40 and more than 40 mg of P_2O_5 100/g and less than 10, 10-20, and more than 20 mg of K_2O/100 g respectively. The namely of Rice fields was measured by using planimeter that were 10.106 ha of lowland rice in Rambah Samo Districts, there are about 177 ha (8.82%) with medium, 1.827 ha (91.18%) with high P status and no areas with low P status. Meanwhile, the areas with medium, and high K status were about 530 ha (26.47%), 1.474 ha (73.53%) respectively. The recommendation of SP-36 fertilizer with low, medium and high P status were 130, 97,5 and 65 kg/ha/season. While the recommendation of KCl

fertilizer only for the lowland with low K status, 50 kg/ha/season. Based on P status, namely SP-36 to be added in amount of 1.133,23 t/ha/season in Rambah Samo Subdistrict.

175 HELMI.
Omission plot as determination bases of N, P, and K fertilizer recommendation for lowland rice participative. ***Petak omisi sebagai dasar penentuan rekomendasi pemupukan N, P, dan K padi secara partisipatif***/Helmi; Nieldalina (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 120-126, 9 tables; 4 ref. 631.152/SEM/p bk1

ORYZA SATIVA; NPK FERTILIZERS; FERTILIZER APPLICATION; FIELD SIZE; NUTRIENT AVAILABILITY; LAND PRODUCTIVITY; CROP PERFORMANCE.

Using of rational and balanced fertilizer is one of the key factor in order to improve and increase land productivity. In determination of fertilizer recommendation, farmers as user have small chance to be directly involved in determining fertilizer recommendation. The objective of the study was to encourage the farmers in order to determine their own fertilizer recommendation. The methodology was used the yield data based on omission plot and adjusted to omission plot table that made by IRRI. Variables observed consisted of number of tiller/hill, filled grain weight, straw dry weight, 1000-grain weight, fertilizer recommendation determined based on omission plot yield. The result showed that the yield production from omission plot without P (NK) and without K (NP) could be determined fertilizer recommendation particularly for P and K in the farmer field based on omission plot table. Determination of fertilizer recommendation based on omission plot could be as a motivator for farmers participatively in order to determine fertilizer recommendation in their own rice field.

176 HELMI.
Fertilizer recommendation for lowland rice based on yield targets to be achieved. ***Rekomendasi pemupukan padi sawah berdasarkan target hasil yang akan dicapai***/Helmi (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 127-132, 6 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; FIELD SIZE; FERTILIZER APPLICATION; LAND SUITABILITY; NUTRITIONAL REQUIREMENTS; CROPPING SYSTEMS; YIELDS.

Rice is a major consumption for Indonesian and fertilizer recommendation particularly for lowland rice still use the general recommendation. In a larger amount of fertilizer were applied in order to get the high production, therefore land quality becomes decreased due to imbalance fertilizer and finally decreased farmers income. The objective of the experiment was to find out the site specific fertilizer recommendation based on omission plot. The treatments consisted of (1) Site Specific Nutrient Management (SSNM)-1 (yield target 6 t/ha with the Legowo 4:1 in cropping system); (2) SSNM-2 (yield target 7 t/ha with the Legowo 4:1 in cropping system); (3) SSNM-3 (yield target 8 t/ha with the Legowo 4:1 in cropping system). The parameter observed consisted of using rate of LCC for urea; N, P, and K content in plant tissue; and yield production. The results showed that using of IRRI recommendation was achieved the yield target on 6, 7, and 8 t/ha, respectively. The better treatment was SSNM-1 with yield target on 6 t/ha, raised to yield production of 7.43 t/ha.

177 JAMIL, A.
[Phosphorus status and availability and phosphorus retention in the soil during the rice transplanted planting in North Sumatra (Indonesia)]. ***Status fosfor tersedia dan retensi fosfor dalam tanah selama masa pertanaman padi tanam pindah di Sumatera Utara***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 159-164, 2 tables; 13 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL IMPROVEMENT; NUTRIENT AVAILABILITY; SOIL FERTILITY; RAINFED FARMING; SUMATRA.

Status of low soil fertility are found in almost all rainfed rice fields due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. The purpose of study was to evaluate soil characteristics dynamic during transplanted rice growth period in Langkat District, North Sumatra as affected by phosphorus fertilizer and cow manure application into rainfed lowland rice particularly in Langkat District, North Sumatra. The experiment was conducted from June to October 2004. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications. Results showed that application of both phosphorus and organic matter significantly increased available phosphorus, however, significantly decreased soil phosphorus retention. Based on the results obtained, were concluded that both phosphorus and cow manure have positive effect to improve soil fertility status, especially under rain fed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

178 KADARWATI, F.T.
Rational fertilization to increase cotton productivity. ***Pemupukan rasional dalam upaya peningkatan produktivitas kapas***/Kadarwati, F.T. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 59-70, 1 ill., 9 tables; 31 ref.

GOSSYPIUM HIRSUTUM; PRODUCTIVITY; FERTILIZER APPLICATION; SOIL ANALYSIS; ORGANIC FERTILIZERS; INORGANIC FERTILIZERS; NUTRIENT UPTAKE.

As cotton is mainly grown on marginal land or less fertile soil, farmers need to apply fertilizer. Balanced fertilization principle was initiated in 1987 and adopted as a method to determine the dosage of fertilization. In fact, this method tends to excessive use in a certain element and less for others. Rational use in fertilizer is needed to avoid the excessive use of fertilizer. This principle implies that it is necessary to supply nutrient based on crop nutrient requirement and soils ability to supply nutrients. Recommendation on fertilizing is determined through several experiments on different sites which is difficult to be extrapolated to other sites. This recommendation is no longer used as cotton areas did not concentrate in a certain part for a long period of time. Nutrient condition in the soil indicates the status of soil fertility that can be used for determination of nutrient requirement. Rational use in nitrogen for cotton is determined based on soil N-NO3 with critical level 20-25 ppm, critical level for soil phosphorus is 20 ppm P; and critical level for soil potassium is 150 ppm K. The application of farm manure, bokashi, and sugar industry waste could increase soil fertility and cotton production.

179 KUSUMA, I.
Effect of fertilizer to citronella production. ***Pengaruh pemupukan terhadap produksi dan mutu serai wangi***/Kusuma, I.; Ansyarullah; Emmyzar; Rubaya, Y.; Herman; Daswir (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 59-65, 4 tables; 8 ref.

ANDROPOGON NARDUS; FERTILIZER APPLICATION; ORGANIC FERTILIZERS; PRODUCTION; QUALITY; ESSENTIAL OILS; LEAVES.

In supporting the development of citronella crops in Indonesia, the increasing of crop productivities must be done. Fertilizing of the organic fertilizer given to the crops was expected to increase the fresh leaves production and high oil yield on citronella crops. The research of fertilizing effects of citronella production was conducted in the experimental garden in Laing, Solok, at 0.90 hectare areas. The location is 450 m asl with Red Yellow Podzolic of the soil type. The research was studied since January to December 2005. The experimental design was randomized block design with 5 treatments and 9 replications, those are without fertilizing, 0.50 kg lime/clump/6 month, 2.00 kg manure/clump/6 month, 0.50 kg compost/clump/6 month, and 2.00 kg manure plus 0.50 kg lime/clump/6 month. The result showed that fertilizing gave significant effect in the second and third harvest. The treatment of 2 kg manure plus 0.50 kg lime per 6 month produced highest time growth, fresh leaf production, and oil production of citronella. Up to the third harvest, manure plus lime could increase the production of fresh leaf of 63.75% and oil production of citronella 36.20%. The content and quality of citronella oil produced was the best and met the standard quality of Indonesian export.

180 MARBUN, T.
Assessment on the effects of organic matter to new rice type of Fatmawati variety. ***Kajian pengaruh bahan organik terhadap padi tipe baru varietas Fatmawati***/Marbun, T.; Yusuf, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BP2TP, 2007: p. 280-286, 6 tables; 8 ref. 631.152/SEM/p bk1

ORYZA SATIVA; VARIETIES; NEW SPECIES; FARMYARD MANURE; INORGANIC FERTILIZERS; FERTILIZER APPLICATION; GROWTH RATE; AGRONOMIC CHARACTERS; YIELD COMPONENTS.

In order to study the influence of giving the manure to growth and productivity PTB Fatmawati variety , this study had been executed in rice field farm of INPPTP Pasar Miring, Pagar Merbau Subdistrict, Deli Serdang Regency at wet season of 2004 (September until December 2004). The experiment was designed in randomized block design (RABD) with four replications. The treatment consisted of 7 (seven) fertilization package placed as treatment that was (A) without manure and without inorganic fertilizer, (B) package fertilizer of urea, SP-36 and KCl according to soil analisys, (C) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 0.5 t manure/ha, (D) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 2.0 t manure/ha, (E) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 4.0 t manure/ha (F) dosage of 4.0 t manure/ha, and (G) dosage of 6.0 t manure/ha. Results of the experiment showed that giving various manure packages on the productivity of PTB Fatmawati variety only gave yield about the 2.35-3.87 t/ha. The manure dosage given of 4.0 and 6.0 t/ha no significantly effect to increasing of yield compared to without manure. Manure giving with dosage 0.5 t manure/ha, 2.0 t manure/ha and 4.0 manure/ha on packages added to inorganic fertilizer according to soil analysis (165 kg urea/ha, 75 kg SP-36/ha, and 0 kg KCl/ha) given could improve the yield up to of 48%, 65%, and 57% compared to treatment of without manure given and without inorganic fertilizer (2.35 t/ha).

181 MUSFAL.
Assessment of liquid fertilizer (Fitofit) effect on soil nutrient availability, growth and yield of lowland rice and farming system profit. ***Kajian pupuk cair fitofit terhadap ketersediaan hara tanah, pertumbuhan dan hasil padi sawah serta keuntungan nilai usaha tani***/Musfal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan

5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 248-255, 3 ill., 5 tables; 7 ref. 631.152/SEM/p bk1

IRRIGATED RICE; LIQUID FERTILIZERS; FOLIAR APPLICATION; NUTRIENT AVAILABILITY; APPLICATION RATES; GROWTH; YIELD COMPONENTS; PROFITABILITY.

The research was done because some of the rice fields in North Sumatera have too much P and K substance. The application give on the soil have not gave the result. The liquid fertilizer of Fitofit was the multi enzyme which could give on leaves. The research was done on May until August 2006 in Pasar Miring Village, Pagar Merbau Distric, Deli Serdang Regency and the laboratory of AIAT North Sumatra. The research was done in two steps. The first step was: (a) field activities with the fitofit and urea treatment: SP-36: KCl (100 : 100 : 0 kg/ha); (b) Without the use of fitofit + urea: SP-36: KCl (200 : 150 : 50 kg/ha). The second step was done in laboratory, that is incubation of fitofit liquid fertilizer (0, 1, 2, 5, 10%) with using soil from the research field. The result of fitofit fertilizer have suitable with standard quality of organic liquid fertilizer which arranged by regulation of the Minister of Agriculture No. 02/Pert/HK.060/2/2006. The incubation in a week has make the available of N, P and K became higher than without giving fitofit. The using of fitofit liquid fertilizer make the result higher up to 8441 kg/ha than without using the fertilizer on 881 kg/ha. Benefit cost ratio get on giving the fitofit fertilizer higher up to 0.96.

182 PUDJIONO, S.
Effect of organic fertilizer from shrimp waste on mulberry growth after second hedging. ***Pengaruh pupuk organik limbah udang terhadap pertumbuhan murbei setelah pangkasan kedua***/Pudjiono, S.; Hardi T.W., T.; Syakur, A.; Setyobudi (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 9-10, 3 tables; 6 ref.

MORUS ALBA; ORGANIC FERTILIZERS; FISH WASTES; GROWTH; PRUNING; PLANT RESPONSE.

The quality of mulberry leaves are dependens on some factors, such as site, hedging shaping, lighting, fertilizing and watering. The purpose of the study was to evaluate the effect of waste shrimp organic fertilizer on growth of mulberry. The study was done at Pelem, Purwobinangun, Pakem, Sleman, Yogyakarta, 500 m asl, using RCBD design. The following rates of waste shrimp organic fertilizer applied was 0, 250, 500, 1000 g/plant. The experiment was arranged in randomized completely block design, 25 trees per plot with three replications per treatment. The result showed that waste shrimp organic fertilizer not only gave increased significant physiology process of plant to some of leaf and branch at 1000 g/plant but also increased better height, diameter, number of leaf, branch, leaf and branch weight with increasing of dosage.

183 RAHARDJO, M.
Effect of fertilizer application on production and quality of *Pimpinella pruatjan* Molkenb. ***Pengaruh pemupukan terhadap pertumbuhan, produksi dan mutu simplisia purwoceng (Pimpinella pruatjan Molkenb)***/Rahardjo, M.; Rosita S.M.D; Darwati, I. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 73-79, 9 tables; 14 ref.

PIMPINELLA; DRUG PLANTS; FERTILIZERS; GROWTH; PRODUCTION; QUALITY; TRADITIONAL MEDICINES.

Purwoceng (*Pimpinella pruatjan* Molkenb.) is an Indonesian indigenous medicinal plant. Purwoceng is classified as an endangered species, and its cultivation technology has not been devoleped. The objective of the research was to find out the effect of fertilizer application on the production and quality of

purwoceng simplisia. The research was conducted in Sikunang, Dieng, Wonosobo, Central Java from 2004/05. The treatments of fertilizer application on 2.4 square m were (1) control (without fertilizer); (2) 9.6 kg dung manure (dm); (3) 96 g urea + 48 g SP-36 + 72 g KCl; (4) 9.6 kg dm + 96 g urea + 48 g SP-36 + 72 g KCl; (5) 9.6 kg dm + 96 g urea + 48 g SP-36; (6) 9.6 kg dm + 9.6 g urea + 72 g KCl; (7) 9.6 kg dm + 48 g SP-36 + 72 g KCl. The experiment was designed in randomized block designed with four replications. The result of the research showed that the treatments of 9.6 kg dm + 96 g urea + 48 g SP36 + 72 g KCl/2.4 m^2 and 96 g urea + 48 g SP-36 + 72 g KCl/2.4 m^2 increased the simplisia production and quality compared with control. The simplisia production increased up to 40% and the stigma sterol content in the roots increased up to 11-14 times. The content of sitosterol in the plants with fertilizer application was 6.7-17.11 ppm but in the plants without fertilizer application was zero. The content of bergapten in shoot part of plant with fertilizer application was 4.92-5.56 ppm, but in the shoot part without fertilizer application was zero. The production and quality of simplisia with the fertilizer application of 96 g urea + 48 g SP36 + 72 g KCl/2.4 m^2 were not significantly different from those with fertilizer application of 96 kg dm + 9.6 g urea + 48 g SP-36 + 72 g KCl/2.4 m^2. It happened probably because the organic soil content was high, so that the application of 40 ton/ha of dung manure did not give any effect. Furthermore, to increase the optimum production of purwoceng simplisia (6.98 kwt/ha) with high quantity it needs 283 mg N, 55 mg P and 356 mg K/plant or 23.50 kg N, 6.30 kg P, and 38.90 K/ha.

184 SEMBIRING, H.
Soil characteristics as affected residues by phosphorus and organic matter on rainfed lowland in North Sumatra] (Indonesia). ***Sifat tanah sebagai pengaruh residu fosfor dan bahan organik pada lahan sawah tadah hujan di Sumatera Utara***/Sembiring, H. (Balai Besar Penelitian Padi, Sukamandi (Indonesia)); Jamil, A. [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 18-25, 3 tables; 23 ref. 631.152/SEM/p bk1

ORYZA SATIVA; IRRIGATED LAND; RAINFED FARMING; PHOSPHATE FERTILIZERS; FARMYARD MANURE; RESIDUAL EFFECTS; SOIL CHEMICOPHYSICAL PROPERTIES; CATIONS; ION EXCHANGE CAPACITY; SUMATRA.

The experiment attempt to assess soil characteristics as affected by residual of phosphorus fertilizer and cow manure applied to two rice cropping seasons previously under rainfed lowland rice was conducted from February to May 2005, in North Sumatra. Treatments for two rice cropping seasons previously involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. No treatment was applied in this experiment. Treatments previously were laid in a factorial RCBD with 3 replications. Results showed that the residual effect of application both phosphorus and organic matter significantly increased P-availability content, organic-C content, and soil CEC. Based on the experimental results, as a conclusions consist of both residue of phosphorus and cow manure have positive effect to increase soil characteristics especially under rainfed lowlands rice, and generally residue of application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect compared to other treatments.

185 SIAGIAN, D.R.
NPK fertilizer effectiveness for growth and production of rice plant in Deli Serdang Regency (Indonesia). ***Efektivitas pupuk NPK terhadap pertumbuhan dan produksi padi sawah di Kabupaten Deli Serdang***/Siagian, D.R.; Girsang, S.S. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 194-199, 4 tables; 3 ref. 631.152/SEM/p bk1

IRRIGATED RICE; NPK FERTILIZERS; FERTILIZER APPLICATION; APPLICATION RATES; GROWTH; PRODUCTION INCREASE; SUMATRA.

Study of the effectiveness of NPK fertilizer carried out in Pasar Miring Experiment Area, Deli Serdang in rainy season 2006 at irrigated rice plant with Typic Tropoquept (according soil taxonomy USDA) in June till October 2006. This study used randomized completely block design with 4 replications to determine the effectiveness NPK fertilizer for growth and production of rice plant. We compared this fertilizer with complex fertilizer (N,P, K and S), that is 80, 60,60 dan 10 kg/ha. N fertilizer (from urea) was given 3 times. P fertilizer was given in times (7 DAT). K fertilizer was given 2 times, 21 and 45 DAT. We gave NPK fertilizer 200 kg/ha in 3 times (7, 21 and 45 DAT). If still there was lack of N, P, K and S, we could added urea SP-36, KCl and ZA so this treatment same quantity with complex fertilizer. The result showed there was positive benefit from NPK fertilizer, increasing productivity 1930 kg/ha. Beside that, information from economic analysis resulted is if we used NPK fertilizer there was profit Rp 8,713,612 (beside Rp 5,785,388 cost as long as planting), while NPKS fertilizer (complex fertilizer) Rp 6,226,314 for profit.

186 SUMARNI, N.
Optimum NPK fertilization for onion in highland. ***Kebutuhan pupuk NPK optimum bawang bombay di dataran tinggi***/Sumarni, N.; Rosliani, R. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 5-11, 3 ill., 3 tables; 12 ref.

ALLIUM CEPA; NPK FERTILIZERS; APPLICATION RATES; TUBERS; YIELDS; HIGHLANDS.

Onion plants need balance of NPK nutrient supply in soil. This experiment was conducted at Experimental Garden of Indonesian Vegetables Research Institute Lembang, 1,250 m asl with Andisol soil type, to find out the optimum dosage of NPK fertilizer application for 2 introduced onion cultivars in highland. A split plot design with 3 replications was used. Two introduced onion cultivars from Australia (E-515 and Z-512) were assigned to main plot, and 14 combination of NPK dosages were assigned to subplot. The range of N, P, K dosages were 75-375 kg/ha N, 75-375 kg/ha P2O5, and 75-375 kg/ha K2O. The results revealed that both onion cultivars no. E-515 and no. Z-512 did not give different respons to NPK fertilizing, expressed in the vegetative growth and bulb yield. The optimum dosage of NPK for both cultivars was 137 kg/ha N, 160 kg/ha P_2O_5, and 195 kg/ha K_2O. The results can be applied to increase the efficiency of NPK fertilizing on the introduced short-day onion.

187 SUMIATI, E.
Growth and yield of white cabbage treated with NPK 15-15-15 and seed fertilizer nutrifarm SD application in high altitude Lembang. ***Pertumbuhan serta hasil tanaman kubis putih dengan aplikasi pupuk NPK 15-15-15 dan pupuk pelengkap benih nutrifarm SD di dataran tinggi Lembang***/Sumiati, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 31-39, 3 tables; 23 ref.

BRASSICA OLERACEA; NPK FERTILIZERS; TESTA; GROWTH; YIELDS; HIGHLANDS; JAVA.

Growth and yield of cabbage could be improved by application of seed fertilizer nutrifarm SD in the nursery combined with application of proper dosage of NPK 15-15-15 in the field. The goal of this experiment was to find out the proper dosage of nutrifarm SD in combination with NPK 15-15-15 to improve the growth and yield of cabbage variety of Green Coronet. A split plot design with three replications was set up in the field. The main plot was NPK 15-15-15, comprised of two level dosages, viz. 0.5 t/ha and 1.0 t/ha. The subplot was application of nutrifarm SD seed fertilizer, comprised of 5 levels, viz. 0, 3, 6, 9, and 12 g/kg seed. The nutrifarm SD was mixed with cabbage seed and germinated in the nursery. NPK 15-15-15 was applied in the field twice, viz. half dosage at planting time and the rest was given at 4 weeks after planting. Cabbage plants were cultivated by using black silver plastic mulch. Research results revealed that there were no phytotoxicity, chlorosis, and other abnormalities symptoms appeared on cabbage plants treated with nutrifarm SD of 3-12 g/kg seed in combination with NPK 15-15-

15 0.5 to 1.0 t/ha. Independently, cabbage yield was significantly increased by the application of nutrifarm SD 6 g/kg seed, with the yield increment of 37.11% compared to control. However, the optimum dosage of nutrifarm SD was 6.2 g/kg seed when it was combined with NPK 15-15-15 dosage of 0.5 t/ha, and 6.5 g/kg seed when it was combined with NPK 15-15-15 of 1 t/ha. Application of NPK 15-15-15 perse from 0.5 to 1.0 t/ha did not significantly increase cabbage yield.

188 UTAMI, P.K.
Growth and flower quality improvement of *A. purpurata* through fertilization application of phosphate and potassium. *Peningkatan pertumbuhan dan mutu Alpinia purpurata melalui pupuk P dan K.*/Utami, P.K.; Tedjasarwana, R.; Herlina, D. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2006) v. 16(4) p. 307-313, 1 ill., 3 tables; 14 ref.

ALPINIA PURPURATA; ORNAMENTAL PLANTS; CUT FLOWERS; GROWTH; QUALITY; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; CROP PERFORMANCE.

Alpinia purpurata is one of the new tropical ornamental plants from Zingiberaceae family. The objective of the experiment was to determine the effect phosphate and potassium fertilizer application on promoting vegetative and generative growth of Alpinia. The experiment was conducted in the screenhouse at Segunung Field Station (1,100 m asl) at Indonesian Ornamental Crops Research Institute, Cianjur, from September 2004 to August 2005. The plots were arranged in a factorial completely randomized design with 3 replications and 2 factors. the first factor comprised of 3 level phosphate dosage i.e. 0,36,72 kg P_2O_5/ha. The second factor consisted of 4 level potassium dosage i.e. 0,60,120, and 180 kg K_2O/ha. The results showed that there was no significant interaction between phosphate and potassium fertilizer application, but the use 60 kg K_2O/ha increased of flower production on February 2005. K 120 kg K_2O/ha signifcantly increased of opened flower diameter (3.97 cm), and flower bud diameter (1.17 cm). Meanwhile, K application at 120 kg K_2O and 60 kg K_2O significantly increased the leaf lenght and mature flower (3.97 cm).

189 WINARDI.
Opportunity of fertilizer substitution materials usage in West Sumatra (Indonesia): 1. For lowland rice. *Peluang penggunaan bahan substitusi pupuk di Sumatera Barat: 1. untuk padi sawah*/Winardi (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 112-119, 2 tables; 18 ref. 631.152/SEM/p bk1

IRRIGATED RICE; ORGANIC FERTILIZERS; COMPOSTS; FERTILIZER APPLICATION; RICE STRAW; TRICHODERMA HARZIANUM; LAND PRODUCTIVITY; SUMATRA.

West Sumatra Province is one of rice production center in Indonesia with rice preference specificly of West Sumatra. Productivity of ricefield in the region still low, it is around 4.50 t/ha. One of the cause the low productivity is not properly fertilizing using by the farmers. Some constraints of fertilization are influencing, such as scarcity of fertilizer, high cost of fertilizer and abundant alternative fertilizer types enter the market so the farmer confuse to use them. One of solution to overcome the fertilizer scarcity, beside to increase the farming effisiency and rice field productivity is the using of compost. The recommended compost mainly includes of using raw material of rice straw with activator of *Trichoderma harzianum*.

190 YUNIZAR.
Balanced fertilization on lowland rice at Sungai Siput Bengkalis District, Riau Province (Indonesia). *Pemupukan berimbang pada padi sawah di Sungai Siput Kabupaten Bengkalis Riau*/Yunizar; Mardawilis; Umar (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)).

[Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Buku 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 78-82, 4 tables; 9 ref. 631.152/SEM/p bk1

IRRIGATED RICE; NPK FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; APPLICATION RATES; AGRONOMIC CHARACTERS; PRODUCTIVITY; SUMATRA.
The application NPK fertilizer in Riau Province is usually around 200-300 kg urea/ha, 100-50 kg SP-36/ha and 100 kg KCl/ha. Application of these fertilizers without considering soil nutrient status and requirement of rice crop. Requirement of nutrient for rice crop is depend on genetic, growing phase, and climatic factor. The research had been conducted in farmers field (Sungai Siput Village) Bengkalis District in 2006/2007 planting season (from November 2006 to February 2007). The research was arranged in randomized block design with 3 replications. The treatments are (A) without fertilizer; (B) 200 kg urea/ha, 100 kg SP-36/ha, 100 kg KCl/ha, (C) using of LCC to determine the urea dosage, 100 kg SP-36/ha, 100 kg KCl/ha (D) 150 kg urea/ha, 50 kg SP-36/ha, 100 kg KCl/ha, 2 t green manure/ha and (E) using of LCC to determine the urea dosage, 50 kg SP-36/ha, 100 kg KC/ha, 2 t green manure/ha. Results showed that the application of NPK fertilizer and green manure affected the rice growth significantly on height of plant, tiller number, sum of panicle/hill, sum of grains/panicle filled grains and yield. The application of NPK fertilizer and green manure did not affect 1000 grain weight. The best yield (4.7 t/ha) was obtained in treatment C (using of LCC) to determine the urea dosage, 100 kg SP-36/ha, 100 kg KCl/ha. The lowest yield (3.1 ton/ha) was obtained in treatment of without fertilizer.

F06 IRRIGATION

191 SUMARYANTO.
[Improving irrigation water use efficiency through irrigation contribution based on economic value of irrigation water]. ***Peningkatan efisiensi penggunaan air irigasi melalui penerapan iuran irigasi berbasis nilai ekonomi air irigasi***/Sumaryanto (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Forum Penelitian Agro Ekonomi* ISSN 0216-4361 (2006) v. 24(2) p. 77-91, 1 ill., 48 ref.

IRRIGATION WATER; EFFICIENCY; WATER AVAILABILITY; ECONOMIC VALUE.

Demand for irrigation water will increase in line with toting up cultivation area of rice required in the future. On the other hand, water quantity should be allocated to fulfil water demand of non-agricultural sectors which are also steadily increased. It implies that water available for irrigation will be scarcer, and therefore, utilization of irrigation water resource should be carried out in a more efficient way. It might be feasible to apply economic value of the irrigation water as a basis of water pricing. As an economic incentive, this approach could meet water charges paid by the farmers and the quantity of water used and the marjinal value product of the irrigation water. Aggregation of crops and its cultivation periods in the form of smaller groups will simplify its field applications.

F07 SOIL CULTIVATION

192 OMON, R.M.
Growth of kamper and hopea wood on alang-alang areas with prepared planting technique. ***Pertumbuhan kayu kamper dan hopea pada lahan alang-alang dengan teknik penyiapan lahan tanam***/Omon, R.M. (Loka Penelitian dan Pengembangan Satwa Primata, Samboja (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 11-23, 9 ill., 2 tables; 18 ref.

DRYOBALANOPS; HOPEA; LAND MANAGEMENT; IMPERATA CYLINDRICA; HERBICIDES; GROWTH.

The effect of preplanting technique on the growth of *Dryobalanops lanceolata* and *Hopea sangal* were conducted on alang-alang (*Imperata cylindrica*) areas in Sungai Wain Protection Forest, Balikpapan, East Kalimantan. The preparation techniques were conducted before planting, using herbicide to kill the alang-alang. The objective of the research was to obtain information on rehabilitation technique on alang-alang with suitable species of Dipterocarpaceae. Every treatment was observed in a plot 50 m x 50 m (0.25 ha) with planting distance 5 m x 5 m. Two species and three prepared planting techniques were tested in the experiment. The experiment was arranged as a factorial completely randomized design with three replications. The result showed that species, prepared planting techniques and interaction between species and prepared planting techniques did not give significant effect to survival percentage of *D. lanceolata* and *H. sangal*. The growth of height and diameter of *D. lanceolata* was higher than that of *H. sangal* as many as 39.79 cm and 0.38 cm, respectively. While treatment of prepared planting technique to growth height and diameter with totally sprayed by herbicide treatments were higher than other treatment as many as 35.37 cm and 0.38 cm, respectively. Therefore, Dipterocarpaceae species plantation, especially *D. lanceolata* and *H. sangal* have a good opportunity to be developed as commercial tree species planted in open areas (alang-alang) with totally sprayed by herbicide.

F08 CROPPING PATTERNS AND SYSTEMS

193 MANSYUR.
Role of leguminosa cover crops at cropping system of sweet maize for forage availability. ***Peranan leguminosa tanaman penutup pada sistem pertanaman jagung untuk penyediaan hijauan pakan***/Mansyur; Indrani, N.P.; Susilawati, I. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Peternakan). [Proceeding of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 879-885, 4 tables; 18 ref. 636:338.439/SEM/p

ZEA MAYS; LEGUMINOSAE; COVER PLANTS; CULTIVATION; YIELDS; FEED CROPS; PROTEIN CONTENT; CRUDE PROTEIN; CRUDE FIBRE; YIELD INCREASES; QUALITY.

The aims of research were at knowing the role of leguminosae as cover crops at cropping system of sweet maize for forage availability. Planting maize and leguminosae were conducted at field of Forage Crops Laboratory, whereas chemical composition and digestible of herbage were conducted at Laboratory of Ruminants Nutrition and Feed Chemistry, Faculty of Animals Science of Padjadjaran University. Randomized completely block design were used with 4 treatments and 4 replications. The objectives observed were yield of sweet maize, yield of herbage, crude protein and crude fiber content. Data were analyzed by using variance method, followed by Duncan Multiple Range Test. The Research result showed that cropping system of maize with leguminosae increased production and quality of forage. The cropping system of maize with *Calopogonium mucunoides* gave the optimum result of forage.

194 PURWANTO.
Potential nitrification and nitrogen mineral of soil in coffee agroforestry system with various shading tress. ***Nitrifikasi potensial dan nitrogen-mineral tanah pada sistem agroforestri kopi dengan berbagai pohon penaung***/Purwanto (Universitas Sebelas Maret, Surakarta (Indonesia). Fakultas Pertanian); Handayanto, D.; Baon, J.B.; Hairiah, K. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 38-56, 6 ill, 3 tables; 33 ref.

COFFEA CANEPHORA; AGROFORESTRY; SHADING; GLIRICIDIA SEPIUM; ARACHIS PINTOI; PARASERIANTHES FALCATARIA; ORGANIC MATTER; NITRIFICATION; NITRATES; INTERCROPPING.

The role of shading trees in coffee farms has been well understood to establish suitable condition for the growth of coffee trees, on the other hand their role in nitrogen cycle in coffee farming is not yet well understood. The objectives of this study are to investigate the influence of various legume shading trees

on the concentration of soil mineral N (N-NH4+ and N-NO3-), potential nitrification and to study the controlling factors of nitrification under field conditions. This field explorative research was carried out in Sumberjaya, West Lampung. Twelve observation plots covered four land use systems (LUS), i.e. (1) Coffee agroforestry with *Gliricidia sepium* as shade trees; (2) Coffee agroforestry with *Gliricidia* as shade trees and *Arachis pintoi* as cover crops; (3) Coffee agroforestry with *Paraserianthes falcataria* as shade trees; and (4) Mixed/multistrata coffee agroforestry with *Gliricidia* and other fruit crops as shade trees. Measurements of soil mineral-N concentration were carried out every three weeks for three months. Results showed that shade tree species in coffee agroforestry significantly affected concentrations of soil NH^{4+}, NO^{3-} and potential nitrification. Mixed coffee agroforestry had the highest NH^{4+}/N-mineral ratio (7.16%) and the lowest potential nitrification (0.13 mg NO^{2-}/kg/hour) compared to other coffee agroforestry systems using single species of leguminous shade trees. Ratio of NH^{4+}/N-mineral increased 0.8-21% while potential nitrification decreased 55-79% in mixed coffee agroforestry compared to coffee agroforestry with *Gliricidia* or *P. falcataria* as shade trees. Coffee agroforestry with *P. falcataria* as shade trees had potential nitrification 53% lower and ratio of NH^{4+}/N-mineral concentration 20% higher than that with *Gliricidia*. Coffee agroforestry with *P. falcataria* as shade trees also had organic C content 17% higher, total N 40% higher, available P 112% higher than that with *Gliricidia*. The presence of *A. pintoi* in coffee agroforestry with *Gliricidia* reduced 56% potential nitrification but increased 19.3% of NH^{4+}/N-mineral concentration. The low soil potential nitrification in the mixed coffee agroforestry had close relationship with the high content of soil organic matter.

195 SEBAYANG, L.
[Integrated crop management (ICM) application of lowland rice farming system on tsunami-affected area, South Nias (Indonesia)]. ***Penerapan teknologi dengan pendekatan pengelolaan tanaman terpadu pada usaha tani padi sawah di lahan sawah bekas tsunami, Nias Selatan***/Sebayang, L. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 214-219, 4 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; CROP MANAGEMENT; INTEGRATED PLANT PRODUCTION; FARMING SYSTEMS; TECHNOLOGY TRANSFER; YIELD COMPONENTS; IRRIGATED LAND; SOIL SALINIZATION; SUMATRA.

South Nias is a new district from the Nias District development. Tsunami incident in 2005 caused a lot of agricultural land in the lowlands and the coast in southern Nias be salted, eroded or covered with silt tsunami that high salt content. According to data of Dinas Pertanian of South Nias in 2005, the tsunami-affected districts is the largest district in the Teluk Dalam of achieving 45 ha. One effort to meet their food needs are increasing the productivity of rice fields. For that North Sumatra AIAT in cooperation with the Dinas Pertanian to do a pilot project application of rice farming system with the ICM approach. This is carried out in the Nanowa Village on land of a farmer with 1 ha area, starting in September until December 2006. Rice varieties are planted Ciherang, Sunggal, Cilosari, Kapuas and Banyuasin. The results of Ciherang 8.1 t/ha; Sunggal 7.3 t/ha; Cilosari 7.0 t/ha; Kapuas 5.9 t/ha; dan Banyuasin 5.6 t/ha.

F30 PLANT GENETICS AND BREEDING

196 AKMAL.
Performance of the promising line in low land area Pasar Miring Subdistrict of Deli Serdang District (Indonesia). ***Penampilan galur-galur unggul padi sawah di Pasar Miring, Deli Serdang, Sumatera Utara***/Akmal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S.

(eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 133-136, 3 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; PROGENY TESTING; ADAPTATION; LOWLAND; CROP PERFORMANCE; HIGH YIELDING VARIETIES; ADAPTABILITY; YIELD COMPONENTS; SUMATRA.

Research was conducted in Pasar Miring Subdistrict of Deli Serdang District, conducted on May to September 2006. Randomize block design was used on 24 promising lines, with 3 replications, on 4 x 5 of plot size. The objective of this research was to get the adaptive of paddy in North Sumatra. They result showed that 24 promising line there were 6 promising lines that produce high compare to the control variety (Ciherang). The lines productivities of UML.S-06- 13 (6.05 t/ha), UML. S-06- 16 (5.88 t/ha), UML. S-06- 17 (5.88 t/ha), UML. S-06- 02 (5.75 t/ha), UML.S-06- 18 (5.71 t/ha), UML.S-06- 20 (5.67 t/ha), Whereas the production of Ciherang varieties is 5.68 t/ha. These promising lines had a good adaptability and high production on low land area.

197 AZRAI, M.
Genetic analysis of maize resistance to downy mildew (*Peronosclerospora maydis* Rac. Shaw). Analisis genetik ketahanan jagung terhadap penyakit bulai/Azrai, M. (Balai Penelitian Tanaman Serealia, Maros (Indonesia)); Aswidinnoor, H.; Koswara, J.; Surahman, M.; Hidajat, J.R. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 71-77, 2 ill., 2 tables; 35 ref.

ZEA MAYS; DISEASE RESISTANCE; GENETIC RESISTANCE; PERONOSCLEROSPORA; MILDEWS; GENETIC VARIATION; HERITABILITY.

Downy mildew disease caused by *Peronosclerospora maydis* is considered as major pathogen in maize. This fungus has been reported to cause economic loss in maize. The genetic of resistance to downy mildew was studied in seven generation crosses, namely resistant parents P1 (Mr10 and Nei9008), susceptible parent P2 (CML161) and their progenies: (F1, F2, F3, BC1P1 and BC1P2) derived from crosses between the resistant inbred lines and the susceptible inbred line. The genetic materials were evaluated for downy mildew resistance (DMR) under artificial screening nursery using spreader row technique, arranged in a split plot design with two replications at Cikeumeuh-Bogor experimental farm. The experiment was carried out to determine genetic variability, heritability and dominance degree estimates of downy mildew resistance (DMR). Results showed that genetic variance component of DMR for each generation was considered as narrow, except for F3 generation which was considered as broad. Heritability estimate for each generation was considered as low to moderate, except for F3 generation was considered as high. The narrow sense estimate based on generation means indicated that heritability values were moderate.

198 HULUPI, R.
Inheritance of Arabica coffee resistance to *Radopholus similis* Cobb. *Pewarisan ketahanan kopi Arabika terhadap nematoda Radopholus similis Cobb.*/Hulupi, R. (Balai Penelitian Kopi dan Kakao, Jember (Indonesia)); Nasrullah; Soemartono. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 1-16, 1 ill, 7 tables; 15 ref.

COFFEA ARABICA; RADOPHOLUS SIMILIS; NEMATODA; PEST RESISTANCE; GENETIC RESISTANCE; GENETIC INHERITANCE.

A research to get inheritance of arabica coffee resistance to *Radopholus similis* nematode was done in screen house and laboratory of Indonesian Coffee and Cocoa Research Institute, also at endemic area of coffee plantation, using F1 and F2 with their reciprocal crossing between BP 542 A (resistant) x Andungsari 1 (susceptible), and BP 542 A x Kartika 1. The purpose of this study that was conducted at seedling stage is to formulate a strategy for arabica coffee breeding to get resistant varieties to nematode. As the variables of resistance were weight of seedling biomass, percentage of root weight deviation, number of root nematodes, number of soil nematodes, reproduction and percent of necrotic root. Using

discriminant analysis and fastclus, those data variables were analyzed for genetic of resistance with statistical analysis system programme version 8. Genetic study on the inheritance of resistance to R. similis was started with evaluation of homozygosity of BP 542 A was resistant parent. The result showed that BP 542 A was heterozygous. Therefore, segregation test could not be suggested with segregation pattern principals as Mendel proposed. Segregation test on BP 542 A showed that it was heterozygote and the resistance was controlled by single gene with complete dominant effect, so the progeny segregated in 75% resistant and 25% susceptible. The result of the test showed the absence of maternal effect for root weight deviation and percentage of necrotic root variables, which meant that no cytoplasmic inheritance was involved. Based on the test of segregation ratio, almost all of the resistance components were not appropriate for monogenic and or digenic segregation pattern as expected due to non allelic gene interaction that caused epistasis.

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

GOSSYPIUM HIRSUTUM; DENSITY; LEAVES; BEMISIA TABACI; COLONIZING ABILITY; GERMPLASM.

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) Kanesis 1 (KI 436), (3) A/35 Reba P 279 (KI 257), (4) Acala 1517 (KI 174), (5) Asembagus 5/A/1 (KI 162), (6) 619-998xLGS-10-77-3-1 (K1 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 square centimeter of leaf and adult of *B. tabaci* on third highest leaf of 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 individu/cm^2 of leaf) due to dense trichome (150-300 trichomes/cm^2 of leaf) as compared with other accessions, viz. TAMCOT SP 21, DP Acala 90, 619-998xLGS-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 (less than 100 individu/cm^2 of leaf).

200 JAYUSMAN.
Evaluation of genetic variation of surian seedling at nursery level. *Evaluasi keragaman genetik bibit surian di persemaian*/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 1-8, 1 ill., 3 tables; 14 ref.

TOONA; GENETIC VARIATION; GROWTH; SEEDLINGS; EVALUATION.

This research aimed at evaluating the growth of surian seedling at the nursery. It consisted of 3 populations (seed collecting areas) of North Sumatra Province: Ambarita (5 families), Sipolha (3 families) and Tarutung (3 families). The growth of seedling was varied range from 5.13 cm to 7.34 cm for height, 1.16 mm to 1.38 mm for diameter and 4.28 to 5.32 for stem hardening. The result of analysis of variance showed that the differences of populations were statistically significant for height and stem hardening and not significant for diameter. The differences of family were statistically significant for all measured traits.

201 JAYUSMAN.
Leaf extraction method and isozyme of *Styrax benzoine* band pattern intensity. Metode ekstraksi daun dan intensitas pola pita isozim jenis kemenyan/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 17-27, 2 ill., 3 tables; 16 ref.

STYRAX; EXTRACTS; LEAVES; METHODS; ENZYME ACTIVITY.

Electrophoresis technique could be used to detect isozyme characterized genetic differences of *Styrax benzoine*. The main problem encountered during extraction is the presence of inhibitor such as tannins, phenolic compound and other cellular constituents. This experiment described a procedure for the visualization of enzyme system in S. benzoine using horizontal electrophoresis. The gel used was 13% hydrolyzed starch potato. The power electrophoresis was up to 35 MA AC at 250 V and at a constant current. Temperature electrophoresis was 4 derajat C a constant. The enzyme system studied were Acid phosphatase (Acp), Malate dehydrogenase (Mdh), Phosphogluco isomerase (Pgi), Glutamate oxaloacetate transaminase (Got), Alcohol dehydrogenase (Adh), and Glucosa-6-phosphate dehydrogenase (G-6-pdh). The proper ratio between buffer (extraction, electrolyte and gel) and leaf character was done as well. The optimum electrophoresis was shown by extraction buffer TPTDAM pH 7.5 and combination at electrolyte and gel buffer natrium borate pH 8.5. Because produce clear band pattern, varied enzyme activity was shown on six-enzyme system tested with isozyme band pattern migration (Rf value) 20 - 62.5 categorized as slower to medium migration. Zimogram was shown monomer - trimer with enzyme structure 10 loci and 20 alleles.

202 JONHARNAS.
Evaluation of several varieties of lawland rice in South Tapanuli (Indonesia). *Evaluasi beberapa varietas padi sawah di Tapanuli Selatan*/Jonharnas; Akmal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 200-204, 2 tables; 5 ref. 631.152/SEM/p bk1

IRRIGATED RICE; VARIETY TRIALS; GENOTYPE ENVIRONMENT INTERACTION; HIGH YIELDING VARIETIES; ADAPTATION; SUMATRA.

The aim of this study was to find out some pre-eminent varieties which is adaptable, high yields. This study counducted by inland ground farmer of country side Gunung Manaon Subdistrict of Batang Angko, South Tapanuli District. High of place was 400 m asl. Climate type was B1. Starting of implementation date on October 2004 until January 2005. Plant system was Legowo 4:1. Distance plant was 20 cm x 10 cm. Planted one/hole. Given manure by 225 kg of urea, 150 kg SP-36, and 100 kg of KCl/ha. Using random group by 3 replications (block). Treatment consisted of 17 pre-eminent varieties of rice field that were: Sunggail, Cisantana, Tukad Unda, Tukad Petanu, Ciherang, Bondoyudo, Singkil, Konawe, Sintanur, Kalimas, IR 64, Angke, Conde, Cigeulis, Situ Patenggang, Situ Bagendit and Lambur. Seed delivered from Balitpa Sukamandi. Analysis of data evaluated by using analysis of variance (ANOVA) to see difference between treatment test and DNMRT at level 5%. Cropping conducted by entangling farmer who chosen those prefered varieties. From 17 examined varieties in South Tapanuli there were 7 with varieties higher yield like as of Sunggal (6,54 t/ha), Lambur (5,50 t/ha), Kalimas (5,25 t/ha), Tukad Petanu (5,15 t/ha), Bondoyudo (7,02 t/ha), Cisantana (5,65 t/ha), Cigeulis (5,29 t/ha). Chosen varieties of rice field which have the highest yield and also adapted for local environment while be developed in that area. Pre-eminent newly varieties better tested before about its adaptable, then to be developed by farmer, so the failured can be minimized.

203 JONHARNAS.
[Evaluation of tungro disease infection on several rice high yielding varieties in South Tapanuli] (Indonesia). ***Evaluasi serangan penyakit tungro pada beberapa varietas unggul padi di Tapanuli Selatan***/Jonharnas; Ulina, E.S. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 205-209, 2 tables; 10 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; HIGH YIELDING VARIETIES; GENETIC RESISTANCE; TUNGRO DISEASE; ADAPTATION; DISEASE TRANSMISSION; SUMATRA.

The experiment was conducted to study the resistance of various rice varieties on tungro disease in Gunung Manaon Village, Batang Angkola Subdistrict, South Tapanuli from October 2004 to January 2005. The treatments were 17 rice varieties: Sunggal, Cisantana, Tukad Unda, Tukad Petanu, Ciherang, Bondoyudo, Singkil, Konawe, Sintanur, Kalimas, IR 64, Angke, Conde, Cigeulis, Situ Patenggang, Situ Bagendit and Lambur. The results indicated that rice variety Tukad Petanu, Tukad Unda and Kalimas were resistant to tungro virus with yield 5.15 t/ha; 4.98 t/ha; and 5.25 t/ha, respectively. While rice variety Singkil and Konawe were succeptible to tungro virus, with damage 5.3% (yield was 4.22 t/ha) and 5.1% (yield was 4.44 t/ha), respectively. The resistant rice varieties were suitable to grow at the endemic field of tungro virus in wet season.

204 KOSMIATIN, M.
Rapid screening for drought tolerance in soybean through in vitro culture. ***Penapisan cepat toleransi kedelai terhadap kekeringan secara in vitro***/Kosmiatin, M.; Hutami, S.; Husni, A.; Mariska, I. (Balai Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 159-167, 4 ill., 6 tables; 18 ref.

GLYCINE MAX; IN VITRO CULTURE; DROUGHT RESISTANCE; GERMINATION.

Screening for crop tolerance to abiotic stresses through in vitro cultures is advantageous because it is quick, need small space, easy to control, and not limited by seasons. In vitro selection for drought tolerance was done using polyethylene glycole (PEG 6000). The aim of the experiment was to develop a quick in vitro selection method for selection of soybean varieties or lines tolerant to drought. Soybean seeds of susceptible (3209 and 3083, moderately tolerant (Wilis), and tolerant to drought (MLG 2805, Tanggamus and Nanti) were used in this study. The experiment was done in two series. In the first experiment, sterile explants of embryo axis, young embryo, and mature embryo were cultured in an MS solid medium containing GA3 0.5 mg/l. PEG 6000 was added to media before sterilization to a concentration of 0, 10, 20, and 30%. In the second experiment, young and mature seeds were used as sources of explants, which were cultured on different solid media (MS 1/2, MS 1/4, PC-L2 1/2 and PC-L2 1/4) containing different concentration of PEG 6000 (0; 5; 10; 15; 20%). Observation was done visually based on germination percentages of the explants. The results showed that germination percentages of the explants varied with the types of the soybean explants used in the trial. The use of PEG in the media decreased the germination percentages of all soybean varieties and lines. Explants of mature embryo were appropriate to be used in the drought tolerance trial in a medium containing 10% PEG. The second experiment showed that PEG with 10% concentration still regrouping soybean seeds based on the tolerance to drought stress. Dilution of the medium untill 1/4 of the basic formula did not affect level of drought tolerance of the soybean.

205 LESTARI, E.G.
Screening for drought-tolerance on Gajahmungkur, Towuti, and IR 64 rice somaclones based on their root penetration ability. ***Uji daya tembus akar untuk seleksi somaklon toleran kekeringan pada***

padi varietas Gajahmungkur, Towuti dan IR-64/Lestari, E.G.; Mariska, I. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Guharja, E.; Harran, S. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 97-103, 2 ill., 3 tables; 16 ref.

ORYZA SATIVA; VARIETIES; IN VITRO SELECTION; DROUGHT RESISTANCE; ROOT SYSTEM.

A simple but effective method is essential in a plant breeding program. A research was conducted in a greenhouse of the ICABIOGRAD, Bogor to select 37 Gajahmungkur, 34 Towuti and 47 IR 64 variants to evaluate of somaclones obtained from in vitro selection need for variants that are drought-tolerant. In the field, the drought-tolerance is indicated by the plant capability to produce roots that are tough enough to penetrate a hard soil. In this trial, the testing for root penetration capability was conducted in a mixture of vaseline and parafine (60:40) at a 30 ^{0}C dilution temperature, which is similar to 1.2 Mpa. The in vitro-selected Gajahmungkur, Towuti and IR 64 somaclones, which were assumed to drought-tolerant, were previously chosen using a filter of 20% PEG (BM 6000). The root-penetration selection yield 24, 9, and 14 somaclones of rice varieties of Gajahmungkur, Towuti, and IR 64, respectively. The roots of Gajahmungkur somaclones penetrated faster the parafine layer than those of Towuti and IR64 somaclones. It was also shown that there was a variability in the root capability to penetrate the parafine layer besides the variations in length, diameter, and numbers of roots penetrating the vaseline base.

206 LESTARI, E.G.
Screening for drought tolerance in Towuti and IR-64 somaclone lines derived from in vitro selection. ***Uji toleransi kekeringan pada galur somaklon IR-64 dan Towuti hasil seleksi in vitro***/Lestari, E.G.; Sukmadjaja, D. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 85-90, 4 tables; 24 ref.

ORYZA SATIVA; IN VITRO SELECTION; SOMACLONAL VARIATION; DROUGHT RESISTANCE; PLANT RESPONSE.

Unsuccessful rice breeding for drought tolerance conducted in the dry field is often due to problems associated with homogeneous drought level. An experiment was conducted in the greenhouse of ICABIOGRAD from December 2004 to October 2005 to identify drought tolerant lines and effective standardized in vitro technique. Genotypes Towuti and IR64 somaclone lines previously selected by using PEG 20% and root penetration were used in this study. The selected nine Towuti and IR64 somaclone lines were planted in pot containing soil and fertilizer. Each line consisted of three plants. Drought stress was induced from the heading stage to harvest. As a control, water was optimally given. Variables observed were plant height, number of tiller, days to heading, rolling leaves, number of filled grain/panicle, number of empty grain and weight of filled grains/plant. The result showed that drought stress influenced the height of the plant, number of tillers, and the grain production. Eight of the nine Towuti lines were observed as drought tolerant producing 19-106 grains/panicle and 18-30 g filled grains/plants. While eight out of the 10 IR64 lines produced 22-108 filled grains/panicle and 13-26 g filled grain/plants.

207 MUSALAMAH.
Resistance improvement to *Callosobruchus chinensis* in mungbean: from conventional to biotechnology approach. ***Peningkatan ketahanan kacang hijau terhadap hama gudang Callosobruchus chinensis: dari pendekatan konvensional menuju bioteknologi***/Musalamah (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 33-42, 2 ill., 2 tables; bibliography p. 40-42

VIGNA RADIATA RADIATA; CALLOSOBRUCHUS CHINENSIS; INSECTICIDES; PEST RESISTANCE; BIOTECHNOLOGY; GENE TRANSFER.

Callosobruchus chinensis cause serious postharvest damage in mungbean. Breeding is improving resistance to *C. chinensis* in mungbean has been conducted for a long time, but it has not showed satisfactory result. In the continuous search for new plant genes that confer resistance against bruchids, some interesting candidates have been found in defence compound, which may be proteic or aproteic. The discovery of some secondary metabolit compounds in some Leguminous crops (e.g. amylase inhibitor, protease inhibitor, lectins, and visilins) available to apply gene transfer, especially gene coding defence resistance to *C. chinensis* (alpha amylase inhibitor/alpha AI). The succesfulness of gene coding alpha AI transfer in Azuki bean and pea indicated that the transfer of alpha AI gene to mungbean could also to be conducted. The alpha AI expression in mungbean seed could avoid damage of *C. chinensis* infestation.

208 PRASETIYONO, J.
Analysis of genetic diversity in species of wild rice using micro satellite markers. ***Analisis keragaman genetik spesies padi liar menggunakan markah mikrosatelit***/Prasetiyono, J.; Tasliah; Bustamam, M.; Silitonga, T.S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Abdullah, B. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 168-174, 2 ill., 4 tables; 19 ref.

ORYZA SATIVA; SPECIES; GENETIC VARIATION; MICRO SATELLITES.

Eighty five accessions of wild rice species tested for their genetic diversity using 17 microsatellite markers. Analysis of DNA polymorphisms resulted in 230 alleles (6-31 alleles for each primer). The number of bands varied among the species from 1-11 bands. The highest value of polymorphic information content (PIC) was found on RM 197 (0.954), while the lowest was on RM287 (0.369). The total of PIC was high (13.6) with at average of 0.805. Based on cluster analysis of the 85 accessions of the wild rice species, they could be clustered into two major groups, similar to that of the botanist grouping as reported earlier. The bootstrap analysis showed that the two species groups had a low degree of confidence. Their cophenetic correlation value was r = 0.75548 which is considered as the poor fit class ($0.7<r<0.8$). To improve confidence level of the dendrogram, more microsatellite markers need to be used in the analysis.

209 RUSLIYADI, M.
Socialization some new pre-eminent rice varieties with approach integrated crop management (ICM) in Province of Gorontalo. ***Sosialisasi beberapa varietas unggul padi baru dengan pendekatan pengelolaan tanaman terpadu di Provinsi Gorontalo***/Rusliyadi, M.; Fadwiwati, A.Y. (Balai Pengkajian Teknologi Pertanian Gorontalo (Indonesia)); Matondang, R.H.; Ulina, E.S. [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 33-38, 3 tables; 8 ref. 631.152/SEM/p bk1

ORYZA SATIVA; INTRODUCED VARIETIES; HIGH YIELDING VARIETIES; CROP MANAGEMENT; INTEGRATED PLANT PRODUCTION; VARIETY TRIALS; AGRONOMIC CHARACTERS; SULAWESI.

One of the major issue to be challenged and resolved in the rural are low amount of soil fertility, land conservation which varities not feasibility for economical, technical and financial capabilities weaken. To anticipate the constraint and problems is needed by innovation of new high yielding varieties. The use of new high yielding varieties is expected as an alternative variety for the earlier varieties which had decreased its production. Research goal was to socialize the adaptive rice high yielding varieties in Gorontalo through Integrated Plant Management (IPM) approach method. Research showed that plant height and buds number of Ciapus varieties legowo planted, larger than the Ciherang, Cimelati, and Fatmawati. Ciherang varieties had the number of panicles per hill and the number of grains per panicle which was higher than varieties of Batang Gadis, Ciapus, Cimelati, and Fatmawati. The highest rice dry

grains yield was Ciherang varieties about 9 ton/ha. Result indicated that Ciherang varieties was more feasible to develop than other varieties, especially varities through legowo system.

210 SEBAYANG, L.
[Performance of some wetland rice high yielding varieties in South Nias] (Indonesia). ***Penampilan beberapa varietas unggul padi sawah di Nias Selatan***/Sebayang, L. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 210-213, 1 table; 4 ref. 631.152/SEM/p bk1

IRRIGATED RICE; HIGH YIELDING VARIETIES; INTRODUCED VARIETIES; ADAPTABILITY; CROP PERFORMANCE; GROWTH; YIELD COMPONENTS; SUMATRA.

Research aimsed at identifying the growth performance of some high yielding varities of rice in lowland. Held in Botohilitano Village, Teluk Dalam Subdistrict of South Nias District. Rice farming system in the region of South Nias have been using local varieties with low productivity (3.2 t/ha). This region thus not able their own food needs. Therefore necessary introduction of new high yielding varieties that have high yield potential through adaptation test. Adapted varieties (Ciherang, Sunggah, Cilosari, Banyuasin and Kapuas) showed a relatively high productivity (6.7; 6.1; 5.6; and 5.9 t/ha) compared with local varities (Sabuso 3.2 t/ha).

211 SEMBIRING, T.
Performance of new superior varieties at rice production centre of Serdang Bedagai Regency (Indonesia). ***Keragaan varietas-varietas unggul baru di sentra produksi padi sawah Kabupaten Serdang***/Sembiring, T. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 287-290, 4 tables; 6 ref. 631.152/SEM/p

IRRIGATED RICE; NEW SPECIES; HIGH YIELDING VARIETIES; ADAPTATION; CROP PERFORMANCE; PRODUCTION INCREASE; PRODUCTIVITY; SUMATRA.

This research was conducted to find out new superior rice varieties adaptation, and executed on April until October 2006, at Lubuk Bayas Village, Perbaungan Subdistrict, Serdang Bedagai Regency, North of Sumatra. The location was at 6 m asl. The research design was arranged in a block design non factorial with four replications. The result of assessment showed that the highest production was found in variety of Ciherang, 7.0 t/ha, followed by variety of Mekongga 6.8 t/ha, variety of Cibogo, 6.5 t/ha, variety of Cigeulis 6.4 t/ha, and variety of Kahayan 6.3 t/ha, respectively.

212 SINAGA, P.H.
Response of seven lines hybrid rice on two methods of urea determination at the new rice field. ***Respon tujuh galur padi hibrida terhadap dua metode penentuan kebutuhan pupuk urea di lahan sawah bukaan baru***/Sinaga, P.H. (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 44-48, 2 tables; 5 ref. 631.152/SEM/p bk1

ORYZA SATIVA; HYBRIDS; PROGENY; UREA; FERTILIZER APPLICATION; DOSAGE; NUTRITIONAL REQUIREMENTS; PLANT RESPONSE; GENOTYPE ENVIRONMENT INTERACTION; IRRIGATED LAND.

A research to evaluate the response of seven lines hybrid rice at two methods of urea at the new rice field was conducted in Pekanbaru from May 2003 to April 2004. A randomized block design with four replications was used. The treatment was seven lines hybrid rice (NY11, NY12, NY13, NY14, LY11, LY12, LY13) and two application methods of urea (based on the soil analysis and leaf colour chart/LCC). Batang Kampar was used as a control variety. The results showed that there are different application timing when the lines need urea as well as urea need on all of hybrid rice tested, and gave good response when urea applied based on the LCC. Application of urea was better than before leaf colour scale under 4.5. The use of LCC saved urea 40 kg/ha and yield response was higher than soil analysis. Lines NY12 and NY11 gave yield response 9.48 t/ha and 7.54 t/ ha, and selected as an adaptable lines at new rice field.

