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# ABSTRAK
# HASIL PENELITIAN PERTANIAN INDONESIA
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# ABSTRAK
# HASIL PENELITIAN PERTANIAN INDONESIA

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**KATA PENGANTAR**

Abstrak Hasil Penelitian Pertanian Indonesia adalah kumpulan abstrak pengarang yang disusun dan disebarkan untuk meningkatkan daya guna hasil-hasil penelitian bidang pertanian di Indonesia. Melalui media komunikasi ini diharapkan pengguna dapat memilih secara lebih tepat informasi yang diperlukan

Abstrak disusun menurut subyek, kemudian menurut abjad nama pengarang dan dilengkapi dengan Indeks Pengarang, Indeks Badan Korporasi, Indeks Subjek dan Indeks Jurnal. Bahan pustaka yang diperlukan pengguna dari abstrak ini dapat dicari pada perpustakaan pertanian setempat atau diminta ke Pusat Perpustakaan dan Penyebaran Teknologi Pertanian, dengan menuliskan nama pengarang, judul, judul majalah atau buku yang memuatnya, dan disertai dengan biaya fotokopi.

Kami harapkan Abstrak ini dapat bermanfaat.

Kepala Pusat Perpustakaan dan
Penyebaran Teknologi Pertanian

## E11 EKONOMI DAN KEBIJAKAN NASIONAL MENGENAI LAHAN

0201 WAHYUNI, S.A.
**Analisa teknis dan sosial ekonomi serta kendala-kendala produksi kapas pada lahan sawah di Kabupaten Lamongan. [Technical and socioeconomic analysis and constraint of cotton production on rice field in Lamongan (Indonesia)]**/Wahyuni, S.A.; Mukani; Basuki, T.; Kartamidjaja, A. (Balai Penelitian Tembakau dan Tanaman Serat, Malang (Indonesia)). 1 ill., 6 tables; 9 ref. Summary (In). [Proceeding of national cotton discussion]. Prosiding diskusi kapas nasional/Hasnam; Sahid, M.; Sastrosupadi, A. (eds.); Balai Penelitian Tembakau dan Tanaman Serat, Malang (Indonesia). Malang (Indonesia): BALITTAS, 1998: p. 247-256.

COTTON; CONSTRAINTS; SOCIOECONOMIC ENVIRONMENT; RICE FIELDS; FARM INCOME; JAVA.

Pengembangan tanaman kapas pada lahan sawah sesudah padi dapat mengatasi dan mengurangi kegagalan hasil kapas tadah hujan akibat kekeringan. Pengkajian kendala-kendala teknis dan sosial ekonomi pengembangan kapas pada lahan sawah sesudah padi, telah dilakukan pada tahun 1994 dengan menggunakan metode survai pada lima kecamatan di Kabupaten Lamongan. Diambil satu desa contoh per kecamatan; tiap desa diambil 40 petani contoh secara acak. Analisa data dengan metode deskriptif dan enterprise. Hasil penelitian pada pola tanam padi+kedelai+kapas dihasilkan produksi padi, kedelai dan kapas berbiji masing-masing sebesar 7.113, 1.051, dan 679 kg/ha, dengan pendapatan petani dari usahatani masing-masing Rp1.054.600, Rp563.400, dan Rp184.000/ha. Kendala teknis antara lain: keterlambatan melakukan penjarangan, pemupukan dan penyiangan pada kapas karena menunggu panen kedelai selesai. Kurangnya ketersediaan air yang menghambat pertumbuhan tanaman kapas. Kenaikan upah tenaga kerja, harga pupuk dan harga insektisida tidak disertai kenaikan harga kapas berbiji, menyebabkan petani mengalami kerugian sebesar Rp40.000 - Rp80.000. Pengiriman saprodi dan pembelian kapas oleh pengelola sering terlambat.

## E20 ORGANISASI, ADMINISTRASI DAN PENGELOLAAN PERUSAHAAN PERTANIAN/USAHA TANI

0202 MUHAMMAD, H.
**Peluang budidaya jahe dalam pot (Jalampot), satu alternatif pengadaan benih jahe. [Opportunity of ginger cultivation in pot: an alternative for ginger seedling stocks]**/Muhammad, H.; Sudiarto (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 7 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 141-147.

ZINGIBER OFFICINALE; POT CULTURE; POT PLANTS; SEEDLINGS; COST ANALYSIS.

Nilai ekspor jahe Indonesia terus menurun dari US $26 juta pada tahun 1991, menjadi US $14 juta pada tahun 1995 dengan pangsa pasar hanya 7,5% dari total ekspor dunia. Salah satu penyebabnya diduga adalah menurunnya produktivitas di hampir semua sentra produksi akibat sulitnya memproduksi benih yang berkualitas serta banyaknya areal pertanaman yang terserang penyakit. Salah satu alternatif pemecahannya adalah dengan pembudidayaan jahe dalam pot (plastik/polybag/ Jalampot). Melalui cara pembudidayaan ini diharapkan mampu menghasilkan benih yang berkualitas serta dapat mengeliminir serangan penyakit, khususnya penyakit layu. Media tumbuh yang diperlukan untuk pembudidayaan jahe dalam pot harus dibuat sedemikian rupa sehingga mampu mendukung perkembangan rimpang seoptimal mungkin. Penggunaan media humus + tanah dengan perbandingan 3:1 dapat menghasilkan rimpang benih 2.020 g/rumpun/pot, sedang pada penggunaan media humus setebal 20 cm telah mampu menghasilkan rimpang muda 663 g/rumpun/pot, yang masih berpeluang untuk meningkat lagi pada saat dipanen tua (untuk benih). Pada penggunaan media tanah + kasting (dosis 500 g/pot) dapat menghasilkan rimpang

muda sebesar 868 g/rumpun. Biaya produksi yang dibutuhkan ± Rp1.000,-/pot, setiap pot dapat menghasilkan 1.000 g (1 kg) rimpang benih dengan harga Rp2.500,- - Rp3.000,-/kg. Keuntungan yang diperoleh berkisar antara Rp1.500,- - Rp2.000,-/pot.

0203 NOER, M.
**Analisis ratio penerimaan atas modal dan tenaga kerja usaha tani cabai di Kecamatan IV Angkat Candung, Kabupaten Agam, Sumatera Barat. Capital and labor output ratio of chili farming system in IV Angkat Candung Sub-District, Agam District, West Sumatra (Indonesia)**/Noer, M. (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian). 2 tables; 4 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 78-81.

CHILLIES; FARMING SYSTEMS; DRY MULCHES; COST BENEFIT ANALYSIS.

This study is an economic comparative analysis between chili farming system with mulch and without mulch, carried out in IV Angkat Candung, Sub-District. The result showed that chili farming system with mulch gave more production and income per hectare about 45.05% and 72.07% compared to chili farming system without mulch. Capital output ratio and labor output ratio of chili farming system with mulch are 4.452 and 57.198.72 and Rp19,509,78. This results lead to an economic advantage of chili farming system with mulch.

## E21 AGROINDUSTRI

0204 KEMALA, S.
**Peluang dan kendala agribisnis perbenihan jahe. [Agribusiness opportunity and constraints on ginger seedlings]**/Kemala, S.; Yuhono, JT. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 ill., 2 tables; 7 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 68-74.

ZINGIBER OFFICINALE; SEEDLINGS; AGROINDUSTRIAL SECTOR; LAND SUITABILITY; CULTIVATION; CONSTRAINTS.

Benih jahe mempunyai peluang dan prospek yang baik untuk diperdagangkan. Ditinjau dari sisi permintaan dan luas areal pertanaman, tahun 1993 minimal dibutuhkan benih jahe sebanyak kurang lebih 30768 ton untuk pembibitan tradisional. Ditinjau dari kesesuaian lahan, iklim dan kelayakan sosial ekonomi, terdapat beberapa daerah sentra produksi yang potensial sebagai penghasil jahe dan benihnya serta secara ekonomi layak diusahakan. Dibalik peluang dan prospek tersebut terdapat beberapa kendala yang belum dapat diatasi secara tuntas antara lain: (1) belum tersedianya lembaga-lembaga penangkar benih jahe, (2) belum tertanggulanginya hama dan penyakit jahe secara tuntas, (3) terjadinya fluktuasi harga dan (4) belum berfungsinya lembaga penunjang secara optimal. Keberadaan jahe di Indonesia sudah mantap, karena itu disarankan untuk menangani perbenihan jahe secara khusus.

0205 KEMALA, S.
**Peluang dan kendala agribisnis perbenihan jambu mente. [Agribusiness opportunity and constraints on cashew seedlings]**/Kemala, S. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 ill., 3 tables; 7 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 75-81.

ANACARDIUM OCCIDENTALE; CASHEWS; AGROINDUSTRIAL SECTOR; CONSTRAINTS; SEEDLINGS.

Laju permintaan yang mantap serta superiornya jambu mente dari kelompok kacang-kacangan menjadikannya komoditas yang prospektif. Kendala pengembangan jambu mente di Indonesia adalah rata-rata tingkat produksi relatif rendah (kurang lebih 300 kg/ha/tahun). Tindakan-tindakan yang perlu dilakukan adalah perbaikan bahan tanaman, mutu dan jumlah benih serta dunia usaha dan peredarannya. Usaha perbaikan tanaman dan mutu sudah mulai ditangani, masalah dunia usahanya (agribisnisnya) belum banyak mendapat perhatian. Peluang agribisnis perbenihan jambu mente cukup besar dan banyak: (1) laju permintaan yang cukup mantap; (2) animo pemakaian benih berkualitas tinggi; (3) kesesuaian lahan dan lingkungan yang cukup luas; (4) teknologi yang sudah banyak dikuasai. Kendalanya adalah: (1) belum ada benih unggul; (2) permodalan; (3) petani kecil sebagai konsumen. Agar agribisnis perbenihan jambu mente bisa memberi perintisan, perlu pendirian dan pembuatan kebun bibit atas varietas pohon-pohon induk yang vigor.

## E50 SOSIOLOGI PEDESAAN DAN KEAMANAN SERTA KESEJAHTERAAN

0206 HASNAH.
**Peranan pekerja wanita dalam kehidupan rumah tangga di daerah pedesaan: studi kasus pekerja wanita pemetik teh pada PTP Nusantara VI Danau Kembar, Kabupaten Solok. The roles of rural women in household economic: a case study at the PTP Nusantara VI tea plantation Danau Kembar, Solok District (Indonesia)**/Hasnah; Nofialdi; Helmi (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian). 2 tables; 2 ref. Summary (En). Appendix. *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 64-68.

ROLE OF WOMEN; HOUSEHOLDS; FARM INCOME.

The main objective of this study was to find out the income contribution of rural women as tea picker within family income, working hours, and their influence upon their responsibility as house wife. The result showed that husband's income of labor woman is lower than husband's income of unemployed woman. The main reason that they should work as tea picker was to increase family income. By working in the plantation they could contribute about 43% of the total family income. Time and allocation between laboring and unemployed women were different. Labor women had less time to do domestic activities at home since they had to work outside, while the domestic activities had been reallocated to the other family member.

0207 WARUWU, F.
**Analisis kebutuhan rumah tangga yang berdampak terhadap konsumsi buah manggis. Analysis of household needs affected mangosteen fruit consumption**/Wawuru, F. (Balai Penelitian Tanaman Buah, Solok (Indonesia)). 1 table; 9 ref. Summary (En). Appendix. *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 74-77.

MANGOSTEEN; FRUITS; HOUSEHOLD CONSUMPTION; BASIC NEEDS; CONSUMPTION FUNCTIONS; SUMATRA.

The aim of this research was to reveal the effect of household need on mangosteen fruit consumption. The research was conducted from June 1996 to March 1997. Survey method was used in Limapuluh Kota and Padang regencies, using Stratified Random Sampling, 90 of selected respondent. The available data were processed by consumption function analysis and transformed into Logarithmic (Trans-Log). The result showed that tobacco/sirih, electricity, tax, and feast had effect on mangosteen fruit consumption with each elasticity -1.63; -4.45; 4.76 and 3.49 respectively.

## F01 PERTANAMAN

0208 MASYHUDI, M.F.
**Paclobutrazol sebagai bahan perangsang pembungaan tanaman melati (*Jasminum sambac*). Paclobutrazol as a flower forcing agent on jasmine plants (*Jasminum sambac*)**/Masyhudi, M.F.;

Helina, D.; Dwiatmini, K. (Balai Penelitian Tanaman Hias Pasar Minggu, Jakarta (Indonesia)). 4 tables; 12 ref. Summaries (En,In). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 61-68.

JASMINUM; FLOWERING; PACLOBUTRAZOL; GROWTH RETARDANTS; PLANT VEGETATIVE ORGANS; POTASSIUM NITRATE; FOLIAR APPLICATION; APPLICATION RATES.

Pengaruh paclobutrazol sebagai zat penghambat pertumbuhan telah dievaluasi terhadap pertumbuhan tanaman melati di Balai Penelitian Tanaman Hias, Bogor. Percobaan-percobaan dilaksanakan pada tahun 1995/96 dan 1996/97 dalam rumah kawat dengan tujuan untuk meningkatkan produksi bunga tanaman melati. Penelitian pendahuluan pada tahun pertama menunjukkan bahwa paclobutrazol cukup efektif sebagai zat penghambat pertumbuhan terlihat dari tereduksinya ruas batang dan luas daun tanaman melati. Larutan paclobutrazol yang diaplikasikan melalui tanah ternyata lebih efisien dalam menghambat pertumbuhan vegetatif. Konsentarsi 200 ppm paclobutrazol sudah tinggi untuk menghambat pertumbuhan tanaman melati. Paclobutrazol mempunyai tendensi kuat untuk meningkatkan produksi bunga tanaman pada percobaan pendahuluan ini. Percobaan kedua pada tahun 1996/97 memantapkan hasil-hasil percobaan pendahuluan. Makin tinggi kosentrasi paclobutrazol digunakan, makin terhambat pertumbuhan tanaman melati dan produksi bunga dapat ditingkatkan. Walaupun demikian, produksi bunga tertinggi dicapai dengan aplikasi 200 ppm paclobutrazol. Aplikasi larutan kalium nitrat melalui daun mepunyai tendensi meningkatkan produksi bunga tetapi pengaruh paclobutrazol ternyata sangat kuat sehingga menutup pengaruh $KNO_3$ terhadap tanaman melati. Disarankan meneliti pengaruh larutan $KNO_3$ yang diaplikasikan melalui daun tanpa paclobutrazol untuk mengetahui efeknya terhadap pertumbuhan tanaman melati.

0209 SOEDJONO, S.

**Pengaruh iradiasi sinar gamma pada tanaman anggrek *Vanda douglas* var. Genta Bandung terhadap penampilan produksi bunga. The effect of gamma ray on the performance of flower production of *Vanda douglas* var. Genta Bandung**/Soedjono, S.; Suskandari K.; Rianawati, S. (Balai Penelitian Tanaman Hias, Jakarta (Indonesia)). 4 tables; 13 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 57-61.

VANDA; GAMMA IRRADIATION; CUT FLOWER PRODUCTION; QUALITY.

Tujuan penelitian ini untuk memperoleh dosis iradiasi sinar gamma terhadap stek anggrek *V. douglas* dan sifat mutan yang positif. Penelitian dilaksanakan mulai bulan April 1997 sampai dengan Maret 1998 di Kebun Percobaan Balai Penelitian Tanaman Hias, Pasar Minggu, Jakarta, dengan perlakuan iradiasi sinar gamma mulai dari dosis 0 sampai 100 Gy, dengan selang dosis 20 Gy (Penelitian I) dan dosis 0-35 Gy dengan selang dosis 5 Gy (Penelitian II) pada stek anggrek *V. douglas* yang dilaksanakan di Pusat Aplikasi Isotop dan Radiasi, Pasar Jumat. Rancangan yang digunakan adalah Rancangan Acak Kelompok yang terdiri atas empat ulangan. Hasil penelitian setelah 6 bulan tanam pada penelitian II dosis 5-15 Gy meningkatkan jumlah kuntum bunga dan ukuran lebar bunga, dosis 20 Gy ternyata dapat mempercepat terbentuknya bunga namun tangkai bunga lebih pendek dibandingkan tanpa penyinaran. Dengan dosis iradiasi lebih rendah warna stek lebih hijau dan pertumbuhan lebih tegar.

0210 SOMPOTAN, S.

**Pengaruh rekayasa struktur tajuk terhadap hasil kedelai (*Glycine max* (L.) Merr). Effect of the structure canopy change to soybean yield**/Sompotan, S.; Tilaar, W. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 2 tables; 7 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 186- 189.

GLYCINE MAX; PRUNING; CANOPY; TIMING; YIELDS.

The objective of this research was to study the effect of the change of canopy structure on soybean yield. The research was conducted in Completely Randomized Design in factorial experiment. The first factor was times of prunning (30, 40, 50 and 60 days after planting) and the second factor was intencity of prunning (0, 10, 20, 30, 40 and 50%). The experiment was done in 3 replications. The results showed that prunning after 60 days of planting gave highest number of flowers, where as 40% intencity produced the best affect. No significant effect was found with 10% prunning.

0211 WIJAYANTI, L.
**Endogenous and applied Gibberellins in relation to flowering in Japanese Morning Glory**/Wijayanti, L. (Pusat Pengembangan Ilmu Pengetahuan dan Teknologi, Serpong (Indonesia)). 7 ill., 1 table; 25 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 423-437.

PHARBITIS NIL; GA; UNICONAZOLE; PLANT GROWTH SUBSTANCES; FLOWERING.

The plant growth regulators the gibberellins (GA), both endogenous and applied influenced flowering of Japanese morning glory (*Pharbitis nil*, strain Violet). Uniconazole, a novel inhibitor of GA biosynthesis has been used to confirm the role of endogenous GA. The inhibitor reduced the flowering response most effectively, when applied before the inductive dark period (single 15-h dark treatment) and there was an associated reduction in the level of GAs in the shoot as determined by GC-SIM with added deuterated internal standards. A significant decrease was also found in the level of GA1 in the plumule. Application of GAs to the uniconazole pretreated seedlings reversed its inhibitory effect of uniconazole on flowering. The above results indicate that a certain level of GA is necessary for flowering in Japanese morning glory for response to an inductive dark period.

0212 WURYANINGSIH, S.
**Pertumbuhan tanaman hias pot *Anthurium andraeanum* pada media curah sabut kelapa. The growth ornamental pot *Anthurium andraeanum* on coir dust growing media**/Wuryaningsih, S. (Instalasi Penelitian Tanaman Hias, Cipanas (Indonesia)); Sutater, T.; Tjia, B. 5 tables; 17 ref. Summaries (En, In). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 31-38.

ANTHURIUM ANDRAEANUM; POT PLANTS; GROWING MEDIA; COIR; POWDERS; CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELDS.

Pengaruh media curah sabut kelapa terhadap pertumbuhan anthurium pot diteliti dalam suatu percobaan yang dilakukan di Kebun Daun Mas Asri di Ciawi dari bulan Januari sampai Juni 1998. Percobaan menggunakan Rancangan Acak Kelompok dengan enam perlakuan media dan tiga ulangan. Hasil penelitian menunjukkan bahwa media berpengaruh nyata terhadap penambahan jumlah daun sejak pengamatan minggu ke empat. Penggunaan 1 : 1 (v/v) media curah sabut kelapa + tanah menunjukkan nilai tinggi tanaman, jumlah daun dan jumlah bunga terbaik, yaitu berturut-turut 31,39 cm, 5,10 daun dan 1,66 bunga.

## F02 PERBANYAKAN TANAMAN

0213 ALAM, G.
**The production of Indole Alkaloid Canthin-6-one in the cell suspension culture of *Brucea javanica* (L.) Merr.**/Alam, G.; Wiryowidagdo, S. (Universitas Hasanudin, Ujung Pandang (Indonesia)); Soegihardjo, C.J.; Sudarsono. 2 ill., 23 ref. Summary (En). Proceedings of the Indonesian biotechnology conference, vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 379-387.

CATHARANTHUS ROSEUS; XANTHINE ALKALOIDS; PRODUCTION; CELL CULTURE; GROWTH; CALLUS; CULTURE MEDIA.