213 SISHARMINI, A.
Optimization of transformation technique for sweet potato (*Ipomoea batatas* (L.) Lam) using *Agrobacterium tumefaciens*. *Optimasi transformasi genetik ubi jalar melalui vektor Agrobacterium tumefaciens*/Sisharmini, A.; Ambarwati, A.D.; Santoso, T.J.; Herman, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Wattimena, G.A. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 104-109, 1 ill., 5 tables; 13 ref.

IPOMOEA BATATAS; TRANSGENIC PLANTS; GENETIC TRANSFORMATION; VECTORS; AGROBACTERIUM TUMEFACIENS; SELECTION.

An optimal transformation system is needed to obtain transgenic sweet potato. Genetic transformation system mediated by *A. tumefaciens* was commonly used in dicotyledonous plants. A study was done to optimize techniques for genetic transformation of sweet potato using *A. tumefaciens*. Leaf petioles of sweet potato cvs. Jewel and BIS 182-81 were used as sources of explants. An isolate of *A. tumefaciens* LBA4404 strain with a plasmid pMON10575 (with gus, nptll and CP-SPFMV genes) was used in the experiment. Effects of acetosyringone concentrations 0, 100, 200 micrometer, respectively and inoculation periods (30 and 60 minutes, respectively) on gus gene expression, and effect of R1 (MS+0.2 mg/l kinetin) and R2 (MS+0.2 mg/l 2-ip) media on transformed calli regenerations were observed. The results showed that acetosyringone at 100 micrometer concentration and 60 minutes inoculation period was the best combination for the gus gene expression. R1 was a better medium than R2 to regenerate the transformed calli of sweet potato cv. Jewel. Six putative transgenic sweet potato plants were obtained. Further analysis was needed to confirm integration of the gene into sweet potato genome.

214 SUSILO, A.W.
Selection and estimation of the genetic parameters of rootstock characteristics on cocoa seedling of half-sibs families. *Seleksi dan pendugaan parameter genetik beberapa sifat batang bawah kakao (Theobroma cacao L.) pada semaian famili saudara tiri*/Susilo, A.W. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Sulastri, D.; Djatiwaloejo, S. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(3) p. 147-158, 3 tables; 13 ref.

THEOBROMA CACAO; SEEDLINGS; SELECTION; GENETIC PARAMETERS; ROOTSTOCKS; AGRONOMIC CHARACTERS.

For cocoa clonal propagation, rootstock with good characteristics is highly needed. Half-sibs families is the most appropriate alternative for rootstock selection. This study was aimed to select and estimate genetic parameters of cocoa seedling on the half-sibs families of DR 1, DR 2, ICS 60, DRC 15, BLC 4, DRC 16, KEE 2, ICS 13, KW 162, KW 163, PA 300, RCC 70, TSH 858, Sca 6 and Sca 12. Research was carried out in Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute.

Genetic parameter were estimated based on variance and covariance component of the variables of the number of leaf, stem height, stem girth, leaf acreage, the volume of fresh root, the length of secondary root and the length of primary root, which assessed along seed growth till 90 day after planting. The result showed that most of the recorded variables perform high category of narrow sense heritability (h2 > 0.5). Stem girth, leaf acreage, volume of fresh root, length of secondary root and the length of primary root were assessed as the broad category of genetic variability (d2A > 2SEd2A). Therefore, length of primary root and length of secondary root would be the main criterion for rootstock selection as their performance on broad category of genetic variability and high category of narrow sense heritability. Length of secondary root can be estimated based on the performance of stem girth (r = 0.5) and leaf acreage (r = 0.23) and the primary root can be estimated based on the performance of stem height (r = 0.81) and leaf acreage (r = 0.72). Based on positive selection of primary root length and negative selection of secondary root length it was identified that the families of KEE 2 and Sca 12 potentially would be good rootstock due to their long category of the primary root and short category of the secondary root that having characteristics of high water uptake and low vigor.

215 WARDIYATI, T.
Characters improvement of banana cv. kepok through induced mutation of gamma ray III. somaclonal variation at generative stage. ***Perbaikan sifat pisang kepok melalui mutasi buatan sinar gamma III. keragaman somaklon pada fase generatif***/Wardiyati, T.; Sugiyanto, A.; Nugroho, A. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian); Lamadji, S.; Mugiono. *Agrivita* ISSN 0126-0537 (2006) v. 28(2) p. 150-159, 4 ill., 1 table; 16 ref.

MUSA PARADISIACA; INDUCED MUTATION; GAMMA RADIATION; SOMACLONAL VARIATION; MUTANTS; MATURATION; PRECOCITY; AGRONOMIC CHARACTERS.

Cooking banana cv. kepok is raw material of banana chips for home industries which developed rapidly. Due to the long period of harvest time (1.5-2.0 years) no one grow the plant in commercial scale. At present, the price of kepok banana is very expensive i.e. Rp 50,000 per bunch, causes the close of the several industries. The use of induced mutation of gamma ray irradiation with dosages of 0-10 krad was one of the efforts for improving early maturity of banana cv. kepok. Result at the second years of the research was obtained several clones of dwarf and early flowering, i.e. early flowering (G141, H18), dwarf (G93, G92), and erect leaves (H43, HA5). Result at third years (year 2001) revealed asociated that several clones which was produced in the second-generation mutation stable of G141 and H18 regarded as early flowering mutant by reducing the harvest time of 6 (six) months but not dwarf. Type G92 was dwarf with normal flowering time, and H43 and H45 were erect leaves with normal height and normal flowering time. Identification by using morphological and isoenzyme methods showed that several mutant clones differed if compared with the control.

216 ZEN, S.
[Anak Daro: high yielding variety of local rice in West Sumatra (Indonesia)]. ***Anak Daro varietas lokal berpotensi hasil tinggi di Sumatera Barat***/Zen, S. (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Padang (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 97-103, 7 tables; 7 ref. 631.152/SEM/p

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

Progress of rice breeding in this time have assembling short-lived new pre-eminent varieties, high yield potency, and resistance to organism intruder of crop with better taste rice which do not interior to local varieties which expand before. In West Sumatra, varieties of rice which matching with consumer

preference, who prefer rice with pera type, during this time only pre-eminent varieties of Cisokan and IR-42, then some specific local varieties. One of the specific local variety which is expanding especially in Regency/Town of Solok is Anak Daro. Besides at Regency/Town of Solok area, this variety had also expanded at other towns in West Sumatra, with imbalance yield from each subprovince as well as season approximately 4.91-5.63 t/ha. Potency result of Anak Daro did not significantly differ compared to pre-eminent varieties of Batang Piaman, Batang Lembang and of Cisokan. But when compared to some others local varieties, like Randah Kuning, Sari Baganti and Ceredek, the yield of this varieties more higher. Beside that selling value of Anak Daro average 17% was higher than pre-eminent varieties of national expanding. The variety of Anak Daro, besides for the accomplishment of requirement of local consumer also to fulfill demand from neighbour province.

217 ZEN, S.
[Participative breeding of irrigated rice based on consumer preference in West Sumatra (Indonesia)]. ***Pemuliaan partisipatif padi sawah preferensi konsumen Sumatera Barat***/Zen, S. (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 104-111, 7 tables; 14 ref. 631.152/SEM/p bk1

IRRIGATED RICE; PLANT BREEDING; PROGENY TESTING; GENOTYPE ENVIRONMENT INTERACTION; HIGH YIELDING VARIETIES; GENETIC RESISTANCE; AGRONOMIC CHARACTERS; YIELD COMPONENTS; SUMATRA.

The due of least at high yielding varieties in approching consumer preferences in West Sumatra, causing the application of rotation planting pattern to suppress the development of damaging plant organisms to be difficult to enforce. Participative Plant Breeding is one approaching effort for selecting lines in middle generation which appropriate with consumer preferences and agroecosystem in West Sumatra. Breeding participative activities in AIAT West Sumatra began in 2000 to evaluate the 39 lines of middle generation by using observation experiment , without repetition, and then continued with the multilocation testing in the centers of rice production areas. Continously, every year had made selection of new lines and until year 2005 has been evaluated as many as 356 lines originating from BALITPA. The observed parameters include agronomic characters, yield component and yield. Release of Batang Piaman and Batang Lembang at the end 2003 was the result of network activities of research and assessment conducted in 2000-2003. Both these varieties had texture, inflammation, and resistance to blast disease and brown plant hopper; and its potential result about 15-20% was higher than the varieties Cisokan and lR 42. The presence of Batang Piaman and Batang Lembang need to be followed by the discovery of other new varities continously in order to anticipate the emergence of other damaging plant organisms problem.

F50 PLANT STRUCTURE

218 LIMBONGAN, J.
Morphological characteristics of some sago palms from Papua (Indonesia). ***Morfologi beberapa jenis sagu potensial di Papua***/Limbongan, J. (Balai Pengkajian Teknologi Pertanian Papua, Jayapura (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 16-24, 2 ill., 6 tables; 20 ref. Appendix

METROXYLON; PLANT ANATOMY; STARCH; QUALITY; PROCESSING; IRIAN JAYA.

Sago palm (*Metroxylon sagu* Ronb.) is a potential starch source in the future. Most of the plants grow naturally in Papua and Maluku and many people consume the sago as a daily food. The paper described morphology of sago palms in Papua. There are many accessions of sago palms in Papua with specific

morphological characteristics in stems, leaves, nutrient and mineral contents, yield, and starch color. Sago palms such as Yepha, Rondo, Para. and Ruruna have different characteristics and these characteristics reflect their yield potential and usage. Sago starch is commonly used as food resources, also as raw materials in cosmetics, food, paper, and plastic industries. Therefore, improvement of sago palm cultivation and conservation of sago germplasm are needed.

F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY

219 HERLINA, T.
Paralytic isoquinoline alkaloids from the bark of *Erythrina poeppigiana* (Walpers) O.F. Cook (Leguminosae). ***Alkaloid isoquinolin yang bersifat paralitik dari kulit batang Erythrina poeppigiana (Walpers) O.F. Cook (Leguminosae)***/Herlina, T.; Supratman, U.; Kurnia, D. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam); Subarnas, A.; Sutardjo, S.; Hayashi, H. *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 212-218, 1 ill., 1 table; 9 ref.

ERYTHRINA POEPPIGIANA; ALKALOIDS; EXTRACTION; ISOLATION.

The research of paralytic compound have been isolated from the bark of *Erythrina poeppigiana* (Walpers) O.F. Cook (Leguminosae) on the third instar larvae of silkworm (*Bombyx mori*). The objective of this research was aimed at finding out isolation and structural elucidation of paralytic compounds from the bark of *E. poeppigiana*. The research was isolated by several steps by bioassay-guided of the paralytic activity. The result showed that the methanol extract which separated by combination of column chromatography yielded two isoquinoline alkaloids (1 and 2). The chemical structure of compounds (1 and 2) were identified on the basis of spectroscopic evidence and comparison with the previously reported. Compounds 1 and 2 showed paralytic activity against third instar larvae of silkworm (*Bombyx mori*) with their ED50 values with 100 and 83 microgram/g diet, respectively.

220 KRISNAWATI, A.
Prospect of pigeonpea and description of qualitative and quantitative properties. ***Prospek kacang gude dan pencandraan sifat kualitatif dan kuantitatifnya***/Krisnawati, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 1-10, 2 ill., 5 tables; 28 ref.

CAJANUS CAJAN; GENETICS VARIATION; QUANTITATIVE GENETICS; PROTEIN CONTENT.

Pigeonpea (*Cajanus cajan* L. Mill. sp.) has widely been grown in the tropical areas. At the present, the largest production area of pigeonpea in the world is India. In Indonesia, the plant is cultivated in Java, Bali, West Nusa Tenggara, East Nusa Tenggara and South Sulawesi. Local cultivar is commonly cultivated by Indonesian farmers, and is usually grown as intercrops or in mixed cropping with maize, cassava and other legumes. The pigeonpea is generally drought and lodging resistant, its pods do not easily shattered, and adaptable to several soil types. The pigeonpea seed can be used as food consumption and to subtitute legumes flour. Whilst, the pigeonpea green leaves can be utilized as green manure and cattle fodder, and its dry stems are of an important household fuel. Characters of seed yield, pods per plants, and protein content, generally have low heritability. On the contrary, days to flower, plant height, and seed size have high heritability estimates. Qualitative and quantitative description of pigeonpea are useful for genetic development in breeding programmes, or important for commerzialisation purposes. However, such a description has not be available at the moment. Additionally, the qualitative and quantitative description are need in relation to plant variety protection, where novelty, distinctness, uniformity, and stability are the main components.

221 KRISTINA, N.N.
Effects of reduced-macro nutrients, and ABA to shoots multiplication of periwinkle (*Vinca rosea*) in vitro. ***Pengaruh penurunan unsur makro dan pemberian absisic acid terhadap multiplikasi tunas tapak dara (Vinca rosea) secara in vitro***/Kristina, N.N. (Balai Penelitian Tanaman Rempah dan Obat,

Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah* dan Obat ISSN 0215-0824 (2005) v. 16(1) p. 1-9, 3 tables; 17 ref.

CATHARANTHUS ROSEUS; IN VITRO CULTURE; ABA; NUTRIENTS; GROWTH INHIBITORS.

Research regarding effect of reduced-macro nutrients and ABA to shoot multiplication of periwinkle (*Vinca rosea*) in vitro has been performed in the Laboratory of Germplasm and Breeding, Indonesian Spice and Medicinal Crops Research Institute. The culture media applied were MS, 3/4 and 1/2 MS + (20 and 30) g/l sucrose + BA 0.1 mg/l and maintained growth inhibitor ABA (1 and 2) mg/l. The experiment was designed as a completely randomized with 10 replications. Results showed that there was no significant different on the growth of shoots from all of MS medium until cultured 9 months with grow up to 90%. Addition of ABA 1 and 2 mg/l in media, made browning shoots until 7 months culture periods, and growing ability of 40 - 60%. Result from test of shoots regeneration showed, that MS + BA 0.1 mg/l + sucrose 30 g/l (control) were the best medium for conservation with the highest number of shoots 8.4.

222 RAUF, A.W.
Effect of rice allelopathy on growth and yield of soybean under a sequential planting system of rice-soybean. ***Pengaruh alelopati padi terhadap pertumbuhan dan hasil kedelai pada sistem tanam berurutan padi-kedelai***/Rauf, A.W. (Balai Pengkajian Teknologi Pertanian Papua, Jayapura (Indonesia)); Tohari; Yudono, P.; Kabirun, S. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 76-84, 2 ill., 7 tables; 28 ref.

ORYZA SATIVA; ALLELOPATHY; GLYCINE MAX; GROWTH; YIELDS; PLANTING; SEQUENTIAL CROPPING.

The objective of this research was to identify potential allelopathic on rice varieties and the effect of growth and yield of soybean under the sequential planting system of rice-soybean. The identification of allelopathic compounds was done by high performance liquid chromatography (HPLC) at the Chemicals and Physical Analysis Laboratory Centre, Gadjah Mada University. Field experiment were conducted at Research Educational and Agricultural Development of Gadjah Mada University. The experiment was arranged in randomized completely block design in three replications. Treatments consisted of (i) no-tillage without rice residues, (ii) no-tillage rice residues as a mulch, (iii) no-tillage under the rice stubble, (iv) tillage without rice residues, (v) rice stubble were mixtured when the soil tillage, and (vi) rice stubble and straw were mixtured when the soil tillage. Result of this experiment indicated that the concentration of phenolic acids ranged from 259 to 776 mg/kg straw for IR 64 and Merning variety. Concentration of phenolic in the rice straw were generally higher than that in the roots. Allelopathic from rice straw strongly inhibited the root and noduls growth than the other growth component. Mixtured rice residues in soil when soil tillage could maximum inhibit yield of soybean of 23.5%. However the treatment of no tillage with rice residues as a mulch could promote the yield of soybean of 0.5%.

223 ROHDIANA, D.
Evaluation of inhibitory effect of green tea effervescent tablet on linoleic acid oxidation. ***Evaluasi daya hambat tablet efervesen teh hijau pada oksidasi asam linoleat***/Rohdiana, D. (Universitas Pasundan, Bandung (Indonesia). Fakultas Teknik); Raharjo, S.; Gardjito, M. *Majalah Farmasi Indonesia* (2005) v. 16(2) p. 76-80, 2 ill., 2 tables; 24 ref.
TEA; ANTIOXIDANTS; LINOLEIC ACID; HERBAL TEAS; INHIBITION; OXIDATION.

Evaluation of the inhibitory effect of green tea effervescent tablet (TETH) on linoleic acid oxidation was carried out. TETH had the highest inhibitory effect on linoleic acid as compared with BHA, BHT, alpha-tocopherol and TETH-C. On tenth days incubation, TETH inhibited of linoleic acid oxidation is 50.64% followed by TETH-C, alpha-tocopherol, BHT and BHA as 33.83%; 33.40%; 29.51% and 26.39%, respectivelly. TETH had a inhibitory effect of 1.5 times more than TETH-C and alpha-tocopherol or 1.7 and 1.9 times more than BHT and BHA, respectively.

F62 PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT

224 KUSWAHYUNING, R.
Influence of lactose and povidon on the formulation of tablet containing *Kaempferia galanga* L. extract by a wet granulation method. *Pengaruh laktosa dan povidon dalam formula tablet ekstrak Kaempferia galanga L. secara granulasi basah*/Kuswahyuning, R.; Soebagyo, S.S. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Farmasi). *Majalah Farmasi Indonesia* (2005) v. 16(2) p. 110-115, 1 ill., 3 tables; 9 ref.

KAEMPFERIA GALANGA; PLANT EXTRACTS; EXTRACTION; PROCESSING; LACTOSE; FORMULATIONS; GRANULES; TRADITIONAL MEDICINES.

Increasing use of *Kaempferia galanga* L. (kencur) as a traditional medicine stimulates the development of more practical preparation form e.g. tablets. This study was conducted to observe the influence of lactose as a filler and povidon as a binding agent to the physical properties of the granules and to determine the optimum tablet formula for *Kaempferia galanga* L. extract by a wet granulation method. The use of factorial design with 2 factors (lactose and povidon) and 2 levels (lactose : low level = 300% and high level = 450% of the extract weight, respectively; povidon : low level = 0.3% and high level = 3% of the extract weight, respectively), it needed four formulas to produce granules of the *Kaempferia galanga* L. extract. Each of the granules of *Kaempferia galanga* L. extract was produced by a wet granulation method and was dried at 40-60°C for 24 hours. Dry granules were tested on their properties of flowability, compactibillity and water uptake. Lactose significantly influenced the compactibillity and the water uptake, whereas povidon significantly influenced the compactibillity, flowability and water uptake. Based on the contour plots of the physical properties of the granules and total responses, formula using 315% lactose and 2.98% povidon of the extract weight, respectively, was chosen as the optimum tablet formula. Produced tablets had dark brown colour and weight uniformity with average weight of 373.60 ± 0.63 mg, hardness of 2.18 ± 0.192 kg, friability of 0.10 ± 0.011%, and disintegration time of 4.43 ± 0.147 minutes.

225 PRABAWARDANI, S.
Leaf stomatal density and plant water relations as affected by soil water regimes on the sweet potato genotypes. *Pengaruh kekeringan terhadap jumlah stomata daun dan status air tanaman pada ubi jalar (Ipomoea batatas L.)*/Prabawardani, S. (Universitas Negeri Papua, Manokwari (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 15-20, 5 ill., 2 tables; 13 ref.

IPOMOEA BATATAS; GENOTYPES; STOMATA; LEAVES; PLANT WATER RELATIONS; SOIL WATER REGIMES; DROUGHT RESISTANCE.

Sweet potato is the primary food source for the highlanders of Papua, Eastern Indonesia. However, due to the occational prolong drought many crops including sweet potatoes suffered drought stress, especially when El Nino occurred. The physiology of sweet potato has been almost neglected in terms of scientific research. The present research was aimed to observe the physiological response of sweet potato to the water stress. Stomatal density and plant water relations represented the physiological parameters were observed in Lole and Wanmun sweet potato cultivar. Lole and Wanmun were subjected to three water stress levels. The water stress levels were imposed by maintaining the soil water content at 20%, 40%, and 80% of field capacity. The factorial experiment used a complete randomized design with 4 replications. The results showed that plant water status and transpiration were both affected by soil water regimes. Lole recorded greater plant water status and less transpiration than did Wanmun in all soil water regimes, this was also shown by lower stomatal number in Lole cultivar in spite of no effect on stomatal density due to water stress. This indicated that Lole was more efficient in consuming soil water and hence more tolerant to water stress than Wanmun.

F63 PLANT PHYSIOLOGY - REPRODUCTION

226 SUNARTI, S.
Pollen viability test of mulberry at stages of flower and storage period. *Pengujian viabilitas serbuk sari murbei pada berbagai tahapan bunga dan lama penyimpanan*/Sunarti, S.; Pudjiono, S. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 1-7, 1 ill., 4 tables; 5 ref.

MORUS ALBA; POLLEN; VIABILITY; FLOWERS; DEVELOPMENTAL STAGES; STORAGE; PERIODICITY.

Pollen viability test of *Morus alba* var. Kanva 2 was conducted at P3HT, Yogyakarta. Media of Brewsbakers modified Owens (1991) used for this test. Treatments applied were 3 kind of flower stages i.e. prereceptive, receptive and postreceptive, than continued to period of storage, 1 to 3 days. The data result showed that the most available stage of flower was receptive stage (38.13%) pollen could not be stored even a day at 0 ^{o}C

H10 PESTS OF PLANT

227 ARIFIN, M.
Compatibility of SlNPV with HaNPV to control soybean cutworm and pod feeder. *Kompatibilitas SlNPV dengan HaNPV dalam pengendalian ulat grayak dan ulat pemakan polong kedelai*/Arifin, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 65-70, 6 ill., 1 table; 12 ref.

GLYCINE MAX; SPODOPTERA LITURA; HELICOVERPA ARMIGERA; BIOLOGICAL CONTROL; NUCLEAR POLYHEDROSIS VIRUS; MORTALITY.

The cutworm, *Spodoptera litura* (F.) and pod feeder, *Helicoverpa armigera* (F.) are the most important insect pests on soybeans. Both insect pests can be controlled by using an entomopathogenic virus called nuclear-polyhedrosis virus (NPV). An experiment was conducted in a laboratory from September to December 2004 to determine the compatibility of SlNPV with HaNPV as active ingredients of a broad spectrum and virulence NPV biopesticide to control soybean cutworm and pod feeder. The experiment used four treatments of SlNPV and HaNPV combinations, each with nine concentrations ranged from 5 X 10^2 to 5 X 10^6 polyhedra inclusion bodies (PIBs)/ml. Results indicated that the SlNPV and HaNPV combinations were highly virulence to the cutworm and pod feeder, with LC50 values were 6.0 X 10^3 and 6.5 X 10^3 PIBs/ml, respectively. The SlNPV and HaNPV combinations were the same virulence with NPV standards. Therefore, both NPVs were compatible and suitable to be combined as a broad spectrum biopesticide to control soybean cutworm and pod feeder.

228 ATMADJA, W.R.
Effect of cashew nut shell liquid (CNSL) to mortality of *Helopeltis antonii* Sign. on cashew seedling. *Pengaruh cashew nut shell liquid (CNSL) terhadap mortalitas Helopeltis antonii Sign. pada bibit jambu mete*/Atmadja, W.R.; Wahyono, T.E. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 66-71, 2 tables; 9 ref.

ANACARDIUM OCCIDENTALE; SEEDLINGS; HELOPELTIS ANTONII; MORTALITY; BOTANICAL INSECTICIDES; CASHEWS.

The effects of CNSL to *Helopeltis antonii* Sign. on cashew seedling were done in laboratory and greenhouse of pest and diseases division at Research Institute for Spice and Medicinal Crops on June until September 2004. The research aimed at studying CNSL effect to *H. antonii* on cashew seedling.

This experiment used two methods, they were topical spray and foliar spray methods. The CNSL treatment that applicated to insects were 0.625; 1.25; 2.50; and 5% concentrations and control. The total number of insect used 10 insects for each treatment of *H. antonii* adult, respectively. The application of cashew seedling used 1.25; 2.50; 5; 10; and 20% concentrations and control. Observation was carried out every day by counting *H. antonii* mortality level. The research was arranged in randomized block design (RBD) with 5 treatments and 5 replications for topical spray method and 6 treatments and 4 replications for foliar spray method. The research results showed that the highest mortality level of insects occured on directly applied CNSL treatment to *H. antonii* of 5% concentration with 100% insect mortality on the 6th days after application, while treayed by applying CNSL of 20% concentration to cashew seedling on 4, 5, and 6th days after application, the mortality level of *H. antonii* were 52.50, 62.50 and 97.50%, respectively.

229 DARWIS, M.
Pests of patchouli plant and their damage. *Jenis-jenis hama dan serangannya pada tanaman nilam*/Darwis, M. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(2) p. 76-82, 1 table; 8 ref.

POGOSTEMON CABLIN; PESTS OF PLANTS; SEEDLINGS.

Generally, patchouli is still cultivated traditionally in Indonesia. Improved technology such as pest and disease control methods, is needed. Observation of pests on patchuoli was carried out at Sukamulya experimental garden from August 2004 to January 2005. Further research was carried out at the laboratory and greenhouse of the Indonesian Spice and Medicinal Crops Research Institute to examine the damage of patchouli plant due to the main insect attack. The experiment was arranged in a randomized block design, with 6 treatments and 4 replications. The experiment used one month-old patchouli seedlings of Sidikalang variety and the main insect of third instar grub. The white grub was infested on patchouli seedling. Each plant was infested with 0, 1, 2, 3, 4, 5, grubs as treatments. The results showed that grasshopper (*Valanga* sp), aphids (*Myzus persicae*), termite (*Coptotermes* sp), snail (*Achatina* sp) and white grub (*Exopholis hypoleuca*) attacked the patchouli plant with low up to high damages. It was observed that the grub was a dominant pest which attacked 1.800 out of 15.000 patchouli plants at Sukamulya experimental garden. Treatments grubs on patchouli seedlings at one, two, three, four and five grubs/polybag caused death on the seedlings at 14, 13, 10, 7 and 7 days after infestation, respectively. While the control seedlings were still alive until the end of the experiment.

230 DARWIS, M.
Controlling *Sexava spp*. through integrated pest management. *Upaya pengendalian hama Sexava spp. secara terpadu*/Darwis, M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 98-110, 41 ref.

COCOS NUCIFERA; LEAF EATING INSECTS; INTEGRATED PEST MANAGEMENT.

Sexava spp consisting of several species, is a major pest of coconut palm. Heavy infestation of this pest may cause serious damage on coconut leaves, and may kill the trees. It was reported that in the districts of Sangihe and Talaud, North Sulawesi, on the first quarter of 2004, approximately 13.000 ha of coconut farms were seriously attacked by *Sexava spp*. The productivity of smallholders coconut farm decreased up to 0.4 - 0.5 ton copra/ha/year. Several programs to control *Sexava* were carried out and the technology to control *Sexava* is available. Theoritically the life probability of *Sexava spp*. is only 14%, approximately 86% can be controlled automatically. To control *Sexava spp*., six methods have been introduced, namely cultivation technology, mechanical system, intercropping, biological control, quarantine system and insecticide application. The newest innovation on biological control was using entomophathogen fungus called "Metabron" (Metarrhizium isolated from Bronstispa) which is effective to control *Sexava spp*. on coconut. One of the benefits of this biological agent was it could automatically and continuously grow in a long periode, in a good treatment and condusive circumstance. Hopefully, the role of Metabron was not only as biological control, but also as biological weapon against *Sexava spp*. pest. The mortality caused

by Metabron was very high. At the concentration of $5x10^5$ conidium/micro l, it was effective to cause 90.25% nymph mortality and 86.25% imago mortality. On the program of *Sexava spp*. management all of technology components should be practiced and suitable with integrated pest management system. In the joint program between Coconut Research Institute and COGENT, three component technologies were applied, namely the use of resistant variety, product diversification, and intercrops plus animal husbandry. It was found that the treatments were able to increase farmer's income and prosperity significantly. To solve the problem of *Sexava spp*. in small holder coconut farms in Sangihe and Talaud, those three components can be integrated with other existing control components. The intensive coordination amongst related institutions are needed to make the program effective and useful.

231 DONO, D.
Effect of extract of *Aglaia harmsiana* Perkins seeds on biological characters of parasitoid, *Eriborus argenteopilosus* Cameron on host *Crocidolomia binotalis* Zeller. *Pengaruh ekstrak biji Aglaia harmsiana Perkins (Meliaceae) terhadap karakter biologi parasitoid Eriborus argenteopilosus Cameron pada inang Crocidolomia binotalis Zeller*/Dono, D. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Pertanian); Prijono, D.; Manuwoto, S.; Buchori, D. *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 234-248, 1 ill., 7 tables; 34 ref.

AGLAIA; PLANT EXTRACTS; BOTANICAL INSECTICIDES; CROCIDOLONIA; BINOTALIS; BIOLOGICAL CONTROL; PARASITOIDS.

Insecticides can give either negative or positive effects on biological characters of parasitoid that develop from insecticide-exposured host insects. The effect of botanical insecticide, the extract of *Aglaia harmsiana* seeds on survival, morphological characters, and reproduction of parasitoid *Eriborus argenteopilosus* which developed from *Crocidolomia binotalis* larvae have been studied. This research was conducted to evaluate the effect of the extract of *A. harmsiana* seeds on survival, morphological characters, and fecundity of *E. argenteopilosus* developed from *C. binotalis* larvae treated with the extract. The results indicated that the treatment of the extract of *A. harmsiana* at a concentration equivalent to LC25 on *C. binotalis* larvae improved the number of emergence of parasitoid from *C. binotalis* larvae, increased body size of adult parasitoid, lengthened live span, and increased reproductive capacity of adult female of *E. argenteopilosus*. Therefore, the extract of *A. harmsiana* seeds had a good opportunity to be combined with biological control using parasitoid in integrated pest management system at cabbage cropping.

232 HARNI, R.
Effect of application method of endophytic bacteria on root lesion nematode (*Pratylenchus brachyurus*) on patchouli. *Pengaruh metode aplikasi bakteri endofit terhadap perkembangan nematoda peluka akar (Pratylenchus brachyurus) pada tanaman nilam*/Harni, R.; Mustika, I. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia))Supramana; Munif, R. *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(4) p. 161-165, 2 tables; 18 ref.

POGOSTEMON CABLIN; PRATYLENCHUS BRACHYURUS; PLANT DISEASES; BIOLOGICAL CONTROL; ENDOPHYTES.

Endophytic bacteria is one of the important agents recently used for controlling plant parasitic nematodes. *P. brachyurus* is one of the factors affecting the productivity of patchouli (*Pogostemon cablin* Benth.) in Indonesia. The objective of the research was to find out an efficient application method of endophytic bacteria to reduce *P. brachyurus* on patchouli. The research was conducted in the Nematology Laboratory, Department of Plant Protection, Bogor Agricultural University and in the Laboratory and Greenhouse of Indonesian Spice and Medicinal Crops Research Institute, from January to July 2005. The research used randomized completely design with two factors, the first factor was application method (drencing and deeping), the second factor was bacteria isolates (NJ2, NJ25, NJ41, NJ46, NJ57, NA22, ERB21, ES32, E26). The result showed that the population of nematode was affected by the interaction between bacterial isolates and application method. While shoot weight, root length and plant height were

affected by bacterial isolates. Bacillus NA22, Bacillus NJ46 and Bacillus NJ2 applicated by deeping the root into bacterial suspension significantly gave good result in reducing *P. brachyurus*, i.e. 75%, 63% and 60%. All bacterial isolates increased shoot weight, root length, and plant height.

233 ISTIANTO, M.

Composition and concentration of sweet orange and pummelo essential oils to the development of *Panonychus citri* McGregor. *Komposisi dan konsentrasi senyawa dalam minyak atsiri jeruk manis dan jeruk besar terhadap perkembangan tungau Panonychus citri McGregor*/Istianto, M. (Balai Penelitian Tanaman Buah, Solok (Indonesia)); Untung, K.; Mulyadi; Trisyono, Y.A.; Yuwono, T. *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 40-49, 4 ill. 3 tables; 23 ref.

CITRUS SINENSIS; CITRUS GRANDIS; ESSENTIAL OILS; BOTANICAL INSECTICIDES; PANONYCHUS CITRI; CHEMICAL COMPOSITION.

Panonychus citri is one of the most economically important citrus pests in Indonesia. One of the key success for controlling the population of the pest is understanding the relationship between this mite and its host. However, information in this area is not well understood. The objectives of this research were to evaluate the influences of essential oil extracted from sweet orange and pummelo fruit peels on the development and reproductive capacity of *P. citri* and to understand the mechanism responsible for the different effects that will be useful to develop management program. The research was conducted in the laboratory of Research Station for Citrus Crops in Tlekung-Batu, Malang and Gadjah Mada University Yogyakarta. The treatments were 10, 20, 40, 80 ppm of essential oil, parafin and control. Each treatment was replicated 15 times and arranged in a completely randomized design. The results showed that the essential oil extracted from Pacitan sweet orange and Nambangan pummelo fruit peels could inhibit the development and reduced the reproductive capacity of *P citri*. The essential oils prolonged the life cycle and reduced the fecundity of *P. citri*. These negative effects were caused by limonene, a dominant compound in the citrus essential oil. The negative effects of essential oil extracted from Nambangan pummelo were found to be more pronounced than that from Pacitan sweet orange. Concentration of linalool was found to be responsible for the differences, and it worked oppositely with limonene by reducing the negative effects of limonene on *P. citri*. Essential oil of Pacitan sweet orange contained more linalool than pummelo. This result gaves an alternative technology to control *P. citri* by using volatile compounds produced by the plant itself with certain composition.

234 LABA, I W.

Ecosystem management for controlling black pepper pest. *Pengelolaan ekosistem untuk pengendalian hama lada*/Laba, I W.; Trisawa, I M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 86-97, 2 tables; 41 ref.

PIPER NIGRUM; PEST CONTROL; ECOSYSTEMS; STEM EATING INSECTS; MIXED CROPPING; COVER PLANTS; NATURAL ENEMIES.

Pest is one of the obstacles of black pepper production in Indonesia. The pest attacks all parts of the plant such as inflorescens, fruits, shoots, branches and stems at nursery as well as in the field. In Indonesia black pepper was infested by 3 species of pests, namely stem borer, Lophobaris piperis Marsh, pepper berry bug, *Dasynus piperis* China and lace bug, *Diconocoris hewetti* (Dist.). The population of stem borers always presents in the field with different stages (egg, larvae, pupa and adult), while lace bug and pepper berry bug are found in the field during flowering and fruit stages. Control of black pepper pests by farmers is usually using syntetic pesticide. Other alternative to manage black pepper pest is ecosystem management and natural enemy such as parasitoid. To increase the natural enemy population can be done by natural enemies conservation through cover crops, mix cropping and limited weeding. *Arachis* sp., *Orthosiphon* sp., *Ocimum* sp. and *Coffea* sp. plants can be used in cropping system with black pepper.

235 NURINDAH.
Agroecosystem management for pest control. *Pengelolaan agroekosistem dalam pengendalian hama*/Nurindah (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 78-85, 38 ref.

GOSSYPIUM HIRSUTUM; INTEGRATED PEST MANAGEMENT; AGROECOSYSTEMS; BIODIVERSITY.

Agroecosystem management is an integrated pest management (IPM) with ecological approaches. This method can be applied when the factors that make the agro ecosystem become vulnerable to pest outbreak are known. The main agroecosystem management for pest management is to create the balance between herbivores and their natural enemies by increasing biodiversity, enhancing vegetations and biomasses. Increasing vegetation diversity can be done by adopting poly culture systems, optimizing agronomic arrangements. Increasing biomasses can be done by applying mulch, green manures, and cattle manures. Both methods are aimed to obtain optimal land productivity and sustainability.

236 PRAYOGO, Y.
Effectiveness of entomopathogenic fungi to control soybean pod sucker *Riptortus linearis* L. and its impact on the predator *Oxyopes javanus* Thorell. *Keefektifan cendawan entomopatogen dalam mengendalikan hama pengisap polong kedelai Riptortus linearis L. dan dampaknya terhadap predator Oxyopes javanus Thorell*/Prayogo, Y. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Santoso, T.; Widodo. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 53-60, 3 ill., 3 tables; 33 ref.

GLYCINE MAX; RIPTORTUS; OXYOPES; ENTOMOGENOUS FUNGI; BIOLOGICAL CONTROL; PREDATORS.

Pod sucking bug (*Riptortus linearis*) is one of the most important pests on soybean. It causes severe damages on soybean pods and crop losses of about 79%. Under the natural conditions, natural enemies, such as predators, control population of *R. linearis* effectively. A research was done to evaluate efficacy of five species of entomopathogenic fungi on soybean pod sucker *R. linearis* L. and to identify impact of these fungi on survival of the soybean pod predator *Oxyopes javanus* Thorell. The research was conducted at laboratory of Insect Pathology of Bogor Agriculture Institute. Five isolates entomophagous fungi, i.e: *Metarhizium anisopliae*, *Beauveria bassiana*, *Verticillium lecanii*, *Nomuraea rileyi*, and *Paecilomyces fumosoroseus*, were used in the trial. Conidia of 30 day-old-cultures of the fungi were suspended in sterile water, and mixed with tween 20. These suspension of 107/ml conidia were sprayed on adult of *R. linearis*, immediately after the insect were introduced in the cage where soybean was planted as host plant. Deltametrin insecticide and water were sprayed as comparison and control, respectively. The mortality of *R. linearis* and the pod damage were assessed to establish the rate of effectiveness of the fungi. The most pathogenic fungus was subsequently tested on five nymph stages of *R. linearis* and on *O. javanus*. The result showed that *V. lecanii* fungi gave the highest mortality rate 81% and the lowest level of damage to the seed of soybean as compared to the application of 0.5 l/ha of deltametrin. Nymph instar I and II of *R. linearis* are more susceptible to *V. lecanii* and the mortality reach 80%. The application of *V. lecanii* at 1011 conidia/ml did not affect the survival of *O. javanus*. Therefore, *V. lecanii* has a high potential that can be used as one of the biological agents to control pod sucking bug *R. linearis*.

237 SULISTYOWATI, E.
Development of monitoring technique for cocoa pod borer (*Conopomorpha cramerella* Snell.). *Pengembangan teknik pemantauan penggerek buah kakao (PBK) Conopomorpha cramerella Snell*/Sulistyowati, E.; Wardani, S.; Mufrihati, E. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(3) p. 159-168, 2 ill., 2 tables; 10 ref.

THEOBROMA CACAO; CONOPOMORPHA CRAMERELLA; MONITORING; TRAPPING; PEST CONTROL EQUIPMENT; APPLICATION METHODS.

Effectiveness and efficiency of CPB control were influenced by the right time of control. To decided this methods, information about CPB infestation was needed. An experiment had been conducted to get a simple and accurate technique for CPB monitoring. The experiment was located in Tirawuta, a small-holder cocoa plantation in Kolaka District, South-East Sulawesi. The evaluated monitoring pods techniques by observing all ripe cocoa pod as standard method, i.e. pod colour changes as an indicator of CPB attack, observation on 100 pods during harvesting, moth trapping and observation on the presence of the holes caused by CPB. The collected data expressed as the percentage of CPB attack and compared with each other. Based on the Chi square value and time consumed for monitoring, it could be concluded that the observation of 100 attacked pods during harvesting was the most accurate technique closest to the standard method, with a lowest chi square value and not significantly different to standard method. On the contrary the visual observation on the pod colour showed the less accurate technique with chi square value of 242.25-335.33 followed by the observation on the present of holes on the pod with chi square value of 243.45-282.87. Furthermore, monitoring technique by moth trapping could not be compared with the other techniques since their unit was unequal. However, no insect could be trapped during a night trapping using either chemical trapping or sticky trap. Development of sticky trap by variation in trap colour could be trapped of CPB moth during more than one week. Red trap was the most interesting (preferred) for the CPB followed by the yellow, white and blue ones. There was significant correlation between number of tree sample and the time needed for observation. Larger size of tree sample consumed a longer time for the observation, but in visual symptom and entry/exit hole observation methods, larger sample size did not significantly influence its accuracy. It's concluded that both of monitoring technique were not a converge estimation.

H20 PLANT DISEASES

238 GUNAWAN, O.S.
Use of antagonistic microbes as biopesticides in controlling anthracnose disease on red pepper. ***Mikroba antagonis untuk pengendalian penyakit antraknos pada cabai merah***/Gunawan, O.S. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(2) p. 151-155, 2 tables; 18 ref.

CAPSICUM ANNUUM; GLOMERELLA CINGULATA; ANTHRACNOSIS; ANTAGONISM; MICROORGANISMS; BIOPESTICIDES; BIOLOGICAL CONTROL.

The objective of this experiment was to determine the effect of biopesticides formulations on the growth and yield of pepper. The research was conducted in Indonesian Vegetable Research Institute in Lembang from June 2003 to January 2004, by using a randomized block design. Each treatment was replicated 3 times. Eight treatments formulation were PfMBO 001 50 WP 0.7 g/l; 0.35 g/l; 0.175 g/l; BSBE 001 50 WP 0.7 g/l; 0.35 g/l; 0.175 g/l; standard fungicide Bion-M 1/48 WP 2 g/l and water as control (untreated). Biopesticides were applied at 7 days intervals, starting from fruit setting (>50 days after planting) for 4 months. Results of this experiment showed that the use of PfMBO 001 50 WP and BSBE 001 50 WP were not significantly suppresed anthracnose disease on red pepper fruits and gave the same effect as Bion-M 1/48 WP fungicide. The yield obtained by using those biopesticides were not significantly different with Bion-M 1/48 WP fungicide treatment.

239 HADIASTONO, T.
Mozaic disease on tomato (*Lycopersicon esculentum* Mill). ***Penyakit mosaik pada tanaman tomat (Lycopersicon esculentum Mill)***/Hadiastono, T. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian). *Agrivita* ISSN 0126-0537 (2006) v. 28(2) p. 160-164, 3 ill., 5 tables; 7 ref.

LYCOPERSICON ESCULENTUM; CUCUMBER MOSAIC CUCUMOVIRUS; SYMPTOMS; ISOLATION TECHNIQUES; DISEASE TRANSMISSION; INDICATOR PLANTS.

A virus obtained from tomato (*Lycopersicon esculentum* Mill.) plant was identified as a strain of cucumber mosaic virus. The virus infected plants of 5 species, including 3 species of legumes and 2

species of solanaceae. It tolerated 6 hours aging and about 1:100 dilution. Plant of broad bean, *Dolichos lab lab*, Glycines, tomato, pepper, were useful in distinguishing this virus from others. The last two species were specific of symptoms. No symptom on Glycine and *D. lab lab*.

240 MACHMUD, M.
Detection and identification of *Ralstonia solanacearum* strains by its polyclonal antibody using indirect ELISA technique. *Deteksi dan identifikasi strain Ralstonia solanacearum dengan teknik ELISA tidak langsung*/Machmud, M.; Suryadi, Y. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 91-99, 1 ill., 5 tables; 22 ref.

ARACHIS HYPOGAEA; PSEUDOMONAS SOLANACEARUM; POLYCLONAL ANTIBODIES; ELISA; IDENTIFICATION; BACTERIOSES; DISEASE CONTROL.

Several techniques for early and rapid detection of *Ralstonia solanacearum* have been developed as components in the integrated control of bacterial wilt. The DNA based techniques are highly effective in detecting the bacterium, but they require sophisticated and expensive materials and impractical for field applications. The enzyme-linked immunosorbent assay (ELISA) is one of the serological techniques that is effective for detection and identification of bacterial plant pathogens, because it is relatively rapid, inexpensive, does not require sophisticated equipment, and applicable under field conditions. Modifications had been made by researchers to improve sensitivities of the detection, including those for *R. solanacearum*, and among them was the Indirect ELISA technique. A laboratory study was done to produce polyclonal antibody (PAb) to *R. solanacearum* and to apply the antibody for detection of strains of *R. solanacearum* representing different hosts, races, and biovars using the indirect ELISA technique. The results showed that PAb to *R. solanacearum* was producible on white rabbits using three different immunization schemes at titers ranging from 128 to 4096. The indirect ELISA technique using the PAb is applicable for detection of *R. solanacearum* strains representing Race 1 Biovar 3, Race 2 Biovar 1, and Race 3 Biovar 2, either from pure cultures, soils, or plant parts. The lowest detection level of the ELISA technique is 10 at the power of 3 cell/ml.

241 NASRUN.
Bacterial wilt disease on patchouli and its control strategy. *Penyakit layu bakteri pada nilam dan strategi pengendaliannya*/Nasrun (Kebun Percobaan Balai Penelitian Tanaman Obat dan Aromatik Lain, Solok (Indonesia)); Nuryani, Y. *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 9-15, 1 ill., 1 table; Bibliography p. 13-15

POGOSTEMON CABLIN; PSEUDOMONAS SOLANACEARUM; SYMPTOMS; BIOLOGICAL CONTROL; INTEGRATED CONTROL.

Bacterial wilt disease is one of the most serious diseases on patchouli plant in West Sumatra, North Sumatra, and Nanggroe Aceh Darussalam (NAD). The disease is caused by *Ralstonia solanacearum* and reduces patchouli production as high as 60-80%, so that it is a constraint in increasing patchouli productivity. The pathogen can be controlled by using tolerant varieties such as Sidikalang, cultural method (fertilizer application, organic matter, and mulch), biological control (*Pseudomonas fluorescens* and *Bacillus spp*.), botanical pesticide (lemon grass), chemical control (bactericide), and preventing pathogen spreading from infected area to non-infected area. Bacterial wilt disease should be controlled integratedly by combining various control techniques.

242 NOVERIZA, R.
Application of *Fusarium oxysporum* non pathogenic (FoNP) in inducing resistance of black pepper seedlings to *Phytophthora capsici*. *Aplikasi Fusarium oxysporum non patogenik (FoNP) untuk menginduksi ketahanan bibit lada terhadap Phytophthora capsici L.*/Noveriza, R.; Tombe, M.; Manohara, D. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)); Rialdy, H. *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(1) p. 27-37, 2 ill., 2 tables; 29 ref.

PIPER NIGRUM; PHYTOPHTHORA CAPSICI; FUSARIUM OXYSPORUM; INDUCE RESISTANCE; PATHOGENS.

Phytophthora capsici Leon is a soil borne pathogen which is known as the causal agent of foot rot disease of black pepper (*Piper nigrum* L.). Induced plant resistance against pathogens is a widespread phenomenon that has been intensively investigated with respect to the underlying signaling pathway as well as to its potential use in plant protection. This study used non pathogenic *Fusarium oxysporum* (FoNP) for inducing resistance on black pepper cuttings against foot rot disease at laboratory and glass house of Phytopatology Laboratory of Indonesian Spice and Medicinal Crop Research Institute-Bogor from July until December 2004. It was observed that FoNP had ability to reduce disease severity. The level of effectiveness was 84.99% (at four months seedlings). The level of effectiveness of fungicide treatment was 14.49%. FoNP was able to colonize black pepper seedlings up to two and a half months. The lowest viabilities of *P. capsici* was observed on black pepper seedling treated with Organo-TRIBA. This study suggested that FoNP has potential to be used in inducing resistance of black pepper seedlings to foot rot disease, eventually will reduce severity of the disease.

243 SALEH, N.
[Soybean mosaic virus (SMV) and soybean stunt virus (SSV) infections transmitted by seed and effort of SMV and SSV free seed production]. ***Penularan virus mosaik kedelai (SMV) dan virus kerdil kedelai (SSV) lewat benih, dan upaya memproduksi benih kedelai bebas SMV dan SSV***/Saleh, N. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 11-20, Bibliography p. 18-20

GLYCINE MAX; SOYBEAN MOSAIC POTYVIRUS; VIROSES; SEED PRODUCTION; INFECTION.

Virus disease infections and the use of low quality seeds are some of the reason of low soybean yield in Indonesia. More than 10 viruses infect soybean crops, and among them soybean mosaic virus (SMV) and soybean stunt virus (SSV) are transmitted through soybean seeds. SMV and SSV were distributed in the seed coats as well as embryo (embryo axis and cotyledon) of infected seeds. Transmission of SMV and SSV through soybean seeds play an important role in virus distribution and epidemic development of the diseases in the field. The presence of SMV and SSV in soybean seeds could be detected by simple methods as growing on and infectivity test, and by using serological methods (such as precipitation test, agglutination test, immuno electron microscopy (IEM), enzyme-linked immunosorbent assay (ELISA), radio immunosorbent assay (RISA), and nucleic acid hybridization. A relatively SMV and SSV-free soybean seeds could be produced under certain pre-requirement, (1) avoid the presence of primary source of infections in the field (using healthy seeds, roguing and eradication of infected plants), (2) avoid the virus entry and distribution in the field (time and local isolations, vector management), and (3) planting of resistant varieties or varieties which are not transmit SMV and SSV through their seeds.

J11 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCT

244 ISMAYADI, C.
Influence of storage of wet arabica parchment prior to wet hulling on moulds development, *Ochratoxin A*. contamination, and cup quality of mandheling coffee. ***Pengaruh penyimpanan biji kopi arabika mandheling bercangkang sebelum pengupasan basah, terhadap perkembangan jamur, kontaminasi Ochratoxin A., dan mutu seduhan***/Ismayadi, C.; Sumartono, B. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Marsh, A.; Clarke, R. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 131-146, 1 ill., 7 tables; 11 ref.

COFFEE BEANS; HUSKING; SEED STORAGE; MOULDS; OCHRATOXIN; CONTAMINATION; BOILING; FLAVOUR.

Mandheling coffee has been a well known special coffee for decades and the demand for this coffee is currently increasing. This coffee is characterised by low acidity, heavy-complex body, spicy-little earthy and fruity flavor. Mandheling coffee is produced by smallholder farmers in the highland surrounding Lake Toba, North Sumatra in an unique way i.e. following de-pulping and 1-2 days sundrying, wet parchment is stored for varying periods up to a few weeks, the parchments are then de-hulled when still wet (40-45% moisture content) then the beans sundried. The handling procedure presumably contributes to the unique cup character of mandheling coffee. On the other hand, the storage of wet parchments may cause mould growth and mycotoxin contamination. This trial was designed to study the influence of storage of wet parchments prior to wet hulling on mould development. OTA contamination and cup mandheling characteristic of the coffee product. The normal wet process, drying of parchment thoroughly to 12% moisture content was used as the control. Parchment coffees (6 lots) used for this trial were drawn from farmers and collectors in the region. The wet parchments (41.74-53.96% moisture content) were stored for 1 (D1), 7 (D7) and 14 (D14) days in PE sacks in a warehouse in the region. During the storage period, when there was visible mould growth, the parchments were spread on a plastic sheet inside the warehouse, as per common practice to suppress the mould growth. Following storage, the wet parchment was de-hulled and then sun-dried to a moisture content of 12% (MC 12%) or dried to a moisture content of 17%, and held in storage for 3 weeks prior to final drying to 12% MC. The normal wet process (fresh-non stored parchments dried thoroughly to 12%) were used as the control. Parameters measured were visual evaluation, mould infestation, aW, moisture content (MC) on the stored parchment; while for dried beans mould infestation, OTA content and the mandheling cup character evaluation (done by 4 panelists who were familiar to the coffee) were determined. Some mould species grew during the storage course, which black Aspergillus was the dominant species found in the beans; while *A. ochraceus* an OTA producer, was found in some samples with low infection rate (0-15.3%). Spreading of coffee inside the warehouse during the day could suppress moulds growth. OTA was found in only 5 samples out of 42 samples with range of 0.17-2.24 ppb, very less than European Union limit. There was no clear trend of storage period on the mould infection rates, OTA content, and the Mandheling cup characters. The high variability of the outcome was likely due to the unhomogenity of parchments used for this trial. The best mandheling was found in the sample of D1-MC 12% coffee source of lot 1.

245 NUGRAHA, S.

Analysis of rice processing models: case study in East Lombok, West Nusa Tenggara (Indonesia). ***Analisis model pengolahan padi: studi kasus di Kabupaten Lombok Timur, Nusa Tenggara Barat***/Nugraha, S.; Thahir, R.; Lubis, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Sutrisno. *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2007) v. 5(1) p. 13-26, 7 tables; 11 ref. Appendices

RICE; PROCESSING; DRYERS; POSTHARVEST EQUIPMENT; POLISHING; QUALITY; FARM INCOME; NUSA TENGGARA.

Analysis of rice processing models was conducted in Selubung Ketangga Village, Keruak Subdistrict, East Lombok District, West Nusa Tenggara Province, as an assessment location of poor farmer income improvement through innovation project (PFI3P). The main objective of the research was to increase farmer income through improvement of milled rice quality and milling recovery. Site identification survey to installing model placement and dryer with has fuel and mist water polisher test trial has been conducted in the first step. In 2004 fiscal year; model improvement was done by installing 1 unit of rice polisher ICHI N-70, and 1 unit engine RINO S 115, 24 HP. Result of research indicated that paddy drying using husk fuel dryer produced better dried paddy quality and higher milling recovery (65.7%), that was mean can increase farmer's rice milling recovery about 2-3% from prior recovery about 60-63%. Improvement milled rice quality through mist water process addition on ICHI N-70 polisher could produce better milled rice quality, a.w cleaned and shiner; hence increase the price about Rp 300/kg. Generally this model assessment could increase farmer's income which obtained by loss production oppression than 5.65 percent, milling recovery improving between 2-3% and increasing of rice price Rp 300/kg. Increasing of farmer's income was about Rp 1,630,290/ha.

246 USMIATI, S.
Pepper skin decorticating process using pectinase enzyme. *Pengupasan kulit buah lada dengan enzim pektinase*/Usmiati, S.; Nurdjannah, N. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 80-86 , 3 ill., 6 tables; 15 ref.

PIPER NIGRUM; PEPPER; POSTHARVEST TECHNOLOGY; PEELING; POLYGALACTURONASE; ENZYMES; QUALITY.

Soaking process as a part of traditional white pepper processing which is usually done for more than 8 days influence the quality of white pepper produced. Long soaking process could produce bad odour and increase the possibility to be contaminated with undesirable microorganism. For that reason the soaking process duration should be shortened but still could make the pepper skin to be soft enough to be peeled. Enzimatic process using pectinase enzyme is one of methods which can be used. The mechanical process to improve the quality of white pepper is available, but to increase its capacity the softening pepper skin process is needed. The aim of this study was at finding out the possibility of using pectinase to softening the pepper skin in white pepper processing and the quality of white pepper produced. The study was designed as completely randomized design (CRD) factorially 2x2 with 4 replications. Treatments consisted of: (i) pectinase (A): Al (1%) and A2 (2%), and (ii) citric acid: Bl (0%) and B2 (2%). Parameters observed were total plate count (CFU/ml), yield (percent), colour which was stated as degree of lightness, redness and bluish, essential oil concentration (percent) and moisture content (percent). The result showed that the use of pectinase could decrease the soaking period to 24 hours. The colour value of white pepper produced with 1% pectinase and 2% citric acid treatments was relatively the same with the one produced by traditional method, with much TPC value. Based on the above result, pectinase could be consider to be applied in traditional method to decrease the soaking process and it could also use to softened the pepper skin before mechanical decorticating process.

K10 FORESTRY PRODUCTION

247 ADINUGRAHA, H.A.
Treatment of stem and root bark peeling in rejuvenation of *Melaleuca cajuputi*. *Pengupasan kulit pada cabang dan akar dalam rejuvenasi tanaman kayu putih*/Adinugraha, H.A.; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 9-16, 4 tables; 9 ref.

MELALEUCA LEUCADENDRON; PLANT PROPAGATION; STEMS; ROOTS; SHOOTS.

Plant propagation of *M. cajuputi* usually conducted by seed (generative), which as generally has many constraints, i.e. still low of seed quality number, a low of seed growth percentage, a high of seed viability and genetic gain is not optimally yet, therefore the effectivity and efficiency of plant propagation are necessarily used. The experiment with the objective to evaluate the treatment on stem and root bark peeling was conducted at The Center for Plantation Forest Research and Development Yogyakarta. The experiment was arranged factorially as complete randomized design with 2 factors and 5 replications, the first factor was plant material i.e. stem and root, and the second factor was bark peeling and untreated. Parameters were observed on shoot percentage, bud and shoot number performed. The experiment result showed that the treatment on stem and root bark peeling gave better effect on shoot percentage, bud and shoot number than others.

248 ADINUGRAHA, H.A.
Grafting study of *Eucalyptus pellita* from seed orchard at Wonogiri. *Studi penyambungan jenis ekaliptus berasal dari kebun benih Wonogiri*/Adinugraha, H.A.; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 37-45, 5 tables; 14 ref.

EUCALYPTUS; PLANT PROPAGATION; GRAFTING; ROOTSTOCKS; SCION; DIAMETER; JAVA.

One of plant vegetative propagation techniques is grafting, by which the genotype of mother plant can be maintained continuously. One constraint which was always appear in the plant grafting is incompatibility. The objective of this experiment was to study the grafting technique between time rootstock from seedling and scion from several plus trees of E. pellita in seed orchard at Wonogiri, Central Java. The experiment was conducted at Center for Plantation Forest Research and Development, Yogyakarta. The method of experiment was done by several activities as preparing of rootstock, scion, grafting used by rind graft technique and maintenance of grafted plants. The result of the experiment showed that the successfulness of the plant grafting were 10% - 80% of living grafted plants. Shading application gave better effect on percentage of living grafted plants and the number and length of shoot than control at 2 months plant age. The use of different diameter of rootstock gave different effect on living grafted plants. Increasing of rootstock diameter could increase the growth of grafted plants. The source of scion could be used from the sprouting of branch with diameter more than 3 mm and gave better growth (shoot number and shoot length) of grafted plants than scion from girlding. Direct grafting by using fresh scion gave better effect (80% of living grafted plants) than those which was stored by immersing in water for 1 - 3 days.

249 JAYUSMAN.
Shoots initiation of *Gonystylus bancanus* Kurz in vitro propagation. *Inisiasi tunas ramin melalui kultur jaringan*/Jayusman; Setiawan, A. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 53-62, 3 ill., 3 tables; 19 ref.

GONYSTYLUS BANCANUS; TISSUE CULTURE; PLANT GROWTH SUBSTANCES; SHOOTS.

A study on the preliminary research of tissue culture on *Gonystylus bancanus* Kurz has been done with the objectives of determining: (1) basal media and (2) combination of plant growth regulator suitable for in vitro culture. The large scale can provide a way to mass production within a short time, and bulk quantity of good quality seedlings from good breeding parental trees. Evaluation was done using four basal media: Murashige and Skoogs (MS); 1/2 MS; Woody Plant Medium (WPM): and Greshoff Doys) (GD). Two auxin plant growth regulators: indole acetic acid (IAA), napthalene acetic acid (NAA) and cytokinin (benzyl amino purine-BAP) of varying concentration, either alone or in combination were evaluated in the shoot tip culture. The results indicated that shoot tip explant planted in 1/2 basal media with combination of BAP 1 ppm + NAA 0.01 ppm gave the best response on initiation of explant shoot. While GD media with combination of BAP 1.25 ppm + IAA 0.05 ppm seemed suitable only for callus induction with poor growth.

250 JAYUSMAN.
Effect of basal media and plant growth regulator concentration towards the success of induction and multiplication in shoot tip culture of *Styrax benzoine*. *Peran media dasar dan konsentrasi hormon pertumbuhan terhadap induksi dan multiplikasi tunas pucuk kemenyan*/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 1-10, 4 ill., 4 tables; 14 ref.

STYRAX; TISSUE CULTURE; CULTURE MEDIA; PLANT GROWTH SUBSTANCES; SHOOTS; GROWTH.

One of biotechnology branches which has been implemented in Indonesia is plant propagation using tissue culture. A number of species have been produced commercially, such as *Tectona grandis* and *Acacia mangium*. Nowdays, the development of species priority by in vitro propagation were progressively done such as *Gonystylus bancanus* and *Styrax spp*. For that reason the research was done with an aim at finding out the approximate basal media and plant growth regulator concentration for the

induction phase of in vitro shoot development. The study was focused on application of varied basal media (MS and 1/2 MS) as well as application of BAP, NAA and Kinetin in different levels of concentration on induction and multiplication of *Styrax benzoine*. The observation result on *Styrax benzoine* shoot initiation showed that basal media of MS and application of plant growth regulators BAP 1 ppm combined with lAA 0.01 ppm gave the best growth. Basal media of MS and application BAP 0.5 ppm combined with NAA 0.01 ppm was the best result in shoot multiplications.

251 MAHFUDZ.
Effect of growth regulators and plant mediums on the growth of *Instia spp*. shoot cuttings. *Pengaruh zat pengatur tumbuh dan media tanam terhadap pertumbuhan setek pucuk merbau*/ Mahfudz; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)); Isnaini. *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 25-34, 3 tables; 20 ref.

INSTIA; PLANT GROWTH SUBSTANCES; GROWING MEDIA; CUTTINGS; VEGETATIVE PROPAGATION; GROWTH.

Instia spp. is one kind of forest plants which has a high economic value for the development of plantation forest, therefore, there is a high need for seed supply. Plant growth regulators and plant mediums are important aspects in vegetative plant propagation, especially by shoot cutting. The objective of this study was to evaluate the effect of plant growth regulators and plant mediums. The study was conducted at the Centre of Plantation Forest Research and Development from June to December 2004. The experiment was arranged in completely randomized design with 2 factorial applications. The first factor was plant growth regulators: 0 and 20 ppm IBA and IAA; meanwhile the second factor was plant mediums: soil + sand (1:1); sand + compost (1:1); and soil + sand + compost (1:1:1), with 3 replications and 10 cuttings each. The experiment result showed that Instia spp. could be propagated by shoot cuttings; plant growth regulators gave better effect on the growth of shoot cuttings and the fresh and dry weight of cuttings than untreated with plant medium consisted of a high organic matter.

252 MASHUDI.
Application of growth media and fertilizer dosage on *Alstonia scholaris* (L.) R. Br. seedling growth at nursery. *Aplikasi media sapih dan dosis pupuk terhadap pertumbuhan bibit pulai di persemaian*/ Mashudi; Setiadi, D.; Hamdan A.A.; Ismail, B. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 31-40, 4 tables; 10 ref.

ALSTONIA; SEEDLINGS; PLANTING STOCK; GROWING MEDIA; FERTILIZERS; DIMENSIONS.

The research was undertaken to find the best growth combination of media and fertilizer dosage of pulai (*Alstonia scholaris* (L.) R. Br.) on nursery. The research was conducted at greenhouse of Centre for Forest Plantation Research and Development, Yogyakarta from March until September 2004. Completely randomized design with factorial series with two factors (growth media and fertilizer dosage) and four layers of each factors, so all of 16 treatments were applied in the research. Four replications were used with five seedlings per replication. The media used were top soil (A1), mixing of top soil and compost (A2), mixing of top soil and coconut husk (A3), and mixing of top soil, compost and coconut husk (A4). The fertilizer used were control (BI), 0.5 gr (B2), 1.0 gr (B3) and 1.5 gr (B4). The effect of those treatment were trought the evalution of seedling percentage, seedling height, seedling diameter and number of leaf. The results showed that the seedling height and seedling diameter were significantly different but growth percentage and number of leaf were not significantly different. The best of three treatments for seedling growth were top soil and fertilizer 0.5 gr (A1B2), mixing of top soil, compost and fertilizer 1 gr (A2B3), and media of top soil (A1B1), respectively.

253 SETIADI, D.
Sprouting productivity of bread fruit root cuttings from several populations in Java and Madura. *Produktivitas trubusan setek akar sukun dari beberapa populasi di Jawa dan Madura*/Setiadi, D.;

Adinugraha, H.A.; Prastyono (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 29-36, 2 ill., 2 tables; 12 ref.

ARTOCARPUS ALTILIS; CUTTINGS; SEEDLINGS; SPROUTING; JAVA.

Artocarpus altilis Forsbeg is a multipurpose tree species which is generally cultivated in the garden. The aim of this research was to investigate the growth of *A. altilis* seedling from four populations in Java i.e. Kediri and Madura (East Java), Lebak/Banten and Sukabumi (West Java). The parameters have been evaluated to find the best seed population of good quality seedlings. Experiment was laid out in a completely randomized design with 5 replicates comprising 10 seedlings of each which were 5 months old after transplanting. The parameters evaluated were number of sprouts, number of leaves, sprouting length, sprouting diameter and seedling strengthen. The result showed that there was a significant effect of source of population on number of sprouts, number of leaves and seedling strengthen, but on the sprouting length and sprout diameter did not show any significant difference. *A. altilis* seedlings from Kediri (East Java) indicated as the best quality of seedling.

254 SIAGIAN, Y.T.
Effect of hedging treatment to the sprouting and rooting of leafy cutting of Hopea species. ***Pengaruh tinggi pangkasan terhadap pertunasan dan daya perakaran setek pucuk jenis Hopea***/Siagian, Y.T.; Adinugraha, H.A. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 25-30, 3 tables; 7 ref.

HOPEA; SPECIES; PRUNING; SPROUTING; ROOTING; CANOPY; PROPAGATION BY CUTTINGS; PROPAGATION MATERIALS.

The rejuvenation technique by hedging of *Hopea odorata* saplings is needed to obtain coppicing shoots as cutting materials. This experiment conducted 5 levels of height of felling as follows 10, 20, 30, 40 and 100 cm to know the influences of hedging on coppicing ability and rooting rate of the leafy cuttings. The result showed that height of felling and stem diameter caused variation on coppicing ability. The felling at 100 cm above the ground showed the largest of average shoot number (19.6) and shoot length (13.3 cm). The largest size of H. odorata saplings produced more coppicing shoots than smaller ones. The coppicing shoots taken from saplings that felt at 20 cm showed the best rooting rate and survival rate 45.6% and 89.7% after 6 weeks.

255 SURYANTO, P.
Crown development of teak from seedling, tissue culture and shoot cutting. ***Perkembangan tajuk pohon jati berasal dari biji, kultur jaringan dan setek pucuk***/Suryanto, P.; Aryono, W.B.; Sabarnurdin, M.S. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Kehutanan). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 35-43, 4 ill., 5 ref.

TECTONA GRANDIS; CROWN; TISSUE CULTURE; GROWTH.

In forest management, the use of teak as major timber has dealed the problems of seed supply and land intensification. The searching program of teak plant material gives alternatives result which are seed, tissue culture and cutting plant. Those three plant materials have own characteristics that need to be tested especially the matter of crown development relating to land intensification emphasizes to space management in agroforestry systems. This research used randomized completely block design (RCBD) with three kinds of teak plant materials (using 5 plus trees varieties) and three blocks. Treatment unit in square plot and each unit had 9 trees, with spacing of plant 6 m x 2 m. The result showed that crown cover estimation was attained when teak stand are 12 years old, 15.2 years old and 8.5 years old, if plant material used are seed, tissue culture and shoot cutting, respectively. If the availability of high quality teak seed is enough, seed will be the first choice, but if the availability of high quality seed is limited, two other of alternative plant materials could be used in consideration of technique skills and more important was the economically factor.

L01 ANIMAL HUSBANDRY

256 MARDININGSIH, D.
Social problem on community improvement face to beef cattle development program: case on corporate farming in Grobogan Regency (Indonesia). ***Kendala sosial pemberdayaan masyarakat melalui program pengembangan ternak sapi potong: kasus corporate farming di Kabupaten Grobogan***/Mardiningsih, D.; Eddy, B.T.; Sriyanto, D.; Sonjaya, A. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 227-231, 9 ref. 636:338.439/SEM/p

BEEF CATTLE; SOCIOECONOMIC DEVELOPMENT; SOCIAL CONDITIONS; COMMUNITY DEVELOPMENT; JAVA.

The research was aimed at studying the behavior of beef cattle farmer's in Corporate Farming Bersemi and problems faced by other stakeholders of beef cattle development. The research was a case study with quantitative approach. Data was collected by field observation, depth interview and focus group discussion. Data was analyzed descriptively and were presented naratively. The results showed that Corporate Farming Bersemi was a concept of plant and animal integration. The credit schemes were not properly done. The farmers employment faced the technological constraints, especially on application of artificial insemination. In turn, it affected the attitude of the farmers on the animal possession, so that it can not encourage their existence. However the establishment of corporate farming gave the people on experience in practicing agribusiness.

257 MUHAMMAD, Z.
Performance of swamp buffalo (*Bubalus bubalus*) production in Brebes District, Central Java Province (Indonesia). ***Penampilan produksi ternak kerbau lumpur (Bubalus bubalus) di Kabupaten Brebes, Jawa Tengah***/Muhammad, Z.; Kusumaningrum, D.A. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1] , Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 310-315, 2 tables; 9 ref. 636:338.439/SEM/p

WATER BUFFALOES; FEEDS; QUALITY; ANIMAL PERFORMANCE; JAVA.

A survey was conducted to observe buffalo production in Brebes District, Central Java, including three subdistricts: Brebes, Tonjong and Bantar Kawung, that had buffalo population of 996, 408 and 765, respectively of the whole population in the district of 5942 heads. Buffalo farming in these villages was traditional of 141 buffaloes (113 females and 28 males) observed indicated that buffaloes were reared for investment, farmer housing repairement, son/daughter wedding and draught. That a long period of fattening was independent on animal selling policy. Native pasture was the only feed offered to the livestock. It could be suggested that feed quality should be improved in order to increase live weight gain.

258 SARIUBANG, M.
System integration of crop maize-beef cattle in Subprovince of Takalar, South Sulawesi (Indonesia). ***Sistem integrasi tanaman jagung - sapi potong di Kabupaten Takalar, Sulawesi Selatan***/Sariubang, M.; Pasambe, D. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 285-291, 5 tables; 12 ref. 636:338.439/SEM/p

BEEF CATTLE; FATTENING; ZEA MAYS; STRAW; INTEGRATION; ECONOMIC ANALYSIS; SULAWESI.

A research on system integration crop of maize at lowland dry farming have been done in Subprovince of Takalar, South Sulawesi, since January up to December 2004 have been done in order to know exploiting of maize crop for beef cattle's feed and at the same time to study influence of exploiting of beef cattle livestock dung which is fermented for organic manure at maize crop. Results of research indicated that of old age maize crop production 60-70 day after planting (fruit and bar) was 40,600 kg/ha and maize hay (fruit and bar) was 21,900 kg/ha crop dry. For the beef cattle weight (early weight ± 200 kg/tail) it showed heavy accretion of ADG and consumption. There were T1 (control) 0.367 kg/tail/day and 5.93 kg/tail/day, T2 (silage) 0.450 kg/tail/day and 5.92 kg/tail/day, T3 (fermented hay) 0,459 kg/tail/day and 5.85 kg/tail/day. While analysis of financial was Rp 6,834,722/ha/year with B/C ratio 1.8. It is concluded that farming system integration of maize-beef cattle was the potential model to be developed at lowland dry farming.

259 SUBIHARTA.
Carrying capacity for cattle farming based on food cropping in marginal areas of Blora (Indonesia). ***Kapasitas penyediaan pakan untuk usaha ternak sapi berbasis tanaman pangan di wilayah marginal Kabupaten Blora***/Subiharta; Hartoyo, B.; Sarjana (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 227-231, 4 tables; 9 ref.

BEEF CATTLE; FEEDS; FOOD CROPS; MARGINAL LAND; JAVA.

Blora is being well known as the central of cattle farming, which have multi purposes, i.e. fattening, breeding, and source of power inland preparation. Feed carrying capacity has been constantly highlighted as the most determinant factor for this cattle farming performances. This particular issue is being major subject of this study, i.e. supply systems, quantities and farmers survival strategies to manage the impacts of feed scarcity incidents. Data collection consisted of standardized interview to farmers, farm record keeping, and observations. The farmers land area is about 0.35 ha in average. On the limited of rainy season (5 months), the planting pattern was upland rice-peanuts-fallow. This cropping pattern produced farming byproduct as the feed material about 5,174.8 kg in average. This farming by product can cover the feed for 97.8 days only. The results show that the limited carrying capacity was a determinant factor of the cattle farming which caused low performance. This implied the urge development of alternative source of feed to improve the cattle farming performance.

260 SUSANTI, T.
Egg production of MA duck and on BPTU Pelaihari South Kalimantan. ***Produksi telur itik MA di BPTU Pelaihari Kalimantan Selatan***/Susanti, T.; Setioko, A.R.; Prasetyo, L.H. (Balai Penelitian Ternak, Bogor (Indonesia)); Supriyadi. [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 817-822, 1 ill., 3 tables; 8 ref. 636:338.439/SEM/p

DUCKS; CROSSBREEDING; EGG PRODUCTION; SPECIES; KALIMANTAN.

Balitnak have released MA duck as crossbred of mojosari male duck and alabio female duck. MA duck has heterocyst value that is high especially on its both egg production and first age egg layer. Genetic improvement on the local breeds is being conducted in order to support the development of the existing production system in the duck production region. One of the locations where MA duck will be developed and distributed is BPTU (Balai Pembibitan Ternak Unggul) Pelaihari in South Kalimantan. At developing area, MA duck must be controlled and evaluated to stand on their quality. Therefore, this study aimed at learning MA duck production on BPTU Pelaihari as breeding centre in South Kalimantan. Seventy five heads of mojosari male ducks were obtained from Balitnak as a result of selection programme. Then, they

were mated with 400 alabio female ducks as a result of selection programme done on BPTU Pelaihari. The crossbred of mojosari male ducks and alabio female duck was contributed to smallholder in areas near BPTU. The part of population MA ducks were stand on BPTU as controlled populations. Measurement was collected on egg production per month during eight months. The results showed that MA ducks in BPTU Pelaihari gave highly production. Their egg production was 74.8 ± 12.9% during eight months production. The egg production was higher than that from their parent. For this time, BPTU have contributed 753 head of MA ducks into 5 areas duck farming in South Kalimantan which is Banjarbaru, Banjarmasin, Liang Anggang, Martapura and Tanah Laut.

L02 ANIMAL FEEDING

261 ALI, U.
Effect of onggok (cassava byproduct) and cow rumen bowel application in complete feed on the performance of etawah crossbred goat. ***Pengaruh penggunaan onggok dan isi rumen sapi dalam pakan komplit terhadap penampilan kambing peranakan Etawah***/Ali, U. (Universitas Islam Malang (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 69-72, 2 tables; 10 ref.

GOATS; COMPLETE FEEDS; ORGANIC WASTES; RUMEN; BYPRODUCTS; TAPIOCA; FEED INTAKE; TOTAL DIGESTIBLE NUTRIENTS; ANIMAL PERFORMANCE; WEIGHT GAIN.

The aim of this experiment was to analyze the effect of onggok and cow rumen bowel (OCRB) use in complete feed on the performance of etawah crossbreed goats (ECG), and was conducted at the Faculty of Animal Husbandry, Islamic University of Malang. The experiment used randomized block design, using 12 etawah crossbreed goats which had body weight 23.5 - 30.8 kg in 3 blocks. The goats were put in individual cages for 65 days and given complete feed. The treatment feed was arranged based on nutrient requirements for ruminants-crude protein max. 14% and crude fiber min. 12%. Formulations of OCRB in feed given were: R0 = 0%, R10 = 10%, R20 = 20% and R30 = 30%. The goat performance which were observed included feed intake, digestible nutrient and body weight gain, and the data obtained was analyzed by covariance and BNJ test. The result of statistical analysis showed that the use of OCRB in complete feed was significant ($P < 0.05$) for IDM, DDM, DOM, IDOM and BWG. In daily intake rate: IDM= 1012.51 ± 8.04 g/head, DDM = 63.94 ± 0.77%, DOM = 65.69 ± 1.13%, IDOM= 613.041 ± 84.955 g/head, and BWG=75.88 ± 4.06 g/head. It was concluded that OCRB in complete feed can be used 30% for goats which it was optimal and efficient with body weight gain of 71.82 g/ head/day.

262 ANGGRAENY, Y.N.
Effectivity of the used of formaldehyde as protein protector to the in vitro crude protein digestibility of coconut meal. ***Efektivitas penggunaan formaldehida sebagai pelindung protein terhadap kecernaan in vitro protein kasar bungkil kelapa***/Anggraeny, Y.N.; Krishna, N.H. (Loka Penelitian Sapi Potong, Grati, Pasuruan (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 430-437, 5 tables; 23 ref. 636:338.439/SEM/p

BEEF CATTLE; RUMEN; FEED MEALS; FORMALDEHYDE; COPRA MEAL; DIGESTIBILITY; PROTEIN QUALITY; IN VITRO.

Coconut meal is one of protein source that compose beef cattle concentrate, but the crude protein rumen is high (89.24%). The higher of crude protein digestibility in the cause inefficiency. Crude protein rumen digestibility can be decreased by formaldehyde (HCHO) treatment. Parameters observed were N solubility, rumen crude protein digestibility, and totally crude protein digestibility. The study of N solubility on coconut meal used 4 x 5 factorial designed using completely randomized design and the study of N solubility. The first factor was the levels of HCHO (0%; 2.5%; 5%; 7.5%) and the second factor was incubation times (0, 3, 6, 12, 24 hours). The solubility and digestibility of coconut meal were

compared by skim milk powder. The results showed that interaction of HCHO treatment and incubation times significantly decreased N solubility both of coconut meal and skim milk powder. N solubility of coconut meal decreased from 33.83% (0% HCHO) to 18.34% (7.5% HCHO). On skim milk powder, the N solubility decreased from 21.42% (0% HCHO) to 14.82% (7.5% HCHO). Maximal N solubility on coconut meal and skim milk powder was on 3 hours after incubation. The solubility decreased by increasing of incubation times. The used of HCHO decreased crude protein digestibility on coconut meal and skim milk powder. Crude protein digestibility of coconut meal decreased from 88.54% (0% HCHO) to 64.04% (7.5% HCHO). On skim milk powder, crude protein digestibility decreased from 97.07 (0% HCHO) to 74.34% (7.5% HCHO). Total crude protein digestibility on coconut meal decreased from 96.20% (0% HCHO) to 86.90% (7.5% HCHO). Total crude protein digestibility on skim milk powder was similar on 0% HCHO treatment (99.80%) and in skim milk powder was 99.97% (7.5% HCHO). The conclusion of this research that HCHO was effective as a protein protector agent on coconut meal.

263 CANDRAWATI, D.P.M.A.
Effect of supplementation of phylazim enzyme in 30% rice bran based diets on performance of broilers. ***Pengaruh suplementasi enzim phylazim dalam ransum yang menggunakan 30 persen dedak padi terhadap penampilan broiler***/Candrawati, D.P.M.A.; Witariadi, N.M.; Bidura, I G.N.G.; Dewantari, M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 73-77, 3 tables; 16 ref.

BROILER CHICKENS; SUPPLEMENTS; ENZYMES; BRAN; RATIONS; FEED CONVERSION EFFICIENCY; WEIGHT GAIN; ANIMAL PERFORMANCE.

This research was carried out to study the effect of supplementation of phylazim enzyme in rice brand based diets on performance of broiler aged 2 - 6 weeks, at Denpasar, Bali. A completely randomized design (CRD) with three treatments in six replications was used in this experiment. There were four birds in each replicate with a homogenouos body weight (473.94 ± 13.70). The experimental diets for the finishing period (aged 2 - 6 weeks) were formulated with 20% crude protein and 2900 kcal ME/kg with 15% rice bran as a control diet (A), diets with 30% rice bran (B), and diets with used 30% rice bran + 0.20% phylazim enzyme (C), respectively. Experimental diets and drinking water were provided ad libitum during the entire experimental period. The variables observed were feed consumption, water consumption, final body weight, body weight gain, and feed conversion ratio (FCR). The result of this experiment showed that rice bran based diets (diets with 30% rice bran) had no significant effect ($P > 0.05$) on feed and drinking water consumption, but decreased significantly ($P < 0.05$) on body weight gain, and feed efficiency compared to control group. An addition of 0.20% phylazim enzymes in rice bran based diets (30% rice bran) showed the same effect ($P > 0,05$) as the control. It was concluded that broilers aged 2 - 6 weeks offered rice bran based diets (diets with 30% rice bran) were decreased body weight gain and feed efficiency compared to the control (diets with content 15% rice bran). But, supplementation of 0.20% phylazim in rice bran based diets had the same effect as the control (diets with content 15% rice brand).

264 KARDA, I W.
Methods to increase intake of gliricidia leaves (*Gliricidia sepium*) by sheep. ***Metode untuk meningkatkan konsumsi daun gamal (Gliricidia sepium) kering oven oleh ternak domba***/Karda, I W. (Universitas Mataram (Indonesia), Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 102-107, 4 tables; 36 ref.

SHEEP; GLIRICIDIA SEPIUM; LEAVES; OVENS; DIET TREATMENT; NUTRIENT INTAKE; MOLASSES; FEED CONSUMPTION.

Three trials were conducted to investigate the intake of oven-dried gliricidia by sheep, namely addition of polyethylene glycol (PEG) (trial 1), pretreatments (trial 2), and addition of additives (trial 3). In the first trial, six rumen fistulated sheep were used to compare two dietary treatments in a change over design to study whether infusion of polyethylene glycol (PEG) into the rumen might increase intake of gliricidia

leaf as tannin in the leaf was believed to limit its intake. In the second trial, four sheep were used to compare four dietary treatments in a latin square design to study whether reheating or freezing the already oven-dried gliricidia leaf might increase its intake by the animals. On the other hand, the third trial was aimed to supplement the sheep with various supplements which are believed to be able to increase the taste of the leaf by the animals. These supplements were wheat millrun, molases, grass hay, cottonseed meal, palm kernel meal, or barley grain. For this reason, ten sheep were used to compare seven dietary treatments in a randomized completely block design. Differences between means were examined by analysis of variance using the general linear model procedure of the statistical analysis system. The results showed that neither administration of PEG into the rumen nor pretreatments (reheating or freezing) increased intake of gliricidia leaf by sheep. However, only mixing gliricidia with molasses increased the intake of the leaf by sheep over the control diet (gliricidia alone) over the six hours feeding period (43 vs 74 g DM).

265 LAKSMIWATI, N.M.
Effect of starbio and effective microorganism-4 (EM-4) as probiotic on the performance of male duckling. ***Pengaruh pemberian starbio dan effective microorganism-4 (EM-4) sebagai probiotik terhadap penampilan itik jantan umur 0 - 8 minggu***/Laksmiwati, N.M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 84-88, 3 tables; 16 ref.

DUCKS; YOUNG ANIMALS; PROBIOTICS; RATIONS; MICROORGANISMS; FEED CONSUMPTION; FEED CONVERSION EFFICIENCY; WEIGHT GAIN; ANIMAL PERFORMANCE.

An experiment was conducted at Denpasar to study the effect of Starbio and effective microorganisms as probiotic on the performance of male ducklings. A randomized block design (RBD) with seven treatments was used in this experiment. The treatment consisted of a control group, three levels of Starbio and three levels of effective microorganisms (EM-4), namely, diets with 0.5 g Starbio/kg diet (S1), with 1 g Starbio/kg diet (S2), with 1.5 g Starbio/kg diet (S3), 1 ml EM-4/l (E1), 2 ml EM-4/l (E2), 3 ml EM-4/l (E3) drinking water and control (K). Each treatment consisted of four replications of 5 ducklings each. The diet given from 0-4 weeks of age contained 20.06% CP and 2847 Kkal/kg ME, while during 4-8 weeks contained 17% CP and 2847 Kkal/kg ME,. Diet and water were provided ad-libitum. The results of this experiment showed that supplementation of probiotic in diet and EM-4 in drinking water were significantly increased growth and feed efficiency ($P < 0.05$), but there was no significant difference of feed consumption. There was no significant difference of 0.5-1.5 g/kg Starbio and 1.5 ml- 3 ml EM-4 on growth, feed efficiency and feed consumption.

266 NUSCHATI, U.
Introduction of proper diet formulation for fattening Ongole generation beef cattle in marginal region. ***Teknologi perbaikan ransum untuk penggemukan sapi peranakan ongole (PO) pada wilayah marginal***/Nuschati, U.; Subiharta; Ernawati (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.)Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 370-375, 3 tables; 14 ref.

BEEF CATTLE; DIETS; FORMULATIONS; FATTENING; MARGINAL LAND.

A feed trial for improving ongole generation (OG) beef cattle productivity under the feed lot fattening management was conducted in marginal region. Six OG beef cattles having average initial body weight of 244 kg were fed diet containing concentrate feed; fermented rice straw, and elephant grass (introduced diet). The concentrate feed contained 88% dry matter, 14% crude protein, and 70% total digestible nutrient. The experimental diets were formulated using Excel program based on the expected body weight gain and its nutrients requirement. Whereas, investigation of the growth rate of 5 OG beef cattles fed

traditional diet (formulated by the farmer) were also performed. During the three months period, measurements were made for body weight gain, feed consumption, and feed efficiency. Data were analyzed using descriptive analysis. Results showed that introduction of concentrate feed in the diet of OG beef cattle resulted in better average growth rate compared to those consuming traditional diet (0.86 vs 0.33 kg/d). Extend to which introduced died also better than traditional diet in the average intake of dry matter: (0.77 vs 0.67 kg/d), crude protein (4.22 vs 3.92 kg/d), and feed efficiency (10.86 vs 4.25%). It was concluded that the introduced feed was suitable to improve OG beef cattle productivity in marginal region.

267 PUTRA, S.
Supplementing effects of some mineral sources in the ration on the apparent absorption, retention, net utilization of nitrogen and blood protein of the etawah crossbred goat fed grass based diet. ***Pengaruh suplementasi beberapa sumber mineral dalam konsentrat terhadap serapan, retensi, utilisasi nitrogen, dan protein darah kambing peranakan etawah yang diberi pakan dasar rumput***/Putra, S. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 94-101, 1 ill., 4 tables; 31 ref.

GOATS; CROSSBREDS; SUPPLEMENTARY FEEDING; CONCENTRATES; NITROGEN RETENTION; PROTEIN QUALITY; BLOOD PROTEIN; DIET; GRASSES.

A (station) research was carried out to study the supplementing effects of some mineral sources in the ration on the nitrogen apparent absorption, blood protein, nitrogen retention, and net nitrogen utilization of the etawah crossbreed goat (PE) fed on a grass based diet. A latin square design consisting of four diet treatments, four of PE goats, and four of periods was used in this research. The four diet treatments were diet A (natural grass + concentrate without source of mineral supplementation); diet B (natural grass + concentrate which supplemented MINERAL 10); diet C (diet of B supplemented with ammonium sulfate); and diet D (diet of C supplemented with PIGNOX). The ratio of natural grass/ concentrate was 68% to 32%. Each period was allocated into 3 weeks, the first two weeks for observation and the last week for total collection of faeces and urine. Between two periods 7 days was given for adaptation or rest time. The results of this research showed that supplementation of some mineral sources in the ration did not affect ($P > 0.05$) the consumption, apparent absorption, retention of N, blood protein, BV, and NNU, but affected ($P < 0.05$) the blood urea N. Quantitatively, consumption, apparent absorption, retention of N, BV, and NNU in goat D was highest due to the higher digestibility of CP and metabolism of diet D compared to the other experimental diets. Urea and protein of blood in goat D were second highest ($P > 0.05$) after goat C, quantitatively. It was concluded that supplementation of MINERAL 10, ammonium sulfate, and PIGNOX on the treatment D were the best combination to increase N apparent absorption, retention of N, net nitrogen utilization (NNU), and blood protein, quantitatively.

268 SUMANTO.
Improvement of feeding management on dairy cattle at Pangalengan (Indonesia). ***Studi perbaikan pakan pada sapi perah di Pangalengan: analisa ekonomi***/Sumanto; Juarini, E.; Sutama, I K. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 390-394, 5 tables; 10 ref. 636:338.439/SEM/p

DAIRY CATTLE; FEEDS; FEEDING; LIVESTOCK MANAGEMENT; MILK PRODUCTION; ECONOMIC ANALYSIS; JAVA.

A collaborative research between The Research Institute For Animal Production (RIAP) and The Noriko Dairy Farm Indonesia on the improvement of the dairy farm enterprise management has been conducted in a farm site of PT Noriko Dairy Farm at Pangalengan, Bandung District since 2003. The aim of this second year study was at developing a more effective and efficient production system mainly focusing on

feeding management of pregnant cows. Ten dairy cows of about 7 month pregnancy and of about the same ages belong to PT Noriko Dairy Farm were divided into two groups, allocated for 90 days feeding treatment. The first group was given forage and standard concentrate as usual (T0). The second group was fed forage and Balitnak concentrate (T1), formulated by the RIAP (CP 16-17%). The amount of feed offered was adjusted as daily intake and milk production were recorded. The technical supporting data and the socioeconomical data were collected during the assessment. Data collected were analyzed descriptively and if necessary financial data were also to be assessed. Recording data were conducted on average daily gain of pregnant cows, over 6 months period (3 months before and after calving) on milk production, milking system, and mating system. Results showed that the average daily gain, the average birth weight of calves, and the economic benefit of over 6 months milk production of the cows fed T1 were higher compared to those of T0: 0.96 kg vs 0.31 kg, 36 kg vs 33 kg and Rp 4,721,700 vs Rp 3,225,600, respectively. Seemingly the farmer prefers conducting natural mating than using T1.

269 SURYANA.
Development of ruminant and oil palm plantation integration in South Kalimantan (Indonesia). ***Pengembangan integrasi ternak ruminansia pada perkebunan kelapa sawit***/Suryana (Balai Pengkajian Teknologi Pertanian Kalimantan Selatan, Banjarbaru (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 35-40, 6 tables; 28 ref.

RUMINANTS; OIL PALMS; PLANTATIONS; INTEGRATION; FEEDS; ANIMAL FEEDING.

In 2005, ruminant population in South Kalimantan Province amounted 193,920 heads for cattle, 41,435 heads for buffaloes, 107,873 heads for goats, and 3,474 heads for sheep. The amount was unsufficient to fulfill the meat demand in the province. Ruminant development in South Kalimantan is mostly constrained by forage availability especially in the long dry season. On the other hand, forage in oil palm plantation and wastes of crude palm oil (CPO) processing is potential for ruminant feeds. In 2005, the area of oil palm plantation in South Kalimantan reached 164,692 ha, which produced CPO of about 350,076 t/year, palm kernel meat 62,232 t/year, and sludge 75,267 t/year. Utilization of oil palm wastes as ruminant feeds could be conducted by integrating ruminant and oil palm plantation. The integration system could be the alternative in alleviating feed insufficiency in order to increase ruminant productivity.

L10 ANIMAL GENETICS AND BREEDING

270 PRIHANDINI, P.W.
Improvement of artificial insemination management using frozen semen in beef cattle, in Blora District (Indonesia). ***Usaha perbaikan tatalaksana IB semen beku sapi potong pada agroekologi berbeda di Kabupaten Blora***/Prihandini, P.W.; Affandi, L. (Loka Penelitian Sapi Potong, Pasuruan (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigno, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 311-315, 3 tables; 18 ref.

BEEF CATTLE; SEMEN; ARTIFICIAL INSEMINATION; THAWING; REPRODUCTIVE PERFORMANCE; FEED CONSUMPTION; JAVA.

Low management and improper artificial insemination (AI) system affected in high service per conception, low conception rate and long calving interval. This research was conducted to evaluate the effect of AI improvement management for beef cattle in the villages with different agroecology. This research was conducted by survey in the village farm under the farmer management on (by and wet land of Blora District, Central Java for 12 months (January to December 2007). Observations were made for frozen semen and reproduction performances by ex and post ante analysis (80 acceptors). Results showed that the thawing and weaning of calves before and after improvement of AI management were different ($P < 0.05$); where as the AI time was different. After improving of AI management (thawing and AI time)

it was documented that the S/C decreased from 2.7- 2.5 time become 1.1 ± 0.3 lime (dryland of Tunjungan Subdistrict) and 1.3 ± 0.4 time (wet land of Blora Subdistrict), Blora District. Thus, there was an increase CR from < 60 % to 70 % on dry land and 65% on wet land. Moreover, feed condition on dry season during the experimental period was similar which were dry matter (DM) 4.8 to 4.4 kg/day and crude protein (CP) 0.3 to 0.3 kg/day (dry land) and OM 6.9 to 6.9 kg/day and CP 0.3 10 0.5 kg/day (wet land). In conclusion, improvement of thawing and time of straw introduction to the cow reduced S/C, increased NNR, and CR.

271 SETIOKO, A.R.

Breeding program of MA ducks in BPTU (Institute for Superior Livestock Breeding) Pelaihari: selection of alabio parent stocks. ***Program pembibitan itik MA di BPTU Pelaihari Kalimantan Selatan: seleksi pada populasi bibit induk itik alabio***/Setioko, A.R.; Susanti, T.; Prasetyo, L.H. (Balai Penelitian Ternak, Bogor (Indonesia)) Supriyadi. [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 763-767, 2 tables; 8 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); CROSS BREEDING; SELECTION; EGG PRODUCTION; DURATION; KALIMANTAN.

A breeding program for producing MA ducks (crossbred between mojosari and alabio ducks) is being conducted at the BPTU (Balai Pembibitan Ternak Unggul) Pelaihari. A selection program is being applied to a population of alabio ducks as female line of the parent stocks with the aim of improving egg productivity. Four hundreds female alabio ducks were used as the foundation stocks (P0) for the selection, and kept in litter cages of 25 heads each. The selection criterion was the first 2-months egg production per cage, with the highest 30% being selected. The selected females were then mated to males at random in order to produce 400 female F1 progeny. Observations were taken on monthly egg production, as % duck-day. Results showed that the average 2-months egg production of the P0 was 41.28% and of the F1 was 71.72%. Therefore, the selection response was 30.44%. Based on this positive selection response, it can be concluded that the selection process being carried out by BPTU is on the right track.

272 SUMANTRI, C.

Effect of kappa-casein genotype on milk quality of Holstein-Friesian (HF) dairy cattle in BPTU Baturraden. ***Pengaruh genotipe kappa kasein (k-kasein) terhadap kualitas susu pada sapi perah FH di BPTU Baturraden***/Sumantri, C.; Maheswari, R.R.A. (Institut Pertanian Bogor (Indonesia). Fakultas Peternakan); Anggraeni, A.; Diwyanto, K.; Farajallah, A. [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 358-365, 5 tables; 22 ref. 636:338.439/SEM/p

DAIRY CATTLE; COW MILK; CASEIN; GENOTYPES; QUALITY.

The objective of this research was to study the effect of k-casein genotype on milk quality of Holstein-Friesian (HF) dairy cattle in BPTU Baturraden. Lactated cows were selected proportionally based on the consideration for three protein classification (high level for protein yield >3.89%, moderate 2.76-3.89% and low <2.76%. Fat yield classification (high level >3.73%, moderate 3.15-3.73% and low <3.15%. The research activities were carried out through: blood collecting, DNA isolating, amplifying DNA with PCR and PCR products were digested by Pst I enzyme restriction, and identifying correlation between k-casein gene polymorphism on protein and fat yield. The frequency of genotype and gene of k-casein was calculated by Warwick and Legates, whereas the significant test of genotype frequency between observation and expectation was calculated by x^2 test. The result showed that the frequency of gene B in

high protein yield classification higher than gene A (0.55 vs 0.45). On the contrary, the frequency of gene B in low protein yield classification lowers than A (0.20 vs 0.80). The genotype of k-casein gene had affected significantly on the protein yield and had not effect on fat yield.

L50 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

273 DOLOKSARIBU, M.
Productivity of Kacang goat at penned condition: 1. birth weight, weaning weight, litter size and mobility of post-weaning. ***Produktivitas kambing Kacang pada kondisi dikandangkan: 1. Bobot lahir, bobot sapih, jumlah anak sekelahiran dan daya hidup anak prasapih***/Doloksaribu, M.; Elieser, S.; Mahmilia, F.; Pamungkas, F.A. (Loka Penelitian Kambing Potong, Sei Putih, Deli Serdang (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 581-585, 2 tables; 7 ref. 636:338.439/SEM/p

GOATS; BREEDS (ANIMALS); PRODUCTIVITY; BIRTH WEIGHT; WEANING WEIGHT; LITTER SIZE; ANIMAL HOUSING.

Research on kacang goat productivity was conducted at Sungei Putih Research Station, and the birth weight, weaning weight, litter size and mobility postweaning were the parameters of the study. The numbers of goats observed were 78 heads. Goat rearing was entirely carried out in cages; in the morning they were given ± 250 g/head/day concentrate, and grass was adequately supplied for the afternoon and evening. All the parameters studied were analyzed with mean test followed by t-test. From the results it was found out that the average birth weight was 1.78 ± 0.23 kg and the average weaning weight was 6.56 ± 1.37 kg, the litter size was equal to 1.23, and mobility post-weaning at the age of 3 months was 83%. From the lactating period studied it was found out that the kidding interval was 268 ± 34 days. Based on the birth sequence (parity) from each goat, it was found out that second and third birth sequences were better for birth weight, weaning weight and mobility compared to those of first birth ($P<0.05$).

274 MAHFUDZ, L.D.
Phenotipic of high productivity of magelang ducks. ***Fenotipik dari itik magelang yang produktif***/Mahfudz, L.D.; Kismiati, S.; Sarjana, T.A. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 779-785, 5 tables; 27 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); PHENOTYPES; HIGH YIELDING BREEDS; PRODUCTIVITY; COLOURS; FEATHERS; ANIMAL PERFORMANCE.

It is very difficult to find the magelang ducks which have capability to produce eggs more than 150/bird/year. This experiment was conducted to examine characteristics of magelang ducks with higher productivity. Magelang duck can be differed from another Indian runner ducks, that is white feather around neck as a white necklace. The material of this experiment was 150 ducks from 3 districts and each district chosen 2 population centre and every population were selected 25 birds by body weight and productivity. The feed consisted of yellow corn, rice bran and concentrate 144, with proportion (3:1:1). The ducks were reared on postal house with paddy straw as a litter, and in the afternoon the ducks were herted in paddy field and small river around experiment location. The examinated parameters were color of feathers, skin, shank and footweb, body weight and eggs production. The feather color was interpreted by analysis of Lancester. The variation of colors of feather was genetically tested using Mandels Low and was analyzed following method of Mozawa, colors of skin and shank used teory of Smyth. Body weight and eggs production were tested by correlation. Mathematic model was used for correlation and t test between population. The results showed that the colors of feather 96.60% are dark and light brown. The

skin colors are 82.45% white and 17.55% grey. The shank color is 100% black, whereas footweb 29.33% white and 70.67% black. The conclusion of this experiment were body weight of ducks 91.33% medium (1.200-1.400 g), eggs production 38.33% lower, 48.67% medium and 13% higher. The ducks with higher productivity has brown color feathers ("kalung plontang"), white skin, black shank and white footweb colors.

275 WULANDARI, W.A.
Biological characteristics of cihateup duck from Tasikmalaya and Garut Regencies. ***Kajian karakteristik biologis itik cihateup dari Kabupaten Tasikmalaya dan Garut***/Wulandari, W,A.; Hardjosworo, P.S.; Gunawan (Balai Pengkajian Teknologi Pertanian Bengkulu (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 795-803, 3 ill., 3 tables; 9 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); BIOLOGICAL PROPERTIES; FEEDING PREFERENCES; CONSUMPTION; EGGS; JAVA.

Cihateup duck is an Indonesian local duck which is mostly found in West Java especially in Tasikmalaya and Garut Regency. Cihateup duck is namely mountainous duck because it can adapt to cool temperature and survive in highland. The aim of this research was to obtain information on biological characteristics of cihateup duck. Five hundreds and seventeen cihateup eggs from Tasikmalaya and Garut were hatched. The commercial diet was used, and water and feed were given ad libitum. Physical traits of egg, growth pattern, feed consumption and conversion, body measurement, plumage patterns, shank and beak colors, and blood protein polymorphism were observed. The data characteristic of egg, growth pattern were analyzed with general linier model. Body measurements were analyzed with principal component analyze (PCA) with Minitab. The result showed that egg weight from Tasikmalaya (68.0 g) was bigger than that from Garut (65.6 g). Both of the males cihateup duck from Tasikmalaya and Garut has higher growth than the females. Feed consumption of male was higher than that of female but the feed conversion of male was better than the females. The males duck has three kind plumage patterns, i.e. pencilled, non barred and laced, whereas the females has two kinds, i.e. laced and buttercup. Almost all cihateup ducks have shank and beak in black color and only some showed the yellow color. There were similarity genetic distance between cihateup duck from Tasikmalaya and Garut.

L53 ANIMAL PHYSIOLOGY - REPRODUCTION

276 ARIFIANTINI, R.I.
Comparison of two packaging techniques using three extenders for the cryopreservation of Friesian Holstein (FH) semen. ***Kaji banding dua teknik pengemasan menggunakan tiga macam pengencer untuk pembekuan semen sapi Friesian Holstein (FH)***/Arifiantini, R.I.; Yusuf, T.L.; Indah, O. (Institut Pertanian Bogor (Indonesia). Fakultas Kedokteran Hewan). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 366-376, 7 ill., 2 tables; 26 ref. 636:338.439/SEM/p

CATTLE; BULLS; SEMEN; VACUUM PACKAGING; BIOLOGICAL PRESERVATION; QUALITY.

The percentage of the progressive motile and life sperm of frozen thawed semen was used as criterion to compare methods of semen cryopreservation. Fifteen ejaculates from three friesian holsteins (FH) were frozen in three extenders, TEY (Tris egg yolk), home made tryladil (HMT) and AndroMed contain soya lecithin (KK), in each of two packaging techniques (0.3 mL minitub and 0.25 mL IMV straw). The sample were equilibrate (5 ^{o}C) for four hours and frozen in liquid nitrogen vapour for 10 minutes. The percentages of postthawed progressive motile and life sperm were greater ($P<0.05$) for KK (56.28; 74.22)

than for HMT (47.60; 65.93); and TEY (48.74; 69.63). They were no significant different in the percentages of progressive motile and life sperm freezing in 0.3 mL (52.16; 69.4) or 0.25 mL (49.59; 70.44). The percentages life sperm in KK minitub (72.76 ± 10.83) and KK IMV (75.67 ± 8.1) were greater than any other combinations. The percentages of progressive motile sperm in KK Minitub (57.9) were greater than KK IMV or any other combinations.

277 ARIFIANTINI, R.I.
[Use of three types of semen cryopreservation in two packed techniques on semen frozen process of Frisien Holstein cattle]. ***Keberhasilan penggunaan tiga pengencer dalam dua jenis kemasan pada proses pembekuan semen sapi Frisien Holstein***/Arifiantini, R.I.; Yusuf, T.L. (Institut Pertanian Bogor (Indonesia). Fakultas Kedokteran Hewan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 89-93, 3 ill., 2 tables; 26 ref.

CATTLE; SEMEN PRESERVATION; EGG YOLK; FROZEN STORAGE; LIQUID NITROGEN; THAWING; SEMEN; MOVEMENT.

Motility and the percentage of live sperm in thawed frozen semen was used ascriterion to evaluate methods of three types of semen cryopreservation. Fifteen ejaculates from three Frisien Holstein (FH) were diluted in three extenders, namely TEY (Tris egg yolk), home made triladyl(HMT) and AndroMed containing soya lecithin (KK). Each semen sample was packed using two techniques (0.3 ml minitub and 0.25 ml Cassou straw). The samples were equilibrated (5 ^{o}C) for four hour and frozen in the vapor of liquid nitrogen for 10 minutes. The percentage of post thawed e motility and life sperm were 56.28 and 74.22 for KK which were greater than HMT (47.60; 65.93) and TEY (48.74; 69.63) ($P < 0.05$). There was no significant difference in the percentage of the progressive motile and life sperm freezing in 0.3 ml (52.16; 69.4) or 0.25 ml (49.59; 70.44). The percentage of life sperm at KK minitub (72.76 ± 10.83) and KK Cassou (75.67 ± 8.1) were greater than any other combination. The percentage of progressive motile sperm in KK minitub (57.9 ± 7.81) were greater than KK Cassou or any other combination.

278 DEWANTARI, M.
Phenotypic plasticity in reproductive character of Mojosari, Tegal, and Tegal-Mojosari ducks as a response to aflatoxin in rations. ***Kelenturan fenotipik sifat-sifat reproduksi itik Mojosari, Tegal, dan persilangan Tegal-Mojosari sebagai respon terhadap aflatoksin dalam ransum***/Dewantari, M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 78-83, 6 tables; 16 ref.

DUCKS; PHENOTYPES; RHEOLOGICAL PROPERTIES; REPRODUCTIVE PERFORMANCE; RATIONS; AFLATOXINS; FEED CONSUMPTION; SEXUAL MATURITY; BODY WEIGHT; EGGS.

The objective of this research was to study the phenotypic plasticity in reproductive character of Mojosari, Tegal, and Tegal-Mojosari ducks as a response to aflatoxin addition in diets. The experiments was conducted at The Research Institute for Animal Production, Ciawi-Bogor. Three duck populations (Mojosari, Tegal, and Tegal-Mojosari ducks) were grown administered four different aflatoxin levels, namely R0 (control diet, without aflatoxin), R1 (control diet + 50 ppb aflatoxin), R2 control diet + 100 ppb aflatoxin), and R3 (control diet + 150 ppb aflatoxin) for one month period (aged 3-7 weeks). After the aflatoxin treatment period, all populations were maintained with R0 diet until laying egg production commenced. Each population was comprised 80 female ducks and 20 male ducks. Diets and water were offered ad libitum. A completely randomized design (CRD) with factorial arrangement (3 x 4) was used. The first factor was a population of ducks (Mojosari, Tegal, and Tegal-Mojosari ducks) and the second factor is aflatoxin levels (diets with 0 ppb, 50 ppb, 100 ppb, and 150 ppb of aflatoxin as treatment R0, R1, R2, and R3, respectively). Two way analysis of variance was used to analyse phenotypic plasticity differences between population. Variable observed were feed consumption, sexual maturity, body weight maturity, and the first weight of egg. The results showed that there were no significantly differences

(P > 0.05) on phenotypic plasticity in reproductive behaviour of Mojosari, Tegal, and Tegal-Mojosari ducks as a responce to aflatoxin addition up to 150 ppb in diets.

279 PURBA, M.
Egg production and hatchery of laying duck in production centre in Blitar District of East Java. ***Produksi dan penetasan telur itik petelur pada sentra-produksi di Kabupaten Blitar, Jawa Timur***/Purba, M.; Prasetyo, L.H.; Susanti , T. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 823-829, 3 tables; 15 ref. 636:338.439/SEM/p

DUCKS; EGGS; HATCHING; FERTILITY; HATCHABILITY; EGG PRODUCTION; JAVA.

A study to evaluate performance of MA/AM, crossing between mojosari and alabio duck (MA/AM) was conducted on an area centre in Ponggok subdistrict in Blitar District of East Java. A number of 5900 of MA/AM ducks with aged 20-22 weeks was reared in two groups (3000 ducks for the first group and 2900 ducks for the second). The two groups were fed the same amount quality of feed and drinking water was given ad libitum. The variable observed was egg production (duck-day-production) for 16 months periods. Beside egg laying production, since 2003 the UD Maju Jaya as one of the research collaborators of RIAP has done hatching of eggs. Production and hatching technologies were guided by RUAP. The number of eggs set in each hatching were 2945 eggs. The hatched eggs was normal, medium size with weight between 60-70 g/egg. The variable observed were fertility, hatchability and a number ratio of male and female of DOD. The result showed that the average of eggs production in the first group for 16 months periods was higher (67.76 ± 3.62%) than that in the second group (58.54 ± 4.81%). Fertility and hatchability of eggs were 90.45 and 67.32% respectively. The number of ratio male and female of the duckling almost the same as 32.94 and 34.38%, respectively.

280 ROHAENI, E.S.
Alabio duck reared in husk cage modification system at breeding centre in Hulu Sungai Utara Regency [South Kalimantan]. ***Usaha penetasan itik alabio sistem sekam yang dimodifikasi di sentra pembibitan Kabupaten Hulu Sungai Utara***/Rohaeni, E.S.; Subhan, A.; Setioko, A.R. (Balai Pengkajian Teknologi Pertanian Kalimantan Selatan, Banjarbaru (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 772-777, 2 tables; 13 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); HATCHERIES; RICE HUSKS; COST ANALYSIS; MARKETING; FARM INCOME; KALIMANTAN.

Hatchery is a business type of alabio duck business conducted by breeders in Hulu Sungai Utara (HSU) Regency. This research aim was at studying the profile and feasibility of hatchery farms at center in Sungai Hulu Utara Regency. The activities were conducted by surveying the alabio duckling breeders through interviews at Mamar Village of South Amuntai Subdistrict, HSU Regency. From the survey result, it was found out that hatching done by the majority was man-made ones by using modified husk system or combined with mechanical hatchers. The eggs hatched came from their own and also from other villages producing hatching eggs. The hatching scale run by breeders ranged from 1,000 to 10,000 per household per week with an average of 2,500 eggs. The fertility ranged from 50 to 70% with an average of 66.12%. The ducklings produced were sold at the age of 1 to 10 days with varied prices depending on the quality, age, and sex. Most of the duckling marketing was conducted at Alabio market held every Wednesday or collected by "pedagang pengumpul" at hatching locations. The hatching farming conducted by breeders produced an income of Rp 632.500/week with the R/C value equal to 1.22. This result indicated that duckling hatching is profitable and worth conducting.

L70 VETERINARY SCIENCE AND HYGIENE – GENERAL ASPECT

281 MUCHTARIDI.
Application of solid phase extraction-GC/MS (gas chromatography-mass spectrometry) technology in preparation of analysis of volatile compounds in blood plasma of mice. ***Aplikasi teknologi ekstraksi fase padat-GC/MS (gas chromatography-mass spectrometry) pada preparasi analisis senyawa atsiri dalam plasma darah mencit***/Muchtaridi (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 184-191, 2 ill., 2 tables; 9 ref.

ESSENTIAL OILS; MYRISTIN; MYRISTICA; SEEDS; EXTRACTS; OCIMUM; BLOOD PLASMA; MICE; LABORATORY ANIMALS.

Sample preparation is one of the steps in analysis which is able to determine efficiency of analysis, because it can establish reproducibility and recovery of the matrix interference. SPE (solid phase extraction) is a recent trend in sample preparation for reduction of solvent volume and time. In this research, application of SPE has been carried out to determine myristicin and linalool in blood plasma of mice after inhalation of essential oil. Recovery of myristicin in blood plasma of mice after inhalation of essential oil of nutmeg seeds (*Myristica fragrans* Houtt) increased up to 90%, after preparation using SPE C-18. On the other hand, linalool could be detected in blood plasma of mice after inhalation of essential oil of kemangi (*Ocimum formacitratum* Linn) leaves with application of SPE in sample preparation.

282 SUBARNAS, A.
Antidepressant activity of the methanol extract of *Areca catechu* L. seeds in mice. ***Aktivitas antidepresi ekstrak metanol biji pinang (Areca catechu L.) pada mencit***/Subarnas, A. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(2) p. 91-100, 5 tables; 13 ref.

ARECA CATECHU; SEEDS; DRUG PLANTS; PLANT EXTRACTS; HYPOTHERMIA; MICE; LABORATORY ANIMALS; METHANOL.

Antidepressant activity of methanol extract of *Areca catechu* L. seeds had been investigated on mice using a forced swimming test. In addition, an effect of the extract on catalepsy, hypothermia, and head-twitch respons induced by haloperidol (5 mg/kg), reserpin (8 mg/kg), and 5-hydroxitryptophan (5-HTP) (300 mg/kg), respectively, had been examined. The results indicated that in the forced swimming test the extract at doses of 200 and 400 mg/kg of body weight decreased duration of immobility of mice significantly as compared to the control at the first and the second 5 minutes. At the two doses, the extract significantly shortened duration of catalepsy observed every 30 minutes in 150 minutes and decreased a number of head-twitches at every 15 minutes along 60 minutes observations. In the antihypothermia examination, the extract raised the body temperature of hypothermia mice only at a dose of 400 mg/kg. These result suggest that the methanol extract of *A. catechu* seeds might have antidepressant activity.

283 WIKANTA, T.
Effect of i-carrageenan and k-carrageenan feeding on the reduction of rabbit's blood glucose level and intestine histopathology. ***Pengaruh pemberian i-karaginan dan k-karaginan terhadap penurunan kadar glukosa darah dan histopatologi usus kelinci***/Wikanta, T. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Kurniawan, R.; Rahayu, L. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 57-68, 8 ill., 5 tables; 27 ref.

RABBITS; CARRAGEENANS; HYPOGLYCAEMIA; CRUDE FIBRE; DOSAGE EFFECTS; BLOOD SUGAR; INTESTINES; HISTOPATHOLOGY; TRADITIONAL MEDICINES.

This paper reported concerning the experimental result on the utilization of the food fiber compounds, i-carrageenan and k-carrageenan for reducing the blood glucose level. This research applied the method of

oral glucose tolerance test using rabbit as an experimental animal, with the feeding dose of 5 mL 2% solution/kg body weight and the feeding duration of 1 day, 3 days, and 7 days. The positive control was chlorpropamide with the dose of 4.9 mg/kg body weight, and the negative control was distilled water. The data of blood glucose level was analysed statistically using one way anova, continued with least significance different test. The relationship between the i-carrageenan and k-carrageenan feeding on the reduction of rabbit's blood glucose level revealed that : 1 day, 3 days, and 7 days i-carrageenan feeding reduced blood glucose level of 5.96%, 8.98%, and 11.91%, respectively; while 1 day, 3 days, and 7 days k-carrageenan feeding reduced blood glucose level of 4.66%, 7.71%, and 13.54%, respectively, and chlorpropamide feeding reduced blood glucose level of 22.66%. The effect of i-carrageenan and k-carrageenan statistically did not significantly different, both had the same capability on reducing rabbit blood glucose level. There was an indication that carrageenan feeding in long period can result a side effect, the abnormalities (lesions) of rabbit's intestine surface cell. However, it is necessary to characterize carrageenan used to give more explanation on the cause of abnormalities (lesions).

284 WIKANTA, T.
In vivo assay on antioxidative effect of *Sargassum crassifolium* seaweed water extract. *Pengujian secara in vivo efek antioksidatif dari ekstrak air rumput laut Sargassum crassifolium*/Wikanta, T. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Rustanti, I.K.; Rahayu, L. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 69-81, 9 ill., 1 table; 15 ref.

MICE; SARGASSUM; EXTRACTS; WATER; ANTIOXIDANTS; BLOOD PLASMA; ACUTE TOXICITY; BLOOD CELLS; HISTOPHATOLOGY; LIVER; IN VIVO EXPERIMENTATION.

This paper reports the result of acute toxicity test (LD50) and antioxidative effect of water extract of *Sargassum crassifolium* seaweed. Measurement of LD50 was using Weil method with mouse (*Mus musculus*) as an experimental animals that given brown seaweed water extract, intraperitoneally (ip). In the extended research, the experimental animal used were rats (*Rattus norvegicus* L.). Experimental animals were divided into 6 groups: (K1) normal group, only distilled water given; (K2) negative control group, treated as treatment group but seaweed water extract was subtituted with distilled water; (K3) treatment group, treated with seaweed water extract at the dose of 0.162 g/100 g BW; (K4) treatment group, treated with seaweed water extract at the dose of 0.324 g/100 g BW; (K5) treatment group, treated with seaweed water extract at the dose of 0.647 g/ 100g BW; (K6) positive control group, treated with vitamin E at the dose of 2.7 mg/100 g BW Group. K1 was treated for 9 days, while K2-K6 were treated for 8 days. On the day 8th, two hours after last treatment, CCl4 at the dose of 55.00 mg/100 g BW were given to group K2-K6. Then, 24 hours afterward, rats blood plasma MDA and red blood cell SOD were analyzed, and liver histopathology preparation was made. The acute toxicity test showed that LD50 was 194.4 mg/100 g BW of mice (ip) or 13.608 g/kg BW of rat (oral). Based on the MDA and SOD value, seaweed water extract feeding with dose of 0.65 g/100 g BW had an antioxidant effect, while based on the liver histopathology analysis, seaweed water extract feeding with dose of 0.324 g/100 g BW was able to prevent liver damaged (as a hepatoprotector).

L72 PESTS OF ANIMALS

285 AHMAD, R.Z.
Reduction of *Arthrobotrys oligospora* mould to *Haemonchus contortus* larvae in grass plot. *Daya reduksi kapang Arthrobotrys oligospora terhadap larva Haemonchus contortus di padang gembalaan*/Ahmad, R.Z.; Beriajaya (Balai Penelitian Veteriner, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 995-1000, 2 ill., 1 table; 19 ref. 636:338.439/SEM/p

SHEEP; ARTHROBOTRYS; HAEMONCHUS CONTORTUS; GRAZING LANDS; NEMATODE INFECTIONS; FAECES; LARVAE.

The purpose of this study was to determine the reduction capacity of fungi *Arthrobotrys oligospora* against infective larvae of *Haemonchus contortus* directly in faeces distributed on grass plots. In the trial faeces from sheep infected with H. contortus was collected and mixed with spores of *A. oligospora*; distributed on grass plots. One week after grass was collected and larvae recovered from grass were counted. The results showed that 6 x 10^6 spore of *A. oligospora* given directly in the sheep faeces caused the decrease of larvae of *H. contortus* on grass plots near significant-dfference value (P = 0,076) compared to there in the control group. Conclusion of this study was *A. oligospora* can be directly used to decrease the contamination of gastrointestinal nematode larvae on grass.