The production of Indole alkaloid canthin-6-one in cell suspension culture of *Brucea javanica* (L.) Merr has been conducted. The goal of this study is an attempt to produce maximum amount of canthin-6-one indole alkaloid compound. In this study the seeds were used as the explant. Explant were placed on solid medium of Murashige Skoog (MS) with containing 2,4-D 2 mg/l for callus propagation. The obtained calluses were subculture for every 5 week. After six times of sub culturing the callus became friable and suitable for preparing cell suspension culture in liquid MS medium. The biomass of cell suspension cultures were than transferred into a liquid treatment media containing growth factor NAA-kinetin (1 and 0.1 mg/l) and the tryptophane precursor. During incubation time, the heights of cell sedimentation were measured for a given period. Harvest of cell cultures were done on the day of 40th, and then the weight of wet and dry cultured were also measured. The biomass production were dried at 40-60$^0$ C. Qualitative analysis of canthin-6-one alkaloid was done by extracting the dried biomass using methanol on a waterbath. The filtrates were evaporated until free of methanol, and the residue was separated using chloroform-water in a funnel flask. The chloroform extract was analyzed by thin layer chromatography using silica gel GF 254 as stationary phase and toluene-ethyl acetate (6:4 v/v) as mobile phase. Spot having the same hRf to standard (hRf 37) was collected then thin layer cochromatography was carried out using toluene ethyl acetate (6:4 v/v), chloroform-methanol (9.5:0.5 v/v) and ethyl acetate as mobile phase. Spots was detected by UV 365 nm. Dragendorff reagent and ceric ammonium sulfate. Quantitative analysis were carried out by Densitometric method using silica gel GF 254 as stationary phase and eluted two times by toluene-ethylacetate (6:4 v/v). The maximum biomass growths of cell culture was reached at 33$^{th}$ day. The highest biomass weight and the maximum concentration of canthin-6-one alkaloid were obtained on media containing 10 mg/l of L-tryphtophane; it could increase canthin-6-one alkaloid by 63%. One way anova statistic analysis on canthin-6-one alkaloid content of various treatment media showed a significance differences (P<0.01).

0214 ANDALASARI, T.D.

**Regeneration of potato (*Solanum tuberosum* L.) on Murashige and Skoog media + coconut water 10 percent with humic acid**/Andalasari, T.D. (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian); Wattimena, G.A.; Didiek H.G. 4 tables; 9 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 202-206.

SOLANUM TUBEROSUM; EXPLANTS; MICROPROPAGATION; TISSUE CULTURE; HUMIC ACIDS; COCONUT WATER.

Humic acid (HA) may be defined as portion of humus which is soluble in aquaeous sodium hydroxide and precipitated by acidification of the alkalin extract. The purpose of this study was to investigate the influence of the humic acid on micro cutting of five potato cultivars. A factorial experiment was arranged in a Randomized Complete Block Design with ten replications. The data were analyzed by analysis of variances and Duncans Multiple Range Test. The treatment consisted of two factors: concentration of humic acid with four levels: 0 ppm, 25 ppm, 50 ppm and 75 ppm; potato cultivar with five levels: Granola, Nooksack, Russet Burbank, PAS 3063, and Atlantic. Humic acid treatment was no significant different in almost all parameter observed. Granola and Noolsack were more response than the other cultivar. Humic acid increased total P, K, Ca uptake.

0215 HARTATI, N.S.

**Extracellular and intracellular from suspension culture of *Acacia mangium***/Hartati, N.S.; Sudarmonowati, E. (Pusat Penelitian dan Pengembangan Bioteknologi, Jakarta (Indonesia)). 2 ill., 2 tables; 12 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 701-707.

ACACIA MANGIUM; CELL CULTURE; PEROXIDASE; ENZYMES; PROTEIN CONTENT.

Plant cell culture offers the advantages of providing aseptic tissue, enabling uniform innoculation of cells at a defined point in time, and production of large enough quantities material for biochemical analysis. Fresh suspension culture of *Acacia mangium* which were established from shoot-derived callus cultures were used to study the activity of important plant enzymes such as peroxidases which is also associated with lignin synthesis. Different ages of cultures (3, 6, and 9 days) maintained in MS liquid media containing 2 mg/l BAP and 2% sucrose, were compared to investigate its effect on enzyme activity. Intracellular peroxidase were extracted with phosphate buffer, while extracellular peroxidase were precipitated with 80% saturated ammonium sulphate. Total peroxidase activity was estimated using a technique developed by Campbell and Ellis (1992). Result observed from PAGE (Polyacrylamide Gel Electrophoresis) showed one single band of extracellular peroxidase which was secreted by 6-day old culture and three band of intracellular peroxidase which were extracted from 3- and 6-day old cultures. Further experiments to induce higher peroxidase activities and to purify the enzyme are being conducted.

0216 KOERNIATI, S.

**Status penelitian pemuliaan dan perbanyakan bahan tanaman jambu mente. [Status of breeding and propagation research of cashew]**/Koerniati, S.; Hadad E.A.; Bermawie, N.; Djisbar, A.; Sudrajat, J. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 ill., 2 tables; 7 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 113-122.

ANACARDIUM OCCIDENTALE; BREEDING METHODS; CLONES; AGRONOMIC CHARACTERS; VEGETATIVE; PROPAGATION; GERMPLASM.

Pengembangan jambu mente ke Kawasan Timur Indonesia secara besar-besaran perlu ditunjang dengan varietas unggul dan penyediaan bahan tanaman dalam jumlah yang cukup. Upaya-upaya perbaikan telah dilakukan antara lain mengumpulkan plasma nutfah, karakterisasi, evaluasi, seleksi dan pengujian {uji keturunan F1 (OP), uji klonal dan multilokasi} serta persilangan. Dari hasil kegiatan telah dimiliki 39 populasi, 11 nomor harapan (C6-5, M4-2, A3-1, A3-2, A3-3, F2-10, F2-8, III/4-5, B 02, 293 dan 180) yang berpotensi produksi asal Jawa, Madura dan India serta hibrida F1 (10 kombinasi persilangan). Beberapa nomor asal Muna menunjukkan sifat produksi dan mutu yang baik (ukuran gelondong jumbo). F1 (OP), klonal dan multilokasi sedang dilakukan untuk beberapa nomor harapan. Penyambungan yang dilakukan menunjukkan hasil beberapa nomor harapan (C6-5, M4-2, A3-2, F2-10 dan III/4-5) telah berbuah pada umur 18-19 bulan. Penyambungan dengan bibit tanaman langsung di lapang lebih baik dibandingkan dengan di polibag. Untuk mendukung keberhasilan program pengembangan, pendirian kebun entres (bahan) jambu mente sangat diperlukan.

0217 MAFTUCHAH.

**Callus induction of Artemisia (*Artemisia vulgaris* L.) through *in vitro* culture**/Maftuchah; Zainudin, A.; Ardiana, H.K.; Sulistiyanto, J.B. (Universitas Muhammadiyah, Malang (Indonesia). Pusat Bioteknologi Pertanian). 5 ill., 2 tables; 13 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 463-473.

ARTEMISIA VULGARIS; DRUG PLANTS; IN VITRO CULTURE; CALLUS; INDUCED MUTATION; GROWTH; PLANT GROWTH SUBSTANCES; CHEMICAL COMPOSITION.

*Artemisia vulgaris* is the kind of pharmacological plant which are contains of various compounds of lactones, like xantonyne, artemicyn, and tauremicyn, and this compound are important to pharmaceutical industry materials. The necessity of pharmaceutical materials which is high and various constrains in multiplication of Artemisia in field based on important to thinking the research about multiplication by in vitro technique. This research has been done at Tissue Culture Laboratory, Center for Agricultural Biotechnology, Muhammadiyah University of Malang. The explant used plant leaves of *A. vulgaris* by growth media treatments, the concentration plant growth regulator of 2,4-D and Benzyl Amino Purine (BAP). From statistical analysis showed that were not interaction between each treatment which are

giving. The treatment of Murashige Skoog medium was resulted highest percentages of callusing explant (85%) and was not significant by Gamborg (B5) medium, but both mediums need callus initiation time more lenght than ½ MS medium. The callus condition in MS mediun was better comparing B5 and ½ MS medium. The treatment of plant growth regulator 2,4-D could be inducing callus of *A. vulgaris* explant. The concentration of 0.5 ppm 2,4-D showed the highest percentage of callus induction (81,483%) but not significant by treatment of 1.0 ppm; 1.5 ppm and 2.0 ppm 2,4-D, respectively. The callus initiation time in 0.5 ppm 2,4-D more slowly than 1.5 ppm and 2.0 ppm 2,4-D. In plant growth regulator of Benzyl Amino Purine (BAP) did not significantly effect to percentage of callusing explant.

0218 MUCHTAR, H.

**The effect of two kind of cytokinin (BAP and kinetin) and auxin on multiplication in Rattan manau (*Calamus manan* Miquel) by *in vitro* technique**/Muchtar, H.; Winata, L.; Wattimena, G.A.; Yahya, S. (Agency for the Assessment and Application of Technology). 2 tables; 6 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 683-687.

CALAMUS (PALMAE); IN VITRO CULTURE; CYTOKININS; AUXINS; GROWTH INHIBITORS; GERMINABILITY; PLANT RESPONSE.

*Calamus manan* Miq. is a solitary rattan which is very rarely found in the natural forest of West and South Sumatra and Kalimantan. Plant regeneration in rattan manau through tissue culture technique as an alternative in preparing planting stock had been studied by Gunawan and Yani since 1986. Explant used in this study was the embryo isolated from mature fruits obtain from Kalimantan. The composition of Murashige and Skoog in organic salt was used as basal medium. The zygotic embryo of rattan manau (*C. manan*) was germinated in medium supplemented with the rate of 6 ppm cytokinin BAP and kinetin and auxin 2,4-D and/or picloram 1,2 and 4 ppm. At the fifth and sixth subculture, NAA was used instead of 2,4-D and picloram. Germination in media with cytokinin BAP was higher than with kinetin, particularly with low concentration of 2,4-D and picloram. The used of cytokinin BAP stimulated higher percentage of shoot of multiplication through adventif shoot compared to kinetin. Low concentration of 2,4-D stimulated multiplication either combined with BAP or kinetin. One of the cultures formed fourty shoots with the green colour and no root observed. Transfer plantlets to autotroph media had been achieved by growing plantlets in zeolit : sand (1:1) medium.

0219 NISA, T.C.

**Citrus germplasm preservation by tissue culture**/Nisa, T.C.; Jenimar; Setiado, H. (Universitas Sumatera Utara, Medan (Indonesia)). 6 ref. Summary (En). Proceedings of the Indonesian biotechnology conference, vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 577-582.

CITRUS; COTYLEDONS; TISSUE CULTURE; NAA; PLANT RESPONSE; GERMPLASM CONSERVATION; INDONESIA.

Tissue culture has proved to be a useful method for Citrus crop improvement and propagations. However, very little work has been done on the indigenous species of Indonesia. Cotyledonary tissues and the smaller embryos of *Citrus aurantifolia*, *Citrus limon*, *Citrus maxima*, and *Citrus hystrix* were cultivated on MS basal medium with NAA and kinetin. The development of callus was common, although the cultures responded variably to different concentrations and combination of growth substances. Whole embryos of *Citrus aurantifolia* could germinate on basal medium alone, but NAA was helpful in callus induction. Nucleus and leaf segments did not respond well to *in vitro* propagation.

0220 PITONO, J.

**Peluang metode penyambungan mengatasi permasalahan bahan tanaman jambu mente. [Grafting method to solve problem for cashew plant material]**/Pitono, J. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 tables; 5 ref. Summary (In). [Proceedings of Scientific Consultation of Spices

and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 215-219.

ANACARDIUM OCCIDENTALE; PROPAGATION MATERIALS; GRAFTING.

Permasalahan umum yang dihadapi dalam pengembangan jambu mente di berbagai tempat adalah rendahnya produktivitas, antara lain akibat pemakaian bahan tanaman yang kurang bermutu. Teknik perbanyakan vegetatif secara sambungan merupakan salah satu alternatif metode pengadaan bahan tanaman. Dengan metode ini stabilitas sifat unggul tetua pada turunannya terjamin. Beberapa aspek strategis teknik penyambungan diantaranya (a) rehabilitasi pada pertanaman jambu mente yang telah berkembang, (b) pengadaan bahan tanaman siap salur, (c) kegiatan bidang pemuliaan. Untuk lebih mengoptimalkan potensi penyambungan masih perlu penyempurnaan beberapa aspek teknisnya.

0221 WARDIYATI, T.
***In vitro* meristem cryopreservation of Banana cv. Kepok (ABB) 2. Precryotreatment**/Wardiyati, T. (Universitas Brawijaya, Malang (Indonesia)). 1 tables; 5 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 583-588.

MUSA (BANANAS); MERISTEM CULTURE; BIOLOGICAL PRESERVATION; FREEZING; SUCROSE; GROWTH INHIBITORS; PLANT RESISTANCE; CHEMICAL COMPOSITION.

Indonesia as one of Musa germplasm resource countries, has responsibility to preserve the germplasm for future utilities. Several banana germplasm collections in the field were damaged due to limited financial support to maintain cultivation. Therefore, in vitro conservation, particularly cryopreservation is one of an attractive technology for the Long term banana germplasm conservation. A laboratories experiment was conducted at Faculty of Agriculture Brawijaya University from July 1996 to July 1997 to evaluate the possibility using cryopreservation technology for Indonesia banana germplasm: cultivar Kepok (ABB). Meristems derived from embryogenic callus of banana shoot tips which treated with five (5, 10, 15, 20, 25 mg/l) benzyl adenine concentrations in the media were excised for the experiment material. These meristems were inoculated in MS media supplemented with three different sucrose concentration (60, 120, 180 g/l), for three weeks before preserved into liquid nitrogen. The white meristems which survived grown in high sucrose media were then plunged in to liquid nitrogen for 24 hours. As control was meristems which did not treated by sucrose. The result showed that only meristems derived from 25 mg/litre Benzyl Adenine media composition survived in 180 g of sucrose (highest concentration) before preserved in liquid nitrogen. After one night preserved the precryotreated meristems were survived (white), while the untreated meristems turned to black or die. It means that precryotreatment using sugar to protect the cells from freeze thawing injury is very important. Regeneration of the cryopreserved meristems were formed normal shoots.

0222 WARUWU, F.
**Analisis usaha tani pembibitan pisang. Farming system analysis of banana propagation**/Waruwu, F. (Balai Penelitian Tanaman Buah, Solok (Indonesia)). 3 tables; 6 ref. Summary (En). Appendix. *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 69-73.

MUSA PARADISIACA; PLANT PROPAGATION; COST BENEFIT ANALYSIS.

The aim of this research was to determine the efficiency of banana seedling farming system. This research was conducted at Aripan Research Institute for Fruit, Solok, from April 1997 to March 1998. Analysis data by descriptive. The result showed that banana seedling farming system using polyethylene bag method gave Rp15,207,- profit per 225 $M^2$. Floor price of banana propagation was Rp941,- per seedling. Banana seedling conducted at Aripan Research Institute for Fruit was efficient with nisbah R/C ratio 1.06 and break even point Rp113,316,- per 225 $M^2$.

## F03 PRODUKSI DAN PERLAKUAN TERHADAP BIJI DAN BENIH

0223 ARTUTI A.M.
**Viabilitas benih karet dari berbagai ukuran dan lama perendaman benih. Rubber seed viability on different size and presoaking duration**/Artuti A.M.; Hasan, Z.; Ramilus (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 6 tables; 7 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 6-13.

HEVEA BRASILIENSIS; SEED VIABILITY; SEED SIZE; SOAKING; DURATION; MOISTURE CONTENT; GERMINABILITY.

A study to identify appropriate type of seed sizes and presoaking duration in order to make high seed viability in rubber seed was done at SMK-2 Batusangkar green house, West Sumatra from August to October 1997. A factorial in Randomized Complete Block Design with three replications was used in experiment. The factors were seed sizes (Small = 220 seed/488 g/l, middle = 175 seed/462 g/l and big = 123 seed/401 g/l) and presoaking duration (0 hour, 24 hours and 72 hours). The results showed that the highest seed viability was found in the middle or bigger sizes (5.8 g and 6.05 g seedling dry) and the seeds were presoaking in water about 48 hours (germination rate 3.39% per day)

0224 EMMYZAR.
**Peranan faktor lingkungan terhadap produksi benih unggul lokal jambu mente. [Effect of environmental factors on production of local high yielding variety cashew]**/Emmyzar; Lubis, M.J.; Sukarman (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)); Tarigans, D.D. 3 tables; 21 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 148-157.

ANACARDIUM OCCIDENTALE; ENVIRONMENTAL FACTORS; SEEDLINGS; LAND SUITABILITY; CLIMATE.

Pengembangan tanaman jambu mente perlu ditunjang oleh penyediaan benih unggul spesifik lokasi (lokal). Benih jambu mente yang akan dijadikan bibit berasal dari gelondong yang tidak digunakan untuk konsumsi dan memenuhi berbagai kriteria, diperoleh dari pertanaman unggul, terpilih dari blok penghasil tinggi serta mempunyai vigor benih yang tinggi. Faktor-faktor lingkungan seperti komponen lahan, iklim dan ketinggian tempat berperan dominan untuk diperolehnya benih yang baik. Faktor-faktor tersebut yang berpengaruh terhadap pertanaman jambu mente sumber benih untuk daerah Kabupaten Muna, Kendari dan Buton (Sulawesi Tenggara) telah diteliti. Hasil pengamatan menunjukkan daerah ini sesuai untuk pertanaman jambu mente dan diperkirakan akan menghasilkan gelondong untuk produksi benih yang cukup baik. Curah hujan berkisar 1348-2170 mm/tahun dengan lama bulan kering 3-5 bulan dan bulan basah 3-4 bulan/tahun. Suhu udara rata-rata $27^0$ C, kelembaban 78-80% dengan kecepatan angin 6-7 km/jam, sedang ketinggian tempat ± 600 m dpl. Tipe iklim menurut Oldeman dan Darmayanti adalah D3. Tanah tergolong jenis latosol, sebagian podsolik dengan tekstur liat berpasir. Perlu ada penelitian mengenai lahan dan iklim untuk daerah pengembangan lainnya.

0225 HOBIR.
**Potensi bioteknologi dalam industri benih jahe. [Biotechnology potential in ginger seed industry]**/Hobir; Mariska, I. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 3 tables; 34 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 105-112.

ZINGIBER OFFICINALE; QUALITY; TISSUE CULTURE; SOMACLONAL VARIATION; PROTOPLAST FUSION; WILTS; BIOTECHNOLOGY.

Kendala utama usahatani jahe di Indonesia adalah serangan penyakit layu. Penyebaran penyakit ini umumnya melalui rimpang bibit. Sampai saat ini bibit diproduksi dari pertanaman produksi, tanpa

mengadopsi suatu metoda tertentu, sehingga mutu bibit umumnya rendah, terutama tingkat kesehatannya. Dua komponen penting perlu diperhatikan dalam memproduksi benih bermutu, yaitu varietas yang jelas asalnya (true to type) dan teknik produksi bibit. Secara konvensional, varietas unggul, terutama yang tahan penyakit sulit diperoleh karena keragaman genetik jahe rendah. Kendala produksi benih adalah tingginya kebutuhan bibit untuk setiap satuan luas (2-3 ton/ha), sedangkan mendapatkan bibit bebas penyakit sulit dicapai, karena membutuhkan areal pembibitan cukup luas. Metode bioteknologi cukup potensial untuk diaplikasikan dalam memproduksi benih bermutu, baik dalam mendapatkan varietas unggul maupun dalam memproduksi bibit dari varietas unggul tersebut. Beberapa metode bioteknologi (antara lain variasi somaklonal, kultur anther, atau rekombinasi DNA) dapat meningkatkan keragaman genetik. Hasil penelitian di Balittro menunjukkan keragaman beberapa sifat morfologi dan resistensi cenderung meningkat dengan variasi somaklonal dan radiasi. Dalam produksi bibit, Balittro telah mengembangkan teknik produksi bibit melalui kultur jaringan, yang dapat menghasilkan rimpang bebas penyakit. Teknik ini potensial diaplikasikan dalam memproduksi benih dasar, namun masih perlu diteliti lebih lanjut dalam teknik budidaya.

0226 JANUWATI, M.

**Teknik penanganan rimpang jahe untuk benih. [Handling of ginger for seedlings]**/Januwati, M.; Surmaini, E. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 6 ill., 4 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997 : p. 208-214.

GINGER; POSTHARVEST TECHNOLOGY; SEEDLINGS; GRADING; DRYING; SEED STORAGE; PACKAGING.