N20 AGRICULTURAL MACHINERY AND EQUIPMENT

286 BUDIHARTI, U.
Dynamic system approach to find out mechanization model of rice mill to predict rice production. ***Pendekatan sistem dinamik untuk mempelajari model mekanisasi penggilingan padi untuk memperkirakan produksi bera***/Budiharti, U.; Tjahjohutomo, R.; Harsono; Gultom, R.Y. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)); Basuki, R.S. *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2007) v. 5(1) p. 1-12, 4 ill., 3 tables; 14 ref. Appendices

RICE; MILLING; MECHANIZATION; POSTHARVEST TECHNOLOGY; SIMULATION MODELS.

Rice is a strategic commodity for Indonesia, as a common staple food; hence its availability will effect the economy and politics situation. Rice mill as starting place for rice processing is an important component for rice production. More than 60% of rice processing unit are small scale rice mills which are consist of husker-polisher only. Research was carried out to find out the effect of input on postharvest technology with regard to increasing rice production. Prediction using dynamic model simulation showed there is possibility to increase the rice production about 300,000-400,000 tones rice by improvement the milling machine configuration. Dynamic model simulation noted that Indonesian have deficit in rice consumption production about 500,000-600,000 tones per year. The rice deficit can be reduced by improving rice mills and postharvest technology. Result showed that rice mill repairing will reduce the deficit, even if that repairing was combined with effort in reducing postharvest losses, it might be surplus in 2010. Rice mill repairing also exhibited increase the milling recovery from 62.78% to 63.48%.

287 FIRDAUS, J.
Work evaluation and determining the break even point of power thresher of UPJA (agricultural machinery service business) groups supervised by Prima Tani. ***Evaluasi kinerja dan penentuan titik impas alat perontok padi pada kelompok UPJA binaan Prima Tani***/Firdaus, J.; Sannang, Z. (Balai Pengkajian Teknologi Pertanian Sulawesi Tengah, Palu (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Buku 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 91-96, 3 tables; 4 ref. 631.152/SEM/p bk1

RICE; THRESHERS; EQUIPMENT PERFORMANCE; WORK CAPACITY; OPERATING COSTS; PROFITABILITY; FARM HELPER SERVICES; FARMERS ASSOCIATIONS; INNOVATION.

The increased of paddy productivity must be followed by maintaining quality efforts both on quality and quantity aspect with the good postharvest treatment. The implementation and development of postharvest machinery to support agroindustry and agribusiness development had the important role to increase efficiency, productivity and improvement of agriculture product quality. The highest yield loss occured at cutting and thresing of paddy. It was about 14.31%. During 2006 BPTP Sulawesi Tengah through Prima Tani (the pioneering and the acceleration of the socialization of the innovation of agricultural technology programme) had expanded an agricultural machinery service business (UPJA) to cultivation group in the Torue Village, Parigi Moutong Regency that was named by the UPJA Pomponelangi. UPJA

Pomponelangi had three harvester groups which implemented with 5 HP throw-in power thresher. This research had purposes to: (1) to evaluate the performance or the ability of harvesters working on the system of rice harvesting, (2) to know the capacity and the work capacity of the power thresher, (3) to know the benefit and break even point of the farm machinery services. The result of the research showed that the 5 HP throw-in power thresher capacity was 1.4069 tons/hour (0.2331 ha/hour) whereas the whole team's capacity of the harvest was 0.5598 tons/hour (0.1062 ha/hour). The harvester performance could still be improved from 1 ha to 2 ha per day if using reaper the break even point of operating 5 HP throw-in power thresher was 1.2 ha/unit, the total income of UPJA was Rp 3,303,996/season.

288 YUSUF, A.
[Feasibility study of direct seeding (ATABELA) IRRI seeder]. ***Kajian kelayakan alat tanam benih langsung (atabela) IRRI seeder***/Yusuf, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 165-170, 1 ill., 3 tables; 6 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; DIRECT SOWING; SEED DRILLS; PLANTING EQUIPMENT; EFFICIENCY; PRODUCTION COSTS.

Purpose of study is to know feasibility of appliance IRRl seeder as a means of plant the direct seeding compared to the method of transplanting. This study have been executed in wetland rice of farmers Wonorejo Village, Pematang Bandar District, Simalungun Regency at dry season 2007. Rice variety Ciherang of class foundation seed (FS) were planted as direct seeding at 3 farmers for the width of 0.20 ha, 0.16 and 0.12 ha each. Results indicated were that usage of seed to 1 ha about of 60.73-72.70 kg/ha is more 55.67% compared to the method transplanting (42.66 kg/ha), required time to planting for the width of 1 ha were about of 5.5-6.0 hours with labours amount of 2 peoples. The planted with method transplanting to 1 ha cost money need about Rp 500,000/ha with tegel planting system and Legowo 4:1 planting system need cost money equal to Rp 625,000/ha. With expense work to Atabela IRRI Seeder with pieces rate Rp 30,000/ha/person hence usage of appliance plant the direct seeding of lRRl seeder can cost efisiency equal to Rp 440,000-Rp 565, 000/ha.

P05 ENERGY RESOURCES MANAGEMENT

289 MULYANTARA, L.T.
Optimalization energy and cost consumption for rice production: case study at five rice production centers in Indonesia. ***Optimalisasi penggunaan energi dan biaya pada budidaya padi: studi kasus di lima daerah penghasil padi di Indonesia***/Mulyantara, L.T.; Hendriadi, A.; Rahmarestia, E.; Triwahyudi, S. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)). *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2005) v. 3(1) p. 19-32, 16 ill., 8 ref.

ORYZA SATIVA; CULTIVATION; ENERGYMANAGEMENT; MECHANIZATION; COST ANALYSIS; INDONESIA.

The principle reason of using agricultural machinery is to increase efficiency of production, included efficiency on energy consumption. However, in recent year the use of energy for rice production has been strongly increased and tended to be in efficient. The aim of the study was at analyzing energy and cost consumed for rice production at any level of mechanization i.e. traditional, existing and fully mechanized. The locations for survey were selected at central rice production in Indonesia, those were Karawang, Lamongan, Sukohardjo, Musi Banyuasin and Tanah Toraja District. In order to obtain optimum level of the rice mechanization, ratio output/input (OE/IE) energy and cost were maximalized. It was found that maximum OE/IE energy at the fully mechanized level was 6.41, while the maximum OB/IB at the level of existing mechanization, was 2.01.

P33 SOIL CHEMISTRY AND PHYSICS

290 JAMIL, A.
Soil properties during transplanted rice cultivation period in Langkat (Indonesia). ***Sifat tanah selama masa pertanaman padi tanam pindah di Langkat***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 150-158, 4 tables; 23 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

Most of the rainfed lowland rice soils have poor fertility due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. This study attempted to evaluate the changes of soil properties as affected by phosphorus fertilizer and cow manure applied onto the rainfed lowland rice soil properties. The experiment was conducted from June to October 2004, in North Sumatra, Indonesia. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications. Results showed that application of both phosphorus and organic matter significantly increased available phosphorus, soil organic carbon, cation exchange capacity, and available water in the soil. Based on the experimental results, as a conclusions consisted of both phosphorus and cow manure had positive effect to improve soil properties, especially under rainfed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

291 JOY, B.
Difference of response and relationship of pH, exchangeable Al, and available P of Typic Kanhapludults due to phosphate rock, calcite, and dolomite application. ***Perbedaan respons dan keterkaitan pH, Al-dd, serta P-tersedia dari Typic Kanhapludults akibat aplikasi P-alam, kalsit, dan dolomit***/Joy, B. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas pertanian). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 249-258, 2 ill., 3 tables; 12 ref.

SOIL TYPES; ROCK PHOSPHATE; PH; DOLOMITE; CALCITE; SOIL CHEMICOPHYSICAL PROPERTIES.

An incubation experiment to find out the effect of phosphate rock and kind of lime (calcite and dolomite) on pH, exchangeable Al, available P, and relationship of each response parameters on Typic Kanhapludults was carried out in Soil Chemistry Laboratory of Faculty of Agriculture, Padjadjaran University. Design experiment used was completely randomized design consisted of two factors and three replications. The first factor was kind of lime, i.e. without lime, calcite 1.5 x exchangeable Al, and dolomite 1.5 x exchangeable Al. The second factor was dosage of phosphate rock consisted of 0, 45, 90, and 135 kg P/ha. Soil was incubated for 45 days in field capacity condition and then response parameters were measured in the laboratory. Result of the experiment showed that interaction of rock phosphate and kind of lime significantly affected exchangeable Al and available P, while soil pH value was affected by single treatment. The value of pH increased in line with increasing of rock phosphate dosage, while dolomite application gave the higher pH value compared to calcite. In general, the higher dosage of rock phosphate combined with lime would be affected the higher available P content of soil. Based on analysis of regression and correlation test increasing of soil pH decreased the content of soil exchangeable Al. Furthermore, decreasing of the exchangeable Al value significantly increased the available P content of soil.

292 SUHARTA, N.
Barongtongkok land system in Kalimantan: potential, constraint, and its development for dryland agriculture. ***Sistem lahan Barongtongkok di Kalimantan: potensi, kendala, dan pengembangannya untuk pertanian lahan kering***/Suharta, N. (Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 1-8, 3 ill., 3 tables; 46 ref.

KALIMANTAN; SOIL CHEMICOPHYSICAL PROPERTIES; AGROECOSYSTEMS; BASALTIC SOILS; DRY FARMING.

Land system concept assumes that there are close relation between rock type, hydroclimatic, landform, soil, and organism. Therefore the same land system, anywhere, would be characterized by the similarity in agriculture potential and limiting factors. Barongtongkok land system is one of land systems found in Kalimantan developed from basaltic lava flow with flat to rolling terrain. This land system is found in wet climate at altitude varied between 150 m and 1,500 m asl. Soils on Barongtongkok land system are classified as weathered soils characterized by deep solum, friable, stabilized aggregate, and rapid permeability. This condition is highly suitable for dryland agriculture, but for wetland rice development that needs the presence of plow layer and mud structure, these physical soil properties are not suitable. The chemical soil characteristics showed the advanced leaching processes characterized by soil reaction with delta-pH zero to positive, low cation exchange capacity, and high pretention. To solve these problems, soil management should be focused on increasing cation exchange capacity and decreasing leaching processes by adding organic matter (manure). At present, the Barongtongkok land system is used partly as dryland agriculture either food crops or estate crops. The rest areas are not yet occupied due to the lack of accessibility. Those areas, either found in West Kalimantan or in East Kalimantan are suitable for dryland agriculture by considering the agroecological characteristics.

Q02 FOOD PROCESSING AND PRESERVATION

293 BASMAL, J.
Effect of concentration and ratio of potassium hydroxide solution to seaweed on quality of sheet carrageenan. ***Pengaruh konsentrasi dan rasio larutan potasium hidroksida dan rumput laut terhadap mutu karaginan kertas***/Basmal, J.; Suryaningrum, T.D.; Yennie, Y. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)). *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 29-38, 7 ill., 15 ref.

CARRAGEENANS; EXTRACTION; EUCHEUMA; POTASSIUM HYDROXIDES; FRESHWATER; TEMPERATURE; COLLOIDS; VISCOSITY; QUALITY; PROXIMATE COMPOSITION.

Quality improvement of sheet carrageenan extracted from Eucheuma cottonii was carried out using several concentration of hot potassium hydroxide solution (4%, 6% and 12%). The ratio of *E. cottonii* to hot potassium hydroxide solution were 1:8 and 1:12. The heating time was 120 minutes at 70°-80°C. Carrageenan was then extracted from the seaweed by cooking in fresh water at 90°-95°C for 2 hours. It was found that *E. cottonii* treated with hot potassium hydroxide solution could increase the value of gel-strength and reduce the value of viscosity, ash, acid insoluble ash, and sulphate content. *E. cottonii* heated in 12% potassium hydroxide solution with the ratio between *E. cottonii* and potassium hydroxide of 1:8 produced the best sheet carrageenan based on the gel strength (578.5 g/cm2), viscosity (15.0 cPs), sulphate content (18.1%), ash content (14.1%), acid insoluble ash (0.1%), moisture content (9.4%) and yield (29.3%).

294 SOEMITRO, S.
Effect of selective chemical modification on the stability of *Saccharomycopsis fibuligera* alpha amylase. ***Pengaruh modifikasi kimiawi selektif terhadap kestabilan alpha amilase dari Saccharomycopsis fibuligera***/Soemitro, S. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 259-273, 3 ill., 2 tables; 29 ref.

YARROWIA; AMYLASES; CHEMICAL COMPOSITION.

The ability to obtain stable enzymes is crucial for their application as biocatalysts. The objective of this study was to increase the stability of *Saccharomycopsis fibuligera* alpha-amylase by various selective chemical modifications of lysine side chains on the enzyme surface. Modifications were performed by hydrophilization with glyoxylic acid, by cross-link formation with dimethyladipimidate, by increasing hydrophobic interactions with acetic acid anhydride. In the comparison with the unmodified alpha-amylase, acetic acid anhydride modified enzyme showed the highest stabilization factor of 11.9 fold, an increase of the affinity toward amylose substrate of 32%, also an increase of the specificity constant of 23.8%.

295 WIDYOTOMO, S.
Influence of milling process of roasted cocoa beans on size distribution change of cocoa cotyledon. *Pengaruh penggilingan biji kakao pascasangrai terhadap perubahan distribusi ukuran keping biji*/Widyotomo, S. (Balai Penelitian Kopi dan Kakao, Jember (Indonesia)); Sri-Mulato; Suharyanto. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 73-89, 8 ill, 4 tables; 17 ref.

COCOA BEANS; MILLING; DIMENSION; POSTHARVEST TECHNOLOGY.

One of important steps in secondary cocoa process is deshelling cocoa beans roasted. The purpose of deshelling is to enrich cotyledon cocoa surface area which affects on reducing energy and processing time with good quality of the chocolate product. The objective of this research was to study the influence of milling process on physical characteristic change of cocoa beans roasted such as size distribution change, geometrical diameter average, uniformity index, fineness modulus, and average dimension of cotyledon cocoa roasted. The Indonesian Coffee and Cocoa Research Institute has designed and tested deshelling of roasted cocoa beans which will be used in this research. Before deshelling process, C grade bulk cocoa beans has been roasted up to 2.5-3% water contents. The result showed that optimal milling process by rotary cutter type milling unit has good size distribution change, geometrical diameter average, uniformity index, fineness modulus, and average dimension on 500 rpm rotary speed and 2.8 m/s air flow. On optimal process condition, 74.5% of cocoa cotyledon roasted had diameter size between 2.0-4.75 mm, 2.116 mm average of geometrical diameter, 0.864 mm average dimension, 3.052 fineness modulus, and 80% as crude size particel-20% as temperate size particle on uniformity index. Therefore, more than 80% of cocoa cotyledon roasted had diameter size between 2.0-4.75 mm with 700-900 rpm rotary cutter speed. Average of geometric diameter was 1.65-2.19 mm, and the dimension average was 0.69-0.89 mm. Uniformity index was crude size particle up to 80-90%, and in temperate size particle 10-20%. Fineness modulus value was 2.73-3.09.

Q04 FOOD COMPOSITION

296 SEMBIRING, B.B.
Influence of the particle size and length of extraction on the yield and quality of curcuma extract (*Curcuma xanthorrhiza*). *Pengaruh kehalusan bahan dan lama ekstraksi terhadap mutu ekstrak temulawak (Curcuma xanthorrhiza Roxb)*/Sembiring, B.B.; Ma'mun; Ginting, E.I. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 53-58, 2 tables; 11 ref.

CURCUMA XANTHORRHIZA; PLANT EXTRACTS; QUALITY; LIPID CONTENT; DURATION; PARTICLE SIZE; YIELDS.

The effect of suitable method condition to quality of curcuma extract, was conducted at Postharvest Technology Laboratory of Research Institute for Aromatic and Medicinal Crops Bogor from March to May 2006. The objective of this experiment was to find out the suitable method condition to obtain qualified curcuma extract. Randomized completely design with factorial was used and using 2 replications. The treatment concisted of 2 factors, they were material of particle size and duration of extraction. Two particles size of 40 and 60 mesh, and three lengths of extraction of 4, 6 and 8 hours were

tested. The result showed that the particle size influenced the extract yield, curcumin content, oil content and xanthorizol content in the extract. Meanwhile, the length of extraction influenced the extract and oil content. The highest curcumin content was 2.88% obtained from 40 mesh particle size material, while xanthorizol content was 14.25% obtained from material with 60 mesh of particle size.

297 USMIATI, S.
Milk quality on morning and afternoon milking at Sarwamukti Cooperation: case study in 2004. ***Mutu susu sapi dari peternak anggota Koperasi Susu Sarwamukti pada pemerahan pagi dan sore hari: studi kasus tahun 2004***/Usmiati, S.; Widaningrum (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 323-327, 2 tables; 10 ref. 636:338.439/SEM/p

COW MILK; QUALITY; FARMERS; COOPERATIVE ACTIVITIES.

The milking process that has been done in the morning and afternoon affected on milk quality. On 2004, research had been done to get the impact of milking process, which was implemented in the morning and afternoon on milk quality of farmer cooperation member of Sarwamukti-Bandung. The research was design by randomized completely block design (RCBD) by two treatments i.e. (i) milking process in the morning; and (ii) milking process in the afternoon on seven farmers as block. The parameters included pH, mass gravity, percentage of fat, protein, water and solid non fat (SNF) and total plate count (TPC) (CFU/ml) of milk. Research result indicated that the treatments effected pH, mass gravity, percentage of fat, protein and water, and total plate count, but not to SNF percentage. The milking process in the afternoon had higher value on pH, mass gravity, and percentage of fat and protein compared to the milking process in the afternoon. On the other hand, milking in the morning had higher value on water content and total plate count compared to the milking process in the afternoon. Value of pH, mass gravity, percentage of fat and protein of milk that milking in the afternoon were 6.67; 1.03; 4.29; and 3.34%, respectively, milking in the morning had water content 89.31% and total plate count 2.24 x 10^8 CFU/ml compared to the milk quality from milking process in the afternoon. Milk quality of Sarwamukti farmers which was milking in the afternoon was better than milking in the morning.

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

298 BASMAL, J.
Effect of monochloro acetic acid concentration during the carboxymethylation process of chitosan on the production of carboxymethyl chitosan produced. ***Pengaruh konsentrasi asam monokloro asetat dalam proses karboksimetilasi kitosan terhadap karboksimetil kitosan yang dihasilkan***/Basmal, J. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Prasetyo, A.; Fawzya, Y.N. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 47-56, 8 ill., 2 tables; 15 ref.

CHITOSAN; HYDROLASES; ACETIC ACID; VISCOSITY; MOISTURE CONTENT; ASH CONTENT; SOLUBILITY.

An experiment to produce carboxymethyl chitosan (CMCts) was carried out using monochloro acetic acid concentrations as a variable factor. The ratio of chitosan : monochloro acetic acid applied were 1:0.9; 1:1.1; 1:1.3 dan 1:1.5 (w/w). Etherification process was executed at 90°C for 4 hours. Result of the experiment showed that monochloro acetic acid showed significant effect on the quality and quantity of CMCts. Based on viscosity, moisture content and ash content, the best ratio of chitosan : monochloro acetic acid was 1:0.9 (w/w) giving yield of 129.4%, moisture content of 9.7%, ash content of 1.7%, viscosity of 49.3 cPs, solubility of 9.85 ml water to dilute 1 g CMCts and degree of substitution of 0.89.

299 CHASANAH, E.
Application of hydrophobic interaction chromatography for chitosanase purification. *Penggunaan kolom kromatografi interaksi hidrofobik untuk pemurnian kitosanase*/Chasanah, E.; Putro, S. (Balai Besar Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Suhartono, M.T. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 19-27, 6 ill., 2 tables; 19 ref.

CHITOSAN; ISOLATION TECHNIQUES; BACILLUS LICHENIFORMIS; PURIFICATION; COLUMN CHROMATOGRAPHY; HYDROPHOBICITY; AMMONIUM SULPHATE; ELECTROPHORESIS; GEL CHROMATOGRAPHY.

The objective of the study was to obtain hydrophobic interaction chromatography performance for purification of *Bacillus licheniformis* MB-2 chitosanase. Butyl Sepharose 4FF matrix was used to fractionate the enzyme from crude extract. The optimum concentration of ammonium sulphate used to maximize hydrophobic interaction was 30% saturation. The fractionation resulted 2 active peaks, i.e. F1 and F2, when elution was done using gradient ammonium sulphate of 30% - 0% saturation, while 2 more active peaks, F3 and F4, were obtained when lower ammonium sulphate gradient was used, i.e. 10% - 0% saturation. SDS-PAGE analysis showed that F2 was relatively pure indicated by 1 band of protein in the gel, while F1, F3 and F4 were not. It can be concluded that pure fraction of F2 (29%) can be obtained by single step purification by hydrophobic interaction of column chromatography.

T01 POLLUTION

300 SETYANTO, P.
Methane emission from three soil types of Central Java. *Emisi gas metan dari tiga jenis tanah di Jawa Tengah*/Setyanto, P. (Loka Penelitian Lingkungan Pertanian, Jakenan, Pati (Indonesia)); Makarim, A.K.; Rosenani, A.B. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 132-139, 6 ill., 2 tables; 24 ref.

METHANE; SOIL POLLUTION; SOIL TYPES; FERRALSOLS; REGOSOLS; ALLUVIAL SOILS; JAVA.

Extrapolation of methane (CH_4) emission estimates to a larger scale basis (upscalling) using GIS (geographic information system) or satellite imaginary figures often obtain limitation due to insufficient data of the emission from different soil properties. Hence, the effects were significant among soils on its ability to emit CH_4 from rice frelos. This study was carried out with the aim to understand the emission of CH_4 from three selected soils cultivated with rice under field conditions and to investigate the relationship between CH_4 flux and water soluble carbon (WSC). Three selected soils were used; they are dark brown alluvial (DBA), brown regosol (BR) and red latosol (RL). The soils received normal irrigation practices and fertilizing. Total annual CH_4 emission of the three soil types were 156.1, 39.7, 142.4 kg CH_4/ha for BR, RL and DBA, respectively. The annual CH_4 emission were significantly different ($P \leq 0.05$), while grain yield were not significantly different among the three soils. High total CH_4 emissions of DBA were due to high C content (2.01%) compared with BR (0.57%) and RL (0.52%) and also due to lower Fe2O3 and MnO2 content. Rice field with red latosol soil is promising to be intensively cultivated because of its low CH_4 emission and significantly no difference in grain yield production with the other soils. Methane flux and WSC pattern differed among soils, which depend on the soil redox potential, competition to utilize WSC among microbes, and the mobility of WSC in soil.

E13 INVESTMENT, FINANCE AND CREDIT

151 ASHARI.
[Perspective of agricultural bank establishment in Indonesia]. ***Perspektif pendirian bank pertanian di Indonesia***/Ashari; Friyatno, S. (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Forum Penelitian Agro Ekonomi* ISSN 0216-4361 (2006) v. 24(2) p. 107-122, 3 tables; 24 ref.

AGRICULTURAL BANKS; CAPITAL; CREDIT; FINANCIAL INSTITUTIONS; INDONESIA.

The role of agricultural sector is very important to enhance the national economic development although its development is not fully supported by sufficient capital. The existing formal financial institutions tend to prioritize non-agricultural services which have high profit but low risk. In this context, efforts to establish agricultural bank institution that especially support agricultural activity services are highly recommended. This paper aimed at a review of the urgency, possibility, potential, and constraints of agricultural bank establishment in Indonesia. The result showed that conceptually and empirically, agricultural bank institution had a promising prospective in Indonesia. There are many options in respect to agricultural bank establishment in Indonesia, such as (1) Credit-agricole "France model', (2) "Bank Bukopin" model, (3) foreign direct investment model, (4) upgrading of "BUMN Bank" to be "Agricultural Bank" model, and (5) utilizing the financial institution that locally available and accessible by the people. For efficiency and effectiveness of the services, the agricultural bank should be designed based on agricultural characteristics and typical sectors of agricultural business.

152 EKOWATI, T.
Financial capital management on Maju Jaya member's group of duck farmer to develop duck enterprise in Brebes District, Brebes Region. ***Manajemen permodalan pada anggota KTTI Maju Jaya untuk pengembangan usaha ternak itik di Kecamatan Brebes, Kabupaten Brebes***/Ekowati, T.; Prasetyo, E.; Oxtovianto, H. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 830-835, 2 tables; 15 ref. 636:338.439/SEM/p

DUCKS; FARMERS ASSOCIATIONS; CAPITAL; PROFITABILITY; FARM INCOME; ECONOMIC VIABILITY; JAVA.

The objective of study was to determine the financial capital management on member's group of duck farmer. Research had been done on February-March, 2005 at Maju Jaya Duck Farmer Group in Limbangan Wetan Village, Brebes District, Brebes Region. Case study was used as a research method, sampling location was chosen by purposive based on majority of member's group; the duck farmer group have been operated more than 5 years and have the financial capital problem. Simple random sampling was used for sampling method to select 30 respondents. Primary and secondary data were obtained by interviewing and recording then was analysed by profitability, rentability and return on investment (ROI). Research result showed that number of duck farm scale were 533 ducks with the farm income was Rp 1.056,989/month. The value of profitability, own capital rentability, economic rentability and return on investment was 15.61%; 21.63%; 15.94% and 79.88%, respectively. According to analysis it can be said that duck farm was a benefit farm enterprise and usage of financial capital have been well operated eventhough the economic rentability was less than credit rate of interest. Financial capital planning have been done for building up the capital and used for duck eggs deposit by the farmer group. It has been implemented as a duck farm development base.

E14 DEVELOPMENT ECONOMICS AND POLICIES

153 HUTAHAEAN, L.
[Assessment of adoption and impact of integrated rice crop management in Central Sulawesi] (Indonesia). ***Kajian adopsi dan dampak pengkajian PTT padi di Sulawesi Tengah***/Hutahaean, L.; Sannang, Z. (Balai Pengkajian Teknologi Pertanian Sumatera Tengah, Palu (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 83-90, 4 tables; 23 ref. Appendix 631.152/SEM/p

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

The AIAT (Assessment Institute of Agricultural Technology) of Central Sulawesi has conducted a revision to help the problem solving on the slow improvement on the productivity of paddy in Central Sulawesi. The parameter on successive technology introduction was shown in the farmer's enthusiasm to adopt the technology. Providing the requirement in adopting revision and the impact on the technology which aimed at obtaining the adoption level of the technology on Integrated Crop Management (PTT), the impact of PTT technology towards productivity and farmers' earnings and also to receive feedback from the technology users. The survey method used in this project was the qualitative and quantitative approach. The data analysis used the analytical description analysis and the mathematical equation. The result indicated that the adoption level on the technology reached 45.31% and diffusion level of 30.03%. The impact of PTT technology on productivity improvement in paddy fields reached 21.45% and the earning indicated 37.69%. Whereas the feedback from the technology users were obtained in order to completing technology package.

154 MUKANI.
Identification of factors affecting slow technology transfer of virginia tobacco farming in Bojonegoro District. ***Identifikasi faktor penyebab lambannya alih teknologi pada usahatani tembakau virginia di Kabupaten Bojonegoro***/Mukani (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 71-77, 2 tables; 17 ref.

NICOTIANA TABACUM; FARMING SYSTEMS; TECHNOLOGY TRANSFER; JAVA.

Transfer of technology represents an indicator of the success of a research institute, because it can express the benefit of the research institute and at the same time it can give feedback from the consumers to the research institute to improve the technology. The technology of Virginia Tobacco of Bojonegoro from seeds to postharvest are available. Application of recommended technology at intensification of Virginia Tobacco program could increase the tobacco product and earnings per ha each of 2,529 kg and Rp 260,297/ha. The application of research technology on farmer farm could increase the tobacco product equal to 932 kg/ha followed by the increase of earnings equal to Rp 205,588/ha. However, the transfer of technology was still low, because it could not reduce the failure due to dryness and excessive water. Returning dried rice stalks as mulch for tobacco plantation was promising to lessen the risk.

E16 PRODUCTION ECONOMICS

155 DARAS, U.
Strategy and innovation of technology to increase cashew productivity in Nusa Tenggara (Indonesia). ***Strategi dan inovasi teknologi peningkatan produktivitas jambu mete di Nusa Tenggara***/Daras, U. (Balai Penelitian Tanaman Rempah dan Aneka Tanaman Industri, Sukabumi

(Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26 (1) p. 25-34, 3 ill., 2 tables; Bibliography p. 33-34

ANACARDIUM OCCIDENTALE; PRODUCTIVITY; TECHNOLOGY; INNOVATION; MARGINAL LAND; NUSA TENGGARA.

West and East Nusa Tenggara are the important cashew growing areas in the eastern parts of Indonesia. The planted areas increase from year to year, however the average yield is low due to some factors like unselected planting materials used, infertile soils, pest and disease constraints, and low crop management. Cashew productivity may be increased by applying available technologies such as high yielding planting materials, amendment of soil fertility, pest and disease control, and improvement of cashew orchad management. To increase cashew productivity, two approaches could be implemented, namely, intensification by applying available technologies and development of cashew plantation areas merely having suitability rate from fair to highly suitable. In fact, growing cashew enables farmers to obtain return income during dry season while other crops do not.

E20 ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARM

156 ADNYANA, M.O.
Impact and farmer's perception towards integrated crop management (ICM) system for irrigated rice. ***Dampak dan persepsi petani terhadap penerapan sistem pengelolaan tanaman terpadu padi sawah***/Adnyana, M.O. (Pusat Penelitian dan Pengembangan Tanaman Pangan, Bogor (Indonesia)); Kariyasa, K. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 21-29, 2 ill., 7 tables; 6 ref.

ORYZA SATIVA; IRRIGATED RICE; FARMERS; FARM MANAGEMENT; FARMING SYSTEMS; PRODUCTIVITY; FARM INCOME; ECONOMIC ANALYSIS.

Research had been conducted in four provinces (North Sumatra, East Java, Bali, and NTB) involving 480 farmer samples. Stratified random sampling technique was used to select farmer samples with ex-ante vs. ex-post and cooperator vs noncooperator approach pattern. The research was focused to (1) determining impact of technology implementation to productivity and farmer's income; (2) calculating adoption cost of ICM; and (3) assessing the extent of adoption and evaluating farmer's perception towards ICM. Results pointed out that ICM was able to increase rice production and farmer's income. Adoption cost of ICM was below the actual price of rice, so that farmers were interested to implement the technology. Most farmers described that some of ICM components were rather new and simple, and they were suitable to their needs. ICM was sufficiently favorable even if it had not been completely applied due to technical problems and socio-economic condition of farmers. Improvement of rice production at national level through large-scale application of ICM could be considered be as a strategic program. Strong supports from local government units and good cooperation among related institutions are essential factors in determining the adoption of ICM by rice farmers on large scale.

157 ERMIATI.
[Feasibility study on *Orthosiphon grandiflorus* farming system in Sukabumi District]. ***Analisis kelayakan usahatani kumis kucing (Orthosiphon grandiflarus) di Kabupaten Sukabumi***/Ermiati; Hasanah, M.; Sukarman (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(2) p. 91-102, 3 tables; 12 ref.

DRUG PLANTS; FARMING SYSTEMS; FARM INCOME; FEASIBILITY STUDIES; JAVA.

Feasibility study on *Orthosiphon grandiflorus* farming system was conducted in Cirendeu, Girijaya Village, Nagrak Dstrict, Sukabumi from March until April 2004. The objective of this study was to evaluate the feasibility of *O. grandiflorus* farming system, include farmer income and minimum price for

farmer to obtain break event points (BEP). The research was conducted by survey methods. Cirendeu was chosen as research location based on the fact that it is one of the central production area of *O. grandiflorus*. Thirty farmer respondents were determined by simple random. Farmer income was determined by income analysis, while feasibility of farming system was determined by analysis of benefit cost ratio (B/C Ratio), net present value (NPV) and internal rate of return (IRR). The results indicated that farmer income was Rp 16,198,757/ha/2 years or Rp 674,948/month. Feasibility of farming system on *O. grandiflorus* up to the end of harvesting time (2 year old), based on interest 15%, were as follow : B/C Ratio was 3,14, NPV = Rp 16,198,757 and IRR = 52%. Based on the result of analysis it could be recommended that *O. grandiflorus* farming system in Cirendeu was feasible to be developed and profitable. The main constraint in developing *O. grandiflorus* farming system in Cirendeu is limitation of capital.

158 JARMANI, S.N.
Possibility of increasing smallholder dairy cattle farmers income independently through a better feeding management. *Kemungkinan menambah pendapatan mandiri peternak sapi perah rakyat melalui perbaikan manajemen pemberian pakan*/Jarmani, S.N.; Hidayati, N. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 333-339, 6 tables; 5 ref. 636:338.439/SEM/p

DAIRY CATTLE; FEEDING; MILK PRODUCTION; FARM INCOME; ECONOMIC ANALYSIS; SMALL FARMS.

Traditional management of dairy cattle under smallholder practices is characterized by constraint in feed supply that resulted in low productivity and income from milk selling. Technology to enrich the nutritive value of agricultural residues such as cassava has been developed, however it has not been carried out optimally in the field. Results of technology assessment of using fermented cassava has been carried out in dairy cattle farmers group in Koperasi Unit Desa (KUD) Tanjungsari, Sumedang, indicated that the use of 15% fermented cassava in the ration has increased the milk production to 1.32 liter with fat content of 1.1% resulting in the price of Rp 507 per liter. Farmers with 2 productive dairy cattle which produce an average of more than 13 liter of milk per day may generated an average monthly income of more than the standard poor farmer's income (Rp 400,000). Therefore, keeping dairy cattle may support a better life of villagers. The farmers will have an additional income, in the range of Rp 174,000 to Rp 349,000 per month if farmers also grow vegetables such as tomato and chilli, or Rp 43.000 to Rp 129.000 if farmers grow corn or cassava during the subsequent planting season after rice for self supporting production.

159 KUSNADI, U.
Role and function of buffalo in farming system in Banten Province (Indonesia). *Fungsi dan peranan kerbau dalam sistem usaha tani di Propinsi Banten*/Kusnadi, U.; Kusumaningrum, D.A.; Sianturi, R.G.; Triwulanningsih, E. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 316-322, 3 tables; 9 ref. 636:338.439/SEM/p

WATER BUFFALOES; FARMING SYSTEMS; FARM INCOME; LAND OWNERSHIP; JAVA.

The Province of Banten is the second populous of buffalo in Indonesia after Aceh. Buffalo, one of the large ruminants, has an important role because of their great contribution in Indonesian beef industry. In general, farmers rear buffaloes used for beef production and draught power in rice field. However, in this decade, buffalo population has been significantly decreased. It may be caused by diminishing function and role of buffalo in supporting farming system and the land for forages. Besides, farmers are not willing to increase number of buffaloes probably due to less profit in raising buffalo. Due to this matter, a study

was conducted to evaluate the function and role of buffalo in supporting farming system in Lebak and Pandeglang District that has the most populous of buffalo in the Province of Banten. This study was carried out by using survey method utilizing questioners. Total of the respondents were 60 farmers consisted of 30 farmers from Lebak and 30 farmers from Banten District. Analysis of simple correlation using R value was performed to estimate factors influenced farm size. The results showed that the role and function of buffalo in farming system in the Lebak and Pandeglang District used as draught power were 53 and 30% respectively; as source of income 37 and 67%, respectively; as savings 20 and 25% respectively; as animal fertilization 20 and 15% respectively; social status 8 and 12%, respectively and as recreation 3% in each district. The average of farm size was 13 heads and 6 heads buffalo per farmer for Lebak and Pandeglang District, respectively. The own-land size were 0.2 ha and 0.4 ha for Lebak and Pandeglang District, respectively. There was a positive correlation between farm size and land size which meaning the farm size increased as the land size increased with the coefficient correlation R = 0.35 and R = 0.65 for Lebak and Pandeglang District, respectively. The farmer's income were Rp 2,730,000 and Rp 1,050,000 per year for Lebak and Pandeglang District, respectively contributed to their farming system about 56% and 48% for Lebak and Pandeglang District, respectively.

E21 AGRO-INDUSTRY

160 KASNO, A.
Profile of agribusiness and technological support on peanut development in Indonesia. ***Profil agribisnis dan dukungan teknologi dalam pengembangan kacang tanah di Indonesia***/Kasno, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 21-32, 10 tables; 38 ref.

ARACHIS HYPOGAEA; AGROINDUSTRIAL SECTOR; CULTIVATION; TECHNOLOGY; PRODUCTION; INDONESIA.

Groundnut on dryland contributed 60% to farmers income. By this reason, groundnut is continously grown by farmers although little respected by stakeholders and beneficiaries. The annual growth rate of 1.3% of planting area indicated the limitation for developing the primary industry. The low access of technology was indicated by the rate of productivity, namely 0.5% annually. The increase of input and labour cost since 2005 seriously affected the capability of farmers to adopt the technology. Indeed, productivity of groundnut at farmers level of 1.5-1.7 t/ha of dry pod could be increase to 2.4-3.0 t/ha or by 30-80% using the improved technology. However, these of improve technology are labour and capital intensives not accessible by small farmers. Efficiency of groundnut farming in short term could be done by reducing the amount of seed from 100-150 kg/ha in broadcast planting to 80-90 kg/ha by planting in the furrow with spacing of 40 cm between furrows of plow. Harvest and postharvest activities that consume 20% of the labour could be given to local trader, due to limited labour, drying floor, and storage at the farmers level. Groundnut development in the short term using the improve technology should be a priority in the main area of groundnut in Central Java (Pati) and South Sumatra. Regarding to the global market, the socialization of the standart quality could not be ignored.

E70 TRADE, MARKETING AND DISTRIBUTION

161 IRAWAN, A.
Analysis on rice market integration in Bengkulu (Indonesia). ***Analisis integrasi pasar beras di Bengkulu***/Irawan, A.; Rosmayanti, D. (Universitas Bengkulu (Indonesia)). *Jurnal Agro Ekonomi* ISSN 0216-9053 (2007) v. 25 (1) p. 37-54, 11 table; 7 ref.

RICE; MARKET; MARKET PRICES; MARKET RESEARCH; SUMATRA.

The goals of this research were to analyze spatial integration and vertical integration in Bengkulu rice markets dan its implication for policy application. Four rice markets were evaluated including Bengkulu Municipality, Rejang Lebong Regency, North Bengkulu Regency and South Bengkulu Regency. Weekly

series data of 2001 to 2005 were used as sample data in analyzing spatial integration test. The vertical integration used weekly data of the period of 2002 to 2005 for Kota Bengkulu. Series data of 2001 to 2005 were used for Rejang Lebong, 2004 to 2005 for South Bengkulu and 2002 to 2005 for North Bengkulu. Quantitative methods used in this study were Johansen Cointegration Test, Vector Error Correction Model, and Granger Causality Test. The results indicate that: (1) Rice market in Bengkulu was imperfect on its spatial integration market, from which a shock price in Bengkulu Municipality market could be transmited to South Bengkulu Regency and North Bengkulu markets, but not to Rejang Lebong market. Policy implication of this result gave indication that to stabilize local rice markets in Bengkulu Province, priority intervention of local government was to stabilize in Bengkulu Municipality market, because price stabilization in Bengkulu Municipality could be transmitted to other markets in the most districts in Bengkulu Province. (2) Vertical market integration in Bengkulu Municipality and South Bengkulu Regency was imperfect, but statistically such integration was proved significantly in Rejang Lebong Regency and North Bengkulu.

F01 CROP HUSBANDRY

162 IRAWATI, A.
Performance of production of new plant type rice variety and new plant rice variety in Lampung (Indonesia). ***Keragaan produksi padi varieties unggul baru tipe baru (VUTB) dan varietas unggul baru (VUB) di Lampung***/Irawati, A. (Balai Pengkajian Teknologi Pertanian Lampung, Bandar Lampung (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigno, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Ungaran (Indonesia). Bogor: BBP2TP, 2007: p. 152-156, 1 ill., 2 tables; 4 ref.

ORYZA SATIVA; HIGH YIELDING VARIETIES; PRODUCTION.

The new type of superior varieties has the yield potential 30-50% higher than new plant rice variety ± 5%. The aim of this assessment was to know yield production performance of new plant type rice variety and new plant rice variety in Rama Indra Village, Central Lampung and Bulu Rejo village, Tanggamus, in dry season 2004 (April/May - August) . The result of the assessment shown that production of Fatmawati in Central Lampung and in Tanggamus lower than Ciherang, Cigeulis and Gilirang. Performance between new plant rice varieties shown that production of Ciherang lower than Cigeulis and Gilirang in Central Lampung but higher in Tanggamus. Production of Cigeulis higher than Gilirang in Central Lampung and Tanggamus. The alternative of postharvesting for Gilirang was rice packaging to increasing added value for farmers group and strengthening group capital.

163 JAMIL, A.
[Soil characteristic during direct sowing rice plantation period in North Sumatra] (Indonesia). ***Karakteristik tanah selama masa pertanaman padi tabur benih langsung di Sumatera Utara***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 143-149, 3 tables; 14 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; DIRECT SOWING; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILIZER; SOIL CHEMICOPHYSICAL PROPERTIES; SUMATRA.

Most of rainfed areas have low soil fertility status due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. The purpose of study was to evaluate the effects of

phosphorus fertilizer and organic matter as cow manure in order to improve soil fertility status of rainfed lowland rice, particularly in North Sumatra. The experiment was conducted from October, 2004 to February, 2005. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications and soil organic carbon content, available water, and soil bulk density as parameters measured. Results showed that application of both phosphorus and organic matter significantly increased soil organic carbon and available water in the soil and significantly decreased soil bulk density. Based on the results obtained, it could be concluded that both phosphorus and cow manure have positive effect to improve soil fertility status, especially under rainfed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

164 RIAJAYA, P.D.
Cotton planting times in Central Java. ***Waktu tanam kapas di Jawa Tengah***/Riajaya, P.D.; Sholeh, M.; Kadarwati, F.T. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2005) v. 11(2) p. 52-59, 2 ill., 2 tables; 18 ref.

GOSSYPIUM HIRSUTUM; PLANTING DATE; HIGHLANDS; SOIL CHEMICOPHYSICAL PROPERTIES; JAVA.

Climatic elements particularly rainfall strongly influences successful prediction of rainfed cotton yield. Rainfall variability varies amongst the seasons. Longterm rainfall data were required for rainfall analysis to get reliable probabilities. The rainfall analysis was done using markov chain first order probability and dryspell probability methods. Initial and conditional probabilities of rainfall for selected amounts (10, 20, 30, 40 and 50 mm/week) were analysed. Rainfall probabilities over 60% to have 20-30 mm rainfall per week were used to identify cotton planting times. The rainfall data were collected from 31 rainfall stations in Central Java (Grobogan, Wonogiri, Blora, Pemalang, Tegal, and Brebes). The planting times varied from the first week of December to the first week of January for Grobogan and Wonogiri. The planting times in Blora, Pemalang, Tegal, and Brebes ranged from early to late January. The majority of land used for cotton has high clay content with high water holding capacity which is sufficient to meet the cotton water requirement.

F02 PLANT PROPAGATION

165 DJAUHARIYA, E.
Effect of cutting materials and growth media on the growth of cubeba cuttings. ***Pengaruh macam setek dan media tumbuh terhadap vigor bibit kemukus (Piper cubeba Linn.)***/Djauhariya, E.; Rahardjo, M.; Sudirman, A.; Sukarman (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 67-72, 3 ill., 3 tables; 18 ref.

PIPER CUBEBA; DRUG PLANTS; CUTTINGS; GROWING MEDIA; VIGOUR; GROWTH.

In Indonesia, cubeba pepper plant (*Piper cubeba* Linn.) has been known for years as a traditional medicine, spice, fragrant, and seasonings. In Central Java, it is usually propagated by using eight or fourteen node cuttings which is not an economical practice. The research on cutting materials and growth media was conducted in Cimanggu Experimental Garden of the Indonesian Spice and Medicinal Crops Research Institute from September to December 2003. The objective of the research was to find out an appropriate propagation technology of cubeba. The research used two factors and three replications which was arranged in a randomized completely block design. The first factor was three kinds of cutting nodes, i.e. (1) attached-rooted cuttings, (2) vegetative branch, and (3) generative branch. The second factor was three kinds of media compositions of soil, dung manure and sand, i.e. (1) 1:1:1, (2) 2:1:1, and (3) 3:1:1. Observations were conducted on the percentage of budding, length of bud, number of leaves, number of roots, length of root, dry weight of the roots, and the shoot. The results of the research indicated that the vigour of seedlings which was expressed by germination percentage, growth of seedlings, and growth of root, did not significantly affected by the interaction between kinds of cuttings and media composition.

However, the kinds of cuttings significantly affected all variables, except the number of leaves. Cubeba seedlings originated from attached-rooted cuttings and vegetative branch had higher germination percentage i.e. 68.40% and 62.00%, length of shoot 2.87 cm and 4.70 cm, dry weight of shoot 0.13 g and 0.14 g, number of roots 5.95 and 5.76, length of root 7.32 cm and 7.27 cm, and dry weight of root 0.05 g and 0.05 g, compared to the cubeba seedlings originated from generative branch. Media composition was significantly effected only on dry weight of shoots. The highest dry weight of shoot was resulted from composition of soil, dung manure and sand 1:1:1 (0.14 g), while the lowest was found on ratio media composition of soil, dung manure and sand 3:1:1 (0.11 g).

166 HERAWAN, T.
Invitro tissue culture of three species of hybrid mulberry. ***Kultur jaringan tiga species murbei hasil persilangan***/Herawan, T.; Hardi T.W., T. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 17-24, 4 tables; 8 ref.

MORUS ALBA; SPECIES; IN VITRO CULTURE; HYBRIDS; CROSSBREDS.

A study on vegetative propagation of three hybrids of mulberry, namelly *M. australis* x *M. indica* (ASI), *M. nigra* x *M. indica* (NI) and *M. multicaulis* x *M. indica* (MI) was carried out in Laboratory of Tissue Culture Central for Forest Plantation Research and Development, Yogyakarta. The objective of this study was to evaluate the effect of the concentration of growth regulator, BAP (derivating of citocinin) on vegetative propagation of three hybrids of mulberry. The result showed that concentration 0.5 ml/l water of BAP produced the best axillar shoot growth of hybrid of *M. australis* x *M. indica* (ASI).

167 MARYANI, Y.
Multiplication of chrysanthemum bud through tissue culture. ***Penggandaan tunas krisan melalui kultur jaringan***/Maryani, Y; Zamroni (Universitas Sarjanawiyata Tamansiswa, Yogyakarta (Indonesia). Fakultas Pertanian). *Ilmu Pertanian* ISSN 0216-4214 (2005) v. 12(1) p. 51-55, 2 tables; 6 ref.

CHRYSANTHEMUM; BUDS; TISSUE CULTURE; PLANT GROWTH SUBSTANCES.

The study on chrysanthemum bud through tissue culture was aimed at studying the effect of combination between BAP and IAA plant growth substances and determining the appropriate concentration of BAP and IAA for multiplication of chrysanthemum bud through tissue culture. This study was carried out in the tissue culture laboratory, Balai Benih Induk (BBI), Salaman, Magelang Regency, Central Java Province. This study used factorial experiment arranged in completely randomized design (CRD). The treatment consisted of 2 factors. The first factor was the BAP concentration, consisted of four levels, i.e. 0 ppm (B1); 0.5 ppm; 1 ppm, and 1.5 ppm. The second factor was IAA concentration, consisted of four levels, i.e. 0 ppm; 0.5 ppm, 1 ppm, and 1.5 ppm. Based on the analysis result, it showed that the combination of BAP 1 ppm and IAA 1 ppm gave the highest number of bud multiplication. The treatment of BAP concentration did not affect the bud length. Similarly, IAA concentration did not affect the bud length as well.

168 MIFTAKHUROHMAH.
[Effect of several concentrations of BA on shoot multiplication of *Mesona palustris*]. *Pengaruh beberapa taraf konsentrasi BA terhadap multiplikasi tunas cincau hitam (Mesona palustris) in vitro*/Miftakhurohmah; Syahid, S.F. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2006) v. 17(1) p. 6-12, 2 ill., 3 tables; 13 ref.

DRUG PLANTS; SHOOTS; PLANT PROPAGATION; IN VITRO; TISSUE CULTURE; BA; SHOOT.

Mesona palustris is one of the medicinal plant which is potential to be developed. Recently, the agribusiness of this plant commodity is considered to be potential. To support the availability of plant material, propagation by tissue culture technique being a good alternative for mass production. This

experiment was conducted from January to April 2005 at the Tissue Culture Laboratory of Indonesian Spices and Medicinal Crops Research Institute (ISMECRI) in Bogor. The objective of this research was to find out the effect of several concentrations of BA on shoot multiplication of *Mesona palustris*. The treatments tested were several concentrations of BA, e.g. 0.0 (control); 0.2; 0.4; 0.6; and 0.8 mg/l. Experiment was arranged in a completely randomized design with six replications. The parameters observed were number of shoots, length of shoots, number of leaves, and percentage of rooting shoots, at 3, 5, and 9 week after culture (WAC). The result showed that the use of 0.2 mg/l BA performed the best shoots growth multiplication with a relatively high rate of increased shoots number and percentage of rooting shoots, at 3 to 9 WAC. Abundant shoots number (21.00 shoots), with length of shoots of 5.92 cm, leaves number of 13.00, and percentage of rooting shoots of 83.33% was obtained on MS + BA 0.2 mg/l, 9 WAC.

169 PRAWOTO, A.A.

Role of auxin and microclimate on the success of rooted cuttings of cocoa. ***Peranan auksin dan iklim mikro dalam keberhasilan penyetekan kakao (Theobroma cacao L.)***/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao, Jember (Indonesia)) Arifin; Bachri, S.; Setyaningtyas, K.C. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 17-37, 4 ill, 9 tables; 32 ref.

THEOBROMA CACAO; CUTTINGS; AUXINS; MICROCLIMATE.

In Indonesia, cocoa reproduction by cuttings is undeveloped yet because the available technology is more expensive than the other clonal reproduction methods. The success of cocoa cuttings is influenced by genetic and environmental factors. The purpose of this research is to study effect of endogenous auxin content, effects of light intensity and exogenous auxin application on the rooted cuttings. The second research purpose is to study effects of PVP (Polyvinylpyrrolidon) and IBA (a-indole-buzyric acid), clones, and microclimate. The experiment was conducted in Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute in Jember (45 m asl and D rainfall type according to Schmidt Ferguson). The design for the first experiment was split-split plot, replicated three times. The main plot was light intensity inside the roof, i.e. 15%, 30% and 45% to direct sun radiation. The subplot was cocoa clones, i.e. DR 2 and ICS 13, and the sub-subplot was IBA concentration, i.e. 0 ppm, 1500 ppm, 3000 ppm and 4500 ppm. The second experiment was designed factorial 3 x 3 of CRD, replicated 3 times. Clones of KW 163, KW 162 and KW 165, and IBA at 0, 3000, and 6000 ppm were the factors. In the same time, effect of IBA 6000 ppm, PVP 6000 ppm IBA + PVP 6000 ppm, and control were observed using KW 165 clone, and designed in completely randomized design (CRD), replicated 3 times. The result showed that auxin content of ICS 13 was higher than DR 2 (62.67 ppm vs 40.90 ppm) so that gave higher rooted cuttings and more root number. Exogenous application of IBA improved auxin content of the cutting materials and promoted root growth. The optimum IBA concentration for root number was 3500 ppm. Light intensity of 45% improved number of rooted cuttings three times compared to 15%, however compared to the second research, percentage of rooted cuttings was still very low. Cocoa cutting method to gain rooted cuttings 80-90% has been obtained. The method was using IBA 3000 ppm or 6000 ppm mixtured with or without PVP 6000 ppm, conducted during rainy season, the nursery using permanent shade trees of *Leucena sp*., temperature of 24-27°C and relative humidity was 78-87%. PVP was supposed inhibit oxidation of IBA so that the effect of IBA was more optimum. The rooting response of KW 162, KW 163 and KW 165 clones were similar. Rooted cuttings during dry season were low due to the less fresh of cutting materials and high temperature inside the bed roof.

170 SRILESTARI, R.

Peanut embryo somatic induced on several vitamins and sucrose. ***Induksi embrio somatik kacang tanah pada berbagai macam vitamin dan sukrosa***/Srilestari, R. (Universitas Pembangunan Nasional Veteran, Yogyakarta (Indonesia). Fakultas Pertanian). *Ilmu Pertanian* ISSN 0216-4214 (2005) v. 2(1) p. 43-50, 3 tables; 21 ref.

ARACHIS HYPOGAEA; EMBRYONIC DEVELOPMENT; PANTOTHENIC ACID; SUCROSE; TISSUE CULTURE.

More variable usage of peanut lead to increasing demand of peanut by year to year. At present, peanut national demand can not be met by domestic production. Regeneration of peanut plant through somatic embryogenesis is the most effective way for plant propagation. Somatic embryogenesis is an embryo development which is not resulted from fusion of gametes but from any somatic cell. Research on peanut somatic embryogenesis so far is quite limited, so this research aimed at determining the most effective combination of vitamin and sucrose in promoting peanut somatic embryogenesis. A 2 x 3 factorial experiment augmented was initiated in completely randomized design. The first factor, B5 and MS vitamin. The second one is sucrose concentration which ranged from 20, 30 and 40 g/l. Collected data were subjected to an analysis of variance followed by mean separation based on Duncan's Multiple Range Test. The result showed that application of B5 vitamin and 40 g/l sucrose produced somatic embryo at considerable number in relatively short time and there was no any interaction between them.

F03 SEED PRODUCTION AND PROCESSING

171 PRAWOTO, A.A.
Response of selected clones of cocoa seedlings in the nursery against high soil water content. ***Respons semaian beberapa klon kakao di pembibitan terhadap kadar lengas tanah tinggi***/Prawoto, A.A. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Zainunnuroni, M.; Slameto. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 90-105, 7 ill., 4 tables; 25 ref.

THEOBROMA CACAO; CLONES; SEEDLINGS; SELECTION RESPONSES; WATERLOGGING; WATER TOLERANCE; PLANT RESPONSE; SOIL MOISTURE CONTENT.

Since 2001 to 2005, cocoa bean price is high, this condition accelerates farmers to plant and enlarger their cocoa areas. The impact of this euphoria is the possibility that the planting area will be more marginal, i.e. high water table or soil with continuously high water content. This study was to evaluate cocoa planting materials tolerance to those condition. The experiment was conducted in glass house of Indonesian Coffee and Cocoa Research Institute using RCBD, replicated 3 times. The treatments were factorial 10 x 4. The propelegitimate seedlings of 10 clones were the first factor, i.e. KW 165, KW 162, DR 2, DRC 16, GC 7, ICS 13, 1CS 60, KW 163, Sca 12, and TSH 858. The second factor were soil water content, that were 100% (field capacity = control), 125%, 150%, and 175%. Watering method was gravimetric, once a month the volume was corrected by wet weight of the seedlings. The study was terminated after 5 month old. The result showed that growth of stem diameter, root dry weight and leaf number were still normal until soil water content 25% above field capacity. At that condition, seedling dry weight dropped 13% below control, whereas at 175% treatment the decreasing of seedling dry weight was 34% below control. According to seedling and root dry weight, and chlorophyll content, by using cluster analysis it could be obtained a group of seedlings tolerant to high soil water content, i.e. DRC 16, GC 7, and ICS 60. Meanwhile, a group of seedlings susceptible to high water content were KW 165, KW 163, and DR 2. Stem diameter and chlorophyll content was good indicator for water logging tolerance reaction for cocoa seedling, its correlation to seedling dry weight were positive and tight.

172 RAHARDJO, P.
Effect of storage period on the viability of bare root cocoa seedlings. ***Pengaruh lama penyimpanan terhadap daya tumbuh bibit kakao cabutan***/Rahardjo, P. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 106-112, 2 ill., 1 table; 13 ref.

THEOBROMA CACAO; SEED; BARE ROOT PLANTING; SEED LONGEVITY; VIABILITY; STORAGE.
An experiment to study the storage of bare root cocoa seedling was conducted as an effort to obtain alternative technology to transport cocoa seedling. The experiment used randomized completely design with 4 replications; and the treatment was the storage period, i.e. 2, 3 and 4 days. Each replication was used 25 seedlings. The results showed that bare cacao seedling storage for 2, 3 and 4 days decreased wet

weight 1-2 g, and leaf number 2-4. Seedling viability percentage for 2, 3 and 4 days storage was 90, 97.5 and 75%, respectively.

173 SUMIATI, E.
Effect of cultivar and seed bulb size of introduced onion on the growth, flowering, and seed yield. ***Pengaruh kultivar dan ukuran umbi bibit bawang bombay introduksi terhadap pertumbuhan, pembungaan, dan produksi benih***/Sumiati, E.; Sumarni, N. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 12-20, 6 tables; 19 ref.

ALLIUM CEPA; VARIETIES; BULBS; FLOWERING; GROWTH; YIELD COMPONENTS.

Low air temperature of 5-12°C is needed to stimulate flower initiation of onion, while in tropical regions it can be done by vernalizing the onion mother bulbs at 10°C for 2 months. Flower initiation was stimulated by low temperature interacts with several factors, such as genetic, physiological age, and size of mother bulbs. The experiment was conducted at highland Lembang Bandung 1,250 asl. The aims of this study were (1) to find out the proper size of the onion mother bulbs in order to get the highest yield of flowers, seed, and bulb, (2) to study kind of natural gibberellins and their concentrations which stimulate flower initiation of introduced onion cultivars. A split plot design with 3 replications was set up in the field. The main plot was two introduced onion cultivars, i.e. cultivar no. E-537, and no. Z-512. The subplot was size of onion mother bulbs, i.e. > 40 g, 25-40 g, and < 25 g per bulb. Research results revealed that the highest total seed yield was gained from cultivar no. Z-512 with the size of mother bulb of more than 25 g. Flower initiation was stimulated by de novo natural gibberellin with kind and concentration depend on cultivars and the size of mother bulb. The bigger mother bulb size (>25 g) the higher the concentration of natural gibberellin and the higher the flowers/umbels and seed yield produced. Kind of natural gibberellins synthesized by onion cultivar no. E-537 were GA3, GA7, and GA45, while from cultivar No. Z-5I2 were GA3, GA21, and GA45. The highest onion bulb yield was gained from cultivar no. E-537. The mother bulb size >25->40 g did not affect the total onion bulb yield for both cultivars.

F04 FERTILIZING

174 ELFIANI.
Requirement of SP-36 and KCl fertilizer in lowland rice at Rambah Samo, Subdistrict, Rokan Hulu, Riau (Indonesia). ***Kebutuhan pupuk SP-36 dan KCl untuk lahan sawah di Kec. Rambah samo, Rokan Hulu, Riau***/Elfiani (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru(Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 27-32, 4 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED LAND; SUPERPHOSPHATE; POTASH FERTILIZERS; SOIL FERTILITY; NUTRITIONAL REQUIREMENTS; FERTILIZER APPLICATION; SUMATRA.

The experiment aimed to know the fertilizer necessity of SP-36 and KCl based on nutrient status on lowland rice was conducted at Rambah Samo Subdistrict, Rokan Hulu Regency, Riau Province in 2003. The P and K status of rice fields were determined using 25% of HCI extract and P and K contents were grouped into three classes i.e. low, medium and high content of P and K concentrations of less than 20, 20-40 and more than 40 mg of P_2O_5 100/g and less than 10, 10-20, and more than 20 mg of K_2O/100 g respectively. The namely of Rice fields was measured by using planimeter that were 10.106 ha of lowland rice in Rambah Samo Districts, there are about 177 ha (8.82%) with medium, 1.827 ha (91.18%) with high P status and no areas with low P status. Meanwhile, the areas with medium, and high K status were about 530 ha (26.47%), 1.474 ha (73.53%) respectively. The recommendation of SP-36 fertilizer with low, medium and high P status were 130, 97,5 and 65 kg/ha/season. While the recommendation of KCl

fertilizer only for the lowland with low K status, 50 kg/ha/season. Based on P status, namely SP-36 to be added in amount of 1.133,23 t/ha/season in Rambah Samo Subdistrict.

175 HELMI.
Omission plot as determination bases of N, P, and K fertilizer recommendation for lowland rice participative. ***Petak omisi sebagai dasar penentuan rekomendasi pemupukan N, P, dan K padi secara partisipatif***/Helmi; Nieldalina (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 120-126, 9 tables; 4 ref. 631.152/SEM/p bk1

ORYZA SATIVA; NPK FERTILIZERS; FERTILIZER APPLICATION; FIELD SIZE; NUTRIENT AVAILABILITY; LAND PRODUCTIVITY; CROP PERFORMANCE.

Using of rational and balanced fertilizer is one of the key factor in order to improve and increase land productivity. In determination of fertilizer recommendation, farmers as user have small chance to be directly involved in determining fertilizer recommendation. The objective of the study was to encourage the farmers in order to determine their own fertilizer recommendation. The methodology was used the yield data based on omission plot and adjusted to omission plot table that made by IRRI. Variables observed consisted of number of tiller/hill, filled grain weight, straw dry weight, 1000-grain weight, fertilizer recommendation determined based on omission plot yield. The result showed that the yield production from omission plot without P (NK) and without K (NP) could be determined fertilizer recommendation particularly for P and K in the farmer field based on omission plot table. Determination of fertilizer recommendation based on omission plot could be as a motivator for farmers participatively in order to determine fertilizer recommendation in their own rice field.

176 HELMI.
Fertilizer recommendation for lowland rice based on yield targets to be achieved. ***Rekomendasi pemupukan padi sawah berdasarkan target hasil yang akan dicapai***/Helmi (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 127-132, 6 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; FIELD SIZE; FERTILIZER APPLICATION; LAND SUITABILITY; NUTRITIONAL REQUIREMENTS; CROPPING SYSTEMS; YIELDS.

Rice is a major consumption for Indonesian and fertilizer recommendation particularly for lowland rice still use the general recommendation. In a larger amount of fertilizer were applied in order to get the high production, therefore land quality becomes decreased due to imbalance fertilizer and finally decreased farmers income. The objective of the experiment was to find out the site specific fertilizer recommendation based on omission plot. The treatments consisted of (1) Site Specific Nutrient Management (SSNM)-1 (yield target 6 t/ha with the Legowo 4:1 in cropping system); (2) SSNM-2 (yield target 7 t/ha with the Legowo 4:1 in cropping system); (3) SSNM-3 (yield target 8 t/ha with the Legowo 4:1 in cropping system). The parameter observed consisted of using rate of LCC for urea; N, P, and K content in plant tissue; and yield production. The results showed that using of IRRI recommendation was achieved the yield target on 6, 7, and 8 t/ha, respectively. The better treatment was SSNM-1 with yield target on 6 t/ha, raised to yield production of 7.43 t/ha.

177 JAMIL, A.
[Phosphorus status and availability and phosphorus retention in the soil during the rice transplanted planting in North Sumatra (Indonesia)]. ***Status fosfor tersedia dan retensi fosfor dalam tanah selama masa pertanaman padi tanam pindah di Sumatera Utara***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 159-164, 2 tables; 13 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL IMPROVEMENT; NUTRIENT AVAILABILITY; SOIL FERTILITY; RAINFED FARMING; SUMATRA.

Status of low soil fertility are found in almost all rainfed rice fields due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. The purpose of study was to evaluate soil characteristics dynamic during transplanted rice growth period in Langkat District, North Sumatra as affected by phosphorus fertilizer and cow manure application into rainfed lowland rice particularly in Langkat District, North Sumatra. The experiment was conducted from June to October 2004. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications. Results showed that application of both phosphorus and organic matter significantly increased available phosphorus, however, significantly decreased soil phosphorus retention. Based on the results obtained, were concluded that both phosphorus and cow manure have positive effect to improve soil fertility status, especially under rain fed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

178 KADARWATI, F.T.
Rational fertilization to increase cotton productivity. ***Pemupukan rasional dalam upaya peningkatan produktivitas kapas***/Kadarwati, F.T. (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 59-70, 1 ill., 9 tables; 31 ref.

GOSSYPIUM HIRSUTUM; PRODUCTIVITY; FERTILIZER APPLICATION; SOIL ANALYSIS; ORGANIC FERTILIZERS; INORGANIC FERTILIZERS; NUTRIENT UPTAKE.

As cotton is mainly grown on marginal land or less fertile soil, farmers need to apply fertilizer. Balanced fertilization principle was initiated in 1987 and adopted as a method to determine the dosage of fertilization. In fact, this method tends to excessive use in a certain element and less for others. Rational use in fertilizer is needed to avoid the excessive use of fertilizer. This principle implies that it is necessary to supply nutrient based on crop nutrient requirement and soils ability to supply nutrients. Recommendation on fertilizing is determined through several experiments on different sites which is difficult to be extrapolated to other sites. This recommendation is no longer used as cotton areas did not concentrate in a certain part for a long period of time. Nutrient condition in the soil indicates the status of soil fertility that can be used for determination of nutrient requirement. Rational use in nitrogen for cotton is determined based on soil N-NO3 with critical level 20-25 ppm, critical level for soil phosphorus is 20 ppm P; and critical level for soil potassium is 150 ppm K. The application of farm manure, bokashi, and sugar industry waste could increase soil fertility and cotton production.

179 KUSUMA, I.
Effect of fertilizer to citronella production. ***Pengaruh pemupukan terhadap produksi dan mutu serai wangi***/Kusuma, I.; Ansyarullah; Emmyzar; Rubaya, Y.; Herman; Daswir (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 59-65, 4 tables; 8 ref.

ANDROPOGON NARDUS; FERTILIZER APPLICATION; ORGANIC FERTILIZERS; PRODUCTION; QUALITY; ESSENTIAL OILS; LEAVES.

In supporting the development of citronella crops in Indonesia, the increasing of crop productivities must be done. Fertilizing of the organic fertilizer given to the crops was expected to increase the fresh leaves production and high oil yield on citronella crops. The research of fertilizing effects of citronella production was conducted in the experimental garden in Laing, Solok, at 0.90 hectare areas. The location is 450 m asl with Red Yellow Podzolic of the soil type. The research was studied since January to December 2005. The experimental design was randomized block design with 5 treatments and 9 replications, those are without fertilizing, 0.50 kg lime/clump/6 month, 2.00 kg manure/clump/6 month, 0.50 kg compost/clump/6 month, and 2.00 kg manure plus 0.50 kg lime/clump/6 month. The result showed that fertilizing gave significant effect in the second and third harvest. The treatment of 2 kg manure plus 0.50 kg lime per 6 month produced highest time growth, fresh leaf production, and oil production of citronella. Up to the third harvest, manure plus lime could increase the production of fresh leaf of 63.75% and oil production of citronella 36.20%. The content and quality of citronella oil produced was the best and met the standard quality of Indonesian export.

180 MARBUN, T.
Assessment on the effects of organic matter to new rice type of Fatmawati variety. ***Kajian pengaruh bahan organik terhadap padi tipe baru varietas Fatmawati***/Marbun, T.; Yusuf, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BP2TP, 2007: p. 280-286, 6 tables; 8 ref. 631.152/SEM/p bk1

ORYZA SATIVA; VARIETIES; NEW SPECIES; FARMYARD MANURE; INORGANIC FERTILIZERS; FERTILIZER APPLICATION; GROWTH RATE; AGRONOMIC CHARACTERS; YIELD COMPONENTS.

In order to study the influence of giving the manure to growth and productivity PTB Fatmawati variety , this study had been executed in rice field farm of INPPTP Pasar Miring, Pagar Merbau Subdistrict, Deli Serdang Regency at wet season of 2004 (September until December 2004). The experiment was designed in randomized block design (RABD) with four replications. The treatment consisted of 7 (seven) fertilization package placed as treatment that was (A) without manure and without inorganic fertilizer, (B) package fertilizer of urea, SP-36 and KCl according to soil analisys, (C) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 0.5 t manure/ha, (D) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 2.0 t manure/ha, (E) package fertilizer of urea, SP-36 and KCl according to soil analysis added of 4.0 t manure/ha (F) dosage of 4.0 t manure/ha, and (G) dosage of 6.0 t manure/ha. Results of the experiment showed that giving various manure packages on the productivity of PTB Fatmawati variety only gave yield about the 2.35-3.87 t/ha. The manure dosage given of 4.0 and 6.0 t/ha no significantly effect to increasing of yield compared to without manure. Manure giving with dosage 0.5 t manure/ha, 2.0 t manure/ha and 4.0 manure/ha on packages added to inorganic fertilizer according to soil analysis (165 kg urea/ha, 75 kg SP-36/ha, and 0 kg KCl/ha) given could improve the yield up to of 48%, 65%, and 57% compared to treatment of without manure given and without inorganic fertilizer (2.35 t/ha).

181 MUSFAL.
Assessment of liquid fertilizer (Fitofit) effect on soil nutrient availability, growth and yield of lowland rice and farming system profit. ***Kajian pupuk cair fitofit terhadap ketersediaan hara tanah, pertumbuhan dan hasil padi sawah serta keuntungan nilai usaha tani***/Musfal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan

5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 248-255, 3 ill., 5 tables; 7 ref. 631.152/SEM/p bk1

IRRIGATED RICE; LIQUID FERTILIZERS; FOLIAR APPLICATION; NUTRIENT AVAILABILITY; APPLICATION RATES; GROWTH; YIELD COMPONENTS; PROFITABILITY.

The research was done because some of the rice fields in North Sumatera have too much P and K substance. The application give on the soil have not gave the result. The liquid fertilizer of Fitofit was the multi enzyme which could give on leaves. The research was done on May until August 2006 in Pasar Miring Village, Pagar Merbau Distric, Deli Serdang Regency and the laboratory of AIAT North Sumatra. The research was done in two steps. The first step was: (a) field activities with the fitofit and urea treatment: SP-36: KCl (100 : 100 : 0 kg/ha); (b) Without the use of fitofit + urea: SP-36: KCl (200 : 150 : 50 kg/ha). The second step was done in laboratory, that is incubation of fitofit liquid fertilizer (0, 1, 2, 5, 10%) with using soil from the research field. The result of fitofit fertilizer have suitable with standard quality of organic liquid fertilizer which arranged by regulation of the Minister of Agriculture No. 02/Pert/HK.060/2/2006. The incubation in a week has make the available of N, P and K became higher than without giving fitofit. The using of fitofit liquid fertilizer make the result higher up to 8441 kg/ha than without using the fertilizer on 881 kg/ha. Benefit cost ratio get on giving the fitofit fertilizer higher up to 0.96.

182 PUDJIONO, S.
Effect of organic fertilizer from shrimp waste on mulberry growth after second hedging. ***Pengaruh pupuk organik limbah udang terhadap pertumbuhan murbei setelah pangkasan kedua***/Pudjiono, S.; Hardi T.W., T.; Syakur, A.; Setyobudi (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 9-10, 3 tables; 6 ref.

MORUS ALBA; ORGANIC FERTILIZERS; FISH WASTES; GROWTH; PRUNING; PLANT RESPONSE.

The quality of mulberry leaves are dependens on some factors, such as site, hedging shaping, lighting, fertilizing and watering. The purpose of the study was to evaluate the effect of waste shrimp organic fertilizer on growth of mulberry. The study was done at Pelem, Purwobinangun, Pakem, Sleman, Yogyakarta, 500 m asl, using RCBD design. The following rates of waste shrimp organic fertilizer applied was 0, 250, 500, 1000 g/plant. The experiment was arranged in randomized completely block design, 25 trees per plot with three replications per treatment. The result showed that waste shrimp organic fertilizer not only gave increased significant physiology process of plant to some of leaf and branch at 1000 g/plant but also increased better height, diameter, number of leaf, branch, leaf and branch weight with increasing of dosage.

183 RAHARDJO, M.
Effect of fertilizer application on production and quality of *Pimpinella pruatjan* Molkenb. ***Pengaruh pemupukan terhadap pertumbuhan, produksi dan mutu simplisia purwoceng (Pimpinella pruatjan Molkenb)***/Rahardjo, M.; Rosita S.M.D; Darwati, I. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 73-79, 9 tables; 14 ref.

PIMPINELLA; DRUG PLANTS; FERTILIZERS; GROWTH; PRODUCTION; QUALITY; TRADITIONAL MEDICINES.

Purwoceng (*Pimpinella pruatjan* Molkenb.) is an Indonesian indigenous medicinal plant. Purwoceng is classified as an endangered species, and its cultivation technology has not been devoleped. The objective of the research was to find out the effect of fertilizer application on the production and quality of

purwoceng simplisia. The research was conducted in Sikunang, Dieng, Wonosobo, Central Java from 2004/05. The treatments of fertilizer application on 2.4 square m were (1) control (without fertilizer); (2) 9.6 kg dung manure (dm); (3) 96 g urea + 48 g SP-36 + 72 g KCl; (4) 9.6 kg dm + 96 g urea + 48 g SP-36 + 72 g KCl; (5) 9.6 kg dm + 96 g urea + 48 g SP-36; (6) 9.6 kg dm + 9.6 g urea + 72 g KCl; (7) 9.6 kg dm + 48 g SP-36 + 72 g KCl. The experiment was designed in randomized block designed with four replications. The result of the research showed that the treatments of 9.6 kg dm + 96 g urea + 48 g SP36 + 72 g KCl/2.4 m^2 and 96 g urea + 48 g SP-36 + 72 g KCl/2.4 m^2 increased the simplisia production and quality compared with control. The simplisia production increased up to 40% and the stigma sterol content in the roots increased up to 11-14 times. The content of sitosterol in the plants with fertilizer application was 6.7-17.11 ppm but in the plants without fertilizer application was zero. The content of bergapten in shoot part of plant with fertilizer application was 4.92-5.56 ppm, but in the shoot part without fertilizer application was zero. The production and quality of simplisia with the fertilizer application of 96 g urea + 48 g SP36 + 72 g KCl/2.4 m^2 were not significantly different from those with fertilizer application of 96 kg dm + 9.6 g urea + 48 g SP-36 + 72 g KCl/2.4 m^2. It happened probably because the organic soil content was high, so that the application of 40 ton/ha of dung manure did not give any effect. Furthermore, to increase the optimum production of purwoceng simplisia (6.98 kwt/ha) with high quantity it needs 283 mg N, 55 mg P and 356 mg K/plant or 23.50 kg N, 6.30 kg P, and 38.90 K/ha.

184 SEMBIRING, H.
Soil characteristics as affected residues by phosphorus and organic matter on rainfed lowland in North Sumatra] (Indonesia). ***Sifat tanah sebagai pengaruh residu fosfor dan bahan organik pada lahan sawah tadah hujan di Sumatera Utara***/Sembiring, H. (Balai Besar Penelitian Padi, Sukamandi (Indonesia)); Jamil, A. [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 18-25, 3 tables; 23 ref. 631.152/SEM/p bk1

ORYZA SATIVA; IRRIGATED LAND; RAINFED FARMING; PHOSPHATE FERTILIZERS; FARMYARD MANURE; RESIDUAL EFFECTS; SOIL CHEMICOPHYSICAL PROPERTIES; CATIONS; ION EXCHANGE CAPACITY; SUMATRA.

The experiment attempt to assess soil characteristics as affected by residual of phosphorus fertilizer and cow manure applied to two rice cropping seasons previously under rainfed lowland rice was conducted from February to May 2005, in North Sumatra. Treatments for two rice cropping seasons previously involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ha of cow manure. No treatment was applied in this experiment. Treatments previously were laid in a factorial RCBD with 3 replications. Results showed that the residual effect of application both phosphorus and organic matter significantly increased P-availability content, organic-C content, and soil CEC. Based on the experimental results, as a conclusions consist of both residue of phosphorus and cow manure have positive effect to increase soil characteristics especially under rainfed lowlands rice, and generally residue of application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect compared to other treatments.

185 SIAGIAN, D.R.
NPK fertilizer effectiveness for growth and production of rice plant in Deli Serdang Regency (Indonesia). ***Efektivitas pupuk NPK terhadap pertumbuhan dan produksi padi sawah di Kabupaten Deli Serdang***/Siagian, D.R.; Girsang, S.S. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 194-199, 4 tables; 3 ref. 631.152/SEM/p bk1

IRRIGATED RICE; NPK FERTILIZERS; FERTILIZER APPLICATION; APPLICATION RATES; GROWTH; PRODUCTION INCREASE; SUMATRA.

Study of the effectiveness of NPK fertilizer carried out in Pasar Miring Experiment Area, Deli Serdang in rainy season 2006 at irrigated rice plant with Typic Tropoquept (according soil taxonomy USDA) in June till October 2006. This study used randomized completely block design with 4 replications to determine the effectiveness NPK fertilizer for growth and production of rice plant. We compared this fertilizer with complex fertilizer (N,P, K and S), that is 80, 60,60 dan 10 kg/ha. N fertilizer (from urea) was given 3 times. P fertilizer was given in times (7 DAT). K fertilizer was given 2 times, 21 and 45 DAT. We gave NPK fertilizer 200 kg/ha in 3 times (7, 21 and 45 DAT). If still there was lack of N, P, K and S, we could added urea SP-36, KCl and ZA so this treatment same quantity with complex fertilizer. The result showed there was positive benefit from NPK fertilizer, increasing productivity 1930 kg/ha. Beside that, information from economic analysis resulted is if we used NPK fertilizer there was profit Rp 8,713,612 (beside Rp 5,785,388 cost as long as planting), while NPKS fertilizer (complex fertilizer) Rp 6,226,314 for profit.

186 SUMARNI, N.
Optimum NPK fertilization for onion in highland. ***Kebutuhan pupuk NPK optimum bawang bombay di dataran tinggi***/Sumarni, N.; Rosliani, R. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 5-11, 3 ill., 3 tables; 12 ref.

ALLIUM CEPA; NPK FERTILIZERS; APPLICATION RATES; TUBERS; YIELDS; HIGHLANDS.

Onion plants need balance of NPK nutrient supply in soil. This experiment was conducted at Experimental Garden of Indonesian Vegetables Research Institute Lembang, 1,250 m asl with Andisol soil type, to find out the optimum dosage of NPK fertilizer application for 2 introduced onion cultivars in highland. A split plot design with 3 replications was used. Two introduced onion cultivars from Australia (E-515 and Z-512) were assigned to main plot, and 14 combination of NPK dosages were assigned to subplot. The range of N, P, K dosages were 75-375 kg/ha N, 75-375 kg/ha P2O5, and 75-375 kg/ha K2O. The results revealed that both onion cultivars no. E-515 and no. Z-512 did not give different respons to NPK fertilizing, expressed in the vegetative growth and bulb yield. The optimum dosage of NPK for both cultivars was 137 kg/ha N, 160 kg/ha P_2O_5, and 195 kg/ha K_2O. The results can be applied to increase the efficiency of NPK fertilizing on the introduced short-day onion.

187 SUMIATI, E.
Growth and yield of white cabbage treated with NPK 15-15-15 and seed fertilizer nutrifarm SD application in high altitude Lembang. ***Pertumbuhan serta hasil tanaman kubis putih dengan aplikasi pupuk NPK 15-15-15 dan pupuk pelengkap benih nutrifarm SD di dataran tinggi Lembang***/Sumiati, E. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 31-39, 3 tables; 23 ref.

BRASSICA OLERACEA; NPK FERTILIZERS; TESTA; GROWTH; YIELDS; HIGHLANDS; JAVA.

Growth and yield of cabbage could be improved by application of seed fertilizer nutrifarm SD in the nursery combined with application of proper dosage of NPK 15-15-15 in the field. The goal of this experiment was to find out the proper dosage of nutrifarm SD in combination with NPK 15-15-15 to improve the growth and yield of cabbage variety of Green Coronet. A split plot design with three replications was set up in the field. The main plot was NPK 15-15-15, comprised of two level dosages, viz. 0.5 t/ha and 1.0 t/ha. The subplot was application of nutrifarm SD seed fertilizer, comprised of 5 levels, viz. 0, 3, 6, 9, and 12 g/kg seed. The nutrifarm SD was mixed with cabbage seed and germinated in the nursery. NPK 15-15-15 was applied in the field twice, viz. half dosage at planting time and the rest was given at 4 weeks after planting. Cabbage plants were cultivated by using black silver plastic mulch. Research results revealed that there were no phytotoxicity, chlorosis, and other abnormalities symptoms appeared on cabbage plants treated with nutrifarm SD of 3-12 g/kg seed in combination with NPK 15-15-

15 0.5 to 1.0 t/ha. Independently, cabbage yield was significantly increased by the application of nutrifarm SD 6 g/kg seed, with the yield increment of 37.11% compared to control. However, the optimum dosage of nutrifarm SD was 6.2 g/kg seed when it was combined with NPK 15-15-15 dosage of 0.5 t/ha, and 6.5 g/kg seed when it was combined with NPK 15-15-15 of 1 t/ha. Application of NPK 15-15-15 perse from 0.5 to 1.0 t/ha did not significantly increase cabbage yield.

188 UTAMI, P.K.
Growth and flower quality improvement of *A. purpurata* through fertilization application of phosphate and potassium. *Peningkatan pertumbuhan dan mutu Alpinia purpurata melalui pupuk P dan K.*/Utami, P.K.; Tedjasarwana, R.; Herlina, D. (Balai Penelitian Tanaman Hias, Cianjur (Indonesia)). *Jurnal Hortikultura* (Indonesia) ISSN 0853-7097 (2006) v. 16(4) p. 307-313, 1 ill., 3 tables; 14 ref.

ALPINIA PURPURATA; ORNAMENTAL PLANTS; CUT FLOWERS; GROWTH; QUALITY; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; CROP PERFORMANCE.

Alpinia purpurata is one of the new tropical ornamental plants from Zingiberaceae family. The objective of the experiment was to determine the effect phosphate and potassium fertilizer application on promoting vegetative and generative growth of Alpinia. The experiment was conducted in the screenhouse at Segunung Field Station (1,100 m asl) at Indonesian Ornamental Crops Research Institute, Cianjur, from September 2004 to August 2005. The plots were arranged in a factorial completely randomized design with 3 replications and 2 factors. the first factor comprised of 3 level phosphate dosage i.e. 0,36,72 kg P_2O_5/ha. The second factor consisted of 4 level potassium dosage i.e. 0,60,120, and 180 kg K_2O/ha. The results showed that there was no significant interaction between phosphate and potassium fertilizer application, but the use 60 kg K_2O/ha increased of flower production on February 2005. K 120 kg K_2O/ha signifcantly increased of opened flower diameter (3.97 cm), and flower bud diameter (1.17 cm). Meanwhile, K application at 120 kg K_2O and 60 kg K_2O significantly increased the leaf lenght and mature flower (3.97 cm).

189 WINARDI.
Opportunity of fertilizer substitution materials usage in West Sumatra (Indonesia): 1. For lowland rice. *Peluang penggunaan bahan substitusi pupuk di Sumatera Barat: 1. untuk padi sawah*/Winardi (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 112-119, 2 tables; 18 ref. 631.152/SEM/p bk1

IRRIGATED RICE; ORGANIC FERTILIZERS; COMPOSTS; FERTILIZER APPLICATION; RICE STRAW; TRICHODERMA HARZIANUM; LAND PRODUCTIVITY; SUMATRA.

West Sumatra Province is one of rice production center in Indonesia with rice preference specificly of West Sumatra. Productivity of ricefield in the region still low, it is around 4.50 t/ha. One of the cause the low productivity is not properly fertilizing using by the farmers. Some constraints of fertilization are influencing, such as scarcity of fertilizer, high cost of fertilizer and abundant alternative fertilizer types enter the market so the farmer confuse to use them. One of solution to overcome the fertilizer scarcity, beside to increase the farming effisiency and rice field productivity is the using of compost. The recommended compost mainly includes of using raw material of rice straw with activator of *Trichoderma harzianum*.

190 YUNIZAR.
Balanced fertilization on lowland rice at Sungai Siput Bengkalis District, Riau Province (Indonesia). *Pemupukan berimbang pada padi sawah di Sungai Siput Kabupaten Bengkalis Riau*/Yunizar; Mardawilis; Umar (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)).

[Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Buku 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 78-82, 4 tables; 9 ref. 631.152/SEM/p bk1

IRRIGATED RICE; NPK FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; APPLICATION RATES; AGRONOMIC CHARACTERS; PRODUCTIVITY; SUMATRA.
The application NPK fertilizer in Riau Province is usually around 200-300 kg urea/ha, 100-50 kg SP-36/ha and 100 kg KCl/ha. Application of these fertilizers without considering soil nutrient status and requirement of rice crop. Requirement of nutrient for rice crop is depend on genetic, growing phase, and climatic factor. The research had been conducted in farmers field (Sungai Siput Village) Bengkalis District in 2006/2007 planting season (from November 2006 to February 2007). The research was arranged in randomized block design with 3 replications. The treatments are (A) without fertilizer; (B) 200 kg urea/ha, 100 kg SP-36/ha, 100 kg KCl/ha, (C) using of LCC to determine the urea dosage, 100 kg SP-36/ha, 100 kg KCl/ha (D) 150 kg urea/ha, 50 kg SP-36/ha, 100 kg KCl/ha, 2 t green manure/ha and (E) using of LCC to determine the urea dosage, 50 kg SP-36/ha, 100 kg KC/ha, 2 t green manure/ha. Results showed that the application of NPK fertilizer and green manure affected the rice growth significantly on height of plant, tiller number, sum of panicle/hill, sum of grains/panicle filled grains and yield. The application of NPK fertilizer and green manure did not affect 1000 grain weight. The best yield (4.7 t/ha) was obtained in treatment C (using of LCC) to determine the urea dosage, 100 kg SP-36/ha, 100 kg KCl/ha. The lowest yield (3.1 ton/ha) was obtained in treatment of without fertilizer.

F06 IRRIGATION

191 SUMARYANTO.
[Improving irrigation water use efficiency through irrigation contribution based on economic value of irrigation water]. ***Peningkatan efisiensi penggunaan air irigasi melalui penerapan iuran irigasi berbasis nilai ekonomi air irigasi***/Sumaryanto (Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian, Bogor (Indonesia)). *Forum Penelitian Agro Ekonomi* ISSN 0216-4361 (2006) v. 24(2) p. 77-91, 1 ill., 48 ref.

IRRIGATION WATER; EFFICIENCY; WATER AVAILABILITY; ECONOMIC VALUE.

Demand for irrigation water will increase in line with toting up cultivation area of rice required in the future. On the other hand, water quantity should be allocated to fulfil water demand of non-agricultural sectors which are also steadily increased. It implies that water available for irrigation will be scarcer, and therefore, utilization of irrigation water resource should be carried out in a more efficient way. It might be feasible to apply economic value of the irrigation water as a basis of water pricing. As an economic incentive, this approach could meet water charges paid by the farmers and the quantity of water used and the marjinal value product of the irrigation water. Aggregation of crops and its cultivation periods in the form of smaller groups will simplify its field applications.

F07 SOIL CULTIVATION

192 OMON, R.M.
Growth of kamper and hopea wood on alang-alang areas with prepared planting technique. ***Pertumbuhan kayu kamper dan hopea pada lahan alang-alang dengan teknik penyiapan lahan tanam***/Omon, R.M. (Loka Penelitian dan Pengembangan Satwa Primata, Samboja (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 11-23, 9 ill., 2 tables; 18 ref.

DRYOBALANOPS; HOPEA; LAND MANAGEMENT; IMPERATA CYLINDRICA; HERBICIDES; GROWTH.

The effect of preplanting technique on the growth of *Dryobalanops lanceolata* and *Hopea sangal* were conducted on alang-alang (*Imperata cylindrica*) areas in Sungai Wain Protection Forest, Balikpapan, East Kalimantan. The preparation techniques were conducted before planting, using herbicide to kill the alang-alang. The objective of the research was to obtain information on rehabilitation technique on alang-alang with suitable species of Dipterocarpaceae. Every treatment was observed in a plot 50 m x 50 m (0.25 ha) with planting distance 5 m x 5 m. Two species and three prepared planting techniques were tested in the experiment. The experiment was arranged as a factorial completely randomized design with three replications. The result showed that species, prepared planting techniques and interaction between species and prepared planting techniques did not give significant effect to survival percentage of *D. lanceolata* and *H. sangal*. The growth of height and diameter of *D. lanceolata* was higher than that of *H. sangal* as many as 39.79 cm and 0.38 cm, respectively. While treatment of prepared planting technique to growth height and diameter with totally sprayed by herbicide treatments were higher than other treatment as many as 35.37 cm and 0.38 cm, respectively. Therefore, Dipterocarpaceae species plantation, especially *D. lanceolata* and *H. sangal* have a good opportunity to be developed as commercial tree species planted in open areas (alang-alang) with totally sprayed by herbicide.

F08 CROPPING PATTERNS AND SYSTEMS

193 MANSYUR.
Role of leguminosa cover crops at cropping system of sweet maize for forage availability. ***Peranan leguminosa tanaman penutup pada sistem pertanaman jagung untuk penyediaan hijauan pakan***/Mansyur; Indrani, N.P.; Susilawati, I. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Peternakan). [Proceeding of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 879-885, 4 tables; 18 ref. 636:338.439/SEM/p

ZEA MAYS; LEGUMINOSAE; COVER PLANTS; CULTIVATION; YIELDS; FEED CROPS; PROTEIN CONTENT; CRUDE PROTEIN; CRUDE FIBRE; YIELD INCREASES; QUALITY.

The aims of research were at knowing the role of leguminosae as cover crops at cropping system of sweet maize for forage availability. Planting maize and leguminosae were conducted at field of Forage Crops Laboratory, whereas chemical composition and digestible of herbage were conducted at Laboratory of Ruminants Nutrition and Feed Chemistry, Faculty of Animals Science of Padjadjaran University. Randomized completely block design were used with 4 treatments and 4 replications. The objectives observed were yield of sweet maize, yield of herbage, crude protein and crude fiber content. Data were analyzed by using variance method, followed by Duncan Multiple Range Test. The Research result showed that cropping system of maize with leguminosae increased production and quality of forage. The cropping system of maize with *Calopogonium mucunoides* gave the optimum result of forage.

194 PURWANTO.
Potential nitrification and nitrogen mineral of soil in coffee agroforestry system with various shading tress. ***Nitrifikasi potensial dan nitrogen-mineral tanah pada sistem agroforestri kopi dengan berbagai pohon penaung***/Purwanto (Universitas Sebelas Maret, Surakarta (Indonesia). Fakultas Pertanian); Handayanto, D.; Baon, J.B.; Hairiah, K. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 38-56, 6 ill, 3 tables; 33 ref.

COFFEA CANEPHORA; AGROFORESTRY; SHADING; GLIRICIDIA SEPIUM; ARACHIS PINTOI; PARASERIANTHES FALCATARIA; ORGANIC MATTER; NITRIFICATION; NITRATES; INTERCROPPING.

The role of shading trees in coffee farms has been well understood to establish suitable condition for the growth of coffee trees, on the other hand their role in nitrogen cycle in coffee farming is not yet well understood. The objectives of this study are to investigate the influence of various legume shading trees

on the concentration of soil mineral N (N-NH4+ and N-NO3-), potential nitrification and to study the controlling factors of nitrification under field conditions. This field explorative research was carried out in Sumberjaya, West Lampung. Twelve observation plots covered four land use systems (LUS), i.e. (1) Coffee agroforestry with *Gliricidia sepium* as shade trees; (2) Coffee agroforestry with *Gliricidia* as shade trees and *Arachis pintoi* as cover crops; (3) Coffee agroforestry with *Paraserianthes falcataria* as shade trees; and (4) Mixed/multistrata coffee agroforestry with *Gliricidia* and other fruit crops as shade trees. Measurements of soil mineral-N concentration were carried out every three weeks for three months. Results showed that shade tree species in coffee agroforestry significantly affected concentrations of soil NH^{4+}, NO^{3-} and potential nitrification. Mixed coffee agroforestry had the highest NH^{4+}/N-mineral ratio (7.16%) and the lowest potential nitrification (0.13 mg NO^{2-}/kg/hour) compared to other coffee agroforestry systems using single species of leguminous shade trees. Ratio of NH^{4+}/N-mineral increased 0.8-21% while potential nitrification decreased 55-79% in mixed coffee agroforestry compared to coffee agroforestry with *Gliricidia* or *P. falcataria* as shade trees. Coffee agroforestry with *P. falcataria* as shade trees had potential nitrification 53% lower and ratio of NH^{4+}/N-mineral concentration 20% higher than that with *Gliricidia*. Coffee agroforestry with *P. falcataria* as shade trees also had organic C content 17% higher, total N 40% higher, available P 112% higher than that with *Gliricidia*. The presence of *A. pintoi* in coffee agroforestry with *Gliricidia* reduced 56% potential nitrification but increased 19.3% of NH^{4+}/N-mineral concentration. The low soil potential nitrification in the mixed coffee agroforestry had close relationship with the high content of soil organic matter.

195 SEBAYANG, L.
[Integrated crop management (ICM) application of lowland rice farming system on tsunami-affected area, South Nias (Indonesia)]. ***Penerapan teknologi dengan pendekatan pengelolaan tanaman terpadu pada usaha tani padi sawah di lahan sawah bekas tsunami, Nias Selatan***/Sebayang, L. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 214-219, 4 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; CROP MANAGEMENT; INTEGRATED PLANT PRODUCTION; FARMING SYSTEMS; TECHNOLOGY TRANSFER; YIELD COMPONENTS; IRRIGATED LAND; SOIL SALINIZATION; SUMATRA.

South Nias is a new district from the Nias District development. Tsunami incident in 2005 caused a lot of agricultural land in the lowlands and the coast in southern Nias be salted, eroded or covered with silt tsunami that high salt content. According to data of Dinas Pertanian of South Nias in 2005, the tsunami-affected districts is the largest district in the Teluk Dalam of achieving 45 ha. One effort to meet their food needs are increasing the productivity of rice fields. For that North Sumatra AIAT in cooperation with the Dinas Pertanian to do a pilot project application of rice farming system with the ICM approach. This is carried out in the Nanowa Village on land of a farmer with 1 ha area, starting in September until December 2006. Rice varieties are planted Ciherang, Sunggal, Cilosari, Kapuas and Banyuasin. The results of Ciherang 8.1 t/ha; Sunggal 7.3 t/ha; Cilosari 7.0 t/ha; Kapuas 5.9 t/ha; dan Banyuasin 5.6 t/ha.

F30 PLANT GENETICS AND BREEDING

196 AKMAL.
Performance of the promising line in low land area Pasar Miring Subdistrict of Deli Serdang District (Indonesia). ***Penampilan galur-galur unggul padi sawah di Pasar Miring, Deli Serdang, Sumatera Utara***/Akmal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S.

(eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 133-136, 3 tables; 8 ref. 631.152/SEM/p bk1

IRRIGATED RICE; PROGENY TESTING; ADAPTATION; LOWLAND; CROP PERFORMANCE; HIGH YIELDING VARIETIES; ADAPTABILITY; YIELD COMPONENTS; SUMATRA.

Research was conducted in Pasar Miring Subdistrict of Deli Serdang District, conducted on May to September 2006. Randomize block design was used on 24 promising lines, with 3 replications, on 4 x 5 of plot size. The objective of this research was to get the adaptive of paddy in North Sumatra. They result showed that 24 promising line there were 6 promising lines that produce high compare to the control variety (Ciherang). The lines productivities of UML.S-06- 13 (6.05 t/ha), UML. S-06- 16 (5.88 t/ha), UML. S-06- 17 (5.88 t/ha), UML. S-06- 02 (5.75 t/ha), UML.S-06- 18 (5.71 t/ha), UML.S-06- 20 (5.67 t/ha), Whereas the production of Ciherang varieties is 5.68 t/ha. These promising lines had a good adaptability and high production on low land area.

197 AZRAI, M.
Genetic analysis of maize resistance to downy mildew (*Peronosclerospora maydis* Rac. Shaw). Analisis genetik ketahanan jagung terhadap penyakit bulai/Azrai, M. (Balai Penelitian Tanaman Serealia, Maros (Indonesia)); Aswidinnoor, H.; Koswara, J.; Surahman, M.; Hidajat, J.R. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 71-77, 2 ill., 2 tables; 35 ref.

ZEA MAYS; DISEASE RESISTANCE; GENETIC RESISTANCE; PERONOSCLEROSPORA; MILDEWS; GENETIC VARIATION; HERITABILITY.

Downy mildew disease caused by *Peronosclerospora maydis* is considered as major pathogen in maize. This fungus has been reported to cause economic loss in maize. The genetic of resistance to downy mildew was studied in seven generation crosses, namely resistant parents P1 (Mr10 and Nei9008), susceptible parent P2 (CML161) and their progenies: (F1, F2, F3, BC1P1 and BC1P2) derived from crosses between the resistant inbred lines and the susceptible inbred line. The genetic materials were evaluated for downy mildew resistance (DMR) under artificial screening nursery using spreader row technique, arranged in a split plot design with two replications at Cikeumeuh-Bogor experimental farm. The experiment was carried out to determine genetic variability, heritability and dominance degree estimates of downy mildew resistance (DMR). Results showed that genetic variance component of DMR for each generation was considered as narrow, except for F3 generation which was considered as broad. Heritability estimate for each generation was considered as low to moderate, except for F3 generation was considered as high. The narrow sense estimate based on generation means indicated that heritability values were moderate.

198 HULUPI, R.
Inheritance of Arabica coffee resistance to *Radopholus similis* Cobb. *Pewarisan ketahanan kopi Arabika terhadap nematoda Radopholus similis Cobb.*/Hulupi, R. (Balai Penelitian Kopi dan Kakao, Jember (Indonesia)); Nasrullah; Soemartono. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 1-16, 1 ill, 7 tables; 15 ref.

COFFEA ARABICA; RADOPHOLUS SIMILIS; NEMATODA; PEST RESISTANCE; GENETIC RESISTANCE; GENETIC INHERITANCE.

A research to get inheritance of arabica coffee resistance to *Radopholus similis* nematode was done in screen house and laboratory of Indonesian Coffee and Cocoa Research Institute, also at endemic area of coffee plantation, using F1 and F2 with their reciprocal crossing between BP 542 A (resistant) x Andungsari 1 (susceptible), and BP 542 A x Kartika 1. The purpose of this study that was conducted at seedling stage is to formulate a strategy for arabica coffee breeding to get resistant varieties to nematode. As the variables of resistance were weight of seedling biomass, percentage of root weight deviation, number of root nematodes, number of soil nematodes, reproduction and percent of necrotic root. Using

discriminant analysis and fastclus, those data variables were analyzed for genetic of resistance with statistical analysis system programme version 8. Genetic study on the inheritance of resistance to R. similis was started with evaluation of homozygosity of BP 542 A was resistant parent. The result showed that BP 542 A was heterozygous. Therefore, segregation test could not be suggested with segregation pattern principals as Mendel proposed. Segregation test on BP 542 A showed that it was heterozygote and the resistance was controlled by single gene with complete dominant effect, so the progeny segregated in 75% resistant and 25% susceptible. The result of the test showed the absence of maternal effect for root weight deviation and percentage of necrotic root variables, which meant that no cytoplasmic inheritance was involved. Based on the test of segregation ratio, almost all of the resistance components were not appropriate for monogenic and or digenic segregation pattern as expected due to non allelic gene interaction that caused epistasis.

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

GOSSYPIUM HIRSUTUM; DENSITY; LEAVES; BEMISIA TABACI; COLONIZING ABILITY; GERMPLASM.

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) Kanesis 1 (KI 436), (3) A/35 Reba P 279 (KI 257), (4) Acala 1517 (KI 174), (5) Asembagus 5/A/1 (KI 162), (6) 619-998xLGS-10-77-3-1 (K1 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 square centimeter of leaf and adult of *B. tabaci* on third highest leaf of 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 individu/cm^2 of leaf) due to dense trichome (150-300 trichomes/cm^2 of leaf) as compared with other accessions, viz. TAMCOT SP 21, DP Acala 90, 619-998xLGS-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 (less than 100 individu/cm^2 of leaf).

200 JAYUSMAN.
Evaluation of genetic variation of surian seedling at nursery level. *Evaluasi keragaman genetik bibit surian di persemaian*/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 1-8, 1 ill., 3 tables; 14 ref.

TOONA; GENETIC VARIATION; GROWTH; SEEDLINGS; EVALUATION.

This research aimed at evaluating the growth of surian seedling at the nursery. It consisted of 3 populations (seed collecting areas) of North Sumatra Province: Ambarita (5 families), Sipolha (3 families) and Tarutung (3 families). The growth of seedling was varied range from 5.13 cm to 7.34 cm for height, 1.16 mm to 1.38 mm for diameter and 4.28 to 5.32 for stem hardening. The result of analysis of variance showed that the differences of populations were statistically significant for height and stem hardening and not significant for diameter. The differences of family were statistically significant for all measured traits.

201 JAYUSMAN.
Leaf extraction method and isozyme of *Styrax benzoine* band pattern intensity. Metode ekstraksi daun dan intensitas pola pita isozim jenis kemenyan/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 17-27, 2 ill., 3 tables; 16 ref.

STYRAX; EXTRACTS; LEAVES; METHODS; ENZYME ACTIVITY.

Electrophoresis technique could be used to detect isozyme characterized genetic differences of *Styrax benzoine*. The main problem encountered during extraction is the presence of inhibitor such as tannins, phenolic compound and other cellular constituents. This experiment described a procedure for the visualization of enzyme system in S. benzoine using horizontal electrophoresis. The gel used was 13% hydrolyzed starch potato. The power electrophoresis was up to 35 MA AC at 250 V and at a constant current. Temperature electrophoresis was 4 derajat C a constant. The enzyme system studied were Acid phosphatase (Acp), Malate dehydrogenase (Mdh), Phosphogluco isomerase (Pgi), Glutamate oxaloacetate transaminase (Got), Alcohol dehydrogenase (Adh), and Glucosa-6-phosphate dehydrogenase (G-6-pdh). The proper ratio between buffer (extraction, electrolyte and gel) and leaf character was done as well. The optimum electrophoresis was shown by extraction buffer TPTDAM pH 7.5 and combination at electrolyte and gel buffer natrium borate pH 8.5. Because produce clear band pattern, varied enzyme activity was shown on six-enzyme system tested with isozyme band pattern migration (Rf value) 20 - 62.5 categorized as slower to medium migration. Zimogram was shown monomer - trimer with enzyme structure 10 loci and 20 alleles.

202 JONHARNAS.
Evaluation of several varieties of lawland rice in South Tapanuli (Indonesia). *Evaluasi beberapa varietas padi sawah di Tapanuli Selatan*/Jonharnas; Akmal (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 200-204, 2 tables; 5 ref. 631.152/SEM/p bk1

IRRIGATED RICE; VARIETY TRIALS; GENOTYPE ENVIRONMENT INTERACTION; HIGH YIELDING VARIETIES; ADAPTATION; SUMATRA.

The aim of this study was to find out some pre-eminent varieties which is adaptable, high yields. This study counducted by inland ground farmer of country side Gunung Manaon Subdistrict of Batang Angko, South Tapanuli District. High of place was 400 m asl. Climate type was B1. Starting of implementation date on October 2004 until January 2005. Plant system was Legowo 4:1. Distance plant was 20 cm x 10 cm. Planted one/hole. Given manure by 225 kg of urea, 150 kg SP-36, and 100 kg of KCl/ha. Using random group by 3 replications (block). Treatment consisted of 17 pre-eminent varieties of rice field that were: Sunggail, Cisantana, Tukad Unda, Tukad Petanu, Ciherang, Bondoyudo, Singkil, Konawe, Sintanur, Kalimas, IR 64, Angke, Conde, Cigeulis, Situ Patenggang, Situ Bagendit and Lambur. Seed delivered from Balitpa Sukamandi. Analysis of data evaluated by using analysis of variance (ANOVA) to see difference between treatment test and DNMRT at level 5%. Cropping conducted by entangling farmer who chosen those prefered varieties. From 17 examined varieties in South Tapanuli there were 7 with varieties higher yield like as of Sunggal (6,54 t/ha), Lambur (5,50 t/ha), Kalimas (5,25 t/ha), Tukad Petanu (5,15 t/ha), Bondoyudo (7,02 t/ha), Cisantana (5,65 t/ha), Cigeulis (5,29 t/ha). Chosen varieties of rice field which have the highest yield and also adapted for local environment while be developed in that area. Pre-eminent newly varieties better tested before about its adaptable, then to be developed by farmer, so the failured can be minimized.

203 JONHARNAS.
[Evaluation of tungro disease infection on several rice high yielding varieties in South Tapanuli] (Indonesia). ***Evaluasi serangan penyakit tungro pada beberapa varietas unggul padi di Tapanuli Selatan***/Jonharnas; Ulina, E.S. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 205-209, 2 tables; 10 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; HIGH YIELDING VARIETIES; GENETIC RESISTANCE; TUNGRO DISEASE; ADAPTATION; DISEASE TRANSMISSION; SUMATRA.

The experiment was conducted to study the resistance of various rice varieties on tungro disease in Gunung Manaon Village, Batang Angkola Subdistrict, South Tapanuli from October 2004 to January 2005. The treatments were 17 rice varieties: Sunggal, Cisantana, Tukad Unda, Tukad Petanu, Ciherang, Bondoyudo, Singkil, Konawe, Sintanur, Kalimas, IR 64, Angke, Conde, Cigeulis, Situ Patenggang, Situ Bagendit and Lambur. The results indicated that rice variety Tukad Petanu, Tukad Unda and Kalimas were resistant to tungro virus with yield 5.15 t/ha; 4.98 t/ha; and 5.25 t/ha, respectively. While rice variety Singkil and Konawe were succeptible to tungro virus, with damage 5.3% (yield was 4.22 t/ha) and 5.1% (yield was 4.44 t/ha), respectively. The resistant rice varieties were suitable to grow at the endemic field of tungro virus in wet season.

204 KOSMIATIN, M.
Rapid screening for drought tolerance in soybean through in vitro culture. ***Penapisan cepat toleransi kedelai terhadap kekeringan secara in vitro***/Kosmiatin, M.; Hutami, S.; Husni, A.; Mariska, I. (Balai Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 159-167, 4 ill., 6 tables; 18 ref.

GLYCINE MAX; IN VITRO CULTURE; DROUGHT RESISTANCE; GERMINATION.

Screening for crop tolerance to abiotic stresses through in vitro cultures is advantageous because it is quick, need small space, easy to control, and not limited by seasons. In vitro selection for drought tolerance was done using polyethylene glycole (PEG 6000). The aim of the experiment was to develop a quick in vitro selection method for selection of soybean varieties or lines tolerant to drought. Soybean seeds of susceptible (3209 and 3083, moderately tolerant (Wilis), and tolerant to drought (MLG 2805, Tanggamus and Nanti) were used in this study. The experiment was done in two series. In the first experiment, sterile explants of embryo axis, young embryo, and mature embryo were cultured in an MS solid medium containing GA3 0.5 mg/l. PEG 6000 was added to media before sterilization to a concentration of 0, 10, 20, and 30%. In the second experiment, young and mature seeds were used as sources of explants, which were cultured on different solid media (MS 1/2, MS 1/4, PC-L2 1/2 and PC-L2 1/4) containing different concentration of PEG 6000 (0; 5; 10; 15; 20%). Observation was done visually based on germination percentages of the explants. The results showed that germination percentages of the explants varied with the types of the soybean explants used in the trial. The use of PEG in the media decreased the germination percentages of all soybean varieties and lines. Explants of mature embryo were appropriate to be used in the drought tolerance trial in a medium containing 10% PEG. The second experiment showed that PEG with 10% concentration still regrouping soybean seeds based on the tolerance to drought stress. Dilution of the medium untill 1/4 of the basic formula did not affect level of drought tolerance of the soybean.

205 LESTARI, E.G.
Screening for drought-tolerance on Gajahmungkur, Towuti, and IR 64 rice somaclones based on their root penetration ability. ***Uji daya tembus akar untuk seleksi somaklon toleran kekeringan pada***

padi varietas Gajahmungkur, Towuti dan IR-64/Lestari, E.G.; Mariska, I. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Guharja, E.; Harran, S. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 97-103, 2 ill., 3 tables; 16 ref.

ORYZA SATIVA; VARIETIES; IN VITRO SELECTION; DROUGHT RESISTANCE; ROOT SYSTEM.

A simple but effective method is essential in a plant breeding program. A research was conducted in a greenhouse of the ICABIOGRAD, Bogor to select 37 Gajahmungkur, 34 Towuti and 47 IR 64 variants to evaluate of somaclones obtained from in vitro selection need for variants that are drought-tolerant. In the field, the drought-tolerance is indicated by the plant capability to produce roots that are tough enough to penetrate a hard soil. In this trial, the testing for root penetration capability was conducted in a mixture of vaseline and parafine (60:40) at a 30 ^{0}C dilution temperature, which is similar to 1.2 Mpa. The in vitro-selected Gajahmungkur, Towuti and IR 64 somaclones, which were assumed to drought-tolerant, were previously chosen using a filter of 20% PEG (BM 6000). The root-penetration selection yield 24, 9, and 14 somaclones of rice varieties of Gajahmungkur, Towuti, and IR 64, respectively. The roots of Gajahmungkur somaclones penetrated faster the parafine layer than those of Towuti and IR64 somaclones. It was also shown that there was a variability in the root capability to penetrate the parafine layer besides the variations in length, diameter, and numbers of roots penetrating the vaseline base.

206 LESTARI, E.G.
Screening for drought tolerance in Towuti and IR-64 somaclone lines derived from in vitro selection. ***Uji toleransi kekeringan pada galur somaklon IR-64 dan Towuti hasil seleksi in vitro***/Lestari, E.G.; Sukmadjaja, D. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 85-90, 4 tables; 24 ref.

ORYZA SATIVA; IN VITRO SELECTION; SOMACLONAL VARIATION; DROUGHT RESISTANCE; PLANT RESPONSE.

Unsuccessful rice breeding for drought tolerance conducted in the dry field is often due to problems associated with homogeneous drought level. An experiment was conducted in the greenhouse of ICABIOGRAD from December 2004 to October 2005 to identify drought tolerant lines and effective standardized in vitro technique. Genotypes Towuti and IR64 somaclone lines previously selected by using PEG 20% and root penetration were used in this study. The selected nine Towuti and IR64 somaclone lines were planted in pot containing soil and fertilizer. Each line consisted of three plants. Drought stress was induced from the heading stage to harvest. As a control, water was optimally given. Variables observed were plant height, number of tiller, days to heading, rolling leaves, number of filled grain/panicle, number of empty grain and weight of filled grains/plant. The result showed that drought stress influenced the height of the plant, number of tillers, and the grain production. Eight of the nine Towuti lines were observed as drought tolerant producing 19-106 grains/panicle and 18-30 g filled grains/plants. While eight out of the 10 IR64 lines produced 22-108 filled grains/panicle and 13-26 g filled grain/plants.

207 MUSALAMAH.
Resistance improvement to *Callosobruchus chinensis* in mungbean: from conventional to biotechnology approach. ***Peningkatan ketahanan kacang hijau terhadap hama gudang Callosobruchus chinensis: dari pendekatan konvensional menuju bioteknologi***/Musalamah (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 33-42, 2 ill., 2 tables; bibliography p. 40-42

VIGNA RADIATA RADIATA; CALLOSOBRUCHUS CHINENSIS; INSECTICIDES; PEST RESISTANCE; BIOTECHNOLOGY; GENE TRANSFER.

Callosobruchus chinensis cause serious postharvest damage in mungbean. Breeding is improving resistance to *C. chinensis* in mungbean has been conducted for a long time, but it has not showed satisfactory result. In the continuous search for new plant genes that confer resistance against bruchids, some interesting candidates have been found in defence compound, which may be proteic or aproteic. The discovery of some secondary metabolit compounds in some Leguminous crops (e.g. amylase inhibitor, protease inhibitor, lectins, and visilins) available to apply gene transfer, especially gene coding defence resistance to *C. chinensis* (alpha amylase inhibitor/alpha AI). The succesfulness of gene coding alpha AI transfer in Azuki bean and pea indicated that the transfer of alpha AI gene to mungbean could also to be conducted. The alpha AI expression in mungbean seed could avoid damage of *C. chinensis* infestation.

208 PRASETIYONO, J.
Analysis of genetic diversity in species of wild rice using micro satellite markers. ***Analisis keragaman genetik spesies padi liar menggunakan markah mikrosatelit***/Prasetiyono, J.; Tasliah; Bustamam, M.; Silitonga, T.S. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Abdullah, B. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 168-174, 2 ill., 4 tables; 19 ref.

ORYZA SATIVA; SPECIES; GENETIC VARIATION; MICRO SATELLITES.

Eighty five accessions of wild rice species tested for their genetic diversity using 17 microsatellite markers. Analysis of DNA polymorphisms resulted in 230 alleles (6-31 alleles for each primer). The number of bands varied among the species from 1-11 bands. The highest value of polymorphic information content (PIC) was found on RM 197 (0.954), while the lowest was on RM287 (0.369). The total of PIC was high (13.6) with at average of 0.805. Based on cluster analysis of the 85 accessions of the wild rice species, they could be clustered into two major groups, similar to that of the botanist grouping as reported earlier. The bootstrap analysis showed that the two species groups had a low degree of confidence. Their cophenetic correlation value was r = 0.75548 which is considered as the poor fit class ($0.7<r<0.8$). To improve confidence level of the dendrogram, more microsatellite markers need to be used in the analysis.

209 RUSLIYADI, M.
Socialization some new pre-eminent rice varieties with approach integrated crop management (ICM) in Province of Gorontalo. ***Sosialisasi beberapa varietas unggul padi baru dengan pendekatan pengelolaan tanaman terpadu di Provinsi Gorontalo***/Rusliyadi, M.; Fadwiwati, A.Y. (Balai Pengkajian Teknologi Pertanian Gorontalo (Indonesia)); Matondang, R.H.; Ulina, E.S. [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 33-38, 3 tables; 8 ref. 631.152/SEM/p bk1

ORYZA SATIVA; INTRODUCED VARIETIES; HIGH YIELDING VARIETIES; CROP MANAGEMENT; INTEGRATED PLANT PRODUCTION; VARIETY TRIALS; AGRONOMIC CHARACTERS; SULAWESI.

One of the major issue to be challenged and resolved in the rural are low amount of soil fertility, land conservation which varities not feasibility for economical, technical and financial capabilities weaken. To anticipate the constraint and problems is needed by innovation of new high yielding varieties. The use of new high yielding varieties is expected as an alternative variety for the earlier varieties which had decreased its production. Research goal was to socialize the adaptive rice high yielding varieties in Gorontalo through Integrated Plant Management (IPM) approach method. Research showed that plant height and buds number of Ciapus varieties legowo planted, larger than the Ciherang, Cimelati, and Fatmawati. Ciherang varieties had the number of panicles per hill and the number of grains per panicle which was higher than varieties of Batang Gadis, Ciapus, Cimelati, and Fatmawati. The highest rice dry

grains yield was Ciherang varieties about 9 ton/ha. Result indicated that Ciherang varieties was more feasible to develop than other varieties, especially varities through legowo system.

210 SEBAYANG, L.
[Performance of some wetland rice high yielding varieties in South Nias] (Indonesia). ***Penampilan beberapa varietas unggul padi sawah di Nias Selatan***/Sebayang, L. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 210-213, 1 table; 4 ref. 631.152/SEM/p bk1

IRRIGATED RICE; HIGH YIELDING VARIETIES; INTRODUCED VARIETIES; ADAPTABILITY; CROP PERFORMANCE; GROWTH; YIELD COMPONENTS; SUMATRA.

Research aimsed at identifying the growth performance of some high yielding varities of rice in lowland. Held in Botohilitano Village, Teluk Dalam Subdistrict of South Nias District. Rice farming system in the region of South Nias have been using local varieties with low productivity (3.2 t/ha). This region thus not able their own food needs. Therefore necessary introduction of new high yielding varieties that have high yield potential through adaptation test. Adapted varieties (Ciherang, Sunggah, Cilosari, Banyuasin and Kapuas) showed a relatively high productivity (6.7; 6.1; 5.6; and 5.9 t/ha) compared with local varities (Sabuso 3.2 t/ha).

211 SEMBIRING, T.
Performance of new superior varieties at rice production centre of Serdang Bedagai Regency (Indonesia). ***Keragaan varietas-varietas unggul baru di sentra produksi padi sawah Kabupaten Serdang***/Sembiring, T. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 287-290, 4 tables; 6 ref. 631.152/SEM/p

IRRIGATED RICE; NEW SPECIES; HIGH YIELDING VARIETIES; ADAPTATION; CROP PERFORMANCE; PRODUCTION INCREASE; PRODUCTIVITY; SUMATRA.

This research was conducted to find out new superior rice varieties adaptation, and executed on April until October 2006, at Lubuk Bayas Village, Perbaungan Subdistrict, Serdang Bedagai Regency, North of Sumatra. The location was at 6 m asl. The research design was arranged in a block design non factorial with four replications. The result of assessment showed that the highest production was found in variety of Ciherang, 7.0 t/ha, followed by variety of Mekongga 6.8 t/ha, variety of Cibogo, 6.5 t/ha, variety of Cigeulis 6.4 t/ha, and variety of Kahayan 6.3 t/ha, respectively.

212 SINAGA, P.H.
Response of seven lines hybrid rice on two methods of urea determination at the new rice field. ***Respon tujuh galur padi hibrida terhadap dua metode penentuan kebutuhan pupuk urea di lahan sawah bukaan baru***/Sinaga, P.H. (Balai Pengkajian Teknologi Pertanian Riau, Pekanbaru (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 44-48, 2 tables; 5 ref. 631.152/SEM/p bk1

ORYZA SATIVA; HYBRIDS; PROGENY; UREA; FERTILIZER APPLICATION; DOSAGE; NUTRITIONAL REQUIREMENTS; PLANT RESPONSE; GENOTYPE ENVIRONMENT INTERACTION; IRRIGATED LAND.