Bahan tanaman sulit diperoleh di luar musim panen, karena umumnya petani menjual seluruh produksi rimpangnya. Hanya menyisakan sedikit untuk benih keperluan sendiri. Rimpang yang berkualitas baik terserap untuk ekspor. Untuk menghindari kelangkaan bibit, dilakukan penyimpanan untuk jangka waktu tertentu. Beberapa faktor yang harus diperhatikan dalam proses penyimpanan: (1) cara panen yang tidak mengakibatkan kerusakan rimpang, (2) penyortiran terhadap rimpang yang terserang hama dan penyakit, ukuran yang kecil, dan bentuk yang tidak dikehendaki, (3) pengeringan kulit dengan penjemuran di bawah sinar matahari pagi atau di dalam ruangan dengan sirkulasi udara dan cahaya yang cukup, (4) penyimpanan dengan cara dihamparkan di dalam ruangan dengan sirkulasi udara yang baik, cahaya yang cukup, atap tidak bocor, atau dengan menggunakan rak kayu/bambu, peti kayu yang tidak tertutup rapat, atau karung yang terbuka bagian atasnya, (5) pengiriman didahului dengan penyortiran kembali terhadap rimpang yang terserang penyakit, kulitnya rusak atau keriput. Untuk pengepakan digunakan peti kayu yang tidak rapat, karung atau keranjang bambu dengan tumpukan yang tidak tinggi untuk menghindari kerusakan rimpang yang terletak di bagian bawah.

0227 LAKSMI, H.R.

**Viabilitas dan variabilitas benih antar famili pada kebun benih *Eucalyptus pellita* di Wonogiri dan Kalimantan Selatan. Seed viability and variability between families in *E. pellita* seedling seed orchards in Wonogiri, Central Java and Pleihari, South Kalimantan (Indonesia)**/Laksmi, H.R.; Sunarti, S.; Tambunan, P.; Mangku, W.F. 4 ill., 5 tables; 10 ref. Summary (En) *Wana Benih (Indonesia)* ISSN 1410-1173 (1999) v. 3(1) p. 37-46.

EUCALYPTUS PELLITA; SEED VIABILITY; QUALITY; SEED; GERMINABILITY; KALIMANTAN.

Viability and variability of seeds are observed in Seedling Seed Orchard (SSO) as parameters tested to see family variation. The result showed significant difference either in South Kalimantan or in Wonogiri (SSO). Some correlations were also shown between fruits diameter and weight or number of seed, seed size and viability, number of fruit locus and weight or number of seed.

0228 PORONG, J.V.

**Optimasi suhu dan kelembaban udara tempat penyimpanan dalam usaha mempertahankan kualitas benih nangka (*Artocarpus integra* (Thumb) Merr). Optimizing storage temperature and humidity to maintain seed quality of jackfruit (*Artocarpus integra* (Thumb) Merr)**/Porong, J.V.; Walingkas, S.A.F.; Najoan, J. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 3 ill.; 2 tables; 14 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5(4) p. 160-167.

SEED TREATMENT; ARTOCARPUS HETEROPHYLLUS; QUALITY; TEMPERATURE; RELATIVE HUMIDITY; DURATION; GERMINATION; SEED LONGEVITY.

The objective of this research was to study the optimum temperature and humidity during storage to maintain seed quality. The experiment was carried out at Sam Ratulangi Central Laboratory for 8 months and using Completely Randomized Design in factorial 3 x 3 x 2 experiment with 3 replications. The first factor was temperature; i.e. $15^0$ C, $20^0$ C, $30^0$ C; the second factors was humidity i.e. 60%, 70%, 80%, and 90%; the third one was the duration of storage i.e. 15, 30 and 45 days. The results showed that all the combinations of treatments significantly affected the seed qualities. At any temperature and humidity, the seed quality decreased as the storage duration increased. Only temperature of $15^0$ C. at some humidities and storage tested was able to maintain the seed qualities during storage and gave higher values of total percentage, seedlings and vigor index than that of control.

0229 ROHAYAT, N.

**Kemampuan perkecambahan benih dan mutu bibit dari beberapa umur tegakan *Acacia mangium*. The ability of seed germination and seedlings quality harvested from some ages of *Acacia mangium***/Rohayat, N.; Mindawati, N. 4 tables.; 12 ref. Summary (En). *Buletin Penelitian Hutan (Indonesia)* ISSN 1410-0649 (1997) (no. 610) p. 51-58.

ACACIA MANGIUM; GERMINATION; SEEDS; SEEDLINGS; QUALITY; GROWTH.

Using good quality of seed for forest plantation is very important, because it will be quarantee of the productivity therefore the research on seed germination ability and seedlings quality from different seed source become important. The research of germination of *Acacia mangium* seed which has harvested from different age was conducted in the Experimental Garden at Forest and Nature Conservation Research and Development Centre Bogor. The Experiment was set up in Completely Randomized Design with seed source from different tree age as the factor (9, 8, 7, and 6 years old) and each treatment was made in three replicated. The result of the experiment showed that the germination (germination percentage and germination value) of seed from different as significantly different. The height and diameter growth, the length of root and the dry weight are also significantly different, but not significant on the quality of index. The best germination percentage was achieved by 9 years old tree (68%), but for the others respon the best treatment were achieved by 6 years old tree of *Acacia mangium* stand as seed sources.

0230 RUMIATI.

**Studi perkembangan benih jambu mente. [Study of cashew seedlings development]**/Rumiati; Sukarman; Rusmin, D.; Hasanah, M. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 tables; 4 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 220-223.

ANACARDIUM OCCIDENTALE; GERMINABILITY; SEEDS; WATER MOISTURE; AGE; DEVELOPMENTAL STAGES.

Benih jambu mente mencapai mutu fisiologis tertinggi bila dipanen pada masak fisiologis, saat mencapai bobot kering gelondong tertinggi. Studi tentang perkembangan benih jambu mente telah dipelajari di Bogor (± 250 m dpl) pada bulan Juni-Agustus 1996. Hasil pengamatan menunjukkan bahwa pada umur 7 hari setelah antesis (HSA), bentuk kering 0,03 g. Selanjutnya kulit gelondong berkembang dengan cepat, diikuti perkembangan kulit ari, dan menyusul pengisian benih. Perkembangan buah semu mulai cepat saat ukuran gelondong telah maksimum, pada umur sekitar 29-31 HSA. Pada umur 36-37 HSA, gelondong dan

buah semu mencapai ukuran diameter yang sama, sekitar 20-22 mm, bobot gelondong segar 9,3 g, bobot kering 4,1 g, daya berkecambah 60%. Masak fisiologis benih dicapai pada umur 42 HSA, bobot gelondong segar 8,7 g, bobot kering 5,5 g, kadar air 36%, daya berkecambah 100%.

0231 SUDIARTO.
**Teknologi produksi benih jahe. [Technology for ginger seed production]**/Sudiarto; Supriadi; Balfas, R.; Rosita, S.M.D. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 table; 14 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 83-92.

ZINGIBER OFFICINALE; SEED PRODUCTION; HIGH YIELDING VARIETIES; WILTS; HOSTS; NEMATODE INFECTIONS; AGROECOSYSTEMS.

Untuk memproduksi benih jahe yang bermutu dan bervarietas yang baik dalam arti memenuhi persyaratan permintaan konsumen, masih menghadapi permasalahan non teknis dan teknis. Permasalahan non teknis adalah belum adanya sistem perbenihan yang baik, rendahnya kesadaran dan kepedulian para pelaku bisnis benih mulai dari petani sampai pemasoknya. Aspek teknisnya berupa kendala serangan penyakit layu yang sering menggagalkan panen, dan masih terbatasnya teknologi budidaya yang memadai untuk memproduksi benih jahe. Berdasarkan permasalahan dan faktor-faktor pendorong keberhasilan produksi benih berupa sumber daya lahan, tanaman dan pemanfaatan iptek hasil penelitian serta pengalaman diharapkan kendala tersebut dapat diatasi. Sehubungan hal tersebut diajukan suatu tinjauan teknologi budidaya untuk produksi benih jahe. Bahan tanaman yang digunakan dari kultivar atau klon unggul lokal yang dianjurkan, baik melalui cara perbanyakan konvensional maupun kultur jaringan. Alternatif pola tanam yang dapat dikembangkan meliputi pola produksi benih langsung di lapangan yang dapat dilakukan di lahan bebas patogen utama seperti di lahan hutan perawan yang baru dibuka, bekas kebun kopi dan lahan yang telah lama dijadikan sawah. Pola lainnya adalah pola tanam jahe dalam pot (jalampot).

0232 WALINGKAS, S.A.F.
**Pemantauan mutu benih dan sumber benih kacang tanah (*Arachis hypogaea* L.) di Minahasa. The monitoring of seeds quality and seeds source of peanut (*Arachis hypogaea* L.) in Minahasa (Indonesia)**/Walingkas, S.A.F.; Najoan, J. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 2 ill.; 4 tables; 12 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5(4) p. 168-180.

ARACHIS HYPOGAEA; QUALITY; SEED; SEED MOISTURE CONTENT; GERMINABILITY; SEED LONGEVITY; SULAWESI.

The objective of this research were to evaluate the seed quality and their sources used by farmers in Minahasa region, and to find the best method to get the best quality peanut seed for planting. Ten villages was selected using purposive sampling method from five sub districts (two villages each). The results showed that the best peanuts quality used by farmers came from good sources. The best seeds for planting came from "Balai Benih Utama" Wasian in Kakas sub district, from Kanonang and Kinali villages in Kawangkoan sub district, Tataaran I and II villages in Tondano sub district, Lowian village in Tompaso Baru sub district, and from Mapanget and Talawaan villages in Dimembe sub distric. Seed from Kinaweruan village in Tompaso Baru sub district and Sensangan village in Kakas sub district, however, were not recommended as seed sources.

## F04 PEMUPUKAN

0233 ADRIZAL.
**Tanggap beberapa varietas buncis (*Phaseolus vulgaris*) terhadap pemupukan NPK. Response varieties of French bean (*Phaseolus vulgaris*) to NPK fertilizer**/Adrizal; Zubaidah, Y.; Kari, Z. (Balai

Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 4 tables; 4 ref. Summary (En). *Jurnal Stigma* (Indonesia) ISSN 0853-3776 (1999) v. 7(2) p. 10-13.

PHASEOLUS VULGARIS; NPK FERTILIZERS; GROWTH; YIELDS.

Response variety of French bean (*Phaseolus vulgaris*) to NPK fertilizer. Pot experiment was conducted at screen cattle in Bandar Buat, Padang from October 1997 until February 1998 to determine growth and yield responses of French bean varieties on applying different rates of NPK fertilizer. Three varieties of French bean (LBPH, TG and TPH) and six rates of NPK fertilizer (22.5 kg N/ha + 90 kg $P_2O_5$/ha + 60 kg $K_2O$/ha; 22.5 kg N/ha + 135 kg $P_2O_5$/ha + 60 kg $K_2O$/ha; 22.5 kg N/ha + 90 kg $P_2O_5$/ha + 120 kg $K_2O$/ha; 22.5 kg N/ha + 135 kg $P_2O_5$/ha + 120 kg $K_2O$/ha; 22.5 kg N + 180 kg $P_2O_5$/ha + 60 kg $K_2O$/ha; and 22.5 kg N/ha + 180 kg $P_2O_5$/ha + 120 kg $K_2O$/ha were arranged in Randomized Complete Block Design, two factors with three replications. Results showed that of three varieties had been tested had response to 22.5 kg N/ha + 135 kg $P_2O_5$/ha + 60 kg $K_2O$/ha (8.02 g/plant French bean, respectively).

0234 ALI, G.M.

**Peningkatan efisiensi pemupukan P tanaman padi gogo pada ultisol dengan pemanfaatan mikoriza. Fertilizers efficiency improvement of paddy gogo on ultisols due to the utilization of mycorrhizae**/Ali, G.M. (Universitas Sriwijaya, Palembang (Indonesia)). 2 tables; 10 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 270-274.

UPLAND RICE; MYCORRHIZAE; PHOSPHATE FERTILIZERS; EFFICIENCY; NUTRIENT UPTAKE; ACRISOLS.

Ultisol is one of the largest soil in terms of area in Indonesia. This kind of soil is known to have limited available phosphorus (P) which is limiting factor for plant growth. Addition of P-fertilizer is often not effective for plant due to its fixation by cation like Fe, Al or Mn. A study has been conducted to improve the efficiency of P-fertilizer addition for upland rice in Ultisol by using mycorrhizae. The role of mycorrhiza in improving efficiency of P-fertilizer addition for upland rice was studied. A factorial design with two factors and five replicates was used. The first factor was being addition of MVA constitute of no MVA and 100 gr/pot MVA. Second factor was the addition of TSP fertilizer of 0; 50; 100; 150 and 200 kg TSP/ha respectively. Result of the study showed that addition of MVA as well as TSP significantly increase the efficiency is derived from the combination treatment between MVA addition and the P-fertilizer addition, being 15.3%. Addition MVA and TSP interacted significantly in the increase of plant weight, but not significantly increased the efficiency of P-fertilizer addition for upland rice in Ultisol.

0235 ATMODJO, M.C.T.

**Budidaya ubikayu barisan ganda (double row) varietas Adira IV pada tanah podzolik merah kuning menggunakan kompos ubikayu sebagai pupuk pengganti. Study of double row cultivation for cassava (*Manihot esculenta* Crantz) Var. Adira IV in red yellow podsolic soil treated with cassava skin compost as fertilizer**/Atmodjo, M.C.T.; Hardoyo; Eko, T.A.; Suryadi; Samiyana. 3 tables; 3 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 220-223.

MANIHOT ESCULENTA; CULTIVATION; COMPOSTS; ORGANIC FERTILIZERS; COST BENEFIT ANALYSIS; YIELDS.

This study was conducted by using three treatments. The first treatment consisted of 20 ton/ha compost, 125 kg/ha Urea, 150 kg/ha TSP and 125 kg/ha KCl. The second treatment consisted of 20 ton/ha compost, 62.5 kg/ha Urea, 75 kg/ha TSP and 62.5 kg/ha KCl, and the third treatment consisted of 0 ton/ha compost, 75 kg/ha Urea, 100 kg/ha TSP and 75 kg/ha KCl as bassal dressing and 50 kg/ha Urea, 50 kg/ha TSP and 50 kg/ha KCl as second fertilizer. The cassava production by 8 months old were between 22.0 to 27.5 ton/ha, 19.12 to 25.25 ton/ha and to 24.2 ton/ha respectively. By 9 months old, were 22.6 to 28.77 ton/ha, 19.0 to 21.0 ton/ha and 21.0 to 22.75 ton/ha, while by 10 months old were 21.38 to 28.95 ton/ha, 17.40 to 23.20 ton/ha and 22.13 to 24.50 ton/ha respectively. Those production were not the best one because there were very hard dry season without rainfall since the plant were 7 months old.

0236 DAMARJAYA, D.I.

**Pengaruh kombinasi jerami, pupuk K dan kapur terhadap keracunan besi pada tanaman padi sawah di tanah sulfat masam. The combination effect of straw, K fertilizer and lime on iron toxicity in lowland rice in acid sulphate**/Darmajaya, D.I.; Hermawan, A. (Universitas Sriwijaya, Palembang (Indonesia). Fakultas Pertanian). 2 tables; 3 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 283-286.

ORYZA SATIVA; RICE STRAW; POTASH FERTILIZERS; LIMING; ACID SULPHATE SOILS; IRON; PHYTOTOXICITY; GROWTH.

Acid sulphate soil is very potential to be developed for lowland rice plantation, but there was some problems especially caused by Fe toxicity. Therefore, this research was to see the effect of K fertilizer (from KCl and rice straw) combined with lime on Fe toxicity of lowland rice on acid sulphate soil, in order to increase the efficiency of fertilization and the land productivity. The experimental design used in this research was Factorial Randomized Block Design with two factors and three replications. The first factor was K fertilization with 6 levels: (K0: 0 kg $K_2O$/ha, K1: 30 kg $K_2O$/ha, K2: 60 kg $K_2O$/ha, K3: 90 kg $K_2O$/ha, K4: 2 ton rice straw/ha, K5: 4 ton rice straw/ha. The other factor was liming with 3 levels (L0: 0 ton $CaCO_3$/ha, L1: 2 ton $CaCO_3$/ha, and L2: 4 ton $CaCO_3$/ha. The observation were made on the plant, the growth and dry biomass of plant 6 weeks after planting. The results showed that K fertilizers significantly increased the available of total K soil, and concentration of K-plant tended to decrease soil available Fe soil and the concentration Fe-plant. Fertilization of K significantly increased the growth and plant biomass. Liming significantly increased soil pH, but had no effect on the other parameters. The highest dry biomass was achieved by $K_3L0$ (120$K_2O$/ha and without lime). Kalium fertilization potentially decreased Fe toxicity in acid sulphate soil.

0237 DERMIYATI.

**Manajemen penggunaan pupuk mengurangi dampak pemupukan terhadap lingkungan dan kesehatan manusia. Management of fertilizer use to minimize the impact of fertilizer on the environment and human health**/Dermiyati (Universitas Lampung, Bandar Lampung (Indonesia)). 2 tables; 14 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 250-255.

FERTILIZER APPLICATION; HEALTH HAZARDS; NUTRITIONAL LOSSES; ENVIRONMENTAL IMPACT; SOIL POLLUTION.

The use of agrochemicals (fertilizers and pesticides) in agriculture undoubtedly help to provide the production increased of food and wood for fuel. However, one question that we should concern is in how serious are the hazard using that fertilizers comparing to the benefit they provide. Excessive nitrate from N

fertilizer in drinking water will cause methaemoglobinemia or blue baby syndrome, lack of oxygen in infants, and also stomach cancer. One requirement will be the best fertilizer management for more sustainable agriculture and environmentally safe. Application of balance nutrients and addition of fertilizer at proper time and place are suggested.

0238 ERNAWATI, R.

**Pengaruh jenis mulsa dan tingkat pemupukan NPK compound terhadap pertumbuhan dan produksi melon (*Cucumis melo* L.). The influence of kinds of mulch and levels of NPK compound fertilization on the growth and yield of melon (*Cucumis melo* L.)**/Ernawati, R. (Loka Pengkajian Teknologi Pertanian Natar, Lampung (Indonesia)). 2 tables; 7 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 163-166.

CUCUMIS MELO; MULCHES; NPK FERTILIZERS; DOSAGE; GROWTH; YIELD COMPONENTS.

The objective of this experiment was to study the influence kinds of mulch and its combination and several NPK dosages supplies on growth and yield of melon. This experiment was carried out at the Hajimena Natar (South of Lampung) from August 1997 to November 1997, using Randomized Block Design arranged factorially with three replications. The first factor with block plastic mulch (M1), straw of rice mulch (M2), sedge grass mulch (M3) and without mulch (M0). The second factor with combination response of NPK compound fertilization was investigated at rates of 40 gr (P1), 50 gr (P2) and 60 gr (P3) each plant. The result showed that the difference kinds of mulch was significantly yield the optimal height of plant and weight of fruit. The best treatment is with rice straw mulch. Combination of difference dosages of NPK supply had not significant effect on observed parameters.

0239 GANDANEGARA, S.

**Pertumbuhan dan kandungan hara tanaman galur mutan kedelai No. 58 karena pengaruh inokulasi dan pemupukan P. Growth and nutrient content of soybean mutant line No. 58 influenced by inoculation and P fertilization**/Gandanegara, S.; Harsoyo; Idawati; Wemay, J. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 6 tables; 11 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 79-84.

GLYCINE MAX; BRADYRHIZOBIUM; MUTANTS; INOCULATION; PHOSPHATE FERTILIZERS; PROXIMATE COMPOSITION.

Telah dilakukan satu percobaan lapang untuk mempelajari pengaruh 3 taraf inokulasi *Bradyrhizobium sp.* (tanpa, dengan strain B-22, dan dengan B-22 plus *Pseudomonas fluorescens*) dan 5 taraf pemupukan P (0, 30, 60, 90, dan 120 kg $P_2O_5$/ha) terhadap pertumbuhan dan kandungan hara N dan P galur mutan kedelai No. 58. Percobaan dilakukan di lahan masam Kebun Percobaan INP2TP Taman Bogo, Lampung Tengah pada MH 1997/98. Percobaan dilaksanakan dengan Rancangan Acak Petak Terpisah dengan 4 ulangan. Pengamatan pertumbuhan serta kandungan N dan P tanaman dilakukan pada stadium pembentukan polong. Hasil percobaan menunjukkan bahwa inokulasi tidak berpengaruh nyata terhadap pertumbuhan yang diduga karena tingkat kesuburan lahan telah optimal melalui pemberian kapur 1 ton/ha. Namun, inokulasi secara nyata meningkatkan kandungan N dalam tanaman. Keikutsertaan bakteri *P. fluorencens* sebagai koinokulan dianggap tidak efektif untuk digunakan karena tidak memberikan hasil yang lebih baik daripada inokulasi dengan strain tunggal. Pemupukan P secara nyata memperbaiki pertumbuhan dan kandungan N tanaman yang optimal pada taraf 90 kg $P_2O_5$/ha.

0240 GOFAR, N.

**Potensi kimia fraksi humat hasil dekomposisi bahan organik limbah pertanian sebagai senyawa organik aktif dalam pupuk pertanian. Chemical potential of humic fraction derived from decomposition of agricultural waste as active organic substance in agricultural fertilizer**/Gofar, N.; Marsi; Priatna, S.J. (Universitas Sriwijaya, Palembang (Indonesia)). 3 tables; 7 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 207-211.

AGRICULTURAL WASTES; ORGANIC MATTER; HUMUS; DEGRADATION; CHEMICAL COMPOSITION.

This research purposed to evaluate the potential use of humic fraction resulted from decomposition of agricultural waste as active organic substances which are combined with N, P, and K fertilizer to form a new NPK-organic fertilizer. Five sources of agriculture wastes had been decomposed for 3 months, then extracted to get the humic fraction, that was analyzed for N, P, K organic-C, carboxylic and phenolic function groups, and total acidity. Based on the result of the chemical analysis, humic fraction derived from rice straw is the most potential as an active organic substance which could be combined in NPK-organic fertilizer.

0241 HARTOYO, H.

**Pertumbuhan dan hasil padi serta N tanah total akibat pemupukan N urea tablet pada tanaman sawah. The growth and yield of paddy rice and soil total nitrogen as affected by tableted urea in paddy fields**/Hartoyo, H.; Isnaini, S.; Maryati (Sekolah Tinggi Surya Dharma Bandar Lampung (Indonesia)). 3 tables; 13 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu TanahIndonesia (HITI) KOMDA Lampung, 1997: p. 239-243.

ORYZA SATIVA; RICE FIELDS; NITROGEN FERTILIZERS; FERTILIZER APPLICATION; DOSAGE; GROWTH; YIELDS.

The slow-release fertilizers are mostly Urea-based. Other new Urea fertilizers include super granulated Urea and Urea briquetes as well as tableted Urea for deep soil placement. The objectives of this research were investigated the effects of N fertilizer from Urea tablet on growth and yield of rice (*Oryza sativa* L.) 'IR64' and soil total N. The research was conducted at Pajaresuk, Pringsewu, Tanggamus from June 1994 to September 1994 on Regosol. An experiment was five N fertilizers dosage arranged in a Randomized Complete Block Design with six replications. The treatment consisted of five N fertilizers dosage, i.e.: 115 kg/ha N from prill by control, 28.75 kg/ha from Urea tablet, 57.50 kg/ha N, and 115.0 kg/ha N. Data were analyzed with ANOVA and means difference with LSD at $\alpha = 0.05$. Result of the experiment showed: (1) nitrogen fertilizers levels dosage had occurred on growth, yield of rice 'IR64', and soil total N, (2) levels of N fertilizers 86.25 kg/ha N from Urea had the highest influence on yield of rice 'IR64'.

0242 HARYANTO.

**Pengaruh pupuk hijau sesbania terhadap efisiensi pemupukan dan produksi padi sawah dengan sistem olah tanah minimal serta tebar benih langsung. Effect of sesbania green manure on efficiency of urea fertilization and rice production cultivated by using minimum tillage and direct seeding**/Haryanto; Idawati (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 5 tables; 12 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha,

H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 25-30.

ORYZA SATIVA; SESBANIA; NITROGEN FERTILIZERS; EFFICIENCY; NUTRIENT UPTAKE.

Percobaan lapang dilakukan di Kebun Instalasi Penelitian Padi Pusakanegara. Untuk mempelajari efisiensi serapan pupuk N digunakan pupuk urea bertanda N-15 yang memiliki akses atom 1,40%. Lima perlakuan pemupukan yang dicoba yaitu: Tanpa pupuk hijau Sesbania dan tanpa urea (OS + OU), tanpa Sesbania, diberikan urea 45 kg N/ha pada 2 MST (S + 45 U/2 MST), pupuk hijau Sesbania, diberikan urea 45 kg N/ha pada saat pembenaman (S + 45 U/inkp), dan pupuk hijau Sesbania, diberikan urea 22,5 kg N/ha pada 2 MST + 22,5 kg N/ha pada saat pembenaman (S + 22,5 U/2 MST + 22,5 U/inkp). Di samping itu juga dilakukan percobaan selama 3 musim tanam yaitu MK 1996, MP 1996/97, dan MK 1997 untuk menguji produksi padi yang dipengaruhi oleh pemupukan urea yang disertai dengan pupuk hijau Sesbania. Hasil penelitian menunjukkan bahwa penggunaan pupuk urea dengan takaran 45 kg N/ha, aplikasi pupuk hijau Sesbania yang diproduksi dari tumpang sari padi Sesbania selama awal pertumbuhan (50 hari setelah tebar benih) dapat meningkatkan efisiensi penggunaan pupuk dari 29,7% menjadi 50,5% dan produksi gabah kering rata-rata dari 3 musim tanam meningkat 1186 kg/ha atau sekitar 27%.

0243 IDAWATI.
**Peran *Sesbania rostrata* dalam peningkatan ketersediaan hara P bagi tanaman padi sawah. The use of *Sesbania rostrata* for increasing P availability in lowland rice cultivation**/Idawati (Pusat Applikasi Isotop dan Radiasi, BATAN Jakarta (Indonesia). 3 tables; 6 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 35-40.

ORYZA SATIVA; SESBANIA ROSTRATA; NUTRIENT AVAILABILITY.

Sesbania, sebagai tanaman legum, mempunyai kemampuan yang besar dalam penyerapan hara P. Hasil serapannya merupakan cadangan bagi tanaman padi yang akan dilepas dalam bentuk P tersedia dalam proses dekomposisi setelah Sesbania dibenamkan ke dalam tanah. Untuk mempelajari peran *Sesbania rostrata* dalam meningkatkan ketersediaan hara P bagi tanaman padi sawah, suatu percobaan pot telah dilakukan di rumah kaca di PAIR-Batan, Pasar Jumat. Tanah yang berasal dari Pusakanegara dan padi varietas IR-64 digunakan dalam percobaan ini untuk menguji 8 perlakuan berikut : tanpa pemupukan dengan Sesbania, urea ataupun SP-36 (kontrol); pemupukan urea takaran penuh (N); pemupukan dengan Sesbania (S), pemupukan dengan Sesbania plus urea setengah takaran (S + ½N); pemupukan dengan Sesbania plus urea takaran penuh (S + N); pemupukan dengan Sesbania plus urea dan SP-36 setengah takaran (S + ½N + ½P); pemupukan dengan Sesbania plus urea setengah takaran dan SP-36 takaran penuh (S + ½N + P); dan pemupukan urea dan SP-36 takaran penuh (N + P). Percobaan dilakukan dengan menggunakan Rancangan Acak Lengkap dan setiap perlakuan diulang 4 kali. Untuk membedakan serapan P tanah dan P pupuk digunakan metode pengenceran isotop P-32. Hasil percobaan menunjukkan bahwa perlakuan dengan Sesbania dengan tambahan atau tanpa tambahan pupuk urea dan SP-36, memberikan serapan P dan bobot kering tanaman padi yang lebih baik dibandingkan dengan perlakuan lainnya. Pada perlakuan dengan Sesbania diperoleh serapan P tanah 2 kali lipat yang diberikan oleh perlakuan kontrol. Kompetisi oleh Sesbania dalam penyerapan P pupuk terlihat dari serapan P pupuk oleh tanaman padi yang lebih rendah pada pemupukan SP-36 dalam perlakuan dengan Sesbania dari pada yang dihasilkan dari pemupukan P tanpa Sesbania.

0244 ISNAINI, S.
**Pemupukan nitrogen pada tiga sistem olah tanah: 1. Pengaruhnya terhadap N tanah total, Nisbah C/N bobot kering tanaman, serapan tanaman, serapan N dan efisiensinya. Nitrogen application and tillage systems: influence on N-total soil, C/N ratio, dry matter, yield, N absorption, and its efficiency**/Isnaini, S. (Sekolah Tinggi Pertanian Surya Dharma Bandar Lampung (Indonesia)). 5 tables; 22

ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 232-238.

ORYZA SATIVA; NITROGEN FERTILIZERS; TILLAGE; SOIL FERTILITY; YIELDS; ABSORPTION; EFFICIENCY.

These slow-release fertilizers and placement of nitrogen in the reduced soil layer had been considered as the best method to decrease nitrogen losses and increase fertilizer nitrogen efficiency in lowland rice. The purpose of this study was to investigate the influence of interaction between N fertilization and tillage system on total N, C/N ratio, plant dry weight, and N uptake. The research was conducted at Kedaloman village, Talangpadang district, Tanggamus from May 1996 to August 1996 on Inceptisol. A factorial experiment was arranged in a Randomized Complete Block Design with three replications. The treatments consisted of four levels of N fertilization, viz: without-N, 57.50 kg/ha N, 86.25 kg/ha N, and 115.00 kg/ha N; and three tillage system, viz: conventional tillage (CV), no-tillage with standing ratoon (NT-1), and no-tillage with dropped ratoon (NT-2). Data were analyzed with ANOVA and means difference with LSD by $\alpha = 0.05$. The result of the experiment showed that interaction effect between N fertilization and tillage system had not on all variables determined. Tillage systems were influenced on total N and C/N ratio. N fertilization had increased on C/N ratio, plant dry weight, and N uptake compared to without-N. Efficiency of N fertilization was the highest on NT-2 that was (59.30 ± 68)%, NT-1 was (38.90 ± 40)% and CT was (36.29 ± 38)%.

0245 ISNAINI, S.

**Pemupukan nitrogen pada tiga sistem olah tanah: 2. Pengaruhnya terhadap tinggi tanaman, jumlah anakan, komponen hasil, dan hasil padi sawah. Nitrogen fertilization and tillage system: effect on plant growth, and yield of paddy rice**/Isnaini, S.; Maryati (Sekolah Tinggi Pertanian Surya Dharma Bandar Lampung, Bandar Lampung (Indonesia)); Hermawan, W. 2 tables; 14 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p.244-249.

FLOODED RICE; NITROGEN FERTILIZERS; TILLAGE; GROWTH; YIELDS.

An experiment of N fertilizers and tillage system was conducted on Inceptisol at Kedaloman village, Talangpadang, Tanggamus from May 1996 to August 1996. The objectives of this research were to investigate the effect of interaction between N fertilizers and tillage system on plant height, tillering number, component of yield, and yield of lowland rice. The experiment 4 x 3 factorial was arranged in a Randomized Complete Block Design with three replications. The treatments consisted of four levels of N fertilizers (without-N, 57.50 kg/ha N, 86.25 kg/ha N, and 115.00 kg/ha N) and three tillage systems (conventional tillage, no-tillage with standing ratoon, and no-tillage with dropped ratoon). Plant height and tillering number were analyzed with ANOVA and means difference with LSD by $\alpha$=0.05. The components of yield were analyzed with the backward elimination procedure of regression, whereas rice of yield with regression. The result showed that interaction effect between N fertilizers and tillage system had not influence on all variable observed. Nitrogen fertilizers 115.00 kg/ha did not have significant different with 86.25 kg/ha on plant height and tillering number. Tillage system was significant on plant height and tillering number. Components of yield were not occurred on yield of rice at level without-N; at 57.50 kg/ha N was spikelet number per panicle, 86.25 kg/ha N was length of panicle and percentage of filled spikelet; and 115.00 kg/ha N was panicle number per plant and length of panicle. Nitrogen fertilizers in various tillage systems had not yet achieve the optimum.

0246 KASIM, N.

**Penggunaan N-15 bagi penentuan sumbangan N-pupuk hijau kepada tanaman jagung. The use of N-15 to determine contribution of green manure N on corn**/Kasim, N.; Halim, S. (Universitas Hasanuddin, Ujung Pandang (Indonesia). Fakultas Pertanian); Sisworo, E.L. 4 tables; 8 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 85-89.

ZEA MAYS; GLIRICIDIA SEPIUM; LEUCAENA LEUCOCEPHALA; NITROGEN FERTILIZERS; NUTRIENT UPTAKE.

Telah dilakukan satu percobaan pot untuk menguji pengaruh pupuk hijau berasal dari *Gliricidia sepium* dan *Leucaena leucocephala* terhadap tanaman jagung. Tanaman jagung dipanen pada saat berumur 42 hari. Parameter yang diamati antara lain adalah, bobot kering, serapan N-total, sumbangan N-berasal dari pupuk hijau, dan efisiensi penggunaan N-pupuk hijau pada tanaman jagung. $^{15}N$ digunakan untuk menentukan sumbangan dan efisiensi N-pupuk hijau. Hasil percobaan yang dapat dikemukakan antara lain adalah, bahwa pupuk hijau dapat meningkatkan bobot kering tanaman jagung di atas tanaman kontrol dan yang diberi urea. Hasil yang disebut terakhir ini terutama diduga disebabkan N-hijau yang diaplikasi jauh lebih tinggi dari pada N-urea. Serapan N-total tanaman sejalan dengan bobot kering. Sumbangan N-pupuk hijau dan urea kepada tanaman jagung berturut-turut berkisar sekitar 50% dan 40%. Nilai efisiensi N-urea memperlihatkan hasil yang lebih tinggi daripada efisiensi N-pupuk hijau. Hal ini terutama disebabkan takaran N-urea jauh lebih rendah daripada N-pupuk hijau.

0247 KASNO, A.

**Pengaruh pupuk nitrogen dan bahan organik terhadap daya pelepasan nitrogen tanah sawah di Jawa. Influence of nitrogen and organic matter fertilizer on release power of nitrogen at wetland in Java (Indonesia)**/Kasno, A.; Suparto; Nurjaya; Adhi, I P.G.W. (Pusat Penelitian Tanah dan Agroklimat, Bogor (Indonesia)). 2 ill., 5 tables; 9 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 139-148.

ORYZA SATIVA; NITROGEN FERTILIZERS; ORGANIC MATTER; LOSSES FROM SOIL; NUTRITIONAL LOSSES; YIELDS; RICE FIELDS; JAVA.

The experiment was conducted in the laboratory of CSAR from February to March 1994 by using soil samples which were taken from integrated nutrient management experiment. Five grams air dried soil sample was put into reaction bottles. Each bottle was treated with or without N fertilizer solution, $Ca(H_2PO_4)_2$ and organic matter accordingly depending on the treatment combinations. Each treatment was repeated twice. The bottles were then incubated for 2 weeks at $26^0$ C and 2 weeks at the room temperature. $NH_4$-N was carried out for analysing every treatment. The results showed that: (1) release of nitrogen from Urea fertilizer in Ngawi smaller than calculated N, (2) Urea fertilizer on Sujung soil could be increased the N release like calculated N, and it was higher than the calculated N in Pekalongan, (3) organic matter application could increase the power of the soil N, (4) it was a positive correlation between nitrogen in the soil and nitrogen released and the dry weight of rice yield.

0248 MARTOYO, K.

**Penggunaan P-32 bagi penentuan efisiensi P-pupuk pada kelapa sawit . The use of P-32 to determine P-fertilizer efficiency on oil palm**/Martoyo, K.; Fadli, L; Poeloengan, Z. (Pusat Penelitian Kelapa Sawit, Medan (Indonesia)); Siswoyo E.L.; Rasjid, H. 7 tables; 6 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation

Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 69-74.

ELAEIS GUINEENSIS; SUPERPHOSPHATE; APPLICATION METHODS; EFFICIENCY; NUTRIENT UPTAKE.

Suatu percobaan lapang telah dilakukan di Kebun Percobaan Pusat Penelitian Kelapa Sawit, Aek Pancur, Medan, menggunakan kelapa sawit berumur sekitar 9 tahun. Tujuan percobaan adalah untuk menentukan efisiensi penggunaan P-SP-36 yang ditempatkan pada jarak 1,5 m dan 2,5 m dari batang tanaman kelapa sawit. Untuk menentukan efisiensi penggunaan P-SP-36 digunakan 32P-TSP. Hasil yang diperoleh antara lain menunjukkan bahwa efisiensi penggunaan P-SP-36 adalah lebih tinggi pada penempatan P-SP-36 di 1,5 m dibandingkan 2,5 m dari batang. Meningkatnya takaran SP-36 dari 0,75 sampai 2,25 kg per pohon menurunkan efisiensi penggunaan SP-36 baik bila diletakkan pada jarak 1,5 m maupun pada jarak 2,5 m dari batang.

0249 MITROSUHARDJO, M.M.
**Pengaruh penambahan unsur mikro Zn pada pemupukan padi sawah dengan TSP terhadap serapan pupuk P dan produksi. The effect of micro element Zn addition in rice fertilized with TSP on P fertilizer uptake and its production**/Mitrosuhardjo, M.M.; Syaukat, S.H.; Wemay, J.; Rasjid, H. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 3 tables; 6 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 31-34.

ORYZA SATIVA; ZINC; SUPERPHOSPHATE; NUTRIENT UPTAKE; YIELDS.

Telah dilakukan penelitian untuk mengetahui pengaruh pemberian Zn bertaraf yang diberikan bersama dengan pemberian pupuk P dalam budidaya padi sawah. Penelitian ini menggunakan percobaan pot di rumah kaca Pusat Aplikasi Isotop dan Radiasi, Jakarta. Tanah yang digunakan diambil dari areal persawahan Mandapa Kabupaten Majalengka dan Pontang Kabupaten Serang. Pupuk TSP $^{32}P$ digunakan dalam penelitian ini. Hasil percobaan menyatakan bahwa penambahan $ZnSO_4$ $7H_2O$ dengan takaran 0,5% dari takaran TSP yang diberikan dapat meningkatkan produksi dan serapan P total yang terakumulasi dalam gabah dan tanaman, akan tetapi serapan P berasal dari pupuk TSP tidak jelas meningkat. Tanah Mandapa ternyata lebih respon terhadap pemberian Zn daripada tanah Pontang.

0250 MULYADI.
**Pengaruh pemberian bahan organik, pupuk K dan pupuk sumber P terhadap peningkatan produktivitas Ultisol di Lampung. The effect of organic matter, K fertilizer and different source of P on increasing Ultisol productivity in Lampung (Indonesia)/**Mulyadi (Instalasi Penelitian dan Pengkajian Teknologi Pertanian, Yogyakarta (Indonesia)); Purnomo, J. 5 ill., 4 tables; 13 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 149-156.

ZEA MAYS; ORGANIC MATTER; POTASH FERTILIZERS; PHOSPHATE FERTILIZERS; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; CROP PERFORMANCE; YIELDS; ACRISOLS; SUMATRA.

In Indonesia, upland area with slope less than 8% is about 48.5 million ha. Almost 16.2 million ha is dominated by Ultisol and Oxisol. These soils are acid and low productivity. To increase the productivity on application of organic matter, K fertilizer and source of P has been studied by using Split Plot Design with 3 replications. The main plot was four addition of organic matter and K fertilizer: (A) without organic matter and K (B) without organic matter with K (C) with organic matter without K and (D) with organic matter and K. Source of organic matter was biomass of alang-alang and source of K was KCl. The sub plot was four different P sources: (1) TSP, (2) Ciamis Rock Phosphate (RP), (3) NC RP and (4) Christmas RP and (5) Without P. A corn variety Arjuna has been used as a crop indicator. The result showed that at depth of 0-20 cm, the soil characteristic is as followed: texture is sandy clay loam, low pH, P, K and organic matter content, but high Al saturation. Among those constraints, P content was critical factor for plant growth. Application of 60 kg P/ha increased seed corn yield about 14 to 17 folds better than without P treatment. Rock Phosphate with high soluble P in mineral acid (TSP and Ciamis RP) was better in increasing crop yield than Rock Phosphate with low soluble in mineral acid. RP Ciamis and TSP addition did not show significant different in improving corn yield. At the rate of 60 kg P/ha, the application of 5 t/ha organic matter and 200 kg KCl/ha did not increase.