A research to evaluate the response of seven lines hybrid rice at two methods of urea at the new rice field was conducted in Pekanbaru from May 2003 to April 2004. A randomized block design with four replications was used. The treatment was seven lines hybrid rice (NY11, NY12, NY13, NY14, LY11, LY12, LY13) and two application methods of urea (based on the soil analysis and leaf colour chart/LCC). Batang Kampar was used as a control variety. The results showed that there are different application timing when the lines need urea as well as urea need on all of hybrid rice tested, and gave good response when urea applied based on the LCC. Application of urea was better than before leaf colour scale under 4.5. The use of LCC saved urea 40 kg/ha and yield response was higher than soil analysis. Lines NY12 and NY11 gave yield response 9.48 t/ha and 7.54 t/ ha, and selected as an adaptable lines at new rice field.

213 SISHARMINI, A.
Optimization of transformation technique for sweet potato (*Ipomoea batatas* (L.) Lam) using *Agrobacterium tumefaciens*. *Optimasi transformasi genetik ubi jalar melalui vektor Agrobacterium tumefaciens*/Sisharmini, A.; Ambarwati, A.D.; Santoso, T.J.; Herman, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)); Wattimena, G.A. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 104-109, 1 ill., 5 tables; 13 ref.

IPOMOEA BATATAS; TRANSGENIC PLANTS; GENETIC TRANSFORMATION; VECTORS; AGROBACTERIUM TUMEFACIENS; SELECTION.

An optimal transformation system is needed to obtain transgenic sweet potato. Genetic transformation system mediated by *A. tumefaciens* was commonly used in dicotyledonous plants. A study was done to optimize techniques for genetic transformation of sweet potato using *A. tumefaciens*. Leaf petioles of sweet potato cvs. Jewel and BIS 182-81 were used as sources of explants. An isolate of *A. tumefaciens* LBA4404 strain with a plasmid pMON10575 (with gus, nptll and CP-SPFMV genes) was used in the experiment. Effects of acetosyringone concentrations 0, 100, 200 micrometer, respectively and inoculation periods (30 and 60 minutes, respectively) on gus gene expression, and effect of R1 (MS+0.2 mg/l kinetin) and R2 (MS+0.2 mg/l 2-ip) media on transformed calli regenerations were observed. The results showed that acetosyringone at 100 micrometer concentration and 60 minutes inoculation period was the best combination for the gus gene expression. R1 was a better medium than R2 to regenerate the transformed calli of sweet potato cv. Jewel. Six putative transgenic sweet potato plants were obtained. Further analysis was needed to confirm integration of the gene into sweet potato genome.

214 SUSILO, A.W.
Selection and estimation of the genetic parameters of rootstock characteristics on cocoa seedling of half-sibs families. *Seleksi dan pendugaan parameter genetik beberapa sifat batang bawah kakao (Theobroma cacao L.) pada semaian famili saudara tiri*/Susilo, A.W. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Sulastri, D.; Djatiwaloejo, S. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(3) p. 147-158, 3 tables; 13 ref.

THEOBROMA CACAO; SEEDLINGS; SELECTION; GENETIC PARAMETERS; ROOTSTOCKS; AGRONOMIC CHARACTERS.

For cocoa clonal propagation, rootstock with good characteristics is highly needed. Half-sibs families is the most appropriate alternative for rootstock selection. This study was aimed to select and estimate genetic parameters of cocoa seedling on the half-sibs families of DR 1, DR 2, ICS 60, DRC 15, BLC 4, DRC 16, KEE 2, ICS 13, KW 162, KW 163, PA 300, RCC 70, TSH 858, Sca 6 and Sca 12. Research was carried out in Kaliwining Experimental Station of Indonesian Coffee and Cocoa Research Institute.

Genetic parameter were estimated based on variance and covariance component of the variables of the number of leaf, stem height, stem girth, leaf acreage, the volume of fresh root, the length of secondary root and the length of primary root, which assessed along seed growth till 90 day after planting. The result showed that most of the recorded variables perform high category of narrow sense heritability (h2 > 0.5). Stem girth, leaf acreage, volume of fresh root, length of secondary root and the length of primary root were assessed as the broad category of genetic variability (d2A > 2SEd2A). Therefore, length of primary root and length of secondary root would be the main criterion for rootstock selection as their performance on broad category of genetic variability and high category of narrow sense heritability. Length of secondary root can be estimated based on the performance of stem girth (r = 0.5) and leaf acreage (r = 0.23) and the primary root can be estimated based on the performance of stem height (r = 0.81) and leaf acreage (r = 0.72). Based on positive selection of primary root length and negative selection of secondary root length it was identified that the families of KEE 2 and Sca 12 potentially would be good rootstock due to their long category of the primary root and short category of the secondary root that having characteristics of high water uptake and low vigor.

215 WARDIYATI, T.
Characters improvement of banana cv. kepok through induced mutation of gamma ray III. somaclonal variation at generative stage. ***Perbaikan sifat pisang kepok melalui mutasi buatan sinar gamma III. keragaman somaklon pada fase generatif***/Wardiyati, T.; Sugiyanto, A.; Nugroho, A. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian); Lamadji, S.; Mugiono. *Agrivita* ISSN 0126-0537 (2006) v. 28(2) p. 150-159, 4 ill., 1 table; 16 ref.

MUSA PARADISIACA; INDUCED MUTATION; GAMMA RADIATION; SOMACLONAL VARIATION; MUTANTS; MATURATION; PRECOCITY; AGRONOMIC CHARACTERS.

Cooking banana cv. kepok is raw material of banana chips for home industries which developed rapidly. Due to the long period of harvest time (1.5-2.0 years) no one grow the plant in commercial scale. At present, the price of kepok banana is very expensive i.e. Rp 50,000 per bunch, causes the close of the several industries. The use of induced mutation of gamma ray irradiation with dosages of 0-10 krad was one of the efforts for improving early maturity of banana cv. kepok. Result at the second years of the research was obtained several clones of dwarf and early flowering, i.e. early flowering (G141, H18), dwarf (G93, G92), and erect leaves (H43, HA5). Result at third years (year 2001) revealed asociated that several clones which was produced in the second-generation mutation stable of G141 and H18 regarded as early flowering mutant by reducing the harvest time of 6 (six) months but not dwarf. Type G92 was dwarf with normal flowering time, and H43 and H45 were erect leaves with normal height and normal flowering time. Identification by using morphological and isoenzyme methods showed that several mutant clones differed if compared with the control.

216 ZEN, S.
[Anak Daro: high yielding variety of local rice in West Sumatra (Indonesia)]. ***Anak Daro varietas lokal berpotensi hasil tinggi di Sumatera Barat***/Zen, S. (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Padang (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 97-103, 7 tables; 7 ref. 631.152/SEM/p

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

Progress of rice breeding in this time have assembling short-lived new pre-eminent varieties, high yield potency, and resistance to organism intruder of crop with better taste rice which do not interior to local varieties which expand before. In West Sumatra, varieties of rice which matching with consumer

preference, who prefer rice with pera type, during this time only pre-eminent varieties of Cisokan and IR-42, then some specific local varieties. One of the specific local variety which is expanding especially in Regency/Town of Solok is Anak Daro. Besides at Regency/Town of Solok area, this variety had also expanded at other towns in West Sumatra, with imbalance yield from each subprovince as well as season approximately 4.91-5.63 t/ha. Potency result of Anak Daro did not significantly differ compared to pre-eminent varieties of Batang Piaman, Batang Lembang and of Cisokan. But when compared to some others local varieties, like Randah Kuning, Sari Baganti and Ceredek, the yield of this varieties more higher. Beside that selling value of Anak Daro average 17% was higher than pre-eminent varieties of national expanding. The variety of Anak Daro, besides for the accomplishment of requirement of local consumer also to fulfill demand from neighbour province.

217 ZEN, S.
[Participative breeding of irrigated rice based on consumer preference in West Sumatra (Indonesia)]. ***Pemuliaan partisipatif padi sawah preferensi konsumen Sumatera Barat***/Zen, S. (Balai Pengkajian Teknologi Pertanian Sumatera Barat, Sukarami (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 104-111, 7 tables; 14 ref. 631.152/SEM/p bk1

IRRIGATED RICE; PLANT BREEDING; PROGENY TESTING; GENOTYPE ENVIRONMENT INTERACTION; HIGH YIELDING VARIETIES; GENETIC RESISTANCE; AGRONOMIC CHARACTERS; YIELD COMPONENTS; SUMATRA.

The due of least at high yielding varieties in approching consumer preferences in West Sumatra, causing the application of rotation planting pattern to suppress the development of damaging plant organisms to be difficult to enforce. Participative Plant Breeding is one approaching effort for selecting lines in middle generation which appropriate with consumer preferences and agroecosystem in West Sumatra. Breeding participative activities in AIAT West Sumatra began in 2000 to evaluate the 39 lines of middle generation by using observation experiment , without repetition, and then continued with the multilocation testing in the centers of rice production areas. Continously, every year had made selection of new lines and until year 2005 has been evaluated as many as 356 lines originating from BALITPA. The observed parameters include agronomic characters, yield component and yield. Release of Batang Piaman and Batang Lembang at the end 2003 was the result of network activities of research and assessment conducted in 2000-2003. Both these varieties had texture, inflammation, and resistance to blast disease and brown plant hopper; and its potential result about 15-20% was higher than the varieties Cisokan and lR 42. The presence of Batang Piaman and Batang Lembang need to be followed by the discovery of other new varities continously in order to anticipate the emergence of other damaging plant organisms problem.

F50 PLANT STRUCTURE

218 LIMBONGAN, J.
Morphological characteristics of some sago palms from Papua (Indonesia). ***Morfologi beberapa jenis sagu potensial di Papua***/Limbongan, J. (Balai Pengkajian Teknologi Pertanian Papua, Jayapura (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 16-24, 2 ill., 6 tables; 20 ref. Appendix

METROXYLON; PLANT ANATOMY; STARCH; QUALITY; PROCESSING; IRIAN JAYA.

Sago palm (*Metroxylon sagu* Ronb.) is a potential starch source in the future. Most of the plants grow naturally in Papua and Maluku and many people consume the sago as a daily food. The paper described morphology of sago palms in Papua. There are many accessions of sago palms in Papua with specific

morphological characteristics in stems, leaves, nutrient and mineral contents, yield, and starch color. Sago palms such as Yepha, Rondo, Para. and Ruruna have different characteristics and these characteristics reflect their yield potential and usage. Sago starch is commonly used as food resources, also as raw materials in cosmetics, food, paper, and plastic industries. Therefore, improvement of sago palm cultivation and conservation of sago germplasm are needed.

F60 PLANT PHYSIOLOGY AND BIOCHEMISTRY

219 HERLINA, T.
Paralytic isoquinoline alkaloids from the bark of *Erythrina poeppigiana* (Walpers) O.F. Cook (Leguminosae). ***Alkaloid isoquinolin yang bersifat paralitik dari kulit batang Erythrina poeppigiana (Walpers) O.F. Cook (Leguminosae)***/Herlina, T.; Supratman, U.; Kurnia, D. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam); Subarnas, A.; Sutardjo, S.; Hayashi, H. *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 212-218, 1 ill., 1 table; 9 ref.

ERYTHRINA POEPPIGIANA; ALKALOIDS; EXTRACTION; ISOLATION.

The research of paralytic compound have been isolated from the bark of *Erythrina poeppigiana* (Walpers) O.F. Cook (Leguminosae) on the third instar larvae of silkworm (*Bombyx mori*). The objective of this research was aimed at finding out isolation and structural elucidation of paralytic compounds from the bark of *E. poeppigiana*. The research was isolated by several steps by bioassay-guided of the paralytic activity. The result showed that the methanol extract which separated by combination of column chromatography yielded two isoquinoline alkaloids (1 and 2). The chemical structure of compounds (1 and 2) were identified on the basis of spectroscopic evidence and comparison with the previously reported. Compounds 1 and 2 showed paralytic activity against third instar larvae of silkworm (*Bombyx mori*) with their ED50 values with 100 and 83 microgram/g diet, respectively.

220 KRISNAWATI, A.
Prospect of pigeonpea and description of qualitative and quantitative properties. ***Prospek kacang gude dan pencandraan sifat kualitatif dan kuantitatifnya***/Krisnawati, A. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 1-10, 2 ill., 5 tables; 28 ref.

CAJANUS CAJAN; GENETICS VARIATION; QUANTITATIVE GENETICS; PROTEIN CONTENT.

Pigeonpea (*Cajanus cajan* L. Mill. sp.) has widely been grown in the tropical areas. At the present, the largest production area of pigeonpea in the world is India. In Indonesia, the plant is cultivated in Java, Bali, West Nusa Tenggara, East Nusa Tenggara and South Sulawesi. Local cultivar is commonly cultivated by Indonesian farmers, and is usually grown as intercrops or in mixed cropping with maize, cassava and other legumes. The pigeonpea is generally drought and lodging resistant, its pods do not easily shattered, and adaptable to several soil types. The pigeonpea seed can be used as food consumption and to subtitute legumes flour. Whilst, the pigeonpea green leaves can be utilized as green manure and cattle fodder, and its dry stems are of an important household fuel. Characters of seed yield, pods per plants, and protein content, generally have low heritability. On the contrary, days to flower, plant height, and seed size have high heritability estimates. Qualitative and quantitative description of pigeonpea are useful for genetic development in breeding programmes, or important for commerzialisation purposes. However, such a description has not be available at the moment. Additionally, the qualitative and quantitative description are need in relation to plant variety protection, where novelty, distinctness, uniformity, and stability are the main components.

221 KRISTINA, N.N.
Effects of reduced-macro nutrients, and ABA to shoots multiplication of periwinkle (*Vinca rosea*) in vitro. ***Pengaruh penurunan unsur makro dan pemberian absisic acid terhadap multiplikasi tunas tapak dara (Vinca rosea) secara in vitro***/Kristina, N.N. (Balai Penelitian Tanaman Rempah dan Obat,

Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah* dan Obat ISSN 0215-0824 (2005) v. 16(1) p. 1-9, 3 tables; 17 ref.

CATHARANTHUS ROSEUS; IN VITRO CULTURE; ABA; NUTRIENTS; GROWTH INHIBITORS.

Research regarding effect of reduced-macro nutrients and ABA to shoot multiplication of periwinkle (*Vinca rosea*) in vitro has been performed in the Laboratory of Germplasm and Breeding, Indonesian Spice and Medicinal Crops Research Institute. The culture media applied were MS, 3/4 and 1/2 MS + (20 and 30) g/l sucrose + BA 0.1 mg/l and maintained growth inhibitor ABA (1 and 2) mg/l. The experiment was designed as a completely randomized with 10 replications. Results showed that there was no significant different on the growth of shoots from all of MS medium until cultured 9 months with grow up to 90%. Addition of ABA 1 and 2 mg/l in media, made browning shoots until 7 months culture periods, and growing ability of 40 - 60%. Result from test of shoots regeneration showed, that MS + BA 0.1 mg/l + sucrose 30 g/l (control) were the best medium for conservation with the highest number of shoots 8.4.

222 RAUF, A.W.
Effect of rice allelopathy on growth and yield of soybean under a sequential planting system of rice-soybean. ***Pengaruh alelopati padi terhadap pertumbuhan dan hasil kedelai pada sistem tanam berurutan padi-kedelai***/Rauf, A.W. (Balai Pengkajian Teknologi Pertanian Papua, Jayapura (Indonesia)); Tohari; Yudono, P.; Kabirun, S. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 76-84, 2 ill., 7 tables; 28 ref.

ORYZA SATIVA; ALLELOPATHY; GLYCINE MAX; GROWTH; YIELDS; PLANTING; SEQUENTIAL CROPPING.

The objective of this research was to identify potential allelopathic on rice varieties and the effect of growth and yield of soybean under the sequential planting system of rice-soybean. The identification of allelopathic compounds was done by high performance liquid chromatography (HPLC) at the Chemicals and Physical Analysis Laboratory Centre, Gadjah Mada University. Field experiment were conducted at Research Educational and Agricultural Development of Gadjah Mada University. The experiment was arranged in randomized completely block design in three replications. Treatments consisted of (i) no-tillage without rice residues, (ii) no-tillage rice residues as a mulch, (iii) no-tillage under the rice stubble, (iv) tillage without rice residues, (v) rice stubble were mixtured when the soil tillage, and (vi) rice stubble and straw were mixtured when the soil tillage. Result of this experiment indicated that the concentration of phenolic acids ranged from 259 to 776 mg/kg straw for IR 64 and Merning variety. Concentration of phenolic in the rice straw were generally higher than that in the roots. Allelopathic from rice straw strongly inhibited the root and noduls growth than the other growth component. Mixtured rice residues in soil when soil tillage could maximum inhibit yield of soybean of 23.5%. However the treatment of no tillage with rice residues as a mulch could promote the yield of soybean of 0.5%.

223 ROHDIANA, D.
Evaluation of inhibitory effect of green tea effervescent tablet on linoleic acid oxidation. ***Evaluasi daya hambat tablet efervesen teh hijau pada oksidasi asam linoleat***/Rohdiana, D. (Universitas Pasundan, Bandung (Indonesia). Fakultas Teknik); Raharjo, S.; Gardjito, M. *Majalah Farmasi Indonesia* (2005) v. 16(2) p. 76-80, 2 ill., 2 tables; 24 ref.
TEA; ANTIOXIDANTS; LINOLEIC ACID; HERBAL TEAS; INHIBITION; OXIDATION.

Evaluation of the inhibitory effect of green tea effervescent tablet (TETH) on linoleic acid oxidation was carried out. TETH had the highest inhibitory effect on linoleic acid as compared with BHA, BHT, alpha-tocopherol and TETH-C. On tenth days incubation, TETH inhibited of linoleic acid oxidation is 50.64% followed by TETH-C, alpha-tocopherol, BHT and BHA as 33.83%; 33.40%; 29.51% and 26.39%, respectivelly. TETH had a inhibitory effect of 1.5 times more than TETH-C and alpha-tocopherol or 1.7 and 1.9 times more than BHT and BHA, respectively.

F62 PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT

224 KUSWAHYUNING, R.
Influence of lactose and povidon on the formulation of tablet containing *Kaempferia galanga* L. extract by a wet granulation method. *Pengaruh laktosa dan povidon dalam formula tablet ekstrak Kaempferia galanga L. secara granulasi basah*/Kuswahyuning, R.; Soebagyo, S.S. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Farmasi). *Majalah Farmasi Indonesia* (2005) v. 16(2) p. 110-115, 1 ill., 3 tables; 9 ref.

KAEMPFERIA GALANGA; PLANT EXTRACTS; EXTRACTION; PROCESSING; LACTOSE; FORMULATIONS; GRANULES; TRADITIONAL MEDICINES.

Increasing use of *Kaempferia galanga* L. (kencur) as a traditional medicine stimulates the development of more practical preparation form e.g. tablets. This study was conducted to observe the influence of lactose as a filler and povidon as a binding agent to the physical properties of the granules and to determine the optimum tablet formula for *Kaempferia galanga* L. extract by a wet granulation method. The use of factorial design with 2 factors (lactose and povidon) and 2 levels (lactose : low level = 300% and high level = 450% of the extract weight, respectively; povidon : low level = 0.3% and high level = 3% of the extract weight, respectively), it needed four formulas to produce granules of the *Kaempferia galanga* L. extract. Each of the granules of *Kaempferia galanga* L. extract was produced by a wet granulation method and was dried at 40-60°C for 24 hours. Dry granules were tested on their properties of flowability, compactibillity and water uptake. Lactose significantly influenced the compactibillity and the water uptake, whereas povidon significantly influenced the compactibillity, flowability and water uptake. Based on the contour plots of the physical properties of the granules and total responses, formula using 315% lactose and 2.98% povidon of the extract weight, respectively, was chosen as the optimum tablet formula. Produced tablets had dark brown colour and weight uniformity with average weight of 373.60 ± 0.63 mg, hardness of 2.18 ± 0.192 kg, friability of 0.10 ± 0.011%, and disintegration time of 4.43 ± 0.147 minutes.

225 PRABAWARDANI, S.
Leaf stomatal density and plant water relations as affected by soil water regimes on the sweet potato genotypes. *Pengaruh kekeringan terhadap jumlah stomata daun dan status air tanaman pada ubi jalar (Ipomoea batatas L.)*/Prabawardani, S. (Universitas Negeri Papua, Manokwari (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 15-20, 5 ill., 2 tables; 13 ref.

IPOMOEA BATATAS; GENOTYPES; STOMATA; LEAVES; PLANT WATER RELATIONS; SOIL WATER REGIMES; DROUGHT RESISTANCE.

Sweet potato is the primary food source for the highlanders of Papua, Eastern Indonesia. However, due to the occational prolong drought many crops including sweet potatoes suffered drought stress, especially when El Nino occurred. The physiology of sweet potato has been almost neglected in terms of scientific research. The present research was aimed to observe the physiological response of sweet potato to the water stress. Stomatal density and plant water relations represented the physiological parameters were observed in Lole and Wanmun sweet potato cultivar. Lole and Wanmun were subjected to three water stress levels. The water stress levels were imposed by maintaining the soil water content at 20%, 40%, and 80% of field capacity. The factorial experiment used a complete randomized design with 4 replications. The results showed that plant water status and transpiration were both affected by soil water regimes. Lole recorded greater plant water status and less transpiration than did Wanmun in all soil water regimes, this was also shown by lower stomatal number in Lole cultivar in spite of no effect on stomatal density due to water stress. This indicated that Lole was more efficient in consuming soil water and hence more tolerant to water stress than Wanmun.

F63 PLANT PHYSIOLOGY - REPRODUCTION

226 SUNARTI, S.
Pollen viability test of mulberry at stages of flower and storage period. *Pengujian viabilitas serbuk sari murbei pada berbagai tahapan bunga dan lama penyimpanan*/Sunarti, S.; Pudjiono, S. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 1-7, 1 ill., 4 tables; 5 ref.

MORUS ALBA; POLLEN; VIABILITY; FLOWERS; DEVELOPMENTAL STAGES; STORAGE; PERIODICITY.

Pollen viability test of *Morus alba* var. Kanva 2 was conducted at P3HT, Yogyakarta. Media of Brewsbakers modified Owens (1991) used for this test. Treatments applied were 3 kind of flower stages i.e. prereceptive, receptive and postreceptive, than continued to period of storage, 1 to 3 days. The data result showed that the most available stage of flower was receptive stage (38.13%) pollen could not be stored even a day at 0 ^{o}C

H10 PESTS OF PLANT

227 ARIFIN, M.
Compatibility of SlNPV with HaNPV to control soybean cutworm and pod feeder. *Kompatibilitas SlNPV dengan HaNPV dalam pengendalian ulat grayak dan ulat pemakan polong kedelai*/Arifin, M. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumberdaya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(1) p. 65-70, 6 ill., 1 table; 12 ref.

GLYCINE MAX; SPODOPTERA LITURA; HELICOVERPA ARMIGERA; BIOLOGICAL CONTROL; NUCLEAR POLYHEDROSIS VIRUS; MORTALITY.

The cutworm, *Spodoptera litura* (F.) and pod feeder, *Helicoverpa armigera* (F.) are the most important insect pests on soybeans. Both insect pests can be controlled by using an entomopathogenic virus called nuclear-polyhedrosis virus (NPV). An experiment was conducted in a laboratory from September to December 2004 to determine the compatibility of SlNPV with HaNPV as active ingredients of a broad spectrum and virulence NPV biopesticide to control soybean cutworm and pod feeder. The experiment used four treatments of SlNPV and HaNPV combinations, each with nine concentrations ranged from 5 X 10^2 to 5 X 10^6 polyhedra inclusion bodies (PIBs)/ml. Results indicated that the SlNPV and HaNPV combinations were highly virulence to the cutworm and pod feeder, with LC50 values were 6.0 X 10^3 and 6.5 X 10^3 PIBs/ml, respectively. The SlNPV and HaNPV combinations were the same virulence with NPV standards. Therefore, both NPVs were compatible and suitable to be combined as a broad spectrum biopesticide to control soybean cutworm and pod feeder.

228 ATMADJA, W.R.
Effect of cashew nut shell liquid (CNSL) to mortality of *Helopeltis antonii* Sign. on cashew seedling. *Pengaruh cashew nut shell liquid (CNSL) terhadap mortalitas Helopeltis antonii Sign. pada bibit jambu mete*/Atmadja, W.R.; Wahyono, T.E. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 66-71, 2 tables; 9 ref.

ANACARDIUM OCCIDENTALE; SEEDLINGS; HELOPELTIS ANTONII; MORTALITY; BOTANICAL INSECTICIDES; CASHEWS.

The effects of CNSL to *Helopeltis antonii* Sign. on cashew seedling were done in laboratory and greenhouse of pest and diseases division at Research Institute for Spice and Medicinal Crops on June until September 2004. The research aimed at studying CNSL effect to *H. antonii* on cashew seedling.

This experiment used two methods, they were topical spray and foliar spray methods. The CNSL treatment that applicated to insects were 0.625; 1.25; 2.50; and 5% concentrations and control. The total number of insect used 10 insects for each treatment of *H. antonii* adult, respectively. The application of cashew seedling used 1.25; 2.50; 5; 10; and 20% concentrations and control. Observation was carried out every day by counting *H. antonii* mortality level. The research was arranged in randomized block design (RBD) with 5 treatments and 5 replications for topical spray method and 6 treatments and 4 replications for foliar spray method. The research results showed that the highest mortality level of insects occured on directly applied CNSL treatment to *H. antonii* of 5% concentration with 100% insect mortality on the 6th days after application, while treayed by applying CNSL of 20% concentration to cashew seedling on 4, 5, and 6th days after application, the mortality level of *H. antonii* were 52.50, 62.50 and 97.50%, respectively.

229 DARWIS, M.
Pests of patchouli plant and their damage. *Jenis-jenis hama dan serangannya pada tanaman nilam*/Darwis, M. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(2) p. 76-82, 1 table; 8 ref.

POGOSTEMON CABLIN; PESTS OF PLANTS; SEEDLINGS.

Generally, patchouli is still cultivated traditionally in Indonesia. Improved technology such as pest and disease control methods, is needed. Observation of pests on patchuoli was carried out at Sukamulya experimental garden from August 2004 to January 2005. Further research was carried out at the laboratory and greenhouse of the Indonesian Spice and Medicinal Crops Research Institute to examine the damage of patchouli plant due to the main insect attack. The experiment was arranged in a randomized block design, with 6 treatments and 4 replications. The experiment used one month-old patchouli seedlings of Sidikalang variety and the main insect of third instar grub. The white grub was infested on patchouli seedling. Each plant was infested with 0, 1, 2, 3, 4, 5, grubs as treatments. The results showed that grasshopper (*Valanga* sp), aphids (*Myzus persicae*), termite (*Coptotermes* sp), snail (*Achatina* sp) and white grub (*Exopholis hypoleuca*) attacked the patchouli plant with low up to high damages. It was observed that the grub was a dominant pest which attacked 1.800 out of 15.000 patchouli plants at Sukamulya experimental garden. Treatments grubs on patchouli seedlings at one, two, three, four and five grubs/polybag caused death on the seedlings at 14, 13, 10, 7 and 7 days after infestation, respectively. While the control seedlings were still alive until the end of the experiment.

230 DARWIS, M.
Controlling *Sexava spp*. through integrated pest management. *Upaya pengendalian hama Sexava spp. secara terpadu*/Darwis, M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 98-110, 41 ref.

COCOS NUCIFERA; LEAF EATING INSECTS; INTEGRATED PEST MANAGEMENT.

Sexava spp consisting of several species, is a major pest of coconut palm. Heavy infestation of this pest may cause serious damage on coconut leaves, and may kill the trees. It was reported that in the districts of Sangihe and Talaud, North Sulawesi, on the first quarter of 2004, approximately 13.000 ha of coconut farms were seriously attacked by *Sexava spp*. The productivity of smallholders coconut farm decreased up to 0.4 - 0.5 ton copra/ha/year. Several programs to control *Sexava* were carried out and the technology to control *Sexava* is available. Theoritically the life probability of *Sexava spp*. is only 14%, approximately 86% can be controlled automatically. To control *Sexava spp*., six methods have been introduced, namely cultivation technology, mechanical system, intercropping, biological control, quarantine system and insecticide application. The newest innovation on biological control was using entomophathogen fungus called "Metabron" (Metarrhizium isolated from Bronstispa) which is effective to control *Sexava spp*. on coconut. One of the benefits of this biological agent was it could automatically and continuously grow in a long periode, in a good treatment and condusive circumstance. Hopefully, the role of Metabron was not only as biological control, but also as biological weapon against *Sexava spp*. pest. The mortality caused

by Metabron was very high. At the concentration of $5x10^5$ conidium/micro l, it was effective to cause 90.25% nymph mortality and 86.25% imago mortality. On the program of *Sexava spp*. management all of technology components should be practiced and suitable with integrated pest management system. In the joint program between Coconut Research Institute and COGENT, three component technologies were applied, namely the use of resistant variety, product diversification, and intercrops plus animal husbandry. It was found that the treatments were able to increase farmer's income and prosperity significantly. To solve the problem of *Sexava spp*. in small holder coconut farms in Sangihe and Talaud, those three components can be integrated with other existing control components. The intensive coordination amongst related institutions are needed to make the program effective and useful.

231 DONO, D.
Effect of extract of *Aglaia harmsiana* Perkins seeds on biological characters of parasitoid, *Eriborus argenteopilosus* Cameron on host *Crocidolomia binotalis* Zeller. *Pengaruh ekstrak biji Aglaia harmsiana Perkins (Meliaceae) terhadap karakter biologi parasitoid Eriborus argenteopilosus Cameron pada inang Crocidolomia binotalis Zeller*/Dono, D. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Pertanian); Prijono, D.; Manuwoto, S.; Buchori, D. *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 234-248, 1 ill., 7 tables; 34 ref.

AGLAIA; PLANT EXTRACTS; BOTANICAL INSECTICIDES; CROCIDOLONIA; BINOTALIS; BIOLOGICAL CONTROL; PARASITOIDS.

Insecticides can give either negative or positive effects on biological characters of parasitoid that develop from insecticide-exposured host insects. The effect of botanical insecticide, the extract of *Aglaia harmsiana* seeds on survival, morphological characters, and reproduction of parasitoid *Eriborus argenteopilosus* which developed from *Crocidolomia binotalis* larvae have been studied. This research was conducted to evaluate the effect of the extract of *A. harmsiana* seeds on survival, morphological characters, and fecundity of *E. argenteopilosus* developed from *C. binotalis* larvae treated with the extract. The results indicated that the treatment of the extract of *A. harmsiana* at a concentration equivalent to LC25 on *C. binotalis* larvae improved the number of emergence of parasitoid from *C. binotalis* larvae, increased body size of adult parasitoid, lengthened live span, and increased reproductive capacity of adult female of *E. argenteopilosus*. Therefore, the extract of *A. harmsiana* seeds had a good opportunity to be combined with biological control using parasitoid in integrated pest management system at cabbage cropping.

232 HARNI, R.
Effect of application method of endophytic bacteria on root lesion nematode (*Pratylenchus brachyurus*) on patchouli. *Pengaruh metode aplikasi bakteri endofit terhadap perkembangan nematoda peluka akar (Pratylenchus brachyurus) pada tanaman nilam*/Harni, R.; Mustika, I. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia))Supramana; Munif, R. *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(4) p. 161-165, 2 tables; 18 ref.

POGOSTEMON CABLIN; PRATYLENCHUS BRACHYURUS; PLANT DISEASES; BIOLOGICAL CONTROL; ENDOPHYTES.

Endophytic bacteria is one of the important agents recently used for controlling plant parasitic nematodes. *P. brachyurus* is one of the factors affecting the productivity of patchouli (*Pogostemon cablin* Benth.) in Indonesia. The objective of the research was to find out an efficient application method of endophytic bacteria to reduce *P. brachyurus* on patchouli. The research was conducted in the Nematology Laboratory, Department of Plant Protection, Bogor Agricultural University and in the Laboratory and Greenhouse of Indonesian Spice and Medicinal Crops Research Institute, from January to July 2005. The research used randomized completely design with two factors, the first factor was application method (drencing and deeping), the second factor was bacteria isolates (NJ2, NJ25, NJ41, NJ46, NJ57, NA22, ERB21, ES32, E26). The result showed that the population of nematode was affected by the interaction between bacterial isolates and application method. While shoot weight, root length and plant height were

affected by bacterial isolates. Bacillus NA22, Bacillus NJ46 and Bacillus NJ2 applicated by deeping the root into bacterial suspension significantly gave good result in reducing *P. brachyurus*, i.e. 75%, 63% and 60%. All bacterial isolates increased shoot weight, root length, and plant height.

233 ISTIANTO, M.

Composition and concentration of sweet orange and pummelo essential oils to the development of *Panonychus citri* McGregor. *Komposisi dan konsentrasi senyawa dalam minyak atsiri jeruk manis dan jeruk besar terhadap perkembangan tungau Panonychus citri McGregor*/Istianto, M. (Balai Penelitian Tanaman Buah, Solok (Indonesia)); Untung, K.; Mulyadi; Trisyono, Y.A.; Yuwono, T. *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(1) p. 40-49, 4 ill. 3 tables; 23 ref.

CITRUS SINENSIS; CITRUS GRANDIS; ESSENTIAL OILS; BOTANICAL INSECTICIDES; PANONYCHUS CITRI; CHEMICAL COMPOSITION.

Panonychus citri is one of the most economically important citrus pests in Indonesia. One of the key success for controlling the population of the pest is understanding the relationship between this mite and its host. However, information in this area is not well understood. The objectives of this research were to evaluate the influences of essential oil extracted from sweet orange and pummelo fruit peels on the development and reproductive capacity of *P. citri* and to understand the mechanism responsible for the different effects that will be useful to develop management program. The research was conducted in the laboratory of Research Station for Citrus Crops in Tlekung-Batu, Malang and Gadjah Mada University Yogyakarta. The treatments were 10, 20, 40, 80 ppm of essential oil, parafin and control. Each treatment was replicated 15 times and arranged in a completely randomized design. The results showed that the essential oil extracted from Pacitan sweet orange and Nambangan pummelo fruit peels could inhibit the development and reduced the reproductive capacity of *P citri*. The essential oils prolonged the life cycle and reduced the fecundity of *P. citri*. These negative effects were caused by limonene, a dominant compound in the citrus essential oil. The negative effects of essential oil extracted from Nambangan pummelo were found to be more pronounced than that from Pacitan sweet orange. Concentration of linalool was found to be responsible for the differences, and it worked oppositely with limonene by reducing the negative effects of limonene on *P. citri*. Essential oil of Pacitan sweet orange contained more linalool than pummelo. This result gaves an alternative technology to control *P. citri* by using volatile compounds produced by the plant itself with certain composition.

234 LABA, I W.

Ecosystem management for controlling black pepper pest. *Pengelolaan ekosistem untuk pengendalian hama lada*/Laba, I W.; Trisawa, I M. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 86-97, 2 tables; 41 ref.

PIPER NIGRUM; PEST CONTROL; ECOSYSTEMS; STEM EATING INSECTS; MIXED CROPPING; COVER PLANTS; NATURAL ENEMIES.

Pest is one of the obstacles of black pepper production in Indonesia. The pest attacks all parts of the plant such as inflorescens, fruits, shoots, branches and stems at nursery as well as in the field. In Indonesia black pepper was infested by 3 species of pests, namely stem borer, Lophobaris piperis Marsh, pepper berry bug, *Dasynus piperis* China and lace bug, *Diconocoris hewetti* (Dist.). The population of stem borers always presents in the field with different stages (egg, larvae, pupa and adult), while lace bug and pepper berry bug are found in the field during flowering and fruit stages. Control of black pepper pests by farmers is usually using syntetic pesticide. Other alternative to manage black pepper pest is ecosystem management and natural enemy such as parasitoid. To increase the natural enemy population can be done by natural enemies conservation through cover crops, mix cropping and limited weeding. *Arachis* sp., *Orthosiphon* sp., *Ocimum* sp. and *Coffea* sp. plants can be used in cropping system with black pepper.

235 NURINDAH.
Agroecosystem management for pest control. *Pengelolaan agroekosistem dalam pengendalian hama*/Nurindah (Balai Penelitian Tanaman Tembakau dan Serat, Malang (Indonesia)). *Perspektif* ISSN 1412-8004 (2006) v. 5(2) p. 78-85, 38 ref.

GOSSYPIUM HIRSUTUM; INTEGRATED PEST MANAGEMENT; AGROECOSYSTEMS; BIODIVERSITY.
Agroecosystem management is an integrated pest management (IPM) with ecological approaches. This method can be applied when the factors that make the agro ecosystem become vulnerable to pest outbreak are known. The main agroecosystem management for pest management is to create the balance between herbivores and their natural enemies by increasing biodiversity, enhancing vegetations and biomasses. Increasing vegetation diversity can be done by adopting poly culture systems, optimizing agronomic arrangements. Increasing biomasses can be done by applying mulch, green manures, and cattle manures. Both methods are aimed to obtain optimal land productivity and sustainability.

236 PRAYOGO, Y.
Effectiveness of entomopathogenic fungi to control soybean pod sucker *Riptortus linearis* L. and its impact on the predator *Oxyopes javanus* Thorell. *Keefektifan cendawan entomopatogen dalam mengendalikan hama pengisap polong kedelai Riptortus linearis L. dan dampaknya terhadap predator Oxyopes javanus Thorell*/Prayogo, Y. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)); Santoso, T.; Widodo. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(2) p. 53-60, 3 ill., 3 tables; 33 ref.

GLYCINE MAX; RIPTORTUS; OXYOPES; ENTOMOGENOUS FUNGI; BIOLOGICAL CONTROL; PREDATORS.

Pod sucking bug (*Riptortus linearis*) is one of the most important pests on soybean. It causes severe damages on soybean pods and crop losses of about 79%. Under the natural conditions, natural enemies, such as predators, control population of *R. linearis* effectively. A research was done to evaluate efficacy of five species of entomopathogenic fungi on soybean pod sucker *R. linearis* L. and to identify impact of these fungi on survival of the soybean pod predator *Oxyopes javanus* Thorell. The research was conducted at laboratory of Insect Pathology of Bogor Agriculture Institute. Five isolates entomophagous fungi, i.e: *Metarhizium anisopliae*, *Beauveria bassiana*, *Verticillium lecanii*, *Nomuraea rileyi*, and *Paecilomyces fumosoroseus*, were used in the trial. Conidia of 30 day-old-cultures of the fungi were suspended in sterile water, and mixed with tween 20. These suspension of 107/ml conidia were sprayed on adult of *R. linearis*, immediately after the insect were introduced in the cage where soybean was planted as host plant. Deltametrin insecticide and water were sprayed as comparison and control, respectively. The mortality of *R. linearis* and the pod damage were assessed to establish the rate of effectiveness of the fungi. The most pathogenic fungus was subsequently tested on five nymph stages of *R. linearis* and on *O. javanus*. The result showed that *V. lecanii* fungi gave the highest mortality rate 81% and the lowest level of damage to the seed of soybean as compared to the application of 0.5 l/ha of deltametrin. Nymph instar I and II of *R. linearis* are more susceptible to *V. lecanii* and the mortality reach 80%. The application of *V. lecanii* at 1011 conidia/ml did not affect the survival of *O. javanus*. Therefore, *V. lecanii* has a high potential that can be used as one of the biological agents to control pod sucking bug *R. linearis*.

237 SULISTYOWATI, E.
Development of monitoring technique for cocoa pod borer (*Conopomorpha cramerella* Snell.). *Pengembangan teknik pemantauan penggerek buah kakao (PBK) Conopomorpha cramerella Snell*/Sulistyowati, E.; Wardani, S.; Mufrihati, E. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)). *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(3) p. 159-168, 2 ill., 2 tables; 10 ref.

THEOBROMA CACAO; CONOPOMORPHA CRAMERELLA; MONITORING; TRAPPING; PEST CONTROL EQUIPMENT; APPLICATION METHODS.

Effectiveness and efficiency of CPB control were influenced by the right time of control. To decided this methods, information about CPB infestation was needed. An experiment had been conducted to get a simple and accurate technique for CPB monitoring. The experiment was located in Tirawuta, a small-holder cocoa plantation in Kolaka District, South-East Sulawesi. The evaluated monitoring pods techniques by observing all ripe cocoa pod as standard method, i.e. pod colour changes as an indicator of CPB attack, observation on 100 pods during harvesting, moth trapping and observation on the presence of the holes caused by CPB. The collected data expressed as the percentage of CPB attack and compared with each other. Based on the Chi square value and time consumed for monitoring, it could be concluded that the observation of 100 attacked pods during harvesting was the most accurate technique closest to the standard method, with a lowest chi square value and not significantly different to standard method. On the contrary the visual observation on the pod colour showed the less accurate technique with chi square value of 242.25-335.33 followed by the observation on the present of holes on the pod with chi square value of 243.45-282.87. Furthermore, monitoring technique by moth trapping could not be compared with the other techniques since their unit was unequal. However, no insect could be trapped during a night trapping using either chemical trapping or sticky trap. Development of sticky trap by variation in trap colour could be trapped of CPB moth during more than one week. Red trap was the most interesting (preferred) for the CPB followed by the yellow, white and blue ones. There was significant correlation between number of tree sample and the time needed for observation. Larger size of tree sample consumed a longer time for the observation, but in visual symptom and entry/exit hole observation methods, larger sample size did not significantly influence its accuracy. It's concluded that both of monitoring technique were not a converge estimation.

H20 PLANT DISEASES

238 GUNAWAN, O.S.
Use of antagonistic microbes as biopesticides in controlling anthracnose disease on red pepper. ***Mikroba antagonis untuk pengendalian penyakit antraknos pada cabai merah***/Gunawan, O.S. (Balai Penelitian Tanaman Sayuran, Lembang (Indonesia)). *Jurnal Hortikultura* ISSN 0853-7097 (2006) v. 16(2) p. 151-155, 2 tables; 18 ref.

CAPSICUM ANNUUM; GLOMERELLA CINGULATA; ANTHRACNOSIS; ANTAGONISM; MICROORGANISMS; BIOPESTICIDES; BIOLOGICAL CONTROL.

The objective of this experiment was to determine the effect of biopesticides formulations on the growth and yield of pepper. The research was conducted in Indonesian Vegetable Research Institute in Lembang from June 2003 to January 2004, by using a randomized block design. Each treatment was replicated 3 times. Eight treatments formulation were PfMBO 001 50 WP 0.7 g/l; 0.35 g/l; 0.175 g/l; BSBE 001 50 WP 0.7 g/l; 0.35 g/l; 0.175 g/l; standard fungicide Bion-M 1/48 WP 2 g/l and water as control (untreated). Biopesticides were applied at 7 days intervals, starting from fruit setting (>50 days after planting) for 4 months. Results of this experiment showed that the use of PfMBO 001 50 WP and BSBE 001 50 WP were not significantly suppresed anthracnose disease on red pepper fruits and gave the same effect as Bion-M 1/48 WP fungicide. The yield obtained by using those biopesticides were not significantly different with Bion-M 1/48 WP fungicide treatment.

239 HADIASTONO, T.
Mozaic disease on tomato (*Lycopersicon esculentum* Mill). ***Penyakit mosaik pada tanaman tomat (Lycopersicon esculentum Mill)***/Hadiastono, T. (Universitas Brawijaya, Malang (Indonesia). Fakultas Pertanian). *Agrivita* ISSN 0126-0537 (2006) v. 28(2) p. 160-164, 3 ill., 5 tables; 7 ref.

LYCOPERSICON ESCULENTUM; CUCUMBER MOSAIC CUCUMOVIRUS; SYMPTOMS; ISOLATION TECHNIQUES; DISEASE TRANSMISSION; INDICATOR PLANTS.

A virus obtained from tomato (*Lycopersicon esculentum* Mill.) plant was identified as a strain of cucumber mosaic virus. The virus infected plants of 5 species, including 3 species of legumes and 2

species of solanaceae. It tolerated 6 hours aging and about 1:100 dilution. Plant of broad bean, *Dolichos lab lab*, Glycines, tomato, pepper, were useful in distinguishing this virus from others. The last two species were specific of symptoms. No symptom on Glycine and *D. lab lab*.

240 MACHMUD, M.
Detection and identification of *Ralstonia solanacearum* strains by its polyclonal antibody using indirect ELISA technique. *Deteksi dan identifikasi strain Ralstonia solanacearum dengan teknik ELISA tidak langsung*/Machmud, M.; Suryadi, Y. (Balai Besar Penelitian dan Pengembangan Bioteknologi dan Sumber Daya Genetik Pertanian, Bogor (Indonesia)). *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2006) v. 25(2) p. 91-99, 1 ill., 5 tables; 22 ref.

ARACHIS HYPOGAEA; PSEUDOMONAS SOLANACEARUM; POLYCLONAL ANTIBODIES; ELISA; IDENTIFICATION; BACTERIOSES; DISEASE CONTROL.

Several techniques for early and rapid detection of *Ralstonia solanacearum* have been developed as components in the integrated control of bacterial wilt. The DNA based techniques are highly effective in detecting the bacterium, but they require sophisticated and expensive materials and impractical for field applications. The enzyme-linked immunosorbent assay (ELISA) is one of the serological techniques that is effective for detection and identification of bacterial plant pathogens, because it is relatively rapid, inexpensive, does not require sophisticated equipment, and applicable under field conditions. Modifications had been made by researchers to improve sensitivities of the detection, including those for *R. solanacearum*, and among them was the Indirect ELISA technique. A laboratory study was done to produce polyclonal antibody (PAb) to *R. solanacearum* and to apply the antibody for detection of strains of *R. solanacearum* representing different hosts, races, and biovars using the indirect ELISA technique. The results showed that PAb to *R. solanacearum* was producible on white rabbits using three different immunization schemes at titers ranging from 128 to 4096. The indirect ELISA technique using the PAb is applicable for detection of *R. solanacearum* strains representing Race 1 Biovar 3, Race 2 Biovar 1, and Race 3 Biovar 2, either from pure cultures, soils, or plant parts. The lowest detection level of the ELISA technique is 10 at the power of 3 cell/ml.

241 NASRUN.
Bacterial wilt disease on patchouli and its control strategy. *Penyakit layu bakteri pada nilam dan strategi pengendaliannya*/Nasrun (Kebun Percobaan Balai Penelitian Tanaman Obat dan Aromatik Lain, Solok (Indonesia)); Nuryani, Y. *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 9-15, 1 ill., 1 table; Bibliography p. 13-15

POGOSTEMON CABLIN; PSEUDOMONAS SOLANACEARUM; SYMPTOMS; BIOLOGICAL CONTROL; INTEGRATED CONTROL.

Bacterial wilt disease is one of the most serious diseases on patchouli plant in West Sumatra, North Sumatra, and Nanggroe Aceh Darussalam (NAD). The disease is caused by *Ralstonia solanacearum* and reduces patchouli production as high as 60-80%, so that it is a constraint in increasing patchouli productivity. The pathogen can be controlled by using tolerant varieties such as Sidikalang, cultural method (fertilizer application, organic matter, and mulch), biological control (*Pseudomonas fluorescens* and *Bacillus spp*.), botanical pesticide (lemon grass), chemical control (bactericide), and preventing pathogen spreading from infected area to non-infected area. Bacterial wilt disease should be controlled integratedly by combining various control techniques.

242 NOVERIZA, R.
Application of *Fusarium oxysporum* non pathogenic (FoNP) in inducing resistance of black pepper seedlings to *Phytophthora capsici*. *Aplikasi Fusarium oxysporum non patogenik (FoNP) untuk menginduksi ketahanan bibit lada terhadap Phytophthora capsici L.*/Noveriza, R.; Tombe, M.; Manohara, D. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)); Rialdy, H. *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0215-0824 (2005) v. 16(1) p. 27-37, 2 ill., 2 tables; 29 ref.

PIPER NIGRUM; PHYTOPHTHORA CAPSICI; FUSARIUM OXYSPORUM; INDUCE RESISTANCE; PATHOGENS.

Phytophthora capsici Leon is a soil borne pathogen which is known as the causal agent of foot rot disease of black pepper (*Piper nigrum* L.). Induced plant resistance against pathogens is a widespread phenomenon that has been intensively investigated with respect to the underlying signaling pathway as well as to its potential use in plant protection. This study used non pathogenic *Fusarium oxysporum* (FoNP) for inducing resistance on black pepper cuttings against foot rot disease at laboratory and glass house of Phytopatology Laboratory of Indonesian Spice and Medicinal Crop Research Institute-Bogor from July until December 2004. It was observed that FoNP had ability to reduce disease severity. The level of effectiveness was 84.99% (at four months seedlings). The level of effectiveness of fungicide treatment was 14.49%. FoNP was able to colonize black pepper seedlings up to two and a half months. The lowest viabilities of *P. capsici* was observed on black pepper seedling treated with Organo-TRIBA. This study suggested that FoNP has potential to be used in inducing resistance of black pepper seedlings to foot rot disease, eventually will reduce severity of the disease.

243 SALEH, N.
[Soybean mosaic virus (SMV) and soybean stunt virus (SSV) infections transmitted by seed and effort of SMV and SSV free seed production]. ***Penularan virus mosaik kedelai (SMV) dan virus kerdil kedelai (SSV) lewat benih, dan upaya memproduksi benih kedelai bebas SMV dan SSV***/Saleh, N. (Balai Penelitian Tanaman Kacang-kacangan dan Umbi-umbian, Malang (Indonesia)). *Buletin Palawija* ISSN 1693-1882 (2005) (no. 9) p. 11-20, Bibliography p. 18-20

GLYCINE MAX; SOYBEAN MOSAIC POTYVIRUS; VIROSES; SEED PRODUCTION; INFECTION.

Virus disease infections and the use of low quality seeds are some of the reason of low soybean yield in Indonesia. More than 10 viruses infect soybean crops, and among them soybean mosaic virus (SMV) and soybean stunt virus (SSV) are transmitted through soybean seeds. SMV and SSV were distributed in the seed coats as well as embryo (embryo axis and cotyledon) of infected seeds. Transmission of SMV and SSV through soybean seeds play an important role in virus distribution and epidemic development of the diseases in the field. The presence of SMV and SSV in soybean seeds could be detected by simple methods as growing on and infectivity test, and by using serological methods (such as precipitation test, agglutination test, immuno electron microscopy (IEM), enzyme-linked immunosorbent assay (ELISA), radio immunosorbent assay (RISA), and nucleic acid hybridization. A relatively SMV and SSV-free soybean seeds could be produced under certain pre-requirement, (1) avoid the presence of primary source of infections in the field (using healthy seeds, roguing and eradication of infected plants), (2) avoid the virus entry and distribution in the field (time and local isolations, vector management), and (3) planting of resistant varieties or varieties which are not transmit SMV and SSV through their seeds.

J11 HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCT

244 ISMAYADI, C.
Influence of storage of wet arabica parchment prior to wet hulling on moulds development, *Ochratoxin A*. contamination, and cup quality of mandheling coffee. ***Pengaruh penyimpanan biji kopi arabika mandheling bercangkang sebelum pengupasan basah, terhadap perkembangan jamur, kontaminasi Ochratoxin A., dan mutu seduhan***/Ismayadi, C.; Sumartono, B. (Pusat Penelitian Kopi dan Kakao Indonesia, Jember (Indonesia)); Marsh, A.; Clarke, R. *Pelita Perkebunan* ISSN 0215-0212 (2005) v. 21(2) p. 131-146, 1 ill., 7 tables; 11 ref.

COFFEE BEANS; HUSKING; SEED STORAGE; MOULDS; OCHRATOXIN; CONTAMINATION; BOILING; FLAVOUR.

Mandheling coffee has been a well known special coffee for decades and the demand for this coffee is currently increasing. This coffee is characterised by low acidity, heavy-complex body, spicy-little earthy and fruity flavor. Mandheling coffee is produced by smallholder farmers in the highland surrounding Lake Toba, North Sumatra in an unique way i.e. following de-pulping and 1-2 days sundrying, wet parchment is stored for varying periods up to a few weeks, the parchments are then de-hulled when still wet (40-45% moisture content) then the beans sundried. The handling procedure presumably contributes to the unique cup character of mandheling coffee. On the other hand, the storage of wet parchments may cause mould growth and mycotoxin contamination. This trial was designed to study the influence of storage of wet parchments prior to wet hulling on mould development. OTA contamination and cup mandheling characteristic of the coffee product. The normal wet process, drying of parchment thoroughly to 12% moisture content was used as the control. Parchment coffees (6 lots) used for this trial were drawn from farmers and collectors in the region. The wet parchments (41.74-53.96% moisture content) were stored for 1 (D1), 7 (D7) and 14 (D14) days in PE sacks in a warehouse in the region. During the storage period, when there was visible mould growth, the parchments were spread on a plastic sheet inside the warehouse, as per common practice to suppress the mould growth. Following storage, the wet parchment was de-hulled and then sun-dried to a moisture content of 12% (MC 12%) or dried to a moisture content of 17%, and held in storage for 3 weeks prior to final drying to 12% MC. The normal wet process (fresh-non stored parchments dried thoroughly to 12%) were used as the control. Parameters measured were visual evaluation, mould infestation, aW, moisture content (MC) on the stored parchment; while for dried beans mould infestation, OTA content and the mandheling cup character evaluation (done by 4 panelists who were familiar to the coffee) were determined. Some mould species grew during the storage course, which black Aspergillus was the dominant species found in the beans; while *A. ochraceus* an OTA producer, was found in some samples with low infection rate (0-15.3%). Spreading of coffee inside the warehouse during the day could suppress moulds growth. OTA was found in only 5 samples out of 42 samples with range of 0.17-2.24 ppb, very less than European Union limit. There was no clear trend of storage period on the mould infection rates, OTA content, and the Mandheling cup characters. The high variability of the outcome was likely due to the unhomogenity of parchments used for this trial. The best mandheling was found in the sample of D1-MC 12% coffee source of lot 1.

245 NUGRAHA, S.

Analysis of rice processing models: case study in East Lombok, West Nusa Tenggara (Indonesia). ***Analisis model pengolahan padi: studi kasus di Kabupaten Lombok Timur, Nusa Tenggara Barat***/Nugraha, S.; Thahir, R.; Lubis, S. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)); Sutrisno. *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2007) v. 5(1) p. 13-26, 7 tables; 11 ref. Appendices

RICE; PROCESSING; DRYERS; POSTHARVEST EQUIPMENT; POLISHING; QUALITY; FARM INCOME; NUSA TENGGARA.

Analysis of rice processing models was conducted in Selubung Ketangga Village, Keruak Subdistrict, East Lombok District, West Nusa Tenggara Province, as an assessment location of poor farmer income improvement through innovation project (PFI3P). The main objective of the research was to increase farmer income through improvement of milled rice quality and milling recovery. Site identification survey to installing model placement and dryer with has fuel and mist water polisher test trial has been conducted in the first step. In 2004 fiscal year; model improvement was done by installing 1 unit of rice polisher ICHI N-70, and 1 unit engine RINO S 115, 24 HP. Result of research indicated that paddy drying using husk fuel dryer produced better dried paddy quality and higher milling recovery (65.7%), that was mean can increase farmer's rice milling recovery about 2-3% from prior recovery about 60-63%. Improvement milled rice quality through mist water process addition on ICHI N-70 polisher could produce better milled rice quality, a.w cleaned and shiner; hence increase the price about Rp 300/kg. Generally this model assessment could increase farmer's income which obtained by loss production oppression than 5.65 percent, milling recovery improving between 2-3% and increasing of rice price Rp 300/kg. Increasing of farmer's income was about Rp 1,630,290/ha.

246 USMIATI, S.
Pepper skin decorticating process using pectinase enzyme. *Pengupasan kulit buah lada dengan enzim pektinase*/Usmiati, S.; Nurdjannah, N. (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). *Jurnal Penelitian Tanaman Industri* ISSN 0853-8212 (2006) v. 12(2) p. 80-86 , 3 ill., 6 tables; 15 ref.

PIPER NIGRUM; PEPPER; POSTHARVEST TECHNOLOGY; PEELING; POLYGALACTURONASE; ENZYMES; QUALITY.

Soaking process as a part of traditional white pepper processing which is usually done for more than 8 days influence the quality of white pepper produced. Long soaking process could produce bad odour and increase the possibility to be contaminated with undesirable microorganism. For that reason the soaking process duration should be shortened but still could make the pepper skin to be soft enough to be peeled. Enzimatic process using pectinase enzyme is one of methods which can be used. The mechanical process to improve the quality of white pepper is available, but to increase its capacity the softening pepper skin process is needed. The aim of this study was at finding out the possibility of using pectinase to softening the pepper skin in white pepper processing and the quality of white pepper produced. The study was designed as completely randomized design (CRD) factorially 2x2 with 4 replications. Treatments consisted of: (i) pectinase (A): Al (1%) and A2 (2%), and (ii) citric acid: Bl (0%) and B2 (2%). Parameters observed were total plate count (CFU/ml), yield (percent), colour which was stated as degree of lightness, redness and bluish, essential oil concentration (percent) and moisture content (percent). The result showed that the use of pectinase could decrease the soaking period to 24 hours. The colour value of white pepper produced with 1% pectinase and 2% citric acid treatments was relatively the same with the one produced by traditional method, with much TPC value. Based on the above result, pectinase could be consider to be applied in traditional method to decrease the soaking process and it could also use to softened the pepper skin before mechanical decorticating process.

K10 FORESTRY PRODUCTION

247 ADINUGRAHA, H.A.
Treatment of stem and root bark peeling in rejuvenation of *Melaleuca cajuputi*. *Pengupasan kulit pada cabang dan akar dalam rejuvenasi tanaman kayu putih*/Adinugraha, H.A.; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 9-16, 4 tables; 9 ref.

MELALEUCA LEUCADENDRON; PLANT PROPAGATION; STEMS; ROOTS; SHOOTS.

Plant propagation of *M. cajuputi* usually conducted by seed (generative), which as generally has many constraints, i.e. still low of seed quality number, a low of seed growth percentage, a high of seed viability and genetic gain is not optimally yet, therefore the effectivity and efficiency of plant propagation are necessarily used. The experiment with the objective to evaluate the treatment on stem and root bark peeling was conducted at The Center for Plantation Forest Research and Development Yogyakarta. The experiment was arranged factorially as complete randomized design with 2 factors and 5 replications, the first factor was plant material i.e. stem and root, and the second factor was bark peeling and untreated. Parameters were observed on shoot percentage, bud and shoot number performed. The experiment result showed that the treatment on stem and root bark peeling gave better effect on shoot percentage, bud and shoot number than others.

248 ADINUGRAHA, H.A.
Grafting study of *Eucalyptus pellita* from seed orchard at Wonogiri. *Studi penyambungan jenis ekaliptus berasal dari kebun benih Wonogiri*/Adinugraha, H.A.; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 37-45, 5 tables; 14 ref.

EUCALYPTUS; PLANT PROPAGATION; GRAFTING; ROOTSTOCKS; SCION; DIAMETER; JAVA.

One of plant vegetative propagation techniques is grafting, by which the genotype of mother plant can be maintained continuously. One constraint which was always appear in the plant grafting is incompatibility. The objective of this experiment was to study the grafting technique between time rootstock from seedling and scion from several plus trees of E. pellita in seed orchard at Wonogiri, Central Java. The experiment was conducted at Center for Plantation Forest Research and Development, Yogyakarta. The method of experiment was done by several activities as preparing of rootstock, scion, grafting used by rind graft technique and maintenance of grafted plants. The result of the experiment showed that the successfulness of the plant grafting were 10% - 80% of living grafted plants. Shading application gave better effect on percentage of living grafted plants and the number and length of shoot than control at 2 months plant age. The use of different diameter of rootstock gave different effect on living grafted plants. Increasing of rootstock diameter could increase the growth of grafted plants. The source of scion could be used from the sprouting of branch with diameter more than 3 mm and gave better growth (shoot number and shoot length) of grafted plants than scion from girlding. Direct grafting by using fresh scion gave better effect (80% of living grafted plants) than those which was stored by immersing in water for 1 - 3 days.

249 JAYUSMAN.
Shoots initiation of *Gonystylus bancanus* Kurz in vitro propagation. *Inisiasi tunas ramin melalui kultur jaringan*/Jayusman; Setiawan, A. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 53-62, 3 ill., 3 tables; 19 ref.

GONYSTYLUS BANCANUS; TISSUE CULTURE; PLANT GROWTH SUBSTANCES; SHOOTS.

A study on the preliminary research of tissue culture on *Gonystylus bancanus* Kurz has been done with the objectives of determining: (1) basal media and (2) combination of plant growth regulator suitable for in vitro culture. The large scale can provide a way to mass production within a short time, and bulk quantity of good quality seedlings from good breeding parental trees. Evaluation was done using four basal media: Murashige and Skoogs (MS); 1/2 MS; Woody Plant Medium (WPM): and Greshoff Doys) (GD). Two auxin plant growth regulators: indole acetic acid (IAA), napthalene acetic acid (NAA) and cytokinin (benzyl amino purine-BAP) of varying concentration, either alone or in combination were evaluated in the shoot tip culture. The results indicated that shoot tip explant planted in 1/2 basal media with combination of BAP 1 ppm + NAA 0.01 ppm gave the best response on initiation of explant shoot. While GD media with combination of BAP 1.25 ppm + IAA 0.05 ppm seemed suitable only for callus induction with poor growth.

250 JAYUSMAN.
Effect of basal media and plant growth regulator concentration towards the success of induction and multiplication in shoot tip culture of *Styrax benzoine*. *Peran media dasar dan konsentrasi hormon pertumbuhan terhadap induksi dan multiplikasi tunas pucuk kemenyan*/Jayusman (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 1-10, 4 ill., 4 tables; 14 ref.

STYRAX; TISSUE CULTURE; CULTURE MEDIA; PLANT GROWTH SUBSTANCES; SHOOTS; GROWTH.

One of biotechnology branches which has been implemented in Indonesia is plant propagation using tissue culture. A number of species have been produced commercially, such as *Tectona grandis* and *Acacia mangium*. Nowdays, the development of species priority by in vitro propagation were progressively done such as *Gonystylus bancanus* and *Styrax spp*. For that reason the research was done with an aim at finding out the approximate basal media and plant growth regulator concentration for the

induction phase of in vitro shoot development. The study was focused on application of varied basal media (MS and 1/2 MS) as well as application of BAP, NAA and Kinetin in different levels of concentration on induction and multiplication of *Styrax benzoine*. The observation result on *Styrax benzoine* shoot initiation showed that basal media of MS and application of plant growth regulators BAP 1 ppm combined with lAA 0.01 ppm gave the best growth. Basal media of MS and application BAP 0.5 ppm combined with NAA 0.01 ppm was the best result in shoot multiplications.

251 MAHFUDZ.
Effect of growth regulators and plant mediums on the growth of *Instia spp.* shoot cuttings. *Pengaruh zat pengatur tumbuh dan media tanam terhadap pertumbuhan setek pucuk merbau*/Mahfudz; Moko, H. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)); Isnaini. *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 25-34, 3 tables; 20 ref.
INSTIA; PLANT GROWTH SUBSTANCES; GROWING MEDIA; CUTTINGS; VEGETATIVE PROPAGATION; GROWTH.

Instia spp. is one kind of forest plants which has a high economic value for the development of plantation forest, therefore, there is a high need for seed supply. Plant growth regulators and plant mediums are important aspects in vegetative plant propagation, especially by shoot cutting. The objective of this study was to evaluate the effect of plant growth regulators and plant mediums. The study was conducted at the Centre of Plantation Forest Research and Development from June to December 2004. The experiment was arranged in completely randomized design with 2 factorial applications. The first factor was plant growth regulators: 0 and 20 ppm IBA and IAA; meanwhile the second factor was plant mediums: soil + sand (1:1); sand + compost (1:1); and soil + sand + compost (1:1:1), with 3 replications and 10 cuttings each. The experiment result showed that Instia spp. could be propagated by shoot cuttings; plant growth regulators gave better effect on the growth of shoot cuttings and the fresh and dry weight of cuttings than untreated with plant medium consisted of a high organic matter.

252 MASHUDI.
Application of growth media and fertilizer dosage on *Alstonia scholaris* (L.) R. Br. seedling growth at nursery. *Aplikasi media sapih dan dosis pupuk terhadap pertumbuhan bibit pulai di persemaian*/Mashudi; Setiadi, D.; Hamdan A.A.; Ismail, B. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 31-40, 4 tables; 10 ref.

ALSTONIA; SEEDLINGS; PLANTING STOCK; GROWING MEDIA; FERTILIZERS; DIMENSIONS.

The research was undertaken to find the best growth combination of media and fertilizer dosage of pulai (*Alstonia scholaris* (L.) R. Br.) on nursery. The research was conducted at greenhouse of Centre for Forest Plantation Research and Development, Yogyakarta from March until September 2004. Completely randomized design with factorial series with two factors (growth media and fertilizer dosage) and four layers of each factors, so all of 16 treatments were applied in the research. Four replications were used with five seedlings per replication. The media used were top soil (A1), mixing of top soil and compost (A2), mixing of top soil and coconut husk (A3), and mixing of top soil, compost and coconut husk (A4). The fertilizer used were control (BI), 0.5 gr (B2), 1.0 gr (B3) and 1.5 gr (B4). The effect of those treatment were trought the evalution of seedling percentage, seedling height, seedling diameter and number of leaf. The results showed that the seedling height and seedling diameter were significantly different but growth percentage and number of leaf were not significantly different. The best of three treatments for seedling growth were top soil and fertilizer 0.5 gr (A1B2), mixing of top soil, compost and fertilizer 1 gr (A2B3), and media of top soil (A1B1), respectively.

253 SETIADI, D.
Sprouting productivity of bread fruit root cuttings from several populations in Java and Madura. *Produktivitas trubusan setek akar sukun dari beberapa populasi di Jawa dan Madura*/Setiadi, D.;

Adinugraha, H.A.; Prastyono (Pusat Penelitian dan Pengembangan Hutan Tanaman, Bogor (Indonesia)). *Wana Benih* ISSN 1410-1173 (2006) v. 7(1) p. 29-36, 2 ill., 2 tables; 12 ref.

ARTOCARPUS ALTILIS; CUTTINGS; SEEDLINGS; SPROUTING; JAVA.

Artocarpus altilis Forsbeg is a multipurpose tree species which is generally cultivated in the garden. The aim of this research was to investigate the growth of *A. altilis* seedling from four populations in Java i.e. Kediri and Madura (East Java), Lebak/Banten and Sukabumi (West Java). The parameters have been evaluated to find the best seed population of good quality seedlings. Experiment was laid out in a completely randomized design with 5 replicates comprising 10 seedlings of each which were 5 months old after transplanting. The parameters evaluated were number of sprouts, number of leaves, sprouting length, sprouting diameter and seedling strengthen. The result showed that there was a significant effect of source of population on number of sprouts, number of leaves and seedling strengthen, but on the sprouting length and sprout diameter did not show any significant difference. *A. altilis* seedlings from Kediri (East Java) indicated as the best quality of seedling.

254 SIAGIAN, Y.T.
Effect of hedging treatment to the sprouting and rooting of leafy cutting of Hopea species. ***Pengaruh tinggi pangkasan terhadap pertunasan dan daya perakaran setek pucuk jenis Hopea***/Siagian, Y.T.; Adinugraha, H.A. (Pusat Penelitian dan Pengembangan Hutan Tanaman, Yogyakarta (Indonesia)). *Wana Benih* ISSN 1410-1173 (2005) v. 6(1) p. 25-30, 3 tables; 7 ref.

HOPEA; SPECIES; PRUNING; SPROUTING; ROOTING; CANOPY; PROPAGATION BY CUTTINGS; PROPAGATION MATERIALS.

The rejuvenation technique by hedging of *Hopea odorata* saplings is needed to obtain coppicing shoots as cutting materials. This experiment conducted 5 levels of height of felling as follows 10, 20, 30, 40 and 100 cm to know the influences of hedging on coppicing ability and rooting rate of the leafy cuttings. The result showed that height of felling and stem diameter caused variation on coppicing ability. The felling at 100 cm above the ground showed the largest of average shoot number (19.6) and shoot length (13.3 cm). The largest size of H. odorata saplings produced more coppicing shoots than smaller ones. The coppicing shoots taken from saplings that felt at 20 cm showed the best rooting rate and survival rate 45.6% and 89.7% after 6 weeks.

255 SURYANTO, P.
Crown development of teak from seedling, tissue culture and shoot cutting. ***Perkembangan tajuk pohon jati berasal dari biji, kultur jaringan dan setek pucuk***/Suryanto, P.; Aryono, W.B.; Sabarnurdin, M.S. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Kehutanan). *Jurnal Penelitian Hutan Tanaman* ISSN 1829-6327 (2006) v. 3(1) p. 35-43, 4 ill., 5 ref.

TECTONA GRANDIS; CROWN; TISSUE CULTURE; GROWTH.

In forest management, the use of teak as major timber has dealed the problems of seed supply and land intensification. The searching program of teak plant material gives alternatives result which are seed, tissue culture and cutting plant. Those three plant materials have own characteristics that need to be tested especially the matter of crown development relating to land intensification emphasizes to space management in agroforestry systems. This research used randomized completely block design (RCBD) with three kinds of teak plant materials (using 5 plus trees varieties) and three blocks. Treatment unit in square plot and each unit had 9 trees, with spacing of plant 6 m x 2 m. The result showed that crown cover estimation was attained when teak stand are 12 years old, 15.2 years old and 8.5 years old, if plant material used are seed, tissue culture and shoot cutting, respectively. If the availability of high quality teak seed is enough, seed will be the first choice, but if the availability of high quality seed is limited, two other of alternative plant materials could be used in consideration of technique skills and more important was the economically factor.

L01 ANIMAL HUSBANDRY

256 MARDININGSIH, D.
Social problem on community improvement face to beef cattle development program: case on corporate farming in Grobogan Regency (Indonesia). ***Kendala sosial pemberdayaan masyarakat melalui program pengembangan ternak sapi potong: kasus corporate farming di Kabupaten Grobogan***/Mardiningsih, D.; Eddy, B.T.; Sriyanto, D.; Sonjaya, A. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 227-231, 9 ref. 636:338.439/SEM/p

BEEF CATTLE; SOCIOECONOMIC DEVELOPMENT; SOCIAL CONDITIONS; COMMUNITY DEVELOPMENT; JAVA.

The research was aimed at studying the behavior of beef cattle farmer's in Corporate Farming Bersemi and problems faced by other stakeholders of beef cattle development. The research was a case study with quantitative approach. Data was collected by field observation, depth interview and focus group discussion. Data was analyzed descriptively and were presented naratively. The results showed that Corporate Farming Bersemi was a concept of plant and animal integration. The credit schemes were not properly done. The farmers employment faced the technological constraints, especially on application of artificial insemination. In turn, it affected the attitude of the farmers on the animal possession, so that it can not encourage their existence. However the establishment of corporate farming gave the people on experience in practicing agribusiness.

257 MUHAMMAD, Z.
Performance of swamp buffalo (*Bubalus bubalus*) production in Brebes District, Central Java Province (Indonesia). ***Penampilan produksi ternak kerbau lumpur (Bubalus bubalus) di Kabupaten Brebes, Jawa Tengah***/Muhammad, Z.; Kusumaningrum, D.A. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1] , Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 310-315, 2 tables; 9 ref. 636:338.439/SEM/p

WATER BUFFALOES; FEEDS; QUALITY; ANIMAL PERFORMANCE; JAVA.

A survey was conducted to observe buffalo production in Brebes District, Central Java, including three subdistricts: Brebes, Tonjong and Bantar Kawung, that had buffalo population of 996, 408 and 765, respectively of the whole population in the district of 5942 heads. Buffalo farming in these villages was traditional of 141 buffaloes (113 females and 28 males) observed indicated that buffaloes were reared for investment, farmer housing repairement, son/daughter wedding and draught. That a long period of fattening was independent on animal selling policy. Native pasture was the only feed offered to the livestock. It could be suggested that feed quality should be improved in order to increase live weight gain.

258 SARIUBANG, M.
System integration of crop maize-beef cattle in Subprovince of Takalar, South Sulawesi (Indonesia). ***Sistem integrasi tanaman jagung - sapi potong di Kabupaten Takalar, Sulawesi Selatan***/Sariubang, M.; Pasambe, D. (Balai Pengkajian Teknologi Pertanian Sulawesi Selatan, Makassar (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 285-291, 5 tables; 12 ref. 636:338.439/SEM/p

BEEF CATTLE; FATTENING; ZEA MAYS; STRAW; INTEGRATION; ECONOMIC ANALYSIS; SULAWESI.

A research on system integration crop of maize at lowland dry farming have been done in Subprovince of Takalar, South Sulawesi, since January up to December 2004 have been done in order to know exploiting of maize crop for beef cattle's feed and at the same time to study influence of exploiting of beef cattle livestock dung which is fermented for organic manure at maize crop. Results of research indicated that of old age maize crop production 60-70 day after planting (fruit and bar) was 40,600 kg/ha and maize hay (fruit and bar) was 21,900 kg/ha crop dry. For the beef cattle weight (early weight ± 200 kg/tail) it showed heavy accretion of ADG and consumption. There were T1 (control) 0.367 kg/tail/day and 5.93 kg/tail/day, T2 (silage) 0.450 kg/tail/day and 5.92 kg/tail/day, T3 (fermented hay) 0,459 kg/tail/day and 5.85 kg/tail/day. While analysis of financial was Rp 6,834,722/ha/year with B/C ratio 1.8. It is concluded that farming system integration of maize-beef cattle was the potential model to be developed at lowland dry farming.

259 SUBIHARTA.
Carrying capacity for cattle farming based on food cropping in marginal areas of Blora (Indonesia). ***Kapasitas penyediaan pakan untuk usaha ternak sapi berbasis tanaman pangan di wilayah marginal Kabupaten Blora***/Subiharta; Hartoyo, B.; Sarjana (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 227-231, 4 tables; 9 ref.

BEEF CATTLE; FEEDS; FOOD CROPS; MARGINAL LAND; JAVA.

Blora is being well known as the central of cattle farming, which have multi purposes, i.e. fattening, breeding, and source of power inland preparation. Feed carrying capacity has been constantly highlighted as the most determinant factor for this cattle farming performances. This particular issue is being major subject of this study, i.e. supply systems, quantities and farmers survival strategies to manage the impacts of feed scarcity incidents. Data collection consisted of standardized interview to farmers, farm record keeping, and observations. The farmers land area is about 0.35 ha in average. On the limited of rainy season (5 months), the planting pattern was upland rice-peanuts-fallow. This cropping pattern produced farming byproduct as the feed material about 5,174.8 kg in average. This farming by product can cover the feed for 97.8 days only. The results show that the limited carrying capacity was a determinant factor of the cattle farming which caused low performance. This implied the urge development of alternative source of feed to improve the cattle farming performance.

260 SUSANTI, T.
Egg production of MA duck and on BPTU Pelaihari South Kalimantan. ***Produksi telur itik MA di BPTU Pelaihari Kalimantan Selatan***/Susanti, T.; Setioko, A.R.; Prasetyo, L.H. (Balai Penelitian Ternak, Bogor (Indonesia)); Supriyadi. [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 817-822, 1 ill., 3 tables; 8 ref. 636:338.439/SEM/p

DUCKS; CROSSBREEDING; EGG PRODUCTION; SPECIES; KALIMANTAN.

Balitnak have released MA duck as crossbred of mojosari male duck and alabio female duck. MA duck has heterocyst value that is high especially on its both egg production and first age egg layer. Genetic improvement on the local breeds is being conducted in order to support the development of the existing production system in the duck production region. One of the locations where MA duck will be developed and distributed is BPTU (Balai Pembibitan Ternak Unggul) Pelaihari in South Kalimantan. At developing area, MA duck must be controlled and evaluated to stand on their quality. Therefore, this study aimed at learning MA duck production on BPTU Pelaihari as breeding centre in South Kalimantan. Seventy five heads of mojosari male ducks were obtained from Balitnak as a result of selection programme. Then, they

were mated with 400 alabio female ducks as a result of selection programme done on BPTU Pelaihari. The crossbred of mojosari male ducks and alabio female duck was contributed to smallholder in areas near BPTU. The part of population MA ducks were stand on BPTU as controlled populations. Measurement was collected on egg production per month during eight months. The results showed that MA ducks in BPTU Pelaihari gave highly production. Their egg production was 74.8 ± 12.9% during eight months production. The egg production was higher than that from their parent. For this time, BPTU have contributed 753 head of MA ducks into 5 areas duck farming in South Kalimantan which is Banjarbaru, Banjarmasin, Liang Anggang, Martapura and Tanah Laut.

L02 ANIMAL FEEDING

261 ALI, U.
Effect of onggok (cassava byproduct) and cow rumen bowel application in complete feed on the performance of etawah crossbred goat. ***Pengaruh penggunaan onggok dan isi rumen sapi dalam pakan komplit terhadap penampilan kambing peranakan Etawah***/Ali, U. (Universitas Islam Malang (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 69-72, 2 tables; 10 ref.

GOATS; COMPLETE FEEDS; ORGANIC WASTES; RUMEN; BYPRODUCTS; TAPIOCA; FEED INTAKE; TOTAL DIGESTIBLE NUTRIENTS; ANIMAL PERFORMANCE; WEIGHT GAIN.

The aim of this experiment was to analyze the effect of onggok and cow rumen bowel (OCRB) use in complete feed on the performance of etawah crossbreed goats (ECG), and was conducted at the Faculty of Animal Husbandry, Islamic University of Malang. The experiment used randomized block design, using 12 etawah crossbreed goats which had body weight 23.5 - 30.8 kg in 3 blocks. The goats were put in individual cages for 65 days and given complete feed. The treatment feed was arranged based on nutrient requirements for ruminants-crude protein max. 14% and crude fiber min. 12%. Formulations of OCRB in feed given were: R0 = 0%, R10 = 10%, R20 = 20% and R30 = 30%. The goat performance which were observed included feed intake, digestible nutrient and body weight gain, and the data obtained was analyzed by covariance and BNJ test. The result of statistical analysis showed that the use of OCRB in complete feed was significant ($P < 0.05$) for IDM, DDM, DOM, IDOM and BWG. In daily intake rate: IDM= 1012.51 ± 8.04 g/head, DDM = 63.94 ± 0.77%, DOM = 65.69 ± 1.13%, IDOM= 613.041 ± 84.955 g/head, and BWG=75.88 ± 4.06 g/head. It was concluded that OCRB in complete feed can be used 30% for goats which it was optimal and efficient with body weight gain of 71.82 g/ head/day.

262 ANGGRAENY, Y.N.
Effectivity of the used of formaldehyde as protein protector to the in vitro crude protein digestibility of coconut meal. ***Efektivitas penggunaan formaldehida sebagai pelindung protein terhadap kecernaan in vitro protein kasar bungkil kelapa***/Anggraeny, Y.N.; Krishna, N.H. (Loka Penelitian Sapi Potong, Grati, Pasuruan (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 430-437, 5 tables; 23 ref. 636:338.439/SEM/p

BEEF CATTLE; RUMEN; FEED MEALS; FORMALDEHYDE; COPRA MEAL; DIGESTIBILITY; PROTEIN QUALITY; IN VITRO.

Coconut meal is one of protein source that compose beef cattle concentrate, but the crude protein rumen is high (89.24%). The higher of crude protein digestibility in the cause inefficiency. Crude protein rumen digestibility can be decreased by formaldehyde (HCHO) treatment. Parameters observed were N solubility, rumen crude protein digestibility, and totally crude protein digestibility. The study of N solubility on coconut meal used 4 x 5 factorial designed using completely randomized design and the study of N solubility. The first factor was the levels of HCHO (0%; 2.5%; 5%; 7.5%) and the second factor was incubation times (0, 3, 6, 12, 24 hours). The solubility and digestibility of coconut meal were

compared by skim milk powder. The results showed that interaction of HCHO treatment and incubation times significantly decreased N solubility both of coconut meal and skim milk powder. N solubility of coconut meal decreased from 33.83% (0% HCHO) to 18.34% (7.5% HCHO). On skim milk powder, the N solubility decreased from 21.42% (0% HCHO) to 14.82% (7.5% HCHO). Maximal N solubility on coconut meal and skim milk powder was on 3 hours after incubation. The solubility decreased by increasing of incubation times. The used of HCHO decreased crude protein digestibility on coconut meal and skim milk powder. Crude protein digestibility of coconut meal decreased from 88.54% (0% HCHO) to 64.04% (7.5% HCHO). On skim milk powder, crude protein digestibility decreased from 97.07 (0% HCHO) to 74.34% (7.5% HCHO). Total crude protein digestibility on coconut meal decreased from 96.20% (0% HCHO) to 86.90% (7.5% HCHO). Total crude protein digestibility on skim milk powder was similar on 0% HCHO treatment (99.80%) and in skim milk powder was 99.97% (7.5% HCHO). The conclusion of this research that HCHO was effective as a protein protector agent on coconut meal.

263 CANDRAWATI, D.P.M.A.
Effect of supplementation of phylazim enzyme in 30% rice bran based diets on performance of broilers. ***Pengaruh suplementasi enzim phylazim dalam ransum yang menggunakan 30 persen dedak padi terhadap penampilan broiler***/Candrawati, D.P.M.A.; Witariadi, N.M.; Bidura, I G.N.G.; Dewantari, M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 73-77, 3 tables; 16 ref.

BROILER CHICKENS; SUPPLEMENTS; ENZYMES; BRAN; RATIONS; FEED CONVERSION EFFICIENCY; WEIGHT GAIN; ANIMAL PERFORMANCE.

This research was carried out to study the effect of supplementation of phylazim enzyme in rice brand based diets on performance of broiler aged 2 - 6 weeks, at Denpasar, Bali. A completely randomized design (CRD) with three treatments in six replications was used in this experiment. There were four birds in each replicate with a homogenouos body weight (473.94 ± 13.70). The experimental diets for the finishing period (aged 2 - 6 weeks) were formulated with 20% crude protein and 2900 kcal ME/kg with 15% rice bran as a control diet (A), diets with 30% rice bran (B), and diets with used 30% rice bran + 0.20% phylazim enzyme (C), respectively. Experimental diets and drinking water were provided ad libitum during the entire experimental period. The variables observed were feed consumption, water consumption, final body weight, body weight gain, and feed conversion ratio (FCR). The result of this experiment showed that rice bran based diets (diets with 30% rice bran) had no significant effect ($P > 0.05$) on feed and drinking water consumption, but decreased significantly ($P < 0.05$) on body weight gain, and feed efficiency compared to control group. An addition of 0.20% phylazim enzymes in rice bran based diets (30% rice bran) showed the same effect ($P > 0,05$) as the control. It was concluded that broilers aged 2 - 6 weeks offered rice bran based diets (diets with 30% rice bran) were decreased body weight gain and feed efficiency compared to the control (diets with content 15% rice bran). But, supplementation of 0.20% phylazim in rice bran based diets had the same effect as the control (diets with content 15% rice brand).

264 KARDA, I W.
Methods to increase intake of gliricidia leaves (*Gliricidia sepium*) by sheep. ***Metode untuk meningkatkan konsumsi daun gamal (Gliricidia sepium) kering oven oleh ternak domba***/Karda, I W. (Universitas Mataram (Indonesia), Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 102-107, 4 tables; 36 ref.

SHEEP; GLIRICIDIA SEPIUM; LEAVES; OVENS; DIET TREATMENT; NUTRIENT INTAKE; MOLASSES; FEED CONSUMPTION.

Three trials were conducted to investigate the intake of oven-dried gliricidia by sheep, namely addition of polyethylene glycol (PEG) (trial 1), pretreatments (trial 2), and addition of additives (trial 3). In the first trial, six rumen fistulated sheep were used to compare two dietary treatments in a change over design to study whether infusion of polyethylene glycol (PEG) into the rumen might increase intake of gliricidia

leaf as tannin in the leaf was believed to limit its intake. In the second trial, four sheep were used to compare four dietary treatments in a latin square design to study whether reheating or freezing the already oven-dried gliricidia leaf might increase its intake by the animals. On the other hand, the third trial was aimed to supplement the sheep with various supplements which are believed to be able to increase the taste of the leaf by the animals. These supplements were wheat millrun, molases, grass hay, cottonseed meal, palm kernel meal, or barley grain. For this reason, ten sheep were used to compare seven dietary treatments in a randomized completely block design. Differences between means were examined by analysis of variance using the general linear model procedure of the statistical analysis system. The results showed that neither administration of PEG into the rumen nor pretreatments (reheating or freezing) increased intake of gliricidia leaf by sheep. However, only mixing gliricidia with molasses increased the intake of the leaf by sheep over the control diet (gliricidia alone) over the six hours feeding period (43 vs 74 g DM).

265 LAKSMIWATI, N.M.
Effect of starbio and effective microorganism-4 (EM-4) as probiotic on the performance of male duckling. ***Pengaruh pemberian starbio dan effective microorganism-4 (EM-4) sebagai probiotik terhadap penampilan itik jantan umur 0 - 8 minggu***/Laksmiwati, N.M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 84-88, 3 tables; 16 ref.

DUCKS; YOUNG ANIMALS; PROBIOTICS; RATIONS; MICROORGANISMS; FEED CONSUMPTION; FEED CONVERSION EFFICIENCY; WEIGHT GAIN; ANIMAL PERFORMANCE.

An experiment was conducted at Denpasar to study the effect of Starbio and effective microorganisms as probiotic on the performance of male ducklings. A randomized block design (RBD) with seven treatments was used in this experiment. The treatment consisted of a control group, three levels of Starbio and three levels of effective microorganisms (EM-4), namely, diets with 0.5 g Starbio/kg diet (S1), with 1 g Starbio/kg diet (S2), with 1.5 g Starbio/kg diet (S3), 1 ml EM-4/l (E1), 2 ml EM-4/l (E2), 3 ml EM-4/l (E3) drinking water and control (K). Each treatment consisted of four replications of 5 ducklings each. The diet given from 0-4 weeks of age contained 20.06% CP and 2847 Kkal/kg ME, while during 4-8 weeks contained 17% CP and 2847 Kkal/kg ME,. Diet and water were provided ad-libitum. The results of this experiment showed that supplementation of probiotic in diet and EM-4 in drinking water were significantly increased growth and feed efficiency ($P < 0.05$), but there was no significant difference of feed consumption. There was no significant difference of 0.5-1.5 g/kg Starbio and 1.5 ml- 3 ml EM-4 on growth, feed efficiency and feed consumption.

266 NUSCHATI, U.
Introduction of proper diet formulation for fattening Ongole generation beef cattle in marginal region. ***Teknologi perbaikan ransum untuk penggemukan sapi peranakan ongole (PO) pada wilayah marginal***/Nuschati, U.; Subiharta; Ernawati (Balai Pengkajian Teknologi Pertanian Jawa Tengah, Ungaran (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigdo, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.)Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 370-375, 3 tables; 14 ref.

BEEF CATTLE; DIETS; FORMULATIONS; FATTENING; MARGINAL LAND.

A feed trial for improving ongole generation (OG) beef cattle productivity under the feed lot fattening management was conducted in marginal region. Six OG beef cattles having average initial body weight of 244 kg were fed diet containing concentrate feed; fermented rice straw, and elephant grass (introduced diet). The concentrate feed contained 88% dry matter, 14% crude protein, and 70% total digestible nutrient. The experimental diets were formulated using Excel program based on the expected body weight gain and its nutrients requirement. Whereas, investigation of the growth rate of 5 OG beef cattles fed

traditional diet (formulated by the farmer) were also performed. During the three months period, measurements were made for body weight gain, feed consumption, and feed efficiency. Data were analyzed using descriptive analysis. Results showed that introduction of concentrate feed in the diet of OG beef cattle resulted in better average growth rate compared to those consuming traditional diet (0.86 vs 0.33 kg/d). Extend to which introduced died also better than traditional diet in the average intake of dry matter: (0.77 vs 0.67 kg/d), crude protein (4.22 vs 3.92 kg/d), and feed efficiency (10.86 vs 4.25%). It was concluded that the introduced feed was suitable to improve OG beef cattle productivity in marginal region.

267 PUTRA, S.
Supplementing effects of some mineral sources in the ration on the apparent absorption, retention, net utilization of nitrogen and blood protein of the etawah crossbred goat fed grass based diet. ***Pengaruh suplementasi beberapa sumber mineral dalam konsentrat terhadap serapan, retensi, utilisasi nitrogen, dan protein darah kambing peranakan etawah yang diberi pakan dasar rumput***/Putra, S. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 94-101, 1 ill., 4 tables; 31 ref.

GOATS; CROSSBREDS; SUPPLEMENTARY FEEDING; CONCENTRATES; NITROGEN RETENTION; PROTEIN QUALITY; BLOOD PROTEIN; DIET; GRASSES.

A (station) research was carried out to study the supplementing effects of some mineral sources in the ration on the nitrogen apparent absorption, blood protein, nitrogen retention, and net nitrogen utilization of the etawah crossbreed goat (PE) fed on a grass based diet. A latin square design consisting of four diet treatments, four of PE goats, and four of periods was used in this research. The four diet treatments were diet A (natural grass + concentrate without source of mineral supplementation); diet B (natural grass + concentrate which supplemented MINERAL 10); diet C (diet of B supplemented with ammonium sulfate); and diet D (diet of C supplemented with PIGNOX). The ratio of natural grass/ concentrate was 68% to 32%. Each period was allocated into 3 weeks, the first two weeks for observation and the last week for total collection of faeces and urine. Between two periods 7 days was given for adaptation or rest time. The results of this research showed that supplementation of some mineral sources in the ration did not affect ($P > 0.05$) the consumption, apparent absorption, retention of N, blood protein, BV, and NNU, but affected ($P < 0.05$) the blood urea N. Quantitatively, consumption, apparent absorption, retention of N, BV, and NNU in goat D was highest due to the higher digestibility of CP and metabolism of diet D compared to the other experimental diets. Urea and protein of blood in goat D were second highest ($P > 0.05$) after goat C, quantitatively. It was concluded that supplementation of MINERAL 10, ammonium sulfate, and PIGNOX on the treatment D were the best combination to increase N apparent absorption, retention of N, net nitrogen utilization (NNU), and blood protein, quantitatively.

268 SUMANTO.
Improvement of feeding management on dairy cattle at Pangalengan (Indonesia). ***Studi perbaikan pakan pada sapi perah di Pangalengan: analisa ekonomi***/Sumanto; Juarini, E.; Sutama, I K. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 390-394, 5 tables; 10 ref. 636:338.439/SEM/p

DAIRY CATTLE; FEEDS; FEEDING; LIVESTOCK MANAGEMENT; MILK PRODUCTION; ECONOMIC ANALYSIS; JAVA.

A collaborative research between The Research Institute For Animal Production (RIAP) and The Noriko Dairy Farm Indonesia on the improvement of the dairy farm enterprise management has been conducted in a farm site of PT Noriko Dairy Farm at Pangalengan, Bandung District since 2003. The aim of this second year study was at developing a more effective and efficient production system mainly focusing on

feeding management of pregnant cows. Ten dairy cows of about 7 month pregnancy and of about the same ages belong to PT Noriko Dairy Farm were divided into two groups, allocated for 90 days feeding treatment. The first group was given forage and standard concentrate as usual (T0). The second group was fed forage and Balitnak concentrate (T1), formulated by the RIAP (CP 16-17%). The amount of feed offered was adjusted as daily intake and milk production were recorded. The technical supporting data and the socioeconomical data were collected during the assessment. Data collected were analyzed descriptively and if necessary financial data were also to be assessed. Recording data were conducted on average daily gain of pregnant cows, over 6 months period (3 months before and after calving) on milk production, milking system, and mating system. Results showed that the average daily gain, the average birth weight of calves, and the economic benefit of over 6 months milk production of the cows fed T1 were higher compared to those of T0: 0.96 kg vs 0.31 kg, 36 kg vs 33 kg and Rp 4,721,700 vs Rp 3,225,600, respectively. Seemingly the farmer prefers conducting natural mating than using T1.

269 SURYANA.
Development of ruminant and oil palm plantation integration in South Kalimantan (Indonesia). ***Pengembangan integrasi ternak ruminansia pada perkebunan kelapa sawit***/Suryana (Balai Pengkajian Teknologi Pertanian Kalimantan Selatan, Banjarbaru (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 35-40, 6 tables; 28 ref.

RUMINANTS; OIL PALMS; PLANTATIONS; INTEGRATION; FEEDS; ANIMAL FEEDING.

In 2005, ruminant population in South Kalimantan Province amounted 193,920 heads for cattle, 41,435 heads for buffaloes, 107,873 heads for goats, and 3,474 heads for sheep. The amount was unsufficient to fulfill the meat demand in the province. Ruminant development in South Kalimantan is mostly constrained by forage availability especially in the long dry season. On the other hand, forage in oil palm plantation and wastes of crude palm oil (CPO) processing is potential for ruminant feeds. In 2005, the area of oil palm plantation in South Kalimantan reached 164,692 ha, which produced CPO of about 350,076 t/year, palm kernel meat 62,232 t/year, and sludge 75,267 t/year. Utilization of oil palm wastes as ruminant feeds could be conducted by integrating ruminant and oil palm plantation. The integration system could be the alternative in alleviating feed insufficiency in order to increase ruminant productivity.

L10 ANIMAL GENETICS AND BREEDING

270 PRIHANDINI, P.W.
Improvement of artificial insemination management using frozen semen in beef cattle, in Blora District (Indonesia). ***Usaha perbaikan tatalaksana IB semen beku sapi potong pada agroekologi berbeda di Kabupaten Blora***/Prihandini, P.W.; Affandi, L. (Loka Penelitian Sapi Potong, Pasuruan (Indonesia)). [Proceedings of the seminar on agricultural innovation and technology transfer to develop rural industrial agribusiness in marginal areas. Book 2: technology innovation of production], Semarang 8 Nov 2007/Muryanto; Prasetyo, T.; Prawirodigno, S.; Yulianto; Hermawan, A.; Kushartanti, E.; Mardiyanto, S.; Sumardi (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor. Bogor: BBP2TP, 2007: p. 311-315, 3 tables; 18 ref.

BEEF CATTLE; SEMEN; ARTIFICIAL INSEMINATION; THAWING; REPRODUCTIVE PERFORMANCE; FEED CONSUMPTION; JAVA.

Low management and improper artificial insemination (AI) system affected in high service per conception, low conception rate and long calving interval. This research was conducted to evaluate the effect of AI improvement management for beef cattle in the villages with different agroecology. This research was conducted by survey in the village farm under the farmer management on (by and wet land of Blora District, Central Java for 12 months (January to December 2007). Observations were made for frozen semen and reproduction performances by ex and post ante analysis (80 acceptors). Results showed that the thawing and weaning of calves before and after improvement of AI management were different ($P < 0.05$); where as the AI time was different. After improving of AI management (thawing and AI time)

it was documented that the S/C decreased from 2.7- 2.5 time become 1.1 ± 0.3 lime (dryland of Tunjungan Subdistrict) and 1.3 ± 0.4 time (wet land of Blora Subdistrict), Blora District. Thus, there was an increase CR from < 60 % to 70 % on dry land and 65% on wet land. Moreover, feed condition on dry season during the experimental period was similar which were dry matter (DM) 4.8 to 4.4 kg/day and crude protein (CP) 0.3 to 0.3 kg/day (dry land) and OM 6.9 to 6.9 kg/day and CP 0.3 10 0.5 kg/day (wet land). In conclusion, improvement of thawing and time of straw introduction to the cow reduced S/C, increased NNR, and CR.

271 SETIOKO, A.R.

Breeding program of MA ducks in BPTU (Institute for Superior Livestock Breeding) Pelaihari: selection of alabio parent stocks. ***Program pembibitan itik MA di BPTU Pelaihari Kalimantan Selatan: seleksi pada populasi bibit induk itik alabio***/Setioko, A.R.; Susanti, T.; Prasetyo, L.H. (Balai Penelitian Ternak, Bogor (Indonesia)) Supriyadi. [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 763-767, 2 tables; 8 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); CROSS BREEDING; SELECTION; EGG PRODUCTION; DURATION; KALIMANTAN.

A breeding program for producing MA ducks (crossbred between mojosari and alabio ducks) is being conducted at the BPTU (Balai Pembibitan Ternak Unggul) Pelaihari. A selection program is being applied to a population of alabio ducks as female line of the parent stocks with the aim of improving egg productivity. Four hundreds female alabio ducks were used as the foundation stocks (P0) for the selection, and kept in litter cages of 25 heads each. The selection criterion was the first 2-months egg production per cage, with the highest 30% being selected. The selected females were then mated to males at random in order to produce 400 female F1 progeny. Observations were taken on monthly egg production, as % duck-day. Results showed that the average 2-months egg production of the P0 was 41.28% and of the F1 was 71.72%. Therefore, the selection response was 30.44%. Based on this positive selection response, it can be concluded that the selection process being carried out by BPTU is on the right track.

272 SUMANTRI, C.

Effect of kappa-casein genotype on milk quality of Holstein-Friesian (HF) dairy cattle in BPTU Baturraden. ***Pengaruh genotipe kappa kasein (k-kasein) terhadap kualitas susu pada sapi perah FH di BPTU Baturraden***/Sumantri, C.; Maheswari, R.R.A. (Institut Pertanian Bogor (Indonesia). Fakultas Peternakan); Anggraeni, A.; Diwyanto, K.; Farajallah, A. [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 358-365, 5 tables; 22 ref. 636:338.439/SEM/p

DAIRY CATTLE; COW MILK; CASEIN; GENOTYPES; QUALITY.

The objective of this research was to study the effect of k-casein genotype on milk quality of Holstein-Friesian (HF) dairy cattle in BPTU Baturraden. Lactated cows were selected proportionally based on the consideration for three protein classification (high level for protein yield >3.89%, moderate 2.76-3.89% and low <2.76%. Fat yield classification (high level >3.73%, moderate 3.15-3.73% and low <3.15%. The research activities were carried out through: blood collecting, DNA isolating, amplifying DNA with PCR and PCR products were digested by Pst I enzyme restriction, and identifying correlation between k-casein gene polymorphism on protein and fat yield. The frequency of genotype and gene of k-casein was calculated by Warwick and Legates, whereas the significant test of genotype frequency between observation and expectation was calculated by x^2 test. The result showed that the frequency of gene B in

high protein yield classification higher than gene A (0.55 vs 0.45). On the contrary, the frequency of gene B in low protein yield classification lowers than A (0.20 vs 0.80). The genotype of k-casein gene had affected significantly on the protein yield and had not effect on fat yield.

L50 ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

273 DOLOKSARIBU, M.
Productivity of Kacang goat at penned condition: 1. birth weight, weaning weight, litter size and mobility of post-weaning. ***Produktivitas kambing Kacang pada kondisi dikandangkan: 1. Bobot lahir, bobot sapih, jumlah anak sekelahiran dan daya hidup anak prasapih***/Doloksaribu, M.; Elieser, S.; Mahmilia, F.; Pamungkas, F.A. (Loka Penelitian Kambing Potong, Sei Putih, Deli Serdang (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 581-585, 2 tables; 7 ref. 636:338.439/SEM/p

GOATS; BREEDS (ANIMALS); PRODUCTIVITY; BIRTH WEIGHT; WEANING WEIGHT; LITTER SIZE; ANIMAL HOUSING.

Research on kacang goat productivity was conducted at Sungei Putih Research Station, and the birth weight, weaning weight, litter size and mobility postweaning were the parameters of the study. The numbers of goats observed were 78 heads. Goat rearing was entirely carried out in cages; in the morning they were given ± 250 g/head/day concentrate, and grass was adequately supplied for the afternoon and evening. All the parameters studied were analyzed with mean test followed by t-test. From the results it was found out that the average birth weight was 1.78 ± 0.23 kg and the average weaning weight was 6.56 ± 1.37 kg, the litter size was equal to 1.23, and mobility post-weaning at the age of 3 months was 83%. From the lactating period studied it was found out that the kidding interval was 268 ± 34 days. Based on the birth sequence (parity) from each goat, it was found out that second and third birth sequences were better for birth weight, weaning weight and mobility compared to those of first birth ($P<0.05$).

274 MAHFUDZ, L.D.
Phenotipic of high productivity of magelang ducks. ***Fenotipik dari itik magelang yang produktif***/Mahfudz, L.D.; Kismiati, S.; Sarjana, T.A. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 779-785, 5 tables; 27 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); PHENOTYPES; HIGH YIELDING BREEDS; PRODUCTIVITY; COLOURS; FEATHERS; ANIMAL PERFORMANCE.

It is very difficult to find the magelang ducks which have capability to produce eggs more than 150/bird/year. This experiment was conducted to examine characteristics of magelang ducks with higher productivity. Magelang duck can be differed from another Indian runner ducks, that is white feather around neck as a white necklace. The material of this experiment was 150 ducks from 3 districts and each district chosen 2 population centre and every population were selected 25 birds by body weight and productivity. The feed consisted of yellow corn, rice bran and concentrate 144, with proportion (3:1:1). The ducks were reared on postal house with paddy straw as a litter, and in the afternoon the ducks were herted in paddy field and small river around experiment location. The examinated parameters were color of feathers, skin, shank and footweb, body weight and eggs production. The feather color was interpreted by analysis of Lancester. The variation of colors of feather was genetically tested using Mandels Low and was analyzed following method of Mozawa, colors of skin and shank used teory of Smyth. Body weight and eggs production were tested by correlation. Mathematic model was used for correlation and t test between population. The results showed that the colors of feather 96.60% are dark and light brown. The

skin colors are 82.45% white and 17.55% grey. The shank color is 100% black, whereas footweb 29.33% white and 70.67% black. The conclusion of this experiment were body weight of ducks 91.33% medium (1.200-1.400 g), eggs production 38.33% lower, 48.67% medium and 13% higher. The ducks with higher productivity has brown color feathers ("kalung plontang"), white skin, black shank and white footweb colors.

275 WULANDARI, W.A.
Biological characteristics of cihateup duck from Tasikmalaya and Garut Regencies. ***Kajian karakteristik biologis itik cihateup dari Kabupaten Tasikmalaya dan Garut***/Wulandari, W,A.; Hardjosworo, P.S.; Gunawan (Balai Pengkajian Teknologi Pertanian Bengkulu (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 795-803, 3 ill., 3 tables; 9 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); BIOLOGICAL PROPERTIES; FEEDING PREFERENCES; CONSUMPTION; EGGS; JAVA.

Cihateup duck is an Indonesian local duck which is mostly found in West Java especially in Tasikmalaya and Garut Regency. Cihateup duck is namely mountainous duck because it can adapt to cool temperature and survive in highland. The aim of this research was to obtain information on biological characteristics of cihateup duck. Five hundreds and seventeen cihateup eggs from Tasikmalaya and Garut were hatched. The commercial diet was used, and water and feed were given ad libitum. Physical traits of egg, growth pattern, feed consumption and conversion, body measurement, plumage patterns, shank and beak colors, and blood protein polymorphism were observed. The data characteristic of egg, growth pattern were analyzed with general linier model. Body measurements were analyzed with principal component analyze (PCA) with Minitab. The result showed that egg weight from Tasikmalaya (68.0 g) was bigger than that from Garut (65.6 g). Both of the males cihateup duck from Tasikmalaya and Garut has higher growth than the females. Feed consumption of male was higher than that of female but the feed conversion of male was better than the females. The males duck has three kind plumage patterns, i.e. pencilled, non barred and laced, whereas the females has two kinds, i.e. laced and buttercup. Almost all cihateup ducks have shank and beak in black color and only some showed the yellow color. There were similarity genetic distance between cihateup duck from Tasikmalaya and Garut.

L53 ANIMAL PHYSIOLOGY - REPRODUCTION

276 ARIFIANTINI, R.I.
Comparison of two packaging techniques using three extenders for the cryopreservation of Friesian Holstein (FH) semen. ***Kaji banding dua teknik pengemasan menggunakan tiga macam pengencer untuk pembekuan semen sapi Friesian Holstein (FH)***/Arifiantini, R.I.; Yusuf, T.L.; Indah, O. (Institut Pertanian Bogor (Indonesia). Fakultas Kedokteran Hewan). [Proceedings of the national seminar on animal husbandry and veterinary technology. Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 366-376, 7 ill., 2 tables; 26 ref. 636:338.439/SEM/p

CATTLE; BULLS; SEMEN; VACUUM PACKAGING; BIOLOGICAL PRESERVATION; QUALITY.

The percentage of the progressive motile and life sperm of frozen thawed semen was used as criterion to compare methods of semen cryopreservation. Fifteen ejaculates from three friesian holsteins (FH) were frozen in three extenders, TEY (Tris egg yolk), home made tryladil (HMT) and AndroMed contain soya lecithin (KK), in each of two packaging techniques (0.3 mL minitub and 0.25 mL IMV straw). The sample were equilibrate (5 ^{o}C) for four hours and frozen in liquid nitrogen vapour for 10 minutes. The percentages of postthawed progressive motile and life sperm were greater ($P<0.05$) for KK (56.28; 74.22)

than for HMT (47.60; 65.93); and TEY (48.74; 69.63). They were no significant different in the percentages of progressive motile and life sperm freezing in 0.3 mL (52.16; 69.4) or 0.25 mL (49.59; 70.44). The percentages life sperm in KK minitub (72.76 ± 10.83) and KK IMV (75.67 ± 8.1) were greater than any other combinations. The percentages of progressive motile sperm in KK Minitub (57.9) were greater than KK IMV or any other combinations.

277 ARIFIANTINI, R.I.
[Use of three types of semen cryopreservation in two packed techniques on semen frozen process of Frisien Holstein cattle]. ***Keberhasilan penggunaan tiga pengencer dalam dua jenis kemasan pada proses pembekuan semen sapi Frisien Holstein***/Arifiantini, R.I.; Yusuf, T.L. (Institut Pertanian Bogor (Indonesia). Fakultas Kedokteran Hewan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 89-93, 3 ill., 2 tables; 26 ref.

CATTLE; SEMEN PRESERVATION; EGG YOLK; FROZEN STORAGE; LIQUID NITROGEN; THAWING; SEMEN; MOVEMENT.

Motility and the percentage of live sperm in thawed frozen semen was used ascriterion to evaluate methods of three types of semen cryopreservation. Fifteen ejaculates from three Frisien Holstein (FH) were diluted in three extenders, namely TEY (Tris egg yolk), home made triladyl(HMT) and AndroMed containing soya lecithin (KK). Each semen sample was packed using two techniques (0.3 ml minitub and 0.25 ml Cassou straw). The samples were equilibrated (5 ^{o}C) for four hour and frozen in the vapor of liquid nitrogen for 10 minutes. The percentage of post thawed e motility and life sperm were 56.28 and 74.22 for KK which were greater than HMT (47.60; 65.93) and TEY (48.74; 69.63) ($P < 0.05$). There was no significant difference in the percentage of the progressive motile and life sperm freezing in 0.3 ml (52.16; 69.4) or 0.25 ml (49.59; 70.44). The percentage of life sperm at KK minitub (72.76 ± 10.83) and KK Cassou (75.67 ± 8.1) were greater than any other combination. The percentage of progressive motile sperm in KK minitub (57.9 ± 7.81) were greater than KK Cassou or any other combination.

278 DEWANTARI, M.
Phenotypic plasticity in reproductive character of Mojosari, Tegal, and Tegal-Mojosari ducks as a response to aflatoxin in rations. ***Kelenturan fenotipik sifat-sifat reproduksi itik Mojosari, Tegal, dan persilangan Tegal-Mojosari sebagai respon terhadap aflatoksin dalam ransum***/Dewantari, M. (Universitas Udayana, Denpasar (Indonesia). Fakultas Peternakan). *Majalah Ilmiah Peternakan* ISSN 0853-8999 (2006) v. 9(3) p. 78-83, 6 tables; 16 ref.

DUCKS; PHENOTYPES; RHEOLOGICAL PROPERTIES; REPRODUCTIVE PERFORMANCE; RATIONS; AFLATOXINS; FEED CONSUMPTION; SEXUAL MATURITY; BODY WEIGHT; EGGS.

The objective of this research was to study the phenotypic plasticity in reproductive character of Mojosari, Tegal, and Tegal-Mojosari ducks as a response to aflatoxin addition in diets. The experiments was conducted at The Research Institute for Animal Production, Ciawi-Bogor. Three duck populations (Mojosari, Tegal, and Tegal-Mojosari ducks) were grown administered four different aflatoxin levels, namely R0 (control diet, without aflatoxin), R1 (control diet + 50 ppb aflatoxin), R2 control diet + 100 ppb aflatoxin), and R3 (control diet + 150 ppb aflatoxin) for one month period (aged 3-7 weeks). After the aflatoxin treatment period, all populations were maintained with R0 diet until laying egg production commenced. Each population was comprised 80 female ducks and 20 male ducks. Diets and water were offered ad libitum. A completely randomized design (CRD) with factorial arrangement (3 x 4) was used. The first factor was a population of ducks (Mojosari, Tegal, and Tegal-Mojosari ducks) and the second factor is aflatoxin levels (diets with 0 ppb, 50 ppb, 100 ppb, and 150 ppb of aflatoxin as treatment R0, R1, R2, and R3, respectively). Two way analysis of variance was used to analyse phenotypic plasticity differences between population. Variable observed were feed consumption, sexual maturity, body weight maturity, and the first weight of egg. The results showed that there were no significantly differences

(P > 0.05) on phenotypic plasticity in reproductive behaviour of Mojosari, Tegal, and Tegal-Mojosari ducks as a responce to aflatoxin addition up to 150 ppb in diets.

279 PURBA, M.
Egg production and hatchery of laying duck in production centre in Blitar District of East Java. ***Produksi dan penetasan telur itik petelur pada sentra-produksi di Kabupaten Blitar, Jawa Timur***/Purba, M.; Prasetyo, L.H.; Susanti , T. (Balai Penelitian Ternak, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 823-829, 3 tables; 15 ref. 636:338.439/SEM/p

DUCKS; EGGS; HATCHING; FERTILITY; HATCHABILITY; EGG PRODUCTION; JAVA.

A study to evaluate performance of MA/AM, crossing between mojosari and alabio duck (MA/AM) was conducted on an area centre in Ponggok subdistrict in Blitar District of East Java. A number of 5900 of MA/AM ducks with aged 20-22 weeks was reared in two groups (3000 ducks for the first group and 2900 ducks for the second). The two groups were fed the same amount quality of feed and drinking water was given ad libitum. The variable observed was egg production (duck-day-production) for 16 months periods. Beside egg laying production, since 2003 the UD Maju Jaya as one of the research collaborators of RIAP has done hatching of eggs. Production and hatching technologies were guided by RUAP. The number of eggs set in each hatching were 2945 eggs. The hatched eggs was normal, medium size with weight between 60-70 g/egg. The variable observed were fertility, hatchability and a number ratio of male and female of DOD. The result showed that the average of eggs production in the first group for 16 months periods was higher (67.76 ± 3.62%) than that in the second group (58.54 ± 4.81%). Fertility and hatchability of eggs were 90.45 and 67.32% respectively. The number of ratio male and female of the duckling almost the same as 32.94 and 34.38%, respectively.

280 ROHAENI, E.S.
Alabio duck reared in husk cage modification system at breeding centre in Hulu Sungai Utara Regency [South Kalimantan]. ***Usaha penetasan itik alabio sistem sekam yang dimodifikasi di sentra pembibitan Kabupaten Hulu Sungai Utara***/Rohaeni, E.S.; Subhan, A.; Setioko, A.R. (Balai Pengkajian Teknologi Pertanian Kalimantan Selatan, Banjarbaru (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor (Indonesia). Bogor: Puslitbangnak, 2005: p. 772-777, 2 tables; 13 ref. 636:338.439/SEM/p

DUCKS; BREEDS (ANIMALS); HATCHERIES; RICE HUSKS; COST ANALYSIS; MARKETING; FARM INCOME; KALIMANTAN.

Hatchery is a business type of alabio duck business conducted by breeders in Hulu Sungai Utara (HSU) Regency. This research aim was at studying the profile and feasibility of hatchery farms at center in Sungai Hulu Utara Regency. The activities were conducted by surveying the alabio duckling breeders through interviews at Mamar Village of South Amuntai Subdistrict, HSU Regency. From the survey result, it was found out that hatching done by the majority was man-made ones by using modified husk system or combined with mechanical hatchers. The eggs hatched came from their own and also from other villages producing hatching eggs. The hatching scale run by breeders ranged from 1,000 to 10,000 per household per week with an average of 2,500 eggs. The fertility ranged from 50 to 70% with an average of 66.12%. The ducklings produced were sold at the age of 1 to 10 days with varied prices depending on the quality, age, and sex. Most of the duckling marketing was conducted at Alabio market held every Wednesday or collected by "pedagang pengumpul" at hatching locations. The hatching farming conducted by breeders produced an income of Rp 632.500/week with the R/C value equal to 1.22. This result indicated that duckling hatching is profitable and worth conducting.

L70 VETERINARY SCIENCE AND HYGIENE – GENERAL ASPECT

281 MUCHTARIDI.
Application of solid phase extraction-GC/MS (gas chromatography-mass spectrometry) technology in preparation of analysis of volatile compounds in blood plasma of mice. ***Aplikasi teknologi ekstraksi fase padat-GC/MS (gas chromatography-mass spectrometry) pada preparasi analisis senyawa atsiri dalam plasma darah mencit***/Muchtaridi (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 184-191, 2 ill., 2 tables; 9 ref.

ESSENTIAL OILS; MYRISTIN; MYRISTICA; SEEDS; EXTRACTS; OCIMUM; BLOOD PLASMA; MICE; LABORATORY ANIMALS.

Sample preparation is one of the steps in analysis which is able to determine efficiency of analysis, because it can establish reproducibility and recovery of the matrix interference. SPE (solid phase extraction) is a recent trend in sample preparation for reduction of solvent volume and time. In this research, application of SPE has been carried out to determine myristicin and linalool in blood plasma of mice after inhalation of essential oil. Recovery of myristicin in blood plasma of mice after inhalation of essential oil of nutmeg seeds (*Myristica fragrans* Houtt) increased up to 90%, after preparation using SPE C-18. On the other hand, linalool could be detected in blood plasma of mice after inhalation of essential oil of kemangi (*Ocimum formacitratum* Linn) leaves with application of SPE in sample preparation.

282 SUBARNAS, A.
Antidepressant activity of the methanol extract of *Areca catechu* L. seeds in mice. ***Aktivitas antidepresi ekstrak metanol biji pinang (Areca catechu L.) pada mencit***/Subarnas, A. (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(2) p. 91-100, 5 tables; 13 ref.

ARECA CATECHU; SEEDS; DRUG PLANTS; PLANT EXTRACTS; HYPOTHERMIA; MICE; LABORATORY ANIMALS; METHANOL.

Antidepressant activity of methanol extract of *Areca catechu* L. seeds had been investigated on mice using a forced swimming test. In addition, an effect of the extract on catalepsy, hypothermia, and head-twitch respons induced by haloperidol (5 mg/kg), reserpin (8 mg/kg), and 5-hydroxitryptophan (5-HTP) (300 mg/kg), respectively, had been examined. The results indicated that in the forced swimming test the extract at doses of 200 and 400 mg/kg of body weight decreased duration of immobility of mice significantly as compared to the control at the first and the second 5 minutes. At the two doses, the extract significantly shortened duration of catalepsy observed every 30 minutes in 150 minutes and decreased a number of head-twitches at every 15 minutes along 60 minutes observations. In the antihypothermia examination, the extract raised the body temperature of hypothermia mice only at a dose of 400 mg/kg. These result suggest that the methanol extract of *A. catechu* seeds might have antidepressant activity.

283 WIKANTA, T.
Effect of i-carrageenan and k-carrageenan feeding on the reduction of rabbit's blood glucose level and intestine histopathology. ***Pengaruh pemberian i-karaginan dan k-karaginan terhadap penurunan kadar glukosa darah dan histopatologi usus kelinci***/Wikanta, T. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Kurniawan, R.; Rahayu, L. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 57-68, 8 ill., 5 tables; 27 ref.

RABBITS; CARRAGEENANS; HYPOGLYCAEMIA; CRUDE FIBRE; DOSAGE EFFECTS; BLOOD SUGAR; INTESTINES; HISTOPATHOLOGY; TRADITIONAL MEDICINES.

This paper reported concerning the experimental result on the utilization of the food fiber compounds, i-carrageenan and k-carrageenan for reducing the blood glucose level. This research applied the method of

oral glucose tolerance test using rabbit as an experimental animal, with the feeding dose of 5 mL 2% solution/kg body weight and the feeding duration of 1 day, 3 days, and 7 days. The positive control was chlorpropamide with the dose of 4.9 mg/kg body weight, and the negative control was distilled water. The data of blood glucose level was analysed statistically using one way anova, continued with least significance different test. The relationship between the i-carrageenan and k-carrageenan feeding on the reduction of rabbit's blood glucose level revealed that : 1 day, 3 days, and 7 days i-carrageenan feeding reduced blood glucose level of 5.96%, 8.98%, and 11.91%, respectively; while 1 day, 3 days, and 7 days k-carrageenan feeding reduced blood glucose level of 4.66%, 7.71%, and 13.54%, respectively, and chlorpropamide feeding reduced blood glucose level of 22.66%. The effect of i-carrageenan and k-carrageenan statistically did not significantly different, both had the same capability on reducing rabbit blood glucose level. There was an indication that carrageenan feeding in long period can result a side effect, the abnormalities (lesions) of rabbit's intestine surface cell. However, it is necessary to characterize carrageenan used to give more explanation on the cause of abnormalities (lesions).