0251 MULYADI.

**Peningkatan produktivitas tanah ultisol melalui pemberian jerami dan pupuk kalium di Jambi. Increasing ultisol productivity by rice straw and K fertilizer addition in Jambi (Indonesia)**/Mulyadi (Instalasi Penelitian dan Pengkajian Teknologi Pertanian Yogyakarta (Indonesia)); Purnomo, J.; Sukristiyonubowo. 2 ill., 2 tables; 14 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 157-162.

GLYCINE MAX; POTASH FERTILIZERS; RICE STRAW; ACRISOLS; SOIL FERTILITY; CHEMICOPHYSICAL PROPERTIES; YIELDS; SUMATRA.

Experiment was conducted on Ultisol at transmigration area of Kubang Ujo, Jambi within 2 seasons. The study aims to evaluate the proper rate of straw and KCl fertilizer to sustain the soil and crop productivities. The research used Factorial Randomized Complete Block Design with three replications. The first factor was three levels of straw application: 0, 5 and 10 t straw/ha, respectively. The second factor was 5 levels of KCl: 0, 20, 60, 80 and 160 kg/ha, respectively. As basal fertilizer was 100 kg urea/ha, 200 kg TSP/ha, and 2 ton lime/ha. Soybean (variety Wilis) was used as an indicator crop. The result showed that the soil management without addition of organic matter and K fertilizer decreased organic matter, K content and soybean yield. Application of straw 5 to 10 t/ha could maintain organic matter, availability of K content and minimize of K fertilizer demand. Fertilization of potassium was needed if exchangeable K content in the soil was 0.20 me/100 g soil. To achieve and sustain the high soybean yield, at least 5 t/ha organic matter and 80 kg KCl/ha were added.

0252 NASRUN D.

**Perkembangan infeksi penyakit antraknosa dan hasil tanaman cabai pada beberapa jenis mulsa dengan tiga takaran kalium. The infection development of anthracnose disease and yield of chillies on some mulches at three potassium rates**/Nasrun D.; Wahab, R. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 7 tables; 9 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 34-39.

CAPSICUM; ANTHRACNOSIS; POTASH FERTILIZERS; MULCHES; INFECTION; YIELDS.

Anthracnose disease is one of the most important diseases on decrease of chillies yield, especially in rainy season. In the integrated pest management, a disease can be controlled through some methods where cultural practice is one of the most important things. To determine the effects of mulches at three potassium levels to anthracnose disease infection and yield of chillies, an experiment was carried out at Sukarami Experimental Station on planting season 1996. This trial used Split Plot Design with three

replications. In the experiment three potassium rates was tested (0, 200, 400 kg KCl/ha) as the main plot and mulches (rice straw, rice pedicle, alang-alang (*Imperata cylindrica*) leaves, without mulch) as the sub plot. The results showed that all treatments with mulch application gave the better effect on reducing anthracnose infection and also gave the higher yield than those of without mulch, while alang-alang leaves mulch application determined the lowest anthracnose infection and the highest yield of chillies. Meanwhile, the more potassium rate applicaton generally had the lower anthracnose infection and gave the higher yield of chillies.

0253 NELVIA.

**Pemupukan fosfat alam dan ameliorasi pada tanah gambut dan serapan P, K, Ca dan Mg oleh tanaman jagung. Rock phosphate fertilization and amelioration in peat soil and P, K, Ca and Mg uptake by corn**/Nelvia (Universitas Riau, Pekanbaru (Indonesia). Fakultas Pertanian). 4 tables; 13 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 132-138.

ZEA MAYS; ROCK PHOSPHATE; SOIL AMENDMENTS; PEAT SOILS; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES; NUTRIENT UPTAKE; CROP PERFORMANCE; GROWTH.

The low productivity of peat soil is highly correlated with high acidity and cation exchange capacity but low in base saturation, and low in nutrients contents. Those conditions do not contribute the growth environment, rate and availability of plant requirement. In the soil acidity, the P element has a great role in the increasing of plant growth and yield. The growth of plant is suffer, stunt, chlorotic and fail in forming grain. Based on these explanations, this research was done with aim to increase the productivity of peat soil by increasing the available P, K, Ca and Mg with addition of phosphate rock and amelioration for maize. This research was done in the green-house and the laboratory of Soil Science Department of the Faculty Agriculture of UGM, Yogyakarta. This experiment used peat soil of Rengat of Riau province from 0 to 30 cm. It was used Split Plot Design and three replications, without ameliorant, lime, oil palm bunch ash and volcanic ash as main plot. Ameliorant were added at the rate of 10 and 20 ton/ha. The rock phosphate consisted of 0, 100, 200 and 300 kg $P_2O_5$/ha as the sub plot. The Urea and KCl were given as basic fertilizers and the dosage of each was 300 kg/ha and 175 kg/ha. The result showed that the oil palm bunch ash could increase P and K uptake by shoot and P, K and Mg by root, and growth of plant. Volcanic ash increased Ca uptake by shoot and root, Mg by shoot and growth of plant. The highest growth (dry weight of shoots and roots) was found on 10 ton/ha oil palm bunch ash without phosphate rock. The addition of 20 ton/ha of oil palm bunch ash and volcanic ash of 10 and 20 ton/ha must be followed by the addition of 200 to 300 kg $P_2O_5$/ha of rock phosphate in order to find the best growth of plant and the highest nutrient uptake.

0254 PUJIHARTI, Y.

**Pengaruh pupuk organik dan dosis pupuk anorganik terhadap pertumbuhan dan produksi buncis. The influence of organic fertilizer and dosage of anorganic fertilizer on the growth and yield of bean**/Pujiharti, Y.; Rumbaina, D.; Hasanah (Loka Pengkajian Teknologi Pertanian Natar, Lampung (Indonesia)). 3 tables; 9 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 256-260.

PHASEOLUS VULGARIS; ORGANIC FERTILIZERS; FERTILIZERS; DOSAGE; SOIL TESTING; GROWTH; YIELDS.

The influence of organic fertilizer and dosage of anorganic fertilizer on the growth and yield of bean was studied at Natar Assessment Station for Agriculture Technology from March 1997 to June 1997. The experiment was designed as a Randomized Block Arranged factorially in two replications. The factors tested were organic fertilizer (four levels) and dosage of anorganic (four levels). Organic fertilizer consisted of without organic fertilizer (control), cassava cake (solid waste of tapioca), stable manure, and liquid organic fertilizer; while dosage of anorganic fertilizer i.e. without anorganic fertilizer (control), 47.5 kg urea + 125 kg SP-36 + 39 kg KCl/ha, 69.75 urea + 187.5 SP-36 + 58.5 kg KCl/ha, 95 kg urea + 250 kg SP-36 + 78 KCl/ha. The result indicated that organic fertilizer has an effect on the length of plant and yield of bean. The longest plant and the highest yield were shown by treatment of stable manure. Dosage of anorganic fertilizer has an effect on the growth and yield of bean. Fertilizer dosage 47.5 kg urea + 125 kg SP-36 + 39 kg KCl/ha did not give significant different on the growth and yield of bean comparing to high dosage of fertilizer treatment, but gave significant different to control.

0255 RAHARDJO, M.

**Pertumbuhan bibit jahe asal kultur jaringan dengan pemberian pupuk kandang. [Growth of ginger seedling from tissue culture fertilized by farmyard manure]**/Rahardjo, M.; Hobir; Fathan, R. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 table; 11 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 158-161.

ZINGIBER OFFICINALE; TISSUE CULTURE; FERTILIZER APPLICATION; GROWTH; FARMYARD MANURE; SEEDLINGS.

Kebutuhan bibit jahe 2-3 ton/ha dan serangan penyakit layu bakteri merupakan sebagian masalah budidaya jahe. Untuk mengatasinya dilakukan penelitian penggunaan rimpang bibit asal kultur jaringan dan pemberian pupuk kandang dalam pot di Instalasi Percobaan Cimanggu pada MT 1996. Digunakan 20 kg tanah jenis Latosol/pot. Percobaan menggunakan Rancangan Acak Lengkap yang disusun faktorial tiga ulangan. Faktor pertama rimpang bibit satu ruas dan dua ruas asal kultur jaringan, faktor kedua dosis pupuk kandang yaitu 0,0; 0,25; 0,50 dan 0,75 kg/pot. Pupuk kandang sesuai perlakuan ditambah 30 g kapur pertanian/pot diberikan sebelum tanam, pada waktu tanam diberi pupuk TSP dan KCl masing-masing 7,5 dan 10 g/pot, setelah tanaman berumur 4 dan 8 minggu setelah tanam (MST) dipupuk Urea masing-masing 15 dan 7,5 g/pot. Hasil penelitian menunjukkan bahwa pemberian pupuk kandang dapat meningkatkan tinggi tanaman, jumlah anakan, dan bobot segar rimpang umur 105 HST, sedangkan penggunaan rimpang 2 ruas dapat meningkatkan jumlah anakan dan kadar karbohidrat rimpang. Bobot rimpang segar tertinggi (225,9 g/rumpun) diperoleh pada perlakuan 0,75 kg/pot pupuk kandang dengan menggunakan bibit dua ruas. Nisbah bobot kering rimpang terhadap bobot kering brangkasan sangat rendah, berkisar 0,15-0,22, disebabkan oleh pertumbuhan tunas batang baru dan akar air lebih pesat dibandingkan pembesaran rimpang.

0256 RAIHAN, S.

**Pengaruh pupuk mikromate dan CaB terhadap pertumbuhan dan hasil padi pada lahan rawa pasang surut. Effect of micromate and CaB fertilizers on growth and yield of rice in tidal swamp**/Raihan, S.; Jumberi, A.; Sjachrani, A. (Balai Penelitian Tanaman Pangan Lahan Rawa, Banjarbaru (Indonesia)). 2 tables; 5 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 189-192.

ORYZA SATIVA; MICRONUTRIENT FERTILIZERS; SWAMP SOILS; INTERTIDAL ENVIRONMENT; YIELD COMPONENTS.

Fertilizer application on rice in generally only macro elements but less attention to the micro elements, so there was no equal nutrients in soil. A field experiment to study the effect of micromate and CaB on

growth and yield of rice was conducted in Palingkau, Central Kalimantan at wet season 1996/97. Treatment were arranged Randomized Block Design with four replications, i.e: (1) NPK (90-90-60), (2) NPK (90-90-60) + micromate 20 kg/ha (3) NPK (90-90-60) + CaB 2 ml/l water, and (4) NPK (90-90-60) + micromate 20 kg/ha + CaB 2 ml/l water. Rice variety planted was IR-64. Micromate and based fertilizers were applicated together. CaB applicated by spraying on leaf at four weeks after planting, primordia stage and pollination stage. Results of these experiments revealed that micromate, CaB and combination of both had no significant effect to the growth and yield, but increased grain number and decreased empty grain, so that it could increase rice yield up to 15.2%; 21.5% and 21.5% respectively than the control.

0257 RAIHAN, S.

**Peningkatan produksi jagung melalui pemupukan di lahan lebak. Increasing maize productivity by fertilizer in swamp area**/Raihan, S.; Hairunsyah; Yulia R. (Balai Penelitian Tanaman Pangan Lahan Rawa, Banjarbaru (Indonesia)). 6 tables; 14 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 184-188.

ZEA MAYS; PHOSPHATE FERTILIZERS; POTASH FERTILIZERS; SOIL FERTILITY; GROWTH; PRODUCTIVITY; SWAMPS.

Swamp area is one of maize production centre in South Kalimantan Province. Presently, the average maize yield in South Kalimantan is still low, mainly due to using of local maize variety and scarcity of fertilization. If maize productivity could be increased, the support to the total production of South Kalimantan will also increase. The improved cultural practices had an opportunity to increase maize yield from 1-2 t/ha to 4-5 t/ha dry grain. Soil profile in swamp area were dominated by organic matters and alluvial clay. Tabat location that was nutrient deficiency of N, P and K and was lower fertility comparing with pulau Damar location, showed that phosphorus and potassium applications were not significant to increase growth and yield of maize in swamp area. Optimum yield was gained when fertilizer application 30 kg $P_2O_5$/ha and 25 kg $K_2O$/ha.

0258 RASJID, H.

**Penggunaan isotop 15N bagi penentuan N-berasal dari pemupukan urea coated pada padi sawah. The use of isotope 15N to determine N-derived from urea coated fertilizer in low land rice**/Rasjid, H.; Sisworo, E.L.; Sisworo, W.H. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 5 tables; 5 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 63-67.

ORYZA SATIVA; UREA; NITROGEN CONTENT; NUTRIENT UPTAKE.

Telah dilaksanakan satu percobaan lapang, yang mencobakan aplikasi urea coated pada padi sawah. Dalam percobaan ini digunakan pupuk AS $^{15}N$ untuk menentukan efisiensi pupuk-N yang digunakan. Hasil percobaan yang patut dikemukakan antara lain adalah bahwa, urea coated dapat menghasilkan rata-rata bobot kering gabah dan jerami berturut-turut 1,4 dan 1,0 ton di atas bobot kering kontrol. Sedangkan bila dibandingkan dengan urea tablet bobot kering gabah dan jerami ini tidak berbeda, namun hasil bobot kering ini umumnya sedikit lebih tinggi daripada tanaman kontrol. Untuk nilai efisiensi penggunaan N-pupuk terlihat bahwa urea coated memberikan nilai yang lebih tinggi daripada urea tablet, terutama untuk takaran 60 kg N/ha.

0259 RUSDI, N.

**Potensi inokulum cendawan mikoriza arbuskular pada lahan budidaya ubi kayu dengan aplikasi limbah cair fermentasi ethanol. Role of arbuscular mycorrhizal fungi in cassava field treated with waste water of ethanol fermentation**/Rusdi, N.; Junaedi; Suryadi, M.D.; Eko, T.A. (Badan Pengkajian dan Penerapan Teknologi, Bandar Lampung (Indonesia)). 2 tables; 10 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 224-227.

MANIHOT ESCULENTA; VESICULAR ARBUSCULAR MYCORRHIZAE; WASTE WATER; WASTE UTILIZATION; ETHANOL; FERMENTATION; CHEMICAL COMPOSITION; YIELDS.

Ethanol fermentation factory waste water contains some nutrient such as Nitrogen and Fosfor which is prospective as fertilizers. The objective of the experiment was to observe the effect of the waste water application on spore density and inoculum potential of Arbuscule Mycorrhizal fungi in cassava field. The experiment was arranged in a Randomized Complete Block Design, consisted of 6 treatments and 3 replicates with the waste water dosage: S0 = 0 litre/ha, S1 = 2.500 litres/ha, S2 = 5000 litres/ha, S3 = 7.500 litres/ha, S4 = 10.000 litres/ha and S5 = 15.000 litres/ha. Data were analysed with anova and F-DMRT at 0.05 and 0.01 level significance. Inoculum potential of AM fungi was measured according to the most probable number method of Daniels and Skipper (1982). To facilitate the measurement, the root of the indicator plant were stained according to clearing and staining method of Kormanik and McGraw (1982). It was revealed that waste water application to soil of cassava plantation had only affected the inoculum potential at the level of more than 10.000 litres waste water/ha. The suitable waste water dosage for inoculum potential of Arbuscule Mycorrhizal is 2.500 litres/ha.

0260 SAHAR, A.

**Pengaruh sumber dan takaran pupuk P terhadap pertumbuhan dan hasil padi sawah tanam benih langsung. The effect of sources and dosages of P fertilizer on growth and yield of direct seeding lowland rice**/Sahar, A.; Adrizal (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 2 tables; 11 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 17-20.

ORYZA SATIVA; PHOSPHATE FERTILIZERS; DIRECT SOWING; GROWTH; YIELDS.

A field experiment was conducted at farmer's field in Koto Tangah Padang Municipality, during wet season 1997/98 (December 1997 - March 1998) to determine the effect of sources and dosages of P fertilizer on growth and yield of direct seeding lowland rice. Three P fertilizer sources (SP-36, SS, and NPK) as the main plot, and dosages (50, 100, and 150 kg/ha) as the sub plot were arranged in Split Plot Design with there replications. The result showed that SS as the source of P fertilizer increased grain number per panicle and yield. Application of 50 up to 150 kg/ha P fertilizer dosages is not significant to growth, yield component, and yield of direct seeding lowland rice.

0261 SLAMETO.

**Pengaruh pemberian pupuk organik terhadap ketersediaan beberapa unsur hara tanah pada usaha tani jagung. The effect of organic manure for soil nutrient availability on corn farming**/Slameto (Loka Pengkajian Teknologi Pertanian Natar, Lampung (Indonesia)). 3 tables; 10 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 173-177.

ZEA MAYS; ORGANIC FERTILIZERS; NUTRIENT AVAILABILITY; SOIL CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELDS; REGOSOLS.

The research aimed to reveal the effect of organic manure for alteration of physical and chemical soil characteristic, soil nutrient availability and growth of corn. It was carried out at Karanganyar, Central Java on regosol soil. The research designed by Randomized Complete Block with four treatments of organic manure with dosages of 0 ton/ha (BO); 10 ton/ha (B1); 20 ton/ha (B2) and 30 ton/ha (B3). Variety of corn was Arjuna. Some parameters observation were growth of corn planting, physical, and chemical characteristic of soil. The result showed, organic manure was significantly to physical characteristic of soil (moisture, bulk density, porosity, soil organic matter, actual alkalinity, potential alkalinity); for soil element availability (phosphorus availability, potassium availability); and for growth of corn (the height of plant, the weight dry, length of ear corn, diameters ear of corn, weight of 1,000 corn seeds). By 20 ton/ha dosages of organic manure gave the highest yield for height of plant (212.822 cm); weight fresh of plant (291.89 gr); weight dry of plant (71.882 gr); lenght ear of corn (16.104); diameter ear of corn (2.971 cm). Organic manure by 30 tons/ha dosages gave the highest yield for weight ear of corn (41.608 gr) and weight of 1,000 corn seeds (262.874 gr). The phosphorus availability highest gave organic manure with 20 ton/ha dosages. The potassium availability highest gave organic manure with 30 ton/ha dosages.

0262 SUPRIYO, A.

**Efisiensi pemupukan fosfat atas keragaan hasil kedelai di lahan pasang surut bergambut. Phosphate fertilizer efficiency on soybean yield performance of peaty soil**/Supriyo, A.; Dirgahayuningsih, R. (Balai Penelitian Tanaman Pangan Lahan Rawa, Banjarbaru (Indonesia)). 1 ill., 6 tables; 17 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 261-269.

GLYCINE MAX; PHOSPHATE FERTILIZERS; EFFICIENCY; RESIDUES; INTERTIDAL ENVIRONMENT; SOIL CHEMICOPHYSICAL PROPERTIES; PEAT SOILS; ROOT NODULES; GROWTH; YIELDS.

The dominant soil type in tidal swamps area is peat/peaty soils which was extent up to 18 millions ha. Soybean development in tidal swamps area mainly on C, D type. One major constraint was the high degree of soil acidity which was resulted in high P nutrient fixation so that caused low productivity. Distribution of kind and content of phosphate fertilizer, also continuation of its usages caused a high cost of production. Therefore, it is needed to study on kind and dosages of P application to find an efficient technology of P application. Research on residual effect of P fertilizer was conducted to study sources and dosages of P application on soybean yield performance in peaty land. Experiment site is Suryakanta village, Batola regency during three seasons from 1995 WS to 1996 WS. Factorial experiment was arranged in RCBD with three replications. The first factor (three phosphate sources) i.e TSP, SP-36 and Rock Phosphate (RP). Second factor (four levels of P dosage i.e 45; 90; 135 and 180 kg $P_2O_5$/ha. P fertilizers apply one time before planting, and basal fertilizer are 30 kg N + 50 kg $K_2O$/ha for each season. Research result showed that residual effects of P fertilizer to increase shoot dry weight, nodule fresh weight, total P-plant content, until to second season, source of P (RP and SP-36) better than TSP, could increase pod filling numbers, this supported by the highest of soil P-available (avl) content and nodule fresh weight. Decrease of soil P-avl of RP and SP-36 more stable until third season compared to TSP, so that status of soils P-avl decrease under critical levels (<5 ppm P). RAE of Rock Phosphate (RP) increased 3-7 times compared to TSP in third season. Nevertheless, in the first season RAE value of RP and SP-36 less than TSP at 45 kg $P_2O_5$/ha levels, but the residual effects of P fertilizer during two seasons (MK 1995-MH 1996/97) RAE of RP higher than SP-36, with value ranges 132-375 and 125-167 respectively.

0263 SUYONO, A.D.

**Pengaruh kombinasi bentuk dan takaran pupuk majemuk NPK tablet terhadap beberapa sifat kimia tanah, pertumbuhan dan hasil rotasi padi-kacang jogo-jagung pada ultisols Jatinangor. The**

**effect of tableted NPK fertilizer dosage and form combination to some soil chemical properties, growth and yield of rotation planting of upland rice-kidney bean-corn on ultisols Jatinangor [West Java, Indonesia]**/Suyono, A.D. [et al.] (Universitas Padjadjaran, Bandung (Indonesia). Fakultas Pertanian). 7 tables; 8 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 275-282.

ORYZA SATIVA; ZEA MAYS; PHASEOLUS VULGARIS; ROTATIONAL CROPPING; NPK FERTILIZERS; DOSAGE; FERTILIZER APPLICATION; SOIL CHEMICOPHYSICAL PROPERTIES; ACRISOLS; GROWTH; YIELDS; JAVA.

The experiment of tableted NPK fertilizer on rotation planting of upland rice-kidney bean-corn on Ultisols Jatinangor was carried out from January 1996 until February 1997. This experiment aimed to study the effect of combination of dosage and form of tableted NPK fertilizer to some soil chemical properties, growth and yield of rotation planting of upland rice-kidney bean-corn on Ultisol Jatinangor. Beside that, this experiment also wanted to reveal the best form and dosage combination for increasing yield of rotation planting. The design used were Randomized Block Design consisted of 6 combinations of form and dosage of tableted NPK fertilizer, with 5 replications. The levels of tableted NPK fertilizer were 100%, 86%, 80%, 65%, 50% and 35% of recommended dosage for each plants. The result of the experiment showed that: (1) The combination of form and dosage of tableted NPK fertilizer affected only for available P after upland rice; (2) the combination of form and dosage of tableted NPK fertilizer affected growth of all the test plants; and (3) the combination of form and dosage of tableted NPK fertilizer affected yield of upland rice only, and the best combination is tableted NPK fertilizer and 65% of recommended dosage.

0264 SYAUKAT, S.H.

**Studi pengaruh sumbangan N pangkasan pohon terhadap pertumbuhan tanaman jagung pada tanah latosol. Study on the effect of N contribution derived from pruning on the growth of corn in latosol** /Syaukat, S.H.; Haryanto; Wemay, J.; Rizal, S. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 6 tables; 8 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 41-47.

ZEA MAYS; EUCALYPTUS; LEUCAENA LEUCOCEPHALA; GREEN MANURE; NITROGEN CONTENT; FERRALSOLS.

Telah dilakukan percobaan pot di rumah kaca untuk mendapatkan informasi sumbangan N pangkasan pupuk hijau *Leucaena leucocephala* (Lamtoro) dan pangkasan *Eucalypthus alba* (kayu putih) serta pupuk urea). Rancangan yang digunakan adalah Rancangan Acak Lengkap (RAL) dengan 4 ulangan. Sepuluh perlakuan yang dicobakan yaitu : 1.H1 (100% *Leucaena leucocephala*), 2.H2 (40% *Leucaena leucocephala*), 3.H3 (50% *Leucaena leucocephala* + 50% *Eucalypthus alba*), 4.B1 (100% *Eucalypthus alba*), 5.B2 (50% *Eucalypthus alba*), 6.B3 (50% *Eucalypthus alba* + 50% urea), 7.MI (100% urea), 8.M2 (50% urea), 9.M3 (50% Leucaena + 50% urea), dan 10.Tanpa pupuk (Kontrol). Amonium sulfat $^{15}N$ dengan atom exces 10,27% diaplikasikan pada semua pot digunakan untuk menghitung sumbangan N berasal dari pupuk. Hasil yang diperoleh adalah pemberian pupuk hijau 100% *Leucaena leucocephala* setara denngan takaran 160 kg N/ha menyebabkan bobot kering batang, akar dan tanaman jagung yang lebih baik dari pada perlakuan setengahnya atau dengan dicampur dengan pupuk buatan. Pemberian pupuk buatan dicampur dengan pupuk hijau *Leucaena leucocephala* menghasilkan kadar N-total yang lebih baik dari pada perlakuan yang lain. Pemupukan berpengaruh juga kepada kadar N-bdp (N-berasal dari pupuk) dan kadar N-bds (N-berasal dari tanah) pada jagung, yang menyatakan bahwa umumnya tanaman dapat

memanfaatkan N berasal dari pupuk hijau dan urea. Hal lain yang perlu dikemukakan bahwa pengaruh urea dengan takaran 50% ditambah 50% *Leucaena leucocephala* dapat meningkatkan nilai A-tanah (AN-tanah) lebih tinggi dua kali lipat bila dibandingkan dengan kontrol.

0265 YUSNAINI, S.

**Pengaruh olah tanah konservasi jangka panjang dan residu pupuk N terhadap keberadaan rhizobium dan produksi kedelai pada Ultisol Hajimena. Long term conservation tillage and residual N fertilizer effects on rhizobium and yield of soybean in Ultisols Hajimena**/Yusnaini, S.; Niswati, A.; Utomo, M.; Arif, M.A.S.; Subroto, D.N. (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian). 5 tables; 6 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 287-291.

GLYCINE MAX; CONSERVATION TILLAGE; NITROGEN FERTILIZERS; RESIDUES; RHIZOBIUM; YIELDS; ACRISOLS; ROOT NODULES; SOIL CHEMICOPHYSICAL PROPERTIES.

Long-term field experiment had been started in February 1987 on a clay loam soil (Udults) at the POLITANI Field in Hajimena, South Lampung. The plot size was 4 x 6 square meter with 4 replications. The treatments were arranged in a Complete Randomized Block Design with 3 x 3 factorial (tillage systems, i.e. intensive tillage, minimum, no-tillage and residual N fertilizers) were applied at 0, 100, 200 kg/ha. The longterm conservation tillage used a cereal-legume rotation system and replouging in the 17$^{th}$ season. Soil samples were collected in March 1997 (1 week before planting). N uptake, effective root nodule at maximum growth and soybean production were measured at harvest time. Soil rhizobium was determined by dilution method. Statistical analysis for data was by ANOVA and LSD test at 0.05. The results showed that there was no interaction between soil tillage and N residual fertilizer on number of rhizobia before planting, effective root nodule, N uptake, dry matter weight and soybean yield. The number of rhizobia in soil conservation tillage (minimum and no-tillage) was the same as that of intensive tillage, but the yield of soybean was higher in intensive tillage than that of conservation tillage. Residual N fertilizer did not affect the number of rhizobia in soils, N uptake, dry matter weight, and yield of soybean.

0266 ZUBAIDAH, Y.

**Tanggap tanaman bawang merah (*Allium ascalonicum* L.) terhadap pupuk kandang dan pupuk nitrogen. Response of shallot to farmyard manure and nitrogen fertilizer**/Zubaidah, Y.; Kari, Z. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 2 ill., 2 tables; 11 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 25-29.

ALLIUM ASCALONICUM; NITROGEN FERTILIZERS; FARMYARD MANURE; SOIL CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELDS.

Study on the response of shallot to farmyard manure and nitrogen fertilizer was carried out in green house of BPTP Sukarami from August to November 1996, planted on Andosol soil (928 m asl). A factorial RCBD with three replications was used in this study. The first factor consisted of farmyard manure dosages (0, 10, 20 and 30 t/ha). The second factor is nitrogen fertilizer dosages (100, 200, 300, 400 and 500 kg N/ha). This research aimed to study the influence of farmyard manure and nitrogen fertilizer addition to shallot yields. The result showed that shallot is responsive to farmyard manure added. The addition of 30 t/ha farmyard manure is in linear function to all parameters. The highest interaction was the utilization of 30 t farmyard manure/ha + 300 kg N/ha, but there was no significant differences with those added with 100, 200, 400 and 500 kg N/ha. The highest yield was achieved in interaction of 30 t farmyard manure/ha + 300 kg N/ha with 81.61 g dry weight/plant.

0267 ZUBAIR, A.

**Pengaruh sumber pupuk P (TSP dan fosfat alam) dan jerami padi terhadap pertumbuhan dan hasil padi gogo rancah, pada sistem tanpa olah tanah. The effect of P fertilizer source (TSP and natural**

**phosphates) and rice straw on growth and yield of gogo rancah rice in zero tillage system**/Zubair, A.; Wayan, S.A.; Agusni (Loka Pengkajian Teknologi Pertanian Natar, Lampung (Indonesia)). 3 tables; 4 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 228-231.

UPLAND RICE; PHOSPHATE FERTILIZERS; RICE STRAW; ZERO TILLAGE; SOIL CHEMICOPHYSICAL PROPERTIES; GROWTH; YIELDS.

The research was carried out at Taman Bogo Experimental Station, Central Lampung during the wet season (1995/96) on Red Yellow Podzolic soil. The study aimed to gain technological components of P fertilizer management and organic matters for red yellow podzolic area. The experiments used Randomized Block Design with three replications. Treatments were a combination of urea fertilizing, sugar cane waste, KCl, TSP or natural phosphate with or without rice straw. The result showed that optimum using of P fertilizer, beside increasing rice straw it influenced obviously all parameter plants which were studied. The highest yield gained from experiment of using 50 kg TSP/ha + 100 kg natural phosphate plus 5 ton rice straw, that was 4.61 ton/ha, eventhough did not show significant difference to the one using 200 kg natural phosphate/ha + 5 ton rice straw and the other that fertilized with 50 kg TSP/ha + 200 kg Ca + 5 ton rice straw/ha which yielded each 4.32 ton/ha and 4.42 ton/ha.

## F08 POLA TANAM DAN SISTEM PENANAMAN

0268 KARI, Z.
**Pengkajian pola tanam pada pengembangan lahan sawah irigasi bukaan baru. Assessment of cropping pattern on development of newly opened lowland irrigated rice area**/Kari, Z.; Dahono; Lamid, Z. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 2 tables; 4 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 14-16.

ORYZA SATIVA; FOOD CROPS; EXTENSIFICATION; CROP MANAGEMENT; COST BENEFIT ANALYSIS.

Assessment of cropping pattern on development of newly opened lowland irrigated rice area. A field experiment was conducted at farmer's field in Mantaro Giri Sako Indragiri Hulu Riau during planting season 1994/95, to determine an alternative technology package of cropping systems under lowland rice area which newly developed irrigation systems. Four cropping patterns (farmings technology, improved farmers technology, rice-soybean and rice-maize) were arranged in Strip Block Design and replicated five times. Result showed that appropriate cropping pattern for newly developed irrigation on lowland rice areas, was rice-soybean cropping pattern. It gained net income of Rp 291,400/ha, while the farmer's cropping pattern (once rice a year), lost about Rp 428,000/ha. However, improved farmer's technology or rice-maize cropping pattern did not improve income under existing condition.

## F30 GENETIKA DAN PEMULIAAN TANAMAN

0269 AWUY, E.
**Heterosis karakter hasil dan komponen hasil hibrida silang tunggal dan silang tiga tanaman kacang hijau. Heterosis of yield and yield component characters of the single cross and three cross hybrids of Mungbean**/Awuy, E.; Sampotan, S.; Kapugu, L.; Kadang, M. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 3 tables; 11 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 148-154.

VIGNA RADIATA RADIATA; VARIETIES; HETEROSIS; HYBRIDIZATION; INBREEDING; CROP PERFORMANCE; YIELD COMPONENTS.

The performance and heterosis of hybrid and inbrid has been investigated on mungbean. The results showed the highest performance were in the hybrid of three cross, followed by the hybrid of single cross, and inbrid. Heterosis of all characters on hybrid Manyar/Betet/Gelatik were positif (17.14% to 14.86%). In the single cross hybrid, the heterosis of the number of flowers ranged from -13.99% to 10.70%, the number of peas ranged from -12.37% to 14.52%, the weight of peas ranged from 6.98% to -13.95%, the number of seed ranged from 12.43% to 15.16%, the weight of seed/shrub ranged from 3.13% to 10.53%, and the weight of 1000 seeds ranged from -13.77% to 3.31%.

0270 BERMAWIE, N.
**Isozyme variation in cultivated and wild Cloves (*Syzygium sp.*)**/Bermawie, N.; Pool, P.A. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 ill., 2 tables; 8 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 709-716.

EUGENIA; CARYOPHYLLUS; CROPS; WILD PLANTS; ISOENZYMES; GENETIC VARIATION; ELECTROPHORESIS.

Electrophoretic procedures for cloves was developed to evaluate genetic variation in cultivated and wild cloves. Five enzyme systems, i.e. Alanine aminopeptidases (AAP), Leucine aminopeptidases (LAP), Malate dehydrogenases (MDH), Phosphoglucose isomerases (PGI), and Phosphoglucose mutases (PGM) were employed using a standard strach gel electrophoresis. The populations examined were the popularly recognized types (Zanzibar, Sikotok, Siputih), the indigenous cultivated cloves from the Moluccas and wild cloves. The interpretation of zymogram revealed eleven loci, seven polymrphic with a total of seventeen alleles were detected at such loci. All seven polymorphic loci exhibited variation in wild cloves, but only two were variable in both the cultivated populations. The mean heterozygosity in the popularly recognized types was low (0.030), it was slightly higher in the indigenous Moluccan populations (0.053) and wild cloves, respectively. While the mean of genetic identity among populations were 0.950 in the popularly recognized types, 0.962 in the indigenous populations and 0.885 in wild cloves. These results indicated that the cultivated cloves outside the Moluccas possessed a narrow genetic base, whereas it was slightly widened when the indigenous population was included. This genetic variation was substantially broadened in the wild cloves.

0271 DARUSMAN, L.K.
**Production of Indol Acetic Acid (IAA) by tropical ectomycorrhizal fungus: *Scleroderma columnare***/Darusman, L.K. (Institut Pertanian Bogor (Indonesia)). 2 ill., 1 table; 11 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 743-748.

DIPTEROCARPACEAE; MYCORRHIZAE; SCLEROSPORA; SYMBIOSIS; IAA; TRYPTOPHAN.

*Scleroderma columnare* had shown a good symbiont for a wide range of species in the Dipterocarp family. One of mechanism of growth improvement which was already tested in the latest study was the hormonal effect. In this research we will focus on the searching the ability of *S. columnare* to systhetise IAA from aromatic amino acid as a precursors through the IAA biochemical pathway of plants. The results of this research showed that *S. columnare* could synthetise IAA from tryptophan as a precursor at the concentration range of 50 μ g - 250 μ g/100 ml culture filtrate. The optimum concentration of tryptophan which determined by IAA concentration and myselial growth, was 50 μ g tryptophan/100 ml. The proposed pathway of IAA in the *S. columnare* was similar with the plant pathway which was recognized by the relationship of tryptophan, IAAld, and IAA concentration.

0272 DJISBAR, A.
**Beberapa metode untuk mendapatkan benih unggul jambu mente dan cara pengelolaannya. [Breeding methods and its management for high yielding cashew]**/Djisbar, A. (Balai Penelitian

Tanaman Rempah dan Obat, Bogor (Indonesia)). 7 ill., 13 ref. Summary (In). Appendices. [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997 : p. 126-137.

ANACARDIUM OCCIDENTALE; BREEDING METHODS; MASS SELECTION.

Dibahas beberapa terobosan metode pemuliaan dan pengelolaan benih unggul jambu mente (*Anacardium occidentale*). Secara umum langkah kegiatan pemuliaan adalah: (a) peningkatan keragaman genetik; (b) evakuasi; (c) seleksi; (d) uji multi lokasi dan (e) penglepasan varietas. Tanaman jambu mente memiliki sifat tahunan, menyerbuk silang dan bisa diperbanyak dengan benih dan vegetatif, serta beberapa sifat lainnya. Empat alternatif metode pemuliaan yaitu: (1) seleksi masa dengan gradisasi tanpa uji turunan; (2) seleksi masa gradisasi klonal dengan uji turunan; (3) seleksi masa generatif dan klonal secara gradisasi dengan uji turunan; (4) seleksi klonal dan generatif fullsib F1 hasil persilangan genotip terpilih dengan uji keturunan. Memilih metode yang akan dilaksanakan berdasarkan ketersediaan waktu dan dana. Untuk tanaman jambu mente karena belum ada varietas yang dilepas, pilihan pertama adalah metode (1), karena biaya lebih rendah dan waktu lebih cepat. Setelah seleksi berjalan satu sampai dua tahun, dilaksanakan metode (2), kalau ini dilaksanakan sekitar dua sampai tiga tahun bisa dilepas varietas yang lebih baik daripada sebelumnya. Dua tahun seleksi (2) berjalan maka seleksi (3) dapat dilaksanakan, setelah itu diseleksi (4) bisa dilakukan sehingga pelepasan varietas bisa berkelanjutan. Hal ini karena pelepasan varietas baru harus lebih baik dari varietas lama. Hal yang lebih penting diperhatikan adalah pembenahan varietas yang telah dilepas sehingga penyaluran benih unggul tersebut sebaik dan seefisien mungkin dan benih unggul tersebut terjamin dalam keasliannya dan ketersediaannya dalam waktu yang dibutuhkan. Untuk tanaman ini perlu ada keterkaitan dengan instansi terkait baik pemerintah maupun swasta, sehingga penyaluran benih jambu mente ini tidak menyalahi peraturan-peraturan yang berlaku.

0273 FATMAWATI.
**Performance of oil palm clones in the field based on ten year observations**/Fatmawati (Pusat Penelitian Kelapa Sawit, Medan (Indonesia)); Pamin, K.; Ginting, G.; Subronto; Muluk, C. 6 tables; 12 ref. Summary (En). Proceedings of the Indonesian biotechnology conference, vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 367-378.

ELAEIS GUINEENSIS; CLONES; AGRONOMIC CHARACTERS; FLOWERING; SELECTION; HIGH YIELDING VARIETIES.

The first oil palm clones produced by IOPRI in 1987 were planted at PTPN IV and PT SIPEF, North Sumatra in 1998. Up to now, 130 different clones covering area of 1,532 ha have already been grown in Aceh, Riau, West Sumatra, Lampung, West Java, West Kalimantan and South Sulawesi. It was found that 5.69% of the flower showed a light to a heavy mantle. The average mantled flower of the clones younger than 6 years was 7.09% while of the older than 6 years was 4.29%. Flowering characteristic of the clones is influenced by the palm age. As the palm gets older, almost all of mantled flowers with a light mantle would recover and develop to a normal fruit. Yield performance of the clones is very promising. Fresh fruit bunch (FFB) yielded in the experimental garden was 10%-20% higher compared to the control cross, whereas in the commercial plantation was 22.5%-40%. Vegetative growth of the clone was uniform than that of seedling. Consumer preference to oil palm clones is quite strong. Some limitation in the clone production system, however, is still existing. As long as an early detection technique on the flowering abnormality is not available yet, the occurrence of mantle flower could only be reduced by a tight culture selection in the laboratory.

0274 HANDAYANI, T.
**Cell line selection of hybrid between *Solanum capsicoides* x *S. khasianum* tolerant to high temperature**/Handayani, T. (Instalasi Penelitian dan Pengkajian Teknologi Pertanian, Jakarta (Indonesia)). 2 tables; 4 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 589-594.

SOLANUM CAPSICOIDES; SOLANUM KHASIANUM; DRUG PLANTS; PROGENY TESTING; HYBRIDIZATION; RESISTANCE TO INJURIOUS FACTORS; TEMPERATURE.

Solasodine is an important steroidal compound that is produced by genus Solanum as a starting material for contracseptives. *Solanum khasianum* is one of the most promising plant producing solasodine. Unfortunately this species is susceptible to heat and drought. Hybrid of *S. capsicoides* x *S. khasianum* was obtained that expected that expected to have tolerance to high temperature. Cell line was selected for heat tolerance of callus derived from hybrid leaf. The selection was carried out using two methods, i.e. direct system: $26^0$ to $30^0$ C, $26^0$ to $35^0$ C, $26^0$ to $40^0$ C, $26^0$ to $45^0$ C, and indirect system: $26^0$ - $30^0$ - $35^0$ - $40^0$ - $45^0$ C. Each system was incubated for a week, except at $45^0$ C the incubation was carried out for 3 days. After treating with both systems, the callus was incubated at $26^0$ C. The callus treated by direct system was still able to form adventitions shoot at $45^0$ C heat treatment. On the other hand, cell line selection using indirect system resulted in the formation of adventitious shoot only up to $40^0$ C.

0275 HARSANTI, L.
**Evaluasi sifat agronomis galur mutan padi arias (*Oryza sativa* L.) pada generasi R3M4 dan R4M5. Evaluation of agronomics characters of arias mutant lines (*Oryza sativa* L.) on R3M4 and R4M5 generation**/Harsanti, L.; Ishak (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 2 tables; 7 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 49-52.

ORYZA SATIVA; AGRONOMIC CHARACTERS; GAMMA IRRADIATION.

Biji padi varietas Arias diiradiasi dengan sinar gamma pada dosis 200Gy. Kalus diinduksi dari embrio padi yang sudah diiradiasi kemudian dikultur secara in-vitro dengan menggunakan media kalus MS (Murashige and Skoog). Pembentukan kalus terjadi pada hari ke-15 kemudian dipindahkan ke media generasi untuk regenerasi pucuk, selanjutnya ditumbuhkan pada media MS bebas hormon sampai terbentuk plantlet. Hasil pengamatan pada generasi R1M2 didapatkan tanaman mempunyai biji berbulu dengan jumlah anakan lebih banyak dari induknya (Var. Arias). Biji padi dari tanaman generasi R1M2 kemudian ditanam dalam bak sawah dan dilakukan seleksi berdasarkan penampilan fenotipenya dan menghasilkan tanaman generasi R2M3. Mutan yang terseleksi kemudian digalurkan untuk diamati semua karakter agronomisnya seperti; tinggi tanaman, jumlah anakan produktif, jumlah biji per malai, jumlah gabah isi dan hampa, panjang daun bendera, dan berat 1000 butir. Hasil pengamatan menunjukkan bahwa tinggi tanaman, panjang malai, panjang daun bendera dari semua galur mutan yang diamati lebih pendek dari var. Arias (kontrol). Pengujian secara statistik menggunakan Beda Nyata Terkecil (BNT) berbeda nyata pada taraf 0,05. Pengamatan terhadap sifat agronomis pada generasi R4M5 sama dengan generasi R3M4, tetapi jumlah gabah hampa pada generasi R4M5 cukup tinggi bila dibandingkan generasi R3M4 oleh karena diserang oleh walang sangit.

0276 IMELDA, M.
**Development of Banana cv. Raja Sere resistant to bunchy top virus through Gamma irradiation**/Imelda, M.; Deswina, P. (Pusat Penelitian dan Pengembangan Biologi, Bogor (Indonesia)); Hendratno. 2 tables; 9 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 455-461.

MUSA (BANANAS); BANANA BUNCHY TOP VIRUS; MERISTEM CULTURE; RADIATION; DISEASE RESISTANCE; ELISA.

Banana Bunchy Top Virus (BBTV) commonly destroys banana plantations. Unfortunately, none of the commercial banana varieties is resistant to the disease. Mutants produced by gamma irradiation on in vitro shoot buds of banana cv. Raja Sere may be endowed with resistance/tolerance to the disease. Shoot buds

of banana cv. Raja Sere were irradiated with gamma rays (1-5 Krad) and proliferated on MS medium with 5 mg/l BAP, rooted on MS medium with 0.5 mg/l NAA and transplanted into soil and compost. The BBTV from infected banana were inoculated into symptomless mutant plants through their vector Pentalonia nigronervosa using a minicage system. The apprearance of mutants was detected through isozyme analysis and resistance against BBTV was evaluated by ELISA test. Among the 283 plantlets evaluated, 111 are BBTV symptomless. Among those symptomless plants, 22 plants were shown by ELISA test to be negative (resistant to BBTV) and 29 positive (tolerant to BBTV) while the rest were killed by other pest/diseases. All the surviving clones are grown in the LIPI germplasm garden at Cibinong and 10 of them have been already produced normal flowers and fruits.

0277 KASLI.
**Genotype selection using in vitro technique for breeding garlic clone adapted to low elevation area**/Kasli; Kasim, M.; Farda, E.; Djafaruddin; Ardi; Suliansyah, I. (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian). 8 tables; 3 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 411-422.

ALLIUM SATIVUM; SELECTION; RESISTANCE TO INJURIOUS FACTORS; IN VITRO CULTURE; CULTURE MEDIA; CALLUS; HIGH YIELDING VARIETIES.

Production improvement of garlic aside through intensification should be done through extensification. Extensification facing two main problems such as the availability of area in low elevation and limitation of genotype for that area. Garlic productivity in marginal land could be improved by using of resistant genotype. Resistant genotype can be made by using in vitro technique. Clone which has been produced through this approach will be permanent and may be regenerated its generation. The objective of this experiment was to produce garlic plantlet which induced selected callus from temperature, Al, and water stresses. The experiment composed of 3 steps: 1)callus induction; 2)stress treatment; 3)callus regeneration through plantlet selection. Medium for regeneration of callus are: 1)Base Medium MS + 1 μM NAA + 2 μM BAP; 2)Base medium MS + 2 μM + 4 μM BAP. Selected plantlet was then acclimatized to produce resistant plantlet. The results of this experiment showed that; 1)The best medium for selected callus regeneration to form plantlet was medium MS + 1 μM NAA + 2 μM BAP; 2)High callus percentage was found in Banjar Sari cultivar (100%). Plantlet formed after 4 times subculturing and 14 weeks period for each cultivar. Plantlet of Lumbu Putih and Jati Barang grown on medium MS + 2 μM BAP + 1 μM NAA with light intensity of 4000 lux and temperature of $18^0$ to $29^0$ C produced micro tubers after 4 to 6 weeks.

0278 PURWATI, R.D.
**Evaluation of Gus reporter gene expression in transformed potatoes with nematode infection**/Purwati, R.D. (Balai Penelitian Tembakau dan Tanaman Serat, Malang (Indonesia)); Sulistyowati, E.; Jones, M.G.K.; Potter, R.H. 1 ill., 1 table; 17 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 497-504.

SOLANUM TUBEROSUM; GENETIC ENGINEERING; MELOIDOGYNE; ROOTS; TISSUE CULTURE; PCR; TRANSGENIC PLANTS; PEST RESISTANCE.

Root knot nematode (*Meloidogyne spp*.) are serious pests of food crops and horticultural plants, including potatoes (*Solanum tuberosum* L.) in tropical and subtropical regions of the world. Therefore, an aim of improvement of potato has been to develop new cultivars which are resistant to root-knot nematodes. Since conventional breeding is time consuming, the use of genetic engineering has become common. There are two major approaches to engineer resistance to nematodes in host plants i.e. inactivation or disruption of giant cells which are required for nematode growth; or delivery of nematotoxid compounds to the nematode through the giant cells. Transgenic potato plants transformed with α0.6TobRB7 promoter were evaluated by nematode infection to detect the expression of Gus gene. In earlier work, Gus expression driven by this promoter has been reported in root at high levels in meristematic and immature vascular cylinder regions, and it giant cell complexes of infected plants. Gus expression was examined by histochemical staining with 5-bromo-4-chloro-3-indolyl betha-D-glucuronide (X-gluc). Most of the lines

tested showed gus expression in the root tissues and in giant cells of infected plants, and in root tissues of uninfected plants.

0279 RATMA, R.
**Variasi genetik sifat agronomi tanaman M-2 kedelai melalui pemuliaan mutasi. Genetic variance of agronomy characters of M-2 soybean plant through mutation breeding**/Ratma, R. (Badan Tenaga Atom Nasional, Jakarta (Indonesia)). 3 tables; 12 ref. Summary (En) *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 1-5.

SOYBEANS; MUTANTS; AGRONOMIC CHARACTERS; GENETIC PARAMETERS; HERITABILITY.

Seeds of M-2 soybean plant derived Orba variety were planted at plot size 5 m x 4 m, spacing 0.10 m x 0.40 m, 3 seeds/hole during dry season of 1997 at Citayam Experimental Station, Bogor. The experiment was conducted with Randomized Complete Block Design and 4 replications. An amount of 1,600 M-2 plant samples/doses were calculated some agronomic characters on variance of parent population (V exp 2o), variance of population due to radiation (V exp 2t), coefficient variance of genetic (KVG) (%), heritability in broad sense (H exp 2) (%) by Henson et al. and Johnson et al. and also Singh & Chaudhary formula. Result of the experiment showed that influence of the doses of 0.10, 0.20 kGy were highly significant different on average of plant height and average number of fertilizer pods/plant compared to the control plant (without radian), whereas, average number of productive branches was significant different severally. The influence of the doses of 0.10, 0.20, 0.30, 0.40 kGy could be improved variance of genetic population so more varieties on population variance due to radiation (V exp 2t), coefficient variance of genetic (KVG) (%), heritability in broad sense (H exp 2) (%), on agronomic characters, but only the doses of 0.10, 0.20, kGy could be selected on plant height, number of productive branches and number of fertile pods/plant in early generation respectively.

0280 RIDWAN.
**Pengaruh varietas/galur terhadap pertumbuhan dan hasil padi gogo sebagai tanaman sela pada gawangan karet. Effect of genotype on growth and yield of upland rice as an intercropping in rubber planting strip**/Ridwan; Khatib, W. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 3 tables; 8 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 21-24.

UPLAND RICE; VARIETIES; INTERCROPPING; HEVEA BRASILIENSIS; SITE FACTORS; GROWTH; YIELDS.

Yield of upland rice in rubber and upland rice depend on variety and cultural practices technologies. The experiment was carried out at farmer's rubber plantation Sitiung, West Sumatra in the rainy season 1998/99 (from November 1998 to March 1999). Two factors of experiment were arranged in Randomized Block Design in a factorial with four replications. Three varieties/lines of upland rice (Jatiluhur, Laut Tawar and GH-Pasaman) as the first factor and two rates of KCl fertilizer application (0 and 75 kg/ha) as the second factor. Objectives of the experiment were to observe the effect of varieties/lines and KCl fertilizer application on growth and yield of upland rice as an intercropping in rubber planting strip. The results showed that Jatiluhur variety and Pasaman line gave better plant growth, the higher number of panicle/hill, number of grain/panicle and yield than Laut Tawar upland rice variety. Application of 75 kg KCl/ha significantly increased number of grain/panicle, filled grain percentage and yield of upland rice as an intercropping in rubber planting strip. Yield of upland rice 14.1% increased due to application of 75 kg KCl/ha.

0281 SIREGAR, H.
**Analisis stabilitas hasil dan interaksi genotipe dan lingkungan pada tanaman padi. Analysis of yield stability and genotype-environment interaction on rice**/Siregar, H.; Kartohardjono, A. (Balai Penelitian Tanaman Padi, Bogor (Indonesia)). 4 tables; 10 ref. Summaries (En, In). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 24-30.

ORYZA SATIVA; HIGH YIELDING VARIETIES; GENOTYPE ENVIRONMENT INTERACTION; GENETIC STABILITY; YIELDS.

Penelitian bertujuan untuk mempelajari besarnya pengaruh interaksi antara lingkungan (E) dan genotipe (G) serta keragaman stabilitas pada penyeleksian varietas yang berhasil tinggi dan stabil. Penelitian dilakukan di lima lokasi, yaitu Singamerta (15 m dpl, jenis tanah hidronort kelabu), Pusakanegara (5 m dpl, jenis tanah alluvial), Kuningan (544 m dpl, jenis tanah latosol merah coklat) dan Genteng (145 m dpl, jenis tanah alluvial), Kendalpayak (450 m dpl, jenis tanah grumusol). Rancangan percobaan di setiap lokasi adalah rancangan kelompok dengan 11 genotipe sebagai perlakuan dalam empat ulangan. Evaluasi dilakukan berdasarkan data hasil gabah kering dengan menggunakan analisis stabilitas parameter oleh Shukla (1972) serta rank sum oleh Kang (1988). Hasil menunjukkan bahwa pengaruh interaksi lingkungan dan genotipe (G x E) sangat nyata. Peringkat galur/varietas bervariasi dari satu lokasi dengan lokasi lainnya. Berdasarkan analisis peringkat hasil dan peringkat stabilitas diperoleh tiga genotipe (galur) yang memberikan hasil tinggi dan stabil yaitu IR 48956-B-3-2, B 5565-13g-Sm- 87-3-1, dan B 6689-Mr-2-1.

0282 SISMINDARI.
**In vitro cleavage of supercoiled double stranden DNA by crude extract of *Annona squamosa* L.**/Sismindari; Husana, A. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Farmasi); Haryana, S.M. 5 ill., 5 tables; 9 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 797-806 .

ANNONA SQUAMOSA; DNA CLEAVAGE; IN VITRO CULTURE; CRUDE PROTEIN; EXTRACTS; PHYTOTOXINS.

The ability of cleaving supercoiled double stranded DNA has recently been found in several ribosome-inactivating protein (RIP) such as trichosantin from *Trichosanthes kirilowi*, ricin from *Ricinus communis* and PAP from *Phytolacca americana*. RIPs are a group of toxic proteins produced in plants which potently inhibit protein synthesis in mammalia. This potent activity makes them an excellent candidates as the toxic part of immunotoxin for cancer therapy. The supercoiled DNA cleaving activity was used to identify the presence of RIP in *Annona squamosa*, a plant which has been traditionally used to prevent pregnancy. This experiment was carried out by incubating pUc19 with serial amounts of crude extract in a final volume of 20 μL containing 50 μM Tris-HCl, 10 μM $MgCl_2$, 100 μM NaCl, pH 8.0 at $37^0$ C for 60 minute. Results showed that the crude extract of *A. squamosa* seeds expressed enzymatic activity to cleave supercoiled double stranded DNA into a nick circular conformation at low concentrations. Incubation at high concentration, the extract was found to cleave supercoiled DNA into a linear form. However, it had no effect on linear DNA. These can be concluded that *A. squamosa* seeds contains RIP-like protein.

0283 SJAMSUDIN, E.
**Somaclonal variation in generating genetic variability of Patchouli (*Pogostemon cablin* Bent.)**/Sjamsudin, E. (Institut Pertanian Bogor, (Indonesia). Fakultas Pertanian); Mariska, I.; Gati, E.; Hobir. 2 tables; 12 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 359-365 .

POGOSTEMON CABLIN; SOMACLONAL VARIATION; RADIATIONS; CALLUS; PLANT RESPONSE; ESSENTIAL OIL CROPS; HIGH YIELDING VARIETIES; GENOTYPE ENVIRONMENT; INTERACTION; LIPID CONTENT.

Indonesia is the biggest producer for Patchouli (*Pogostemon cablin* Bent.) in the world, but there are very limited varieties have been obtained due to the plant never flowers. This study was conducted to obtain clones with higher oil content in having high production. The study consist of three stages i.e.: 1)generating genetic variability through callus radiation and callus age, 2)evaluating growth characteristic, and selecting superior clones with high oil content, and 3)field testing of selected clones at Bogor and Manoko field experiment stations. Each stage required one year experiment which has been started in 1994 at the Laboratory of Research Institute and Development of Industrial Crops Bogor. At present the

third year experiment is still in progress. The treatment of the first stage is making genetic variability by generating theoretically 20 populations based on combination of four dosages (0, 1, 2, and 3 krad) radiation and five (1, 6, 12, 18, and 24 months) callus ages resulting 172 clones from 8 reality populations. The plantlets showed variability in plant height, leaf number, leaf width and leaf length. In the second stage due to difficulties in oil content analyses, the 172 clones were divided in two serial field experiment using Augmented Completely Randomized Design with two replicates for each tester clones. Where the tester clones are the clones from non radiated callus including control clone (83.a), comes from original cultivar with standard tissue culture method. The results indicated that except for Patchouli and leaf thickness; effects of radiation were significant in making variation and mean differences for oil content, leaf length, leaf width, and fresh weight. However the Patchouli alcohol value as a quality for this experiment relatively satisfactory. Even the radiated population presented the lower means, the variabilities were higher, and the heritabilities of those variables were high, therefore were promising to have new clones. The second stage produced 23 selected clones which at least similar oil content with the control clone. The last stage was conducted at two field experiment station, at Bogor and Manoko using Randomized Complete Block Design, using 23 selected clones and two control clones (83.a and Tapak Tuan, the present cultivar). The temporary results indicated that there were genotype x environment interactions, therefore the screening have to be done not too tight but as loose as possible. The rank of oil content was not similar with fresh weight, therefore in selection for finding high oil production (l/ha), fresh weight has to be applied in consideration not only based on the oil content (%).

0284 SUBROTO, M.A.

**Plant regeneration of Agrobacterium rhizogenes transformed and control roots of *Solanum spp*.**/Subroto, M.A. (Pusat Penelitian dan Pengembangan Bioteknologi, Bogor (Indonesia)); Sudrajat, D.; Djanakum, A.; Widayat, E.; Artanti, N. 4 ill., 3 tables; 21 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 439-454.

SOLANUM; AGROBACTERIUM RHIZOGENES; GENETIC TRANSFORMATION; ROOT HAIRS; CLONES; TRANSGENIC PLANTS; REGENERATIVE ABILITY; HORMONES.

Hairy root cultures of *Solanum khasianum*, *S. laciniatum*, *S. mammosum*, *S. melongena*, *S. nigrum*, and *Solanum sp*. were established by infecting hypocotyl or leaf of sterile seedlings, or sterile leaf explants with wild-type Agrobacterium rhizogenes strain A4, 15834 and 072001. The genetic transformation of the roots was confirmed by the opine assay and the detection of T-DNA by using PCR technique. Normal roots of the respective species which are capable growing in hormone-free medium were also attempted to be established for controls. However, only normal roots of *S. nigrum* that have been successfully cultured in hormone-free medium. All of the transformed and normal root clones obtained grew vigorously on hormone-free medium. Some of the transformed and normal root clones were regenerated spontaneously into whole plants upon transfer of the roots from dark to light conditions. The clones that regenerated into whole plants were from the species of *S. khasianum*. *S. melongena*, *S. nigrum*, and *Solanum sp*. Strains of the bacteria used to infect the plants seem to have an effect on the regeneration capability of the transformed roots. The role of endogenous hormones on the regeneration capability of the transformed and normal roots are discussed.

0285 SUDARMONOWATI, E.

**Production of embryoids from anthers of *Pometia pinnata*: a tropical forest tree**/Sudarmonowati, E.; Yunita, E. (Pusat Penelitian dan Pengembangan Bioteknologi, Jakarta (Indonesia)). 2 ill., 4 tables; 10 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 671-682.

POMETIA; ANTHER CULTURE; EMBRYONIC DEVELOPMENT; NAA; GROWTH FACTORS; CALLUS; TROPICAL FORESTS.

Anther culture of *Pometia pinnata* as a model of tropical forest tree species has been developed as an effort to shorten a lengthy breeding procedure through conventional techniques. The success rate of anther culture in many species especially forest tree species was very low. Factors affecting the production of

embryoids from anther culture such the composition of culture medium including type of gelling agent, anther stage, pretreatment conditions and period of incubation were investigated. The highest percentage of explants producing callus (26.7%) which all of them could produce embryoids was obtained from the youngest stage of anthers which was yellow in colour cultured on modified WP induction callus medium supplemented with 10 mg/l 2,4-D, 6% sucrose, 1.75% glucose, 100 mg/l ficoll and solidified with 0.6% agarose following precultures on MS liquid media containing the same composition as induction medium expect for 2,4-D which was 8 mg/l. Pretreating the anthers at low temperatures has a negative effect on callus production. Embryoids obtained could be converted to plantlets when they were subjected to a series of transfer on WP medium containing a combination of 1.0 mg/l kinetin and 0.01 mg/l NAA. Effort to increase the conversion of embryoids to normal plantlets is still in progress.

0286 SUDARMONOWATI, E.
**Simple methods for extracting DNA and obtaining RAPD (Random Amplified Polymorphic DNA) markers of *Shorea parvifolia***/Sudarmonowati, E.; Hartati, N.S. (Pusat Penelitian dan Pengembangan Bioteknologi, Jakarta (Indonesia)). 2 ill., 1 table; 10 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 725-732.

SHOREA; GENETIC VARIATION; DNA; EXTRATION; RAPD.

Forest tree species especially *Shorea sp.* had been known to have very high content of phenolic compounds which resulted in the difficulties in obtaining good quality of DNA. To solve this problem, a simple method for extracting DNA from *Shorea parvifolia* leaves has been developed to enable ones to assess genetic diversity, relatedness using RAPD or other molecular techniques, and to conduct genetic improvement employing molecular biology techniques. RAPD technique has been widely used to assess variation and genetic diversity because of its simplicity and rapidity. Two procedures for extracting DNA employing two different compositions of extraction buffer, and two DNA amplification-PCR based methods employing different conditions, concentrations of $MgCl_2$ and primers, were compared. Using the best conditions for amplifying DNA, out of 23 primers screened, 10 could be generated RAPD markers. This technique would be useful for assessing genetic diversity in other Shorea species and other forest tree species containing high phenolic compounds.

0287 SUDARMONOWATI, E.
**Cryopreservation of *Acacia mangium* shoot tips**/Sudarmonowati, E.; Rosmithayani (Pusat Penelitian dan Pengembangan Bioteknologi, Jakarta (Indonesia)). 2 ill., 3 tables; 14 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 733-742.

ACACIA MANGIUM; MERISTEM CULTURE; BIOLOGICAL PRESERVATION; FREEZING; SURVIVAL.

Long-term in vitro preservation (storage at $-196^0$ C) of shoot tips of *Acacia mangium*, a leguminosae tree species, has been made possible by developing an encapsulation dehydration technique. This technique has a great potential for preserving other tropical forest tree species when other cryopreservation techniques such as vitrification and conventional cryopreservation using two-step cooling procedure have not been successful. Various factors that might affect the survival rate such as procedure and period of dehydration, capsule removal time, period of preculture, exposure time in cryoprotectant or vitrification solution were investigated. Unlike two-step cooling and vitrification techniques which gave no survival, encapsulation-dehydration technique led to 70% survival. This survival rate was obtained by dehydrating natrium alginate encapsulated shoots tips in a Petri dish containing silica gel for 6 hours and the removal of capsules was carried out at 3 days after freezing.

0288 SUGIHARTO, B.
**Cloning and expression analysis of genes for sucrose-phosphate synthase in sugar cane plant (*Saccharum officinarum*)**/Sugiharto, B. (Universitas Jember, (Indonesia). Fakultas Pertanian); Sakakibara

H. 6 ill., 30 Ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 545-561.

SACCHARUM OFFICINARUM; SUCROSE; PHOSPHATES; BIOSYNTHESIS; GENE EXPRESSION; CLONING; REVERSE TRANSCRIPTION; PCR.

Sucrose-phosphate synthase (SPS; EC 2.4.1.14) is a key enzyme controlling sucrose biosynthesis in plants. The activity of SPS was reported highly correlate with growth rate ans productivity of sugar cane plants (Sugiharto et al., 1997). We have isolated two cDNA clones encoding sucrose-phosphate synthase from sugar cane leaves (pSoSPS1 and pSoSPS2) by screening a leaf cDNA libray using nucleic acid hybridization. The deduced amino acid sequences of pSoSPS1 and pSoSPS2 had significant homology to those of SPSs from spinach, sugar beet, and potato (50 to 56% identity); in particular, SoSPS1 had much higher homology to maize SPSs (95% identity) than did SoSPS2 (50% identity). The domain involved in the light dependent reversible protein phosphorylation was little conserved in SoSPS2. Northern analysis revealed the transcripts of SoSPS1 gene to be predominantly in leaves but that of SoSPS2 to be distributed not only in leaves but also in roots at a similar level. Moreover, the transcript of SoSPS1 was markedly accumulated during greening of etiolated leaves, whereas that SoSPS1 was constitutively expressed. These finding indicate that SPS in sugar cane is encoded by multiple genes, which show organ-specificity and are differently regulated in response to light.

0289 SUKARMAN.
**Teknologi produksi benih jambu mente. [Technology for cashew seed production]**/Sukarman; Hasanah, M.; Rusmin, D.; Rumiati (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 6 tables; 20 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 93-101.

ANACARDIUM OCCIDENTALE; SEEDLINGS; HARVESTING DATE; DRYING; GRADING; STORAGE.

Jambu mente merupakan salah satu tanaman industri prioritas untuk dikembangkan, khususnya di Kawasan Timur Indonesia. Selama Pelita VII diperkirakan kebutuhan benih jambu mente sebanyak 2,5 juta butir/tahun. Mutu benih yang baik harus memenuhi persyaratan baik genetis, fisiologis maupun fisis yang mencakup aspek prapanen dan pascapanen. Mutu genetik yang baik dapat diperoleh dengan menggunakan sumber benih yang baik berasal dari nomor-nomor terpilih yang berpotensi produksi tinggi. Aspek prapanen perlu diperhatikan agar didapatkan benih bermutu tinggi melalui pendekatan pemupukan, penyiangan, pengendalian hama dan penyakit utama. Pemanenan dilakukan pada saat benih mencapai masak fisiologis, dengan kriteria sebelum buah semu mencapai ukuran maksimum. Pengeringan benih dilakukan selama 2-4 hari sampai mencapai kadar air 6-7%. Untuk menekan laju kemunduran mutu fisiologis, benih harus dikemas dalam kantong kedap udara dengan kadar air awal 6-7%. Hasil penelitian menunjukkan bahwa benih masih dapat disimpan sampai 12 bulan dengan daya berkecambah 84%.

0290 SUMANGGONO, A.M.R.
**Pengujian daya hasil beberapa galur mutan kacang hijau di lahan Podsolik Merah Kuning. Yield potential trial of some mungbean mutant lines on Ultisol soil**/Sumanggono, A.M.R.; Dewi, K.; Harsanti, L. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 2 tables; 11 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 75-78.

VIGNA RADIATA RADIATA; MUTANTS; FIELD EXPERIMENTATION; ACRISOLS; YIELDS.

Usaha untuk meningkatkan dan mempertahankan produksi tanaman pangan antara lain dilaksanakan dengan program ekstensifikasi di luar pulau Jawa. Dalam melaksanakan program tersebut pada umumnya menghadapi beberapa kendala, antara lain tanahnya adalah Podsolik Merah Kuning (PMK). Untuk mengatasi hal tersebut dapat dilakukan dengan menanam varietas yang toleran terhadap lahan PMK. Pada musim kemarau 1997 dan musim hujan 1997/98 telah dilakukan pengujian daya hasil beberapa galur mutan kacang hijau pada empat lokasi lahan PMK yang berbeda. Pengujian dilakukan dengan Rancangan Acak Kelompok dengan 4 ulangan pada plot yang berukuran 4 x 5 m. Hasil percobaan menunjukkan bahwa 3 galur mutan yang diuji, yaitu galur No. PsJ-B-II-15-91, PsJ-B-II-17-6-92 dan PsJ-S-30-91 tampaknya dapat beradaptasi dengan baik pada lahan PMK dan mempunyai produksi tinggi.

0291 SUTARYO, B.

**Evaluasi standard heterosis hasil dan analisis koefisien lintasan komponen hasil beberapa kombinasi padi hibrida turunan galur mandul jantan IR58025A. Evaluation on standars heterosis of yield and path coeffisien analysis on yield components of some hybrid rice combinations derived from cytoplasmic male sterile line IR58025A**/Sutaryo, B.; Suprihatno, B. (Balai Penelitian Tanaman Padi, Sukamandi (Indonesia)). 1 ill., 4 tables; 14 ref. Summaries (En, In). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 15-23.

ORYZA SATIVA; HYBRIDS; CYTOPLASMIC MALE STERILITY; HETEROSIS; YIELD COMPONENTS.

Penelitian untuk mengevaluasi standard heterosis hasil dan analisis koefisien lintasan beberapa kombinasi padi hibrida turunan IR58025A dilaksanakan di Kebun Percobaan Sukamandi (15 m dpl) selama musim hujan (MH) 1993/94 menggunakan Rancangan Acak Kelompok dengan 3 ulangan. Dua puluh kombinasi padi hibrida turunan IR58025A yang dibuat di Lembaga International Penelitian Padi Filipina, diuji hasilnya terhadap varietas pembanding (IR64). Data menunjukkan bahwa nilai standard heterosis untuk hasil bervariasi dari -30,77% untuk IR58025A/IR54742-221-9-3 sampai 5,64% untuk IR58025A/IR72 dibandingkan dengan varietas pembanding terbaik IR64. Hasil gabah agak rendah, tetapi berkorelasi positif dengan jumlah malai per rumpun. Jumlah gabah isi per malai dan bobot 1000 butir juga berpengaruh positif tetapi harus melalui jumlah malai per rumpun.

0292 TAJUDDIN, T.

**The effectiveness of kanamycin and hygromycin B as the selection agents for the recovery of transgenic shoots**/Tajuddin, T. (Badan Pengkajian dan Pengembangan Teknologi, Serpong (Indonesia). Center for the Assessment and Applicaton of Industrial and Agricultural Biotechnology). 1 ill., 2 tables; 13 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 595-604.

LINUM USITATISSIMUM; AGROBACTERIUM; TISSUE CULTURE; SHOOT; GENETIC MARKERS; GENETIC TRANSFORMATION; KANAMYCIN; ANTIBIOTICS.

A selectable marker gene is used for the identification of transformed plant cells. In this study, npt II and aph IV in the T-DNA of the binary plasmid pJIT56 and pJIT73, respectively, are used as the marker genes. The npt II gene provide resistance to kanamycin, whereas aph IV confers resistance to hygromycin B. Callus formstion and shoot regeneration on hypocotyl explant of linseed (*Linum usitatissimum* L.) following Agrobacterium-mediated transformation was investigated. Plant tissue showed less sensitive to the selective agent kanamycin than hygromycin B. Leaf callus assay on medium containing 2,4-D and agents for selecton were set up to confirm transformation.

0293 UTOMO, H.S.

**High Lysine rice (*Oryza sativa* L.) from in vitro screening of suspension cells using Lysine-analog, S-aminoethyl L-cysteine, and combination of Lysine plus Threonine**/Utomo, H.S. (Universitas Bengkulu, (Indonesia). Fakultas Pertanian). 3 tables; 16 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 389-395.

ORYZA SATIVA; LYSINE; THREONINE; IN VITRO SELECTION; RICE; QUALITY.

Lysine is an essential amino acid and limiting factor for optimal nutritional quality in rice grain. This amino acid is synthesized by a complex pathway, regulated primarily by feedback inhibition of two enzymes, aspartate kinase and dihydrodipicolinate synthase. *In vitro* screening using inhibitory levels of S-aminoethyl L-cysteine (AEC) or lysine plus threonine (L + T) was conducted using suspension cell clumps 5-10 cells in size. These selective agents were incorporated into suspension medium. Concentrations of AEC used were 0.5% and 1.0% (w/v), while concentrations of L + T were 5 and 10 mM. Suspension cells were exposed to these agents for one week. Resistant cells were selected and plated on regeneration medium. A total of approximately 0.6 kg suspension cells were screened, and more than 220 fertile plants were recovered from various treatments. Cells selected with 1.0% AEC yielded a regenerated plant with an improved lysine content by 104%.

0294 UTOMO, S.D.
**Correlation between gene expression and copy number in transgenic peanut callus**/Utomo, S.D. (Universitas Lampung, Bandar Lampung (Indonesia)); Weissinger, A.K. 3 ill., 1 table; 13 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 525-534.

ARACHIS HYPOGAEA; AGROBACTERIUM TUMEFACIENS; CALLUS; GENE EXPRESSION; GENETIC TRANSFORMATION; NUCLEOTIDE SEQUENCE; CLONES.

In succesful genetic transformation of an organism, a transgene is expressed properly in targeted transgenic tissue. It has been reported that gene expression in transgenic tissue is influenced by several factors, i.e. promoter, 5'untranslated leader sequence, 3'untranslated sequence, sequences of ATG, integrity of coding sequence, intron, enhancer sequences, integrated gene copy number, silencing, and position effects. If the influences of promoter, 5'untranslated leader sequence, 3'untranslated sequence, sequences of ATG, integrity of coding sequence, intron, enhancer sequences, silencing, and position effects are constant because the same vector and protocol for Agrobacterium transformation is used, the gene expression and gene copy number should be highly correlated. The objective of this study is to estimate the correlation between gene expression and copy number in transgenic peanut callus. Transgenic peanut callus was obtained by Agrobacterium-mediated transformation of mature peanut leaves. *Agrobacterium tumefaciens* strain EHA 105 used in the transformation carries plasmid pBI121 containing GUS and NPTII cassettes. GUS fluorometric assay was conducted on 72 clones after being maintained for 14 and 16 weeks under kanamycin selection. Gene copy number were estimate on 12 clones using quantitative PCR. The selected 12 clones showed diverse levels of GUS specific activity. PCR reactions were transformed simultaneously for reconstruction standards and unknown (12 clones). All amplification products were subjected to agarose gel electrophoresis, transferred to nylon membranes and probed. Hybridization signal were quantified and estimate of copy number were calculated using linear regression analysis. GUS specific activity averaged 0.1071 nmol $min^{-1}$ ($\mu g$ protein)$^{-1}$ and ranged from 0.0145 to 0.3243 nmol $min^{-1}$ ($\mu g$ protein)$^{-1}$. The copy number of the 12 selected clones ranged from 11 to 7. Gene copy number was not correlated with GUS expression ($P<0.62$). These results indicated that GUS expression is a poor predictor of gene copy number. A clone carrying high copy number of GUS gene does not necessarily show high level of expression of GUS. It can also be concluded that factors other than gene copy number are important in affecting gene expression.

## F40 EKOLOGI TANAMAN

0295 EMMYZAR.
**Faktor-faktor lingkungan yang berpengaruh pada benih jahe. [Environmental factors affecting on ginger seedlings]**/Emmyzar; Rosman, R. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 tables; 15 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 175-182.

ZINGIBER OFFICINALE; SEEDLINGS; ENVIRONMENTAL FACTORS; LAND SUITABILITY.

Upaya pembudidayaan tanaman jahe perlu benih jahe baik kuantitas maupun kualitas. Untuk memperoleh benih yang baik perlu diperhatikan keadaan lahan, iklim, teknologi budidaya yang sesuai antara keadaan lingkungan, iklim, dengan persyaratan tumbuh tanaman. Lingkungan yang baik adalah tidak terlalu lembab dan tidak terlalu kering, dengan jumlah curah hujan 2.000-3.000 mm/th, kelembaban 55,70% dan berdrainase baik. Intensitas radiasi (cahaya) minimum 75% dan tingkat naungan 25%, pH 5,5-7 bertekstur lempung, lempung liat berpasir, jenis Latosol, Andosol dan Podsolik. Lingkungan yang lembab (>70%) akan memudahkan berkembangnya patogen penyakit sehingga dapat menurunkan jumlah dan mutu hasil. Kandungan air tanah yang tinggi dapat meningkatkan kelembaban, perlu dibuat drainase. Keadaan lingkungan yang terlalu kering menyebabkan proses pembentukan dan pengisian rimpang terhambat, rimpang yang dihasilkan bentuknya lebih kecil, jika terlalu lembab akan terjadi pembusukan. Dengan kondisi lingkungan pertanaman yang memenuhi persyaratan tumbuh, diharapkan diperoleh benih yang baik.

0296 HARDI T.W.T.
**Pengaruh perubahan lingkungan biofisik dari hutan alam ke hutan tanaman Eucalyptus terhadap kelimpahan dan keragaman famili serangga. The influence of biophysical environment change from natural forest to Eucalyptus plantation forest on insect family abundance and it diversity**/Hardi T.W.T.; Asmaliyah; Djunaidah, S. 8 tables.; 15 ref. Summary (En). *Buletin Penelitian Hutan (Indonesia)* ISSN 1410-0649 (1997) (no. 610) p. 59-76.

EUCALYPTUS; BIOPHYSICS; ENVIRONMENTAL FACTORS; VIRGIN FORESTS; FOREST PLANTATION; BIODIVERSITY; INSECTA.

Study of the influence of the change of natural forest to Industrial plantation forest was carried out in Wirakarya Sakti Company, Jambi for 3 months, since July to October 1996. Family abundance of insect and diversity were measured using variance index by Brillouin and Shannon-Wierner which were comparison between natural forest, boundry of natural forest and Eucalptus plantation forest. On each plot of site location is installed light trap with white TL that started 6.00 pm to 9.00 pm and swiched on by simultaneously. The result showed that biophysical environment change from natural forest to Eucalyptus plantation forest caused family abundance of insect and diversity is also change. The family of insects which were not found on natural forest was found not only on Eucalyptus plantation forest but also on the natural forest.

## F60 FISIOLOGI DAN BIOKIMIA TANAMAN

0297 JENIMAR.
**Kajian perbandingan umur kalus *Citrus grandis* terhadap produksi metabolit sekunder. Studies on the effect of *Citrus grandis* callus age on the production of secondary metabolites**/Jenimar; Norulaini, N.; Kadir, O. (Universitas Islam Sumatera Utara, Medan (Indonesia). Fakultas Pertanian). 1 ill., 1 table; 11 ref. Summary (En). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 11-14.

CITRUS GRANDIS; CALLUS; METABOLITES; LIMONENE; LINALOOL; SUPERCRITICAL FLUID EXTRACTION.

Bali orange (*C. grandis*) belongs to Rutaceae family and commonly used as traditional drugs. Beside consumed freshly, the orange also produces important chemical constituents such as terpene group as its secondary metabolites through extracting parts of the orange plant. The secondary metabolite produced in the orange plant can be used in pharmaceutical industries, food additive, and cosmetical industries. Terpene groups were commonly occured in the flesh of the orange. In the case of shorthening the

production cycle of the secondary metabolites, research have been conducted biotechnologically by extracting callus *in vitro*. The aim of this study was to determine the potential callus age in producing secondary metabolite (limonene and linalool) and the extractive tehnicques applied was supercritical fluid extraction $C0_2$. The component was identified using GC-MS. The medium applied was modified Murashige & Skoog (1962) media. The result shows that the best callus age applied in producing secondary metabolite was 1/0 months, i.e. limonene (0,077 mg/g) and linalool (0,066 mg/g) at 7 months after cultured.

0298 PUDJIHARTA, A.

**Proporsi curah hujan dan kebutuhan air tegakan sengon (*Paraserianthes falcataria*), Gmelina (*Gmelina arborea*) dan Sungkai (*Peronema canescens*). The proportion of rainfall and consumptive use of *P. falcataria*, *G. arborea* and *P. canescens***/Pudjiharta, A. 6 ill., 4 tables.; 6 ref. Summary (En). *Buletin Penelitian Hutan (Indonesia)* ISSN 1410-0649 (1997) (no. 610) p. 1-15.

PARASERIANTHES FALCATARIA; GMELINA ARBOREA; PLANT WATER RELATION; EVAPOTRANSPIRATION; RAIN; GROWTH.

The study on consumptive use or evapotranspiration of *Paraserianthes falcataria*, *Gmelina arborea* and *Peronema canescens* species was carried out at Bogor, West Java. The study was performed on 3 concrete lysimeter with size of 4 m length, 3 m wide and 2 m depth. On each lysimeter was planted with one species totaling tree from 35 trees and continued until 6 trees at the and of study. The study was carried out in 2 years (1994 - 1995). The aim of this study was to gather information about consumptive use or evapotranspiration of *P. falcataria*, *G. arborea* and *P. canescens*. These 3 tree species was planted on some places for different objects; among other for reforestation, rehabilitation of critical land and social forestry especially *P. falcataria*. The information of consumptive use/evapotranspiration by tree species is important for the selection of tree planting program. The result showed that consumptive use or evapotranspiration of *G. arborea* is higher than consumptive use of *P. falcataria*. The average monthly consumptive use of *G. arborea*, *P. falcataria* and *P. canescens* is 162 mm - 419 mm, 164 mm - 351 mm and 118 mm - 376 mm for 174 mm - 443 mm rainfall. Consumptive use by tree species used for product biomass, photosynthesis, transport of nutrient and transpiration. The logical consequence of fast growing is the higher consumptive use. Based on those information, *P. falcataria* and *G. arborea* should be planted at high rainfall area (more than 3300 mm per years), and flat area.

0299 TRANGGONO.

**Pola respirasi dan senyawa flavor selama tahap pemasakan buah salak pondoh. [Respiration pattern and flavor compound changes during maturation stage in the development of snake fruit (*Salacca edulis*)]**/Tranggono (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Teknologi Pertanian). 1 ill., 4 tables; 14 ref. Summary (En). *Agritech (Indonesia)* ISSN 0216-0455 (1998) v. 18 (2) p. 1-4.

SALACCA EDULIS; MATURATION; ORGANIC MATTER; RESPIRATION; FLAVOUR; MOISTURE CONTENT.

Studies on respiration pattern and flavor compound changes during maturation stage in the development of snake fruit (*Salacca edulis* Reinw cultivar Pondoh) were carried out at picking times of 4.5. 5.0, 5.5, 6.0 and 6.5 months after pollination. At each time, samples were drawn for determinations of edible portion, moisture, respiration rate, ester