284 WIKANTA, T.
In vivo assay on antioxidative effect of *Sargassum crassifolium* seaweed water extract. *Pengujian secara in vivo efek antioksidatif dari ekstrak air rumput laut Sargassum crassifolium*/Wikanta, T. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Rustanti, I.K.; Rahayu, L. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 69-81, 9 ill., 1 table; 15 ref.

MICE; SARGASSUM; EXTRACTS; WATER; ANTIOXIDANTS; BLOOD PLASMA; ACUTE TOXICITY; BLOOD CELLS; HISTOPHATOLOGY; LIVER; IN VIVO EXPERIMENTATION.

This paper reports the result of acute toxicity test (LD50) and antioxidative effect of water extract of *Sargassum crassifolium* seaweed. Measurement of LD50 was using Weil method with mouse (*Mus musculus*) as an experimental animals that given brown seaweed water extract, intraperitoneally (ip). In the extended research, the experimental animal used were rats (*Rattus norvegicus* L.). Experimental animals were divided into 6 groups: (K1) normal group, only distilled water given; (K2) negative control group, treated as treatment group but seaweed water extract was subtituted with distilled water; (K3) treatment group, treated with seaweed water extract at the dose of 0.162 g/100 g BW; (K4) treatment group, treated with seaweed water extract at the dose of 0.324 g/100 g BW; (K5) treatment group, treated with seaweed water extract at the dose of 0.647 g/ 100g BW; (K6) positive control group, treated with vitamin E at the dose of 2.7 mg/100 g BW Group. K1 was treated for 9 days, while K2-K6 were treated for 8 days. On the day 8th, two hours after last treatment, CCl4 at the dose of 55.00 mg/100 g BW were given to group K2-K6. Then, 24 hours afterward, rats blood plasma MDA and red blood cell SOD were analyzed, and liver histopathology preparation was made. The acute toxicity test showed that LD50 was 194.4 mg/100 g BW of mice (ip) or 13.608 g/kg BW of rat (oral). Based on the MDA and SOD value, seaweed water extract feeding with dose of 0.65 g/100 g BW had an antioxidant effect, while based on the liver histopathology analysis, seaweed water extract feeding with dose of 0.324 g/100 g BW was able to prevent liver damaged (as a hepatoprotector).

L72 PESTS OF ANIMALS

285 AHMAD, R.Z.
Reduction of *Arthrobotrys oligospora* mould to *Haemonchus contortus* larvae in grass plot. *Daya reduksi kapang Arthrobotrys oligospora terhadap larva Haemonchus contortus di padang gembalaan*/Ahmad, R.Z.; Beriajaya (Balai Penelitian Veteriner, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono (eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 995-1000, 2 ill., 1 table; 19 ref. 636:338.439/SEM/p

SHEEP; ARTHROBOTRYS; HAEMONCHUS CONTORTUS; GRAZING LANDS; NEMATODE INFECTIONS; FAECES; LARVAE.

The purpose of this study was to determine the reduction capacity of fungi *Arthrobotrys oligospora* against infective larvae of *Haemonchus contortus* directly in faeces distributed on grass plots. In the trial faeces from sheep infected with H. contortus was collected and mixed with spores of *A. oligospora*; distributed on grass plots. One week after grass was collected and larvae recovered from grass were counted. The results showed that 6 x 10^6 spore of *A. oligospora* given directly in the sheep faeces caused the decrease of larvae of *H. contortus* on grass plots near significant-dfference value (P = 0,076) compared to there in the control group. Conclusion of this study was *A. oligospora* can be directly used to decrease the contamination of gastrointestinal nematode larvae on grass.

N20 AGRICULTURAL MACHINERY AND EQUIPMENT

286 BUDIHARTI, U.
Dynamic system approach to find out mechanization model of rice mill to predict rice production. ***Pendekatan sistem dinamik untuk mempelajari model mekanisasi penggilingan padi untuk memperkirakan produksi bera***/Budiharti, U.; Tjahjohutomo, R.; Harsono; Gultom, R.Y. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)); Basuki, R.S. *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2007) v. 5(1) p. 1-12, 4 ill., 3 tables; 14 ref. Appendices

RICE; MILLING; MECHANIZATION; POSTHARVEST TECHNOLOGY; SIMULATION MODELS.

Rice is a strategic commodity for Indonesia, as a common staple food; hence its availability will effect the economy and politics situation. Rice mill as starting place for rice processing is an important component for rice production. More than 60% of rice processing unit are small scale rice mills which are consist of husker-polisher only. Research was carried out to find out the effect of input on postharvest technology with regard to increasing rice production. Prediction using dynamic model simulation showed there is possibility to increase the rice production about 300,000-400,000 tones rice by improvement the milling machine configuration. Dynamic model simulation noted that Indonesian have deficit in rice consumption production about 500,000-600,000 tones per year. The rice deficit can be reduced by improving rice mills and postharvest technology. Result showed that rice mill repairing will reduce the deficit, even if that repairing was combined with effort in reducing postharvest losses, it might be surplus in 2010. Rice mill repairing also exhibited increase the milling recovery from 62.78% to 63.48%.

287 FIRDAUS, J.
Work evaluation and determining the break even point of power thresher of UPJA (agricultural machinery service business) groups supervised by Prima Tani. ***Evaluasi kinerja dan penentuan titik impas alat perontok padi pada kelompok UPJA binaan Prima Tani***/Firdaus, J.; Sannang, Z. (Balai Pengkajian Teknologi Pertanian Sulawesi Tengah, Palu (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Buku 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 91-96, 3 tables; 4 ref. 631.152/SEM/p bk1

RICE; THRESHERS; EQUIPMENT PERFORMANCE; WORK CAPACITY; OPERATING COSTS; PROFITABILITY; FARM HELPER SERVICES; FARMERS ASSOCIATIONS; INNOVATION.

The increased of paddy productivity must be followed by maintaining quality efforts both on quality and quantity aspect with the good postharvest treatment. The implementation and development of postharvest machinery to support agroindustry and agribusiness development had the important role to increase efficiency, productivity and improvement of agriculture product quality. The highest yield loss occured at

cutting and thresing of paddy. It was about 14.31%. During 2006 BPTP Sulawesi Tengah through Prima Tani (the pioneering and the acceleration of the socialization of the innovation of agricultural technology programme) had expanded an agricultural machinery service business (UPJA) to cultivation group in the Torue Village, Parigi Moutong Regency that was named by the UPJA Pomponelangi. UPJA Pomponelangi had three harvester groups which implemented with 5 HP throw-in power thresher. This research had purposes to: (1) to evaluate the performance or the ability of harvesters working on the system of rice harvesting, (2) to know the capacity and the work capacity of the power thresher, (3) to know the benefit and break even point of the farm machinery services. The result of the research showed that the 5 HP throw-in power thresher capacity was 1.4069 tons/hour (0.2331 ha/hour) whereas the whole team's capacity of the harvest was 0.5598 tons/hour (0.1062 ha/hour). The harvester performance could still be improved from 1 ha to 2 ha per day if using reaper the break even point of operating 5 HP throw-in power thresher was 1.2 ha/unit, the total income of UPJA was Rp 3,303,996/season.

288 YUSUF, A.
[Feasibility study of direct seeding (ATABELA) IRRI seeder]. ***Kajian kelayakan alat tanam benih langsung (atabela) IRRI seeder***/Yusuf, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 165-170, 1 ill., 3 tables; 6 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; DIRECT SOWING; SEED DRILLS; PLANTING EQUIPMENT; EFFICIENCY; PRODUCTION COSTS.

Purpose of study is to know feasibility of appliance IRRl seeder as a means of plant the direct seeding compared to the method of transplanting. This study have been executed in wetland rice of farmers Wonorejo Village, Pematang Bandar District, Simalungun Regency at dry season 2007. Rice variety Ciherang of class foundation seed (FS) were planted as direct seeding at 3 farmers for the width of 0.20 ha, 0.16 and 0.12 ha each. Results indicated were that usage of seed to 1 ha about of 60.73-72.70 kg/ha is more 55.67% compared to the method transplanting (42.66 kg/ha), required time to planting for the width of 1 ha were about of 5.5-6.0 hours with labours amount of 2 peoples. The planted with method transplanting to 1 ha cost money need about Rp 500,000/ha with tegel planting system and Legowo 4:1 planting system need cost money equal to Rp 625,000/ha. With expense work to Atabela IRRI Seeder with pieces rate Rp 30,000/ha/person hence usage of appliance plant the direct seeding of lRRl seeder can cost efisiency equal to Rp 440,000-Rp 565, 000/ha.

P05 ENERGY RESOURCES MANAGEMENT

289 MULYANTARA, L.T.
Optimalization energy and cost consumption for rice production: case study at five rice production centers in Indonesia. ***Optimalisasi penggunaan energi dan biaya pada budidaya padi: studi kasus di lima daerah penghasil padi di Indonesia***/Mulyantara, L.T.; Hendriadi, A.; Rahmarestia, E.; Triwahyudi, S. (Balai Besar Pengembangan Mekanisasi Pertanian, Serpong (Indonesia)). *Jurnal Enjiniring Pertanian* ISSN 1693-2900 (2005) v. 3(1) p. 19-32, 16 ill., 8 ref.

ORYZA SATIVA; CULTIVATION; ENERGYMANAGEMENT; MECHANIZATION; COST ANALYSIS; INDONESIA.

The principle reason of using agricultural machinery is to increase efficiency of production, included efficiency on energy consumption. However, in recent year the use of energy for rice production has been strongly increased and tended to be in efficient. The aim of the study was at analyzing energy and cost consumed for rice production at any level of mechanization i.e. traditional, existing and fully mechanized. The locations for survey were selected at central rice production in Indonesia, those were Karawang,

Lamongan, Sukohardjo, Musi Banyuasin and Tanah Toraja District. In order to obtain optimum level of the rice mechanization, ratio output/input (OE/IE) energy and cost were maximalized. It was found that maximum OE/IE energy at the fully mechanized level was 6.41, while the maximum OB/IB at the level of existing mechanization, was 2.01.

P33 SOIL CHEMISTRY AND PHYSICS

290 JAMIL, A.
Soil properties during transplanted rice cultivation period in Langkat (Indonesia). ***Sifat tanah selama masa pertanaman padi tanam pindah di Langkat***/Jamil, A. (Balai Pengkajian Teknologi Pertanian Sumatera Utara, Medan (Indonesia)). [Proceedings of the national seminar on innovation and specific location technology transfer to support agriculture revitalization. Book 1], Medan 5 Jun 2007/Sudana, W.; Moudar, D.; Jamil, A.; Yufdi, P.; Napitupulu, B.; Daniel, M.; Simatupang, S.; Nainggolan, P.; Hayani; Haloho, L.; Darmawati; Suryani, S. (eds.) Balai Besar Pengkajian dan Pengembangan Teknologi Pertanian, Bogor (Indonesia). Bogor: BBP2TP, 2007: p. 150-158, 4 tables; 23 ref. Appendix 631.152/SEM/p bk1

ORYZA SATIVA; PHOSPHATE FERTILIZERS; FARMYARD MANURE; FERTILIZER APPLICATION; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; RAINFED FARMING; SUMATRA.

Most of the rainfed lowland rice soils have poor fertility due to either continued cultivation with little or no nutrient replacement and/or naturally low soil fertility. This study attempted to evaluate the changes of soil properties as affected by phosphorus fertilizer and cow manure applied onto the rainfed lowland rice soil properties. The experiment was conducted from June to October 2004, in North Sumatra, Indonesia. Treatments involved a combination of 0, 30, 60, and 90 kg/ha of P_2O_5 and 0, 3, and 6 t/ ha of cow manure. Treatments were laid in a factorial RCBD with 3 replications. Results showed that application of both phosphorus and organic matter significantly increased available phosphorus, soil organic carbon, cation exchange capacity, and available water in the soil. Based on the experimental results, as a conclusions consisted of both phosphorus and cow manure had positive effect to improve soil properties, especially under rainfed lowlands rice, and generally application of 90 kg/ha of P_2O_5 and 6 t/ha of cow manure had greater effect on soil nutrient content compared to other treatments.

291 JOY, B.
Difference of response and relationship of pH, exchangeable Al, and available P of Typic Kanhapludults due to phosphate rock, calcite, and dolomite application. ***Perbedaan respons dan keterkaitan pH, Al-dd, serta P-tersedia dari Typic Kanhapludults akibat aplikasi P-alam, kalsit, dan dolomit***/Joy, B. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas pertanian). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 249-258, 2 ill., 3 tables; 12 ref.

SOIL TYPES; ROCK PHOSPHATE; PH; DOLOMITE; CALCITE; SOIL CHEMICOPHYSICAL PROPERTIES.
An incubation experiment to find out the effect of phosphate rock and kind of lime (calcite and dolomite) on pH, exchangeable Al, available P, and relationship of each response parameters on Typic Kanhapludults was carried out in Soil Chemistry Laboratory of Faculty of Agriculture, Padjadjaran University. Design experiment used was completely randomized design consisted of two factors and three replications. The first factor was kind of lime, i.e. without lime, calcite 1.5 x exchangeable Al, and dolomite 1.5 x exchangeable Al. The second factor was dosage of phosphate rock consisted of 0, 45, 90, and 135 kg P/ha. Soil was incubated for 45 days in field capacity condition and then response parameters were measured in the laboratory. Result of the experiment showed that interaction of rock phosphate and kind of lime significantly affected exchangeable Al and available P, while soil pH value was affected by single treatment. The value of pH increased in line with increasing of rock phosphate dosage, while dolomite application gave the higher pH value compared to calcite. In general, the higher dosage of rock phosphate combined with lime would be affected the higher available P content of soil. Based on analysis

of regression and correlation test increasing of soil pH decreased the content of soil exchangeable Al. Furthermore, decreasing of the exchangeable Al value significantly increased the available P content of soil.

292 SUHARTA, N.
Barongtongkok land system in Kalimantan: potential, constraint, and its development for dryland agriculture. ***Sistem lahan Barongtongkok di Kalimantan: potensi, kendala, dan pengembangannya untuk pertanian lahan kering***/Suharta, N. (Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian, Bogor (Indonesia)). *Jurnal Penelitian dan Pengembangan Pertanian* ISSN 0216-4418 (2007) v. 26(1) p. 1-8, 3 ill., 3 tables; 46 ref.

KALIMANTAN; SOIL CHEMICOPHYSICAL PROPERTIES; AGROECOSYSTEMS; BASALTIC SOILS; DRY FARMING.

Land system concept assumes that there are close relation between rock type, hydroclimatic, landform, soil, and organism. Therefore the same land system, anywhere, would be characterized by the similarity in agriculture potential and limiting factors. Barongtongkok land system is one of land systems found in Kalimantan developed from basaltic lava flow with flat to rolling terrain. This land system is found in wet climate at altitude varied between 150 m and 1,500 m asl. Soils on Barongtongkok land system are classified as weathered soils characterized by deep solum, friable, stabilized aggregate, and rapid permeability. This condition is highly suitable for dryland agriculture, but for wetland rice development that needs the presence of plow layer and mud structure, these physical soil properties are not suitable. The chemical soil characteristics showed the advanced leaching processes characterized by soil reaction with delta-pH zero to positive, low cation exchange capacity, and high pretention. To solve these problems, soil management should be focused on increasing cation exchange capacity and decreasing leaching processes by adding organic matter (manure). At present, the Barongtongkok land system is used partly as dryland agriculture either food crops or estate crops. The rest areas are not yet occupied due to the lack of accessibility. Those areas, either found in West Kalimantan or in East Kalimantan are suitable for dryland agriculture by considering the agroecological characteristics.

Q02 FOOD PROCESSING AND PRESERVATION

293 BASMAL, J.
Effect of concentration and ratio of potassium hydroxide solution to seaweed on quality of sheet carrageenan. ***Pengaruh konsentrasi dan rasio larutan potasium hidroksida dan rumput laut terhadap mutu karaginan kertas***/Basmal, J.; Suryaningrum, T.D.; Yennie, Y. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)). *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 29-38, 7 ill., 15 ref.

CARRAGEENANS; EXTRACTION; EUCHEUMA; POTASSIUM HYDROXIDES; FRESHWATER; TEMPERATURE; COLLOIDS; VISCOSITY; QUALITY; PROXIMATE COMPOSITION.

Quality improvement of sheet carrageenan extracted from Eucheuma cottonii was carried out using several concentration of hot potassium hydroxide solution (4%, 6% and 12%). The ratio of *E. cottonii* to hot potassium hydroxide solution were 1:8 and 1:12. The heating time was 120 minutes at 70°-80°C. Carrageenan was then extracted from the seaweed by cooking in fresh water at 90°-95°C for 2 hours. It was found that *E. cottonii* treated with hot potassium hydroxide solution could increase the value of gel-strength and reduce the value of viscosity, ash, acid insoluble ash, and sulphate content. *E. cottonii* heated in 12% potassium hydroxide solution with the ratio between *E. cottonii* and potassium hydroxide of 1:8 produced the best sheet carrageenan based on the gel strength (578.5 g/cm2), viscosity (15.0 cPs), sulphate content (18.1%), ash content (14.1%), acid insoluble ash (0.1%), moisture content (9.4%) and yield (29.3%).

294 SOEMITRO, S.
Effect of selective chemical modification on the stability of *Saccharomycopsis fibuligera* alpha amylase. *Pengaruh modifikasi kimiawi selektif terhadap kestabilan alpha amilase dari Saccharomycopsis fibuligera*/Soemitro, S. (Universitas Padjadjaran, Sumedang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). *Bionatura* ISSN 1411-0903 (2005) v. 7(3) p. 259-273, 3 ill., 2 tables; 29 ref.

YARROWIA; AMYLASES; CHEMICAL COMPOSITION.

The ability to obtain stable enzymes is crucial for their application as biocatalysts. The objective of this study was to increase the stability of *Saccharomycopsis fibuligera* alpha-amylase by various selective chemical modifications of lysine side chains on the enzyme surface. Modifications were performed by hydrophilization with glyoxylic acid, by cross-link formation with dimethyladipimidate, by increasing hydrophobic interactions with acetic acid anhydride. In the comparison with the unmodified alpha-amylase, acetic acid anhydride modified enzyme showed the highest stabilization factor of 11.9 fold, an increase of the affinity toward amylose substrate of 32%, also an increase of the specificity constant of 23.8%.

295 WIDYOTOMO, S.
Influence of milling process of roasted cocoa beans on size distribution change of cocoa cotyledon. *Pengaruh penggilingan biji kakao pascasangrai terhadap perubahan distribusi ukuran keping biji*/Widyotomo, S. (Balai Penelitian Kopi dan Kakao, Jember (Indonesia)); Sri-Mulato; Suharyanto. *Pelita Perkebunan* ISSN 0215-0212 (2007) v. 23(1) p. 73-89, 8 ill, 4 tables; 17 ref.

COCOA BEANS; MILLING; DIMENSION; POSTHARVEST TECHNOLOGY.

One of important steps in secondary cocoa process is deshelling cocoa beans roasted. The purpose of deshelling is to enrich cotyledon cocoa surface area which affects on reducing energy and processing time with good quality of the chocolate product. The objective of this research was to study the influence of milling process on physical characteristic change of cocoa beans roasted such as size distribution change, geometrical diameter average, uniformity index, fineness modulus, and average dimension of cotyledon cocoa roasted. The Indonesian Coffee and Cocoa Research Institute has designed and tested deshelling of roasted cocoa beans which will be used in this research. Before deshelling process, C grade bulk cocoa beans has been roasted up to 2.5-3% water contents. The result showed that optimal milling process by rotary cutter type milling unit has good size distribution change, geometrical diameter average, uniformity index, fineness modulus, and average dimension on 500 rpm rotary speed and 2.8 m/s air flow. On optimal process condition, 74.5% of cocoa cotyledon roasted had diameter size between 2.0-4.75 mm, 2.116 mm average of geometrical diameter, 0.864 mm average dimension, 3.052 fineness modulus, and 80% as crude size particel-20% as temperate size particle on uniformity index. Therefore, more than 80% of cocoa cotyledon roasted had diameter size between 2.0-4.75 mm with 700-900 rpm rotary cutter speed. Average of geometric diameter was 1.65-2.19 mm, and the dimension average was 0.69-0.89 mm. Uniformity index was crude size particle up to 80-90%, and in temperate size particle 10-20%. Fineness modulus value was 2.73-3.09.

Q04 FOOD COMPOSITION

296 SEMBIRING, B.B.
Influence of the particle size and length of extraction on the yield and quality of curcuma extract (*Curcuma xanthorrhiza*). *Pengaruh kehalusan bahan dan lama ekstraksi terhadap mutu ekstrak temulawak (Curcuma xanthorrhiza Roxb)*/Sembiring, B.B.; Ma'mun; Ginting, E.I. (Balai Penelitian Tanaman Obat dan Aromatik, Bogor (Indonesia)). *Buletin Penelitian Tanaman Rempah dan Obat* ISSN 0251-0824 (2006) v. 17(2) p. 53-58, 2 tables; 11 ref.

CURCUMA XANTHORRHIZA; PLANT EXTRACTS; QUALITY; LIPID CONTENT; DURATION; PARTICLE SIZE; YIELDS.

The effect of suitable method condition to quality of curcuma extract, was conducted at Postharvest Technology Laboratory of Research Institute for Aromatic and Medicinal Crops Bogor from March to May 2006. The objective of this experiment was to find out the suitable method condition to obtain qualified curcuma extract. Randomized completely design with factorial was used and using 2 replications. The treatment concisted of 2 factors, they were material of particle size and duration of extraction. Two particles size of 40 and 60 mesh, and three lengths of extraction of 4, 6 and 8 hours were tested. The result showed that the particle size influenced the extract yield, curcumin content, oil content and xanthorizol content in the extract. Meanwhile, the length of extraction influenced the extract and oil content. The highest curcumin content was 2.88% obtained from 40 mesh particle size material, while xanthorizol content was 14.25% obtained from material with 60 mesh of particle size.

297 USMIATI, S.
Milk quality on morning and afternoon milking at Sarwamukti Cooperation: case study in 2004. ***Mutu susu sapi dari peternak anggota Koperasi Susu Sarwamukti pada pemerahan pagi dan sore hari: studi kasus tahun 2004***/Usmiati, S.; Widaningrum (Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor (Indonesia)). [Proceedings of the national seminar on animal husbandry and veterinary technology: Book 1], Bogor 12-13 Sep 2005/Mathius, I W.; Bahri, S.; Tarmudji; Prasetyo, L.H.; Triwulanningsih, E.; Tiesnamurti, B.; Sendow, I.; Suhardono(eds.) Pusat Penelitian dan Pengembangan Peternakan, Bogor. Bogor: Puslitbangnak, 2005: p. 323-327, 2 tables; 10 ref. 636:338.439/SEM/p

COW MILK; QUALITY; FARMERS; COOPERATIVE ACTIVITIES.

The milking process that has been done in the morning and afternoon affected on milk quality. On 2004, research had been done to get the impact of milking process, which was implemented in the morning and afternoon on milk quality of farmer cooperation member of Sarwamukti-Bandung. The research was design by randomized completely block design (RCBD) by two treatments i.e. (i) milking process in the morning; and (ii) milking process in the afternoon on seven farmers as block. The parameters included pH, mass gravity, percentage of fat, protein, water and solid non fat (SNF) and total plate count (TPC) (CFU/ml) of milk. Research result indicated that the treatments effected pH, mass gravity, percentage of fat, protein and water, and total plate count, but not to SNF percentage. The milking process in the afternoon had higher value on pH, mass gravity, and percentage of fat and protein compared to the milking process in the afternoon. On the other hand, milking in the morning had higher value on water content and total plate count compared to the milking process in the afternoon. Value of pH, mass gravity, percentage of fat and protein of milk that milking in the afternoon were 6.67; 1.03; 4.29; and 3.34%, respectively, milking in the morning had water content 89.31% and total plate count 2.24 x 10^8 CFU/ml compared to the milk quality from milking process in the afternoon. Milk quality of Sarwamukti farmers which was milking in the afternoon was better than milking in the morning.

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

298 BASMAL, J.
Effect of monochloro acetic acid concentration during the carboxymethylation process of chitosan on the production of carboxymethyl chitosan produced. ***Pengaruh konsentrasi asam monokloro asetat dalam proses karboksimetilasi kitosan terhadap karboksimetil kitosan yang dihasilkan***/Basmal, J. (Balai Besar Riset Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Prasetyo, A.; Fawzya, Y.N. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 47-56, 8 ill., 2 tables; 15 ref.

CHITOSAN; HYDROLASES; ACETIC ACID; VISCOSITY; MOISTURE CONTENT; ASH CONTENT; SOLUBILITY.

An experiment to produce carboxymethyl chitosan (CMCts) was carried out using monochloro acetic acid concentrations as a variable factor. The ratio of chitosan : monochloro acetic acid applied were 1:0.9; 1:1.1; 1:1.3 dan 1:1.5 (w/w). Etherification process was executed at 90°C for 4 hours. Result of the experiment showed that monochloro acetic acid showed significant effect on the quality and quantity of CMCts. Based on viscosity, moisture content and ash content, the best ratio of chitosan : monochloro acetic acid was 1:0.9 (w/w) giving yield of 129.4%, moisture content of 9.7%, ash content of 1.7%, viscosity of 49.3 cPs, solubility of 9.85 ml water to dilute 1 g CMCts and degree of substitution of 0.89.

299 CHASANAH, E.

Application of hydrophobic interaction chromatography for chitosanase purification. *Penggunaan kolom kromatografi interaksi hidrofobik untuk pemurnian kitosanase*/Chasanah, E.; Putro, S. (Balai Besar Pengolahan Produk dan Bioteknologi Kelautan dan Perikanan, Jakarta (Indonesia)); Suhartono, M.T. *Jurnal Penelitian Perikanan Indonesia* ISSN 0853-5884 (2005) v. 11(8) p. 19-27, 6 ill., 2 tables; 19 ref.

CHITOSAN; ISOLATION TECHNIQUES; BACILLUS LICHENIFORMIS; PURIFICATION; COLUMN CHROMATOGRAPHY; HYDROPHOBICITY; AMMONIUM SULPHATE; ELECTROPHORESIS; GEL CHROMATOGRAPHY.

The objective of the study was to obtain hydrophobic interaction chromatography performance for purification of *Bacillus licheniformis* MB-2 chitosanase. Butyl Sepharose 4FF matrix was used to fractionate the enzyme from crude extract. The optimum concentration of ammonium sulphate used to maximize hydrophobic interaction was 30% saturation. The fractionation resulted 2 active peaks, i.e. F1 and F2, when elution was done using gradient ammonium sulphate of 30% - 0% saturation, while 2 more active peaks, F3 and F4, were obtained when lower ammonium sulphate gradient was used, i.e. 10% - 0% saturation. SDS-PAGE analysis showed that F2 was relatively pure indicated by 1 band of protein in the gel, while F1, F3 and F4 were not. It can be concluded that pure fraction of F2 (29%) can be obtained by single step purification by hydrophobic interaction of column chromatography.

T01 POLLUTION

300 SETYANTO, P.

Methane emission from three soil types of Central Java. *Emisi gas metan dari tiga jenis tanah di Jawa Tengah*/Setyanto, P. (Loka Penelitian Lingkungan Pertanian, Jakenan, Pati (Indonesia)); Makarim, A.K.; Rosenani, A.B. *Penelitian Pertanian Tanaman Pangan* ISSN 0216-9959 (2005) v. 24(3) p. 132-139, 6 ill., 2 tables; 24 ref.

METHANE; SOIL POLLUTION; SOIL TYPES; FERRALSOLS; REGOSOLS; ALLUVIAL SOILS; JAVA.

Extrapolation of methane (CH_4) emission estimates to a larger scale basis (upscalling) using GIS (geographic information system) or satellite imaginary figures often obtain limitation due to insufficient data of the emission from different soil properties. Hence, the effects were significant among soils on its ability to emit CH_4 from rice frelos. This study was carried out with the aim to understand the emission of CH_4 from three selected soils cultivated with rice under field conditions and to investigate the relationship between CH_4 flux and water soluble carbon (WSC). Three selected soils were used; they are dark brown alluvial (DBA), brown regosol (BR) and red latosol (RL). The soils received normal irrigation practices and fertilizing. Total annual CH_4 emission of the three soil types were 156.1, 39.7, 142.4 kg CH_4/ha for BR, RL and DBA, respectively. The annual CH_4 emission were significantly different ($P \leq 0.05$), while grain yield were not significantly different among the three soils. High total CH_4 emissions of DBA were due to high C content (2.01%) compared with BR (0.57%) and RL (0.52%) and also due to lower Fe2O3 and MnO2 content. Rice field with red latosol soil is promising to be intensively cultivated because of its

low CH_4 emission and significantly no difference in grain yield production with the other soils. Methane flux and WSC pattern differed among soils, which depend on the soil redox potential, competition to utilize WSC among microbes, and the mobility of WSC in soil.

AUTHOR INDEX

A
Abdullah, B.
208
Adinugraha, H.A.
247, 248, 253, 254
Adnyana, M.O.
156
Affandi, L.
270
Ahmad, R.Z.
285
Akmal
196, 202
Ali, U.
261
Ambarwati, A.D.
213
Anggraeni, A.
272
Anggraeny, Y.N.
262
Ansyarullah
179
Arifiantini, R.I.
276, 277
Arifin
169
Arifin, M.
227
Aryono, W.B.
255
Ashari
151
Aswidinnoor, H.
197
Atmadja, W.R.
228
Azrai, M.
197

B
Bachri, S.
169
Baon, J.B.
194
Basmal, J.
293, 298
Basuki, R.S
286
Beriajaya
285
Bidura, I G.N.G.
263
Buchori, D
231
Budiharti, U.
286
Bustamam, M.
208

C
Candrawati, D.P.M.A.
263
Chasanah, E.
299
Clarke, R
244

D
Daras, U.
155
Darwati, I.
183
Darwis, M.
229, 230
Daswir
179
Dewantari, M.
263, 278
Diwyanto, K.
272
Djatiwaloejo, S
214
Djauhariya, E.
165
Doloksaribu, M.
273
Dono, D.
231

E
Eddy, B.T.
256
Ekowati, T.
152
Elfiani
174
Elieser, S.
273
Emmyzar
179
Ermiati
157
Ernawati
266

F
Fadwiwati, A.Y.
209
Farajallah, A.
272
Fawzya, Y.N
298
Firdaus, J.
287
Friyatno, S.
151

G
Gardjito, M
223
Ginting, E.I.
296
Girsang, S.S.
185
Guharja, E.
205
Gultom, R.Y.
286
Gunawan
275
Gunawan, O.S.
238

H
Hadiastono, T.
239
Hairiah, K
194
Hamdan A.A.
252
Handayanto, D.
194
Hardi T.W., T.
166, 182
Hardjosworo, P.S.
275
Harni, R.
232
Harran, S.
205
Harsono
286
Hartoyo, B.
259
Hasanah, M.
157
Hayashi, H
219
Helmi
175, 176
Hendriadi, A.
289
Herawan, T.
166
Herlina, D.
188
Herlina, T.
219
Herman
179
Herman, M.
213
Hidajat, J.R.
197
Hidayati, N.
158
Hulupi, R.
198
Husni, A.
204
Hutahaean, L.
153
Hutami, S.
204

I
Indah, O.
276
Indrani, N.P.
193
Indrayani, I G.A.A.
199
Irawan, A.
161
Irawati, A.
162
Ismail, B.
252
Ismayadi, C.
244
Isnaini
251
Istianto, M.
233

J
Jamil, A.
163, 177, 184, 290
Jarmani, S.N.
158
Jayusman
200, 201, 249, 250
Jonharnas
202, 203
Joy, B.
291

Juarini, E.
268

K
Kabirun, S.
222
Kadarwati, F.T.
164, 178
Karda, I W.
264
Kariyasa, K.
156
Kasno, A.
160
Kismiati, S.
274
Kosmiatin, M.
204
Koswara, J.
197
Krishna, N.H.
262
Krisnawati, A.
220
Kristina, N.N.
221
Kurnia, D.
219
Kurniawan, R.
283
Kusnadi, U.
159
Kusuma, I.
179
Kusumaningrum, D.A.
159, 257
Kuswahyuning, R.
224

L
Laba, I W.
234
Laksmiwati, N.M.
265
Lamadji, S.
215
Lestari, E.G.
205, 206
Limbongan, J.
218
Lubis, S.
245

M
Ma'mun
296
Machmud, M.
240
Maheswari, R.R.A.
272
Mahfudz
251
Mahfudz, L.D.
274
Mahmilia, F.
273
Makarim, A.K.
300
Manohara, D.
242
Mansyur
193
Manuwoto, S.
231
Marbun, T.
180
Mardawilis
190
Mardiningsih, D.
256
Mariska, I.
204, 205
Marsh, A.
244
Maryani, Y
167
Mashudi
252
Matondang, R.H.
209
Miftakhurohmah
168
Moko, H.
247, 248, 251
Muchtaridi
281
Mufrihati, E.
237
Mugiono
215
Muhammad, Z.
257
Mukani
154
Mulyadi
233
Mulyantara, L.T.
289
Munif, R
232
Musalamah
207

Musfal
181
Mustika, I.
232

N
Nasrullah
198
Nieldalina
175
Noveriza, R.
242
Nugraha, S.
245
Nugroho, A.
215
Nurdjannah, N.
246
Nurindah
235
Nuryani, Y
241
Nuschati, U.
266

O
Omon, R.M.
192
Oxtovianto, H.
152

P
Pamungkas, F.A.
273
Pasambe, D.
258
Prabawardani, S.
225
Prasetiyono, J.
208
Prasetyo, A.
298
Prasetyo, E.
152
Prasetyo, L.H.
260, 271, 279
Prastyono
253
Prawoto, A.A.
169, 171
Prayogo, Y.
236
Prihandini, P.W.
270
Prijono, D.
231
Pudjiono, S.
182, 226
Purba, M.
279
Purwanto
194
Putra, S.
267
Putro, S.
299

R
Rahardjo, M.
165, 183
Rahardjo, P.
172
Raharjo, S.
223
Rahayu, L
283, 284
Rahmarestia, E.
289
Rauf, A.W.
222
Riajaya, P.D.
164
Rialdy, H
242
Rohaeni, E.S.
280
Rohdiana, D.
223
Rosenani, A.B.
300
Rosita S.M.D
183
Rosliani, R.
186
Rosmayanti, D.
161
Rubaya, Y.
179
Rusliyadi, M.
209
Rustanti, I.K.
284

S
Sabarnurdin, M.S.
255
Saleh, N.
243
Sannang, Z.
153, 287
Santoso, T.
236

Santoso, T.J.
213
Sariubang, M.
258
Sarjana
259
Sarjana, T.A.
274
Sebayang, L.
195, 210
Sembiring, B.B.
296
Sembiring, H.
184
Sembiring, T.
211
Setiadi, D.
252, 253
Setiawan, A.
249
Setioko, A.R.
260, 271, 280
Setyaningtyas, K.C
169
Setyanto, P.
300
Setyobudi
182
Sholeh, M.
164
Siagian, D.R.
185
Siagian, Y.T.
254
Sianturi, R.G.
159
Silitonga, T.S.
208
Sinaga, P.H.
212
Sisharmini, A.
213
Slameto
171
Soebagyo, S.S.
224
Soemartono
198
Soemitro, S.
294
Sonjaya, A.
256
Sri-Mulato
295
Srilestari, R.
170
Sriyanto, D.
256
Subarnas, A.
219, 282
Subhan, A.
280
Subiharta
259, 266
Sudirman, A.
165
Sugiyanto, A.
215
Suharta, N.
292
Suhartono, M.T.
299
Suharyanto
295
Sukarman
157, 165
Sukmadjaja, D.
206
Sulastri, D.
214
Sulistyowati, E.
199, 237
Sumanto
268
Sumantri, C.
272
Sumarni, N.
173, 186
Sumartono, B.
244
Sumaryanto
191
Sumiati, E.
173, 187
Sunarti, S.
226
Supramana
232
Supratman, U.
219
Supriyadi
260, 271
Surahman, M.
197
Suryadi, Y.
240
Suryana
269
Suryaningrum, T.D.
293
Suryanto, P.
255

Susanti , T.
279
Susanti, T.
260, 271
Susilawati, I.
193
Susilo, A.W.
214
Sutama, I K.
268
Sutardjo, S.
219
Sutrisno
245
Syahid, S.F.
168
Syakur, A.
182

T
Tasliah
208
Tedjasarwana, R.
188
Thahir, R.
245
Tjahjohutomo, R.
286
Tohari
222
Tombe, M.
242
Trisawa, I M.
234
Trisyono, Y.A.
233
Triwahyudi, S.
289
Triwulanningsih, E.
159

U
Ulina, E.S.
203, 209
Umar
190
Untung, K.
233
Usmiati, S.
246, 297
Utami, P.K.
188

W
Wahyono, T.E.
228
Wardani, S.
237
Wardiyati, T.
215
Wattimena, G.A
213
Widaningrum
297
Widodo
236
Widyotomo, S.
295
Wikanta, T.
283, 284
Winardi
189
Witariadi, N.M.
263
Wulandari, W,A.
275

Y
Yennie, Y.
293
Yudono, P.
222
Yunizar
190
Yusuf, A.
180, 288
Yusuf, T.L.
276, 277
Yuwono, T.
233

Z
Zainunnuroni, M.
171
Zamroni
167
Zen, S.
216, 217

SUBJECT INDEX

A
ABA
221
ACETIC ACID
298
ACUTE TOXICITY
284
ADAPTABILITY
196, 210
ADAPTATION
196, 202, 203, 211
AFLATOXINS
278
AGLAIA
231
AGRICULTURAL BANKS
151
AGROBACTERIUM TUMEFACIENS
213
AGROECOSYSTEMS
235, 292
AGROFORESTRY
194
AGROINDUSTRIAL SECTOR
160
AGRONOMIC CHARACTERS
180, 190, 209, 214, 215, 217
ALKALOIDS
219
ALLELOPATHY
222
ALLIUM CEPA
173, 186
ALLUVIAL SOILS
300
ALPINIA PURPURATA
188
ALSTONIA
252
AMMONIUM SULPHATE
299
AMYLASES
294
ANACARDIUM OCCIDENTALE
155, 228
ANDROPOGON NARDUS
179
ANIMAL FEEDING
269
ANIMAL HOUSING
273
ANIMAL PERFORMANCE
257, 261, 263, 265, 274
ANTAGONISM
238
ANTHRACNOSIS
238
ANTIOXIDANTS
223, 284
APPLICATION METHODS
237
APPLICATION RATES
181, 185, 186, 190
ARACHIS HYPOGAEA
160, 170, 240
ARACHIS PINTOI
194
ARECA CATECHU
282
ARTHROBOTRYS
285
ARTIFICIAL INSEMINATION
270
ARTOCARPUS ALTILIS
253
ASH CONTENT
298
AUXINS
169

B
BA
168
BACILLUS LICHENIFORMIS
299
BACTERIOSES
240
BARE ROOT PLANTING
172
BASALTIC SOILS
292
BEEF CATTLE
256, 258, 259, 262, 266, 270
BEMISIA TABACI
199
BINOTALIS
231
BIODIVERSITY
235
BIOLOGICAL CONTROL
227, 231, 232, 236, 238, 241
BIOLOGICAL PRESERVATION
276
BIOLOGICAL PROPERTIES
275
BIOPESTICIDES
238

BIOTECHNOLOGY
207
BIRTH WEIGHT
273
BLOOD CELLS
284
BLOOD PLASMA
281, 284
BLOOD PROTEIN
267
BLOOD SUGAR
283
BODY WEIGHT
278
BOILING
244
BOTANICAL INSECTICIDES
228, 231, 233
BRAN
263
BRASSICA OLERACEA
187
BREEDS (ANIMALS)
271, 273, 274, 275, 280
BROILER CHICKENS
263
BUDS
167
BULBS
173
BULLS
276
BYPRODUCTS
261

C
CAJANUS CAJAN
220
CALCITE
291
CALLOSOBRUCHUS CHINENSIS
207
CANOPY
254
CAPITAL
151, 152
CAPSICUM ANNUUM
238
CARRAGEENANS
283, 293
CASEIN
272
CASHEWS
228
CATHARANTHUS ROSEUS
221
CATIONS
184
CATTLE
276, 277
CHEMICAL COMPOSITION
233, 294
CHITOSAN
298, 299
CHRYSANTHEMUM
167
CITRUS GRANDIS
233
CITRUS SINENSIS
233
CLONES
171
COCOA BEANS
295
COCOS NUCIFERA
230
COFFEA ARABICA
198
COFFEA CANEPHORA
194
COFFEE BEANS
244
COLLOIDS
293
COLONIZING ABILITY
199
COLOURS
274
COLUMN CHROMATOGRAPHY
299
COMMUNITY DEVELOPMENT
256
COMPLETE FEEDS
261
COMPOSTS
189
CONCENTRATES
267
CONOPOMORPHA CRAMERELLA
237
CONSUMPTION
275
CONTAMINATION
244
COOPERATIVE ACTIVITIES
297
COPRA MEAL
262
COST ANALYSIS
280, 289
COVER PLANTS
193, 234

COW MILK
272, 297
CREDIT
151
CROCIDOLONIA
231
CROP MANAGEMENT
195, 209
CROP PERFORMANCE
175, 188, 196, 210, 211
CROPPING SYSTEMS
176
CROSS BREEDING
271
CROSSBREDS
166, 267
CROSSBREEDING
260
CROWN
255
CRUDE FIBRE
193, 283
CRUDE PROTEIN
193
CUCUMBER MOSAIC CUCUMOVIRUS
239
CULTIVATION
160, 193, 289
CULTURE MEDIA
250
CURCUMA XANTHORRHIZA
296
CUT FLOWERS
188
CUTTINGS
165, 169, 251, 253

D
DAIRY CATTLE
158, 268, 272
DENSITY
199
DEVELOPMENTAL STAGES
226
DIAMETER
248
DIET
267
DIET TREATMENT
264
DIETS
266
DIGESTIBILITY
262
DIMENSION
295
DIMENSIONS
252
DIRECT SOWING
163, 288
DISEASE CONTROL
240
DISEASE RESISTANCE
197
DISEASE TRANSMISSION
203, 239
DOLOMITE
291
DOSAGE
212
DOSAGE EFFECTS
283
DROUGHT RESISTANCE
204, 205, 206, 225
DRUG PLANTS
157, 165, 168, 183, 282
DRY FARMING
292
DRYERS
245
DRYOBALANOPS
192
DUCKS
152, 260, 265, 271, 274, 275, 278, 279, 280
DURATION
271, 296

E
ECONOMIC ANALYSIS
156, 158, 258, 268
ECONOMIC VALUE
191
ECONOMIC VIABILITY
152
ECOSYSTEMS
234
EFFICIENCY
191, 288
EGG PRODUCTION
260, 271, 279
EGG YOLK
277
EGGS
275, 278, 279
ELECTROPHORESIS
299
ELISA
240
EMBRYONIC DEVELOPMENT
170
ENDOPHYTES
232

ENERGYMANAGEMENT
289
ENTOMOGENOUS FUNGI
236
ENZYME ACTIVITY
201
ENZYMES
246, 263
EQUIPMENT PERFORMANCE
287
ERYTHRINA POEPPIGIANA
219
ESSENTIAL OILS
179, 233, 281
EUCALYPTUS
248
EUCHEUMA
293
EVALUATION
200
EXTRACTION
219, 224, 293
EXTRACTS
201, 281, 284

F
FAECES
285
FARM HELPER SERVICES
287
FARM INCOME
152, 156, 157, 158, 159, 245, 280
FARM MANAGEMENT
156
FARMERS
156, 297
FARMERS ASSOCIATIONS
152, 287
FARMING SYSTEMS
154, 156, 157, 159, 195
FARMYARD MANURE
153, 163, 177, 180, 184, 190, 216, 290
FATTENING
258, 266
FEASIBILITY STUDIES
157
FEATHERS
274
FEED CONSUMPTION
264, 265, 270, 278
FEED CONVERSION EFFICIENCY
263, 265
FEED CROPS
193
FEED INTAKE
261
FEED MEALS
262
FEEDING
158, 268
FEEDING PREFERENCES
275
FEEDS
257, 259, 268, 269
FERRALSOLS
300
FERTILITY
279
FERTILIZER APPLICATION
153, 163, 174, 175, 176, 177, 178, 179, 180, 185, 189, 190, 212, 216, 290
FERTILIZERS
183, 252
FIELD SIZE
175, 176
FINANCIAL INSTITUTIONS
151
FISH WASTES
182
FLAVOUR
244
FLOWERING
173
FLOWERS
226
FOLIAR APPLICATION
181
FOOD CROPS
259
FORMALDEHYDE
262
FORMULATIONS
224, 266
FRESHWATER
293
FROZEN STORAGE
277
FUSARIUM OXYSPORUM
242

G
GAMMA RADIATION
215
GEL CHROMATOGRAPHY
299
GENE TRANSFER
207
GENETIC INHERITANCE
198
GENETIC PARAMETERS
214

GENETIC RESISTANCE
197, 198, 203, 217
GENETIC TRANSFORMATION
213
GENETIC VARIATION
197, 200, 208
GENETICS VARIATION
220
GENOTYPE ENVIRONMENT INTERACTION
202, 212, 217
GENOTYPES
225, 272
GERMINATION
204
GERMPLASM
199
GLIRICIDIA SEPIUM
194, 264
GLOMERELLA CINGULATA
238
GLYCINE MAX
204, 222, 227, 236, 243
GOATS
261, 267, 273
GONYSTYLUS BANCANUS
249
GOSSYPIUM HIRSUTUM
164, 178, 199, 235
GRAFTING
248
GRANULES
224
GRASSES
267
GRAZING LANDS
285
GROWING MEDIA
165, 251, 252
GROWTH
165, 173, 181, 182, 183, 185, 187, 188, 192, 200, 210, 222, 250, 251, 255
GROWTH INHIBITORS
221
GROWTH RATE
180

H
HAEMONCHUS CONTORTUS
285
HATCHABILITY
279
HATCHERIES
280
HATCHING
279
HELICOVERPA ARMIGERA
227
HELOPELTIS ANTONII
228
HERBAL TEAS
223
HERBICIDES
192
HERITABILITY
197
HIGH YIELDING BREEDS
274
HIGH YIELDING VARIETIES
162, 196, 202, 203, 209, 210, 211, 217
HIGHLANDS
164, 186, 187
HISTOPATHOLOGY
283
HISTOPHATOLOGY
284
HOPEA
192, 254
HUSKING
244
HYBRIDS
166, 212
HYDROLASES
298
HYDROPHOBICITY
299
HYPOGLYCAEMIA
283
HYPOTHERMIA
282

I
IDENTIFICATION
240
IMPERATA CYLINDRICA
192
IN VITRO
168, 262
IN VITRO CULTURE
166, 204, 221
IN VITRO SELECTION
205, 206
IN VIVO EXPERIMENTATION
284
INDICATOR PLANTS
239
INDONESIA
151, 160, 289
INDUCE RESISTANCE
242
INDUCED MUTATION
215

INFECTION
243
INHIBITION
223
INNOVATION
155, 287
INORGANIC FERTILIZERS
178, 180
INSECTICIDES
207
INSTIA
251
INTEGRATED CONTROL
241
INTEGRATED PEST MANAGEMENT
230, 235
INTEGRATED PLANT PRODUCTION
195, 209
INTEGRATION
258, 269
INTERCROPPING
194
INTESTINES
283
INTRODUCED VARIETIES
209, 210
ION EXCHANGE CAPACITY
184
IPOMOEA BATATAS
213, 225
IRIAN JAYA
218
IRRIGATED LAND
174, 184, 195, 212
IRRIGATED RICE
156, 176, 181, 185, 189, 190, 195, 196, 202, 210, 211, 217
IRRIGATION WATER
191
ISOLATION
219
ISOLATION TECHNIQUES
239, 299

J
JAVA
152, 154, 157, 159, 164, 187, 248, 253, 256, 257, 259, 268, 270, 275, 279, 300

K
KAEMPFERIA GALANGA
224
KALIMANTAN
260, 271, 280, 292

L
LABORATORY ANIMALS
281, 282
LACTOSE
224
LAND MANAGEMENT
192
LAND OWNERSHIP
159
LAND PRODUCTIVITY
175, 189
LAND SUITABILITY
176
LARVAE
285
LEAF EATING INSECTS
230
LEAVES
179, 199, 201, 225, 264
LEGUMINOSAE
193
LINOLEIC ACID
223
LIPID CONTENT
296
LIQUID FERTILIZERS
181
LIQUID NITROGEN
277
LITTER SIZE
273
LIVER
284
LIVESTOCK MANAGEMENT
268
LOWLAND
196
LYCOPERSICON ESCULENTUM
239

M
MARGINAL LAND
155, 259, 266
MARKET
161
MARKET PRICES
161
MARKET RESEARCH
161
MARKETING
280
MATURATION
215
MECHANIZATION
286, 289

MELALEUCA LEUCADENDRON
247
METHANE
300
METHANOL
282
METHODS
201
METROXYLON
218
MICE
281, 282, 284M
ICRO SATELLITES
208
MICROCLIMATE
169
MICROORGANISMS
238, 265
MILDEWS
197
MILK PRODUCTION
158, 268
MILLING
286, 295
MIXED CROPPING
234
MOISTURE CONTENT
298
MOLASSES
264
MONITORING
237
MORTALITY
227, 228
MORUS ALBA
166, 182, 226
MOULDS
244
MOVEMENT
277
MUSA PARADISIACA
215
MUTANTS
215
MYRISTICA
281
MYRISTIN
281

N
NATURAL ENEMIES
234
NEMATODA
198
NEMATODE INFECTIONS
285
NEW SPECIES
180, 211
NICOTIANA TABACUM
154
NITRATES
194
NITRIFICATION
194
NITROGEN RETENTION
267
NPK FERTILIZERS
175, 185, 186, 187, 190
NUCLEAR POLYHEDROSIS VIRUS
227
NUSA TENGGARA
155, 245
NUTRIENT AVAILABILITY
175, 177, 181
NUTRIENT INTAKE
264
NUTRIENT UPTAKE
178
NUTRIENTS
221
NUTRITIONAL REQUIREMENTS
174, 176, 212

O
OCHRATOXIN
244
OCIMUM
281
OIL PALMS
269
OPERATING COSTS
287
ORGANIC FERTILIZERS
178, 179, 182, 189
ORGANIC MATTER
194
ORGANIC WASTES
261
ORNAMENTAL PLANTS
188
ORYZA SATIVA
153, 156, 162, 163, 175, 177, 180, 184, 203, 205, 206, 208, 209, 212, 216, 222, 288, 289, 290
OVENS
264
OXIDATION
223
OXYOPES
236

P
PANONYCHUS CITRI
233
PANTOTHENIC ACID
170
PARASERIANTHES FALCATARIA
194
PARASITOIDS
231
PARTICLE SIZE
296
PATHOGENS
242
PEELING
246
PEPPER
246
PERIODICITY
226
PERONOSCLEROSPORA
197
PEST CONTROL
234
PEST CONTROL EQUIPMENT
237
PEST RESISTANCE
198, 207
PESTS OF PLANTS
229
PH
291
PHENOTYPES
274, 278
PHOSPHATE FERTILIZERS
153, 163, 177, 184, 188, 216, 290
PHYTOPHTHORA CAPSICI
242
PIMPINELLA
183
PIPER CUBEBA
165
PIPER NIGRUM
234, 242, 246
PLANT ANATOMY
218
PLANT BREEDING
217
PLANT DISEASES
232
PLANT EXTRACTS
224, 231, 282, 296
PLANT GROWTH SUBSTANCES
167, 249, 250, 251
PLANT PROPAGATION
168, 247, 248
PLANT RESPONSE
171, 182, 206, 212
PLANT WATER RELATIONS
225
PLANTATIONS
269
PLANTING
222
PLANTING DATE
164
PLANTING EQUIPMENT
288
PLANTING STOCK
252
POGOSTEMON CABLIN
229, 232, 241
POLISHING
245
POLLEN
226
POLYCLONAL ANTIBODIES
240
POLYGALACTURONASE
246
POSTHARVEST EQUIPMENT
245
POSTHARVEST TECHNOLOGY
246, 286, 295
POTASH FERTILIZERS
174, 188
POTASSIUM HYDROXIDES
293
PRATYLENCHUS BRACHYURUS
232
PRECOCITY
215
PREDATORS
236
PROBIOTICS
265
PROCESSING
218, 224, 245
PRODUCTION
160, 162, 179, 183
PRODUCTION COSTS
288
PRODUCTION INCREASE
185, 211
PRODUCTIVITY
155, 156, 178, 190, 211, 273, 274
PROFITABILITY
152, 181, 287
PROGENY
212
PROGENY TESTING
196, 217

PROPAGATION BY CUTTINGS
254
PROPAGATION MATERIALS
254
PROTEIN CONTENT
193, 220
PROTEIN QUALITY
262, 267
PROXIMATE COMPOSITION
293
PRUNING
182, 254
PSEUDOMONAS SOLANACEARUM
240, 241
PURIFICATION
299

Q
QUALITY
179, 183, 188, 193, 218, 245, 246, 257, 272, 276, 293, 296, 297
QUANTITATIVE GENETICS
220

R
RABBITS
283
RADOPHOLUS SIMILIS
198
RAINFED FARMING
153, 177, 184, 216, 290
RATIONS
263, 265, 278
REGOSOLS
300
REPRODUCTIVE PERFORMANCE
270, 278
RESIDUAL EFFECTS
184
RHEOLOGICAL PROPERTIES
278
RICE
161, 245, 286, 287
RICE HUSKS
280
RICE STRAW
189
RIPTORTUS
236
ROCK PHOSPHATE
291
ROOT SYSTEM
205
ROOTING
254
ROOTS
247
ROOTSTOCKS
214, 248
RUMEN
261, 262
RUMINANTS
269

S
SARGASSUM
284
SCION
248
SEED
172
SEED DRILLS
288
SEED LONGEVITY
172
SEED PRODUCTION
243
SEED STORAGE
244
SEEDLINGS
171, 200, 214, 228, 229, 252, 253
SEEDS
281, 282
SELECTION
213, 214, 271
SELECTION RESPONSES
171
SEMEN
270, 276, 277
SEMEN PRESERVATION
277
SEQUENTIAL CROPPING
222
SEXUAL MATURITY
278
SHADING
194
SHEEP
264, 285
SHOOT
168
SHOOTS
168, 247, 249, 250
SIMULATION MODELS
286
SMALL FARMS
158
SOCIAL CONDITIONS
256
SOCIOECONOMIC DEVELOPMENT
256

SOIL ANALYSIS
178
SOIL CHEMICOPHYSICAL PROPERTIES
153, 163, 164, 184, 216, 290, 291, 292
SOIL FERTILITY
153, 174, 177, 216, 290
SOIL FERTILIZER
163
SOIL IMPROVEMENT
177
SOIL MOISTURE CONTENT
171
SOIL POLLUTION
300
SOIL SALINIZATION
195
SOIL TYPES
291, 300
SOIL WATER REGIMES
225
SOLUBILITY
298
SOMACLONAL VARIATION
206, 215
SOYBEAN MOSAIC POTYVIRUS
243
SPECIES
166, 208, 254, 260
SPODOPTERA LITURA
227
SPROUTING
253, 254
STARCH
218
STEM EATING INSECTS
234
STEMS
247
STOMATA
225
STORAGE
172, 226
STRAW
258
STYRAX
201, 250
SUCROSE
170
SULAWESI
209, 258
SUMATRA
153, 161, 163, 174, 177, 184, 185, 189, 190, 195, 196, 202, 203, 210, 211, 216, 217, 290
SUPERPHOSPHATE
174
SUPPLEMENTARY FEEDING
267
SUPPLEMENTS
263
SYMPTOMS
239, 241

T
TAPIOCA
261
TEA
223
TECHNOLOGY
155, 160
TECHNOLOGY TRANSFER
154, 195
TECTONA GRANDIS
255
TEMPERATURE
293
TESTA
187
THAWING
270, 277
THEOBROMA CACAO
169, 171, 172, 214, 237
THRESHERS
287
TISSUE CULTURE
167, 168, 170, 249, 250, 255
TOONA
200
TOTAL DIGESTIBLE NUTRIENTS
261
TRADITIONAL MEDICINES
183, 224, 283
TRANSGENIC PLANTS
213
TRAPPING
237
TRICHODERMA HARZIANUM
189
TUBERS
186
TUNGRO DISEASE
203

U
UREA
212

V
VACUUM PACKAGING
276
VARIETIES
173, 180, 205

VARIETY TRIALS
202, 209
VECTORS
213
VEGETATIVE PROPAGATION
251
VIABILITY
172, 226
VIGNA RADIATA RADIATA
207
VIGOUR
165
VIROSES
243
VISCOSITY
293, 298

W
WATER
284
WATER AVAILABILITY
191
WATER BUFFALOES
159, 257
WATER TOLERANCE
171
WATERLOGGING
171
WEANING WEIGHT
273
WEIGHT GAIN
261, 263, 265
WORK CAPACITY
287

Y
YARROWIA
294
YIELD COMPONENTS
173, 180, 181, 195, 196, 210, 217
YIELD INCREASES
193
YIELDS
176, 186, 187, 193, 222, 296
YOUNG ANIMALS
265

Z
ZEA MAYS
193, 197, 258

JOURNAL INDEX

A
Agrivita
215, 239

B
Bionatura
219, 231, 281, 282, 291, 294
Buletin Palawija
160, 207, 220, 243
Buletin Penelitian Tanaman Rempah dan Obat
157, 168, 179, 221, 228, 229, 242, 296

F
Forum Penelitian Agro Ekonomi
151, 191

I
Ilmu Pertanian
167, 170

J
Jurnal Agro Ekonomi
161
Jurnal Enjiniring Pertanian
245, 286, 289
Jurnal Hortikultura
173, 186, 187, 188, 233, 238
Jurnal Penelitian dan Pengembangan Pertanian
155, 218, 241, 269, 292
Jurnal Penelitian Hutan Tanaman
192, 249, 250, 251, 255
Jurnal Penelitian Perikanan Indonesia
283, 284, 293, 298, 299
Jurnal Penelitian Tanaman Industri
164, 165, 183, 199, 232, 246

M
Majalah Farmasi Indonesia
223, 224
Majalah Ilmiah Peternakan
261, 263, 264, 265, 267, 277, 278

P
Pelita Perkebunan
169, 171, 172, 194, 198, 214, 237, 244, 295
Penelitian Pertanian Tanaman Pangan
156, 197, 204, 205, 206, 208, 213, 222, 225, 227, 236, 240, 300
Perspektif
154, 178, 230, 234, 235

W
Wana Benih
166, 182, 200, 201, 226, 247, 248, 252, 253, 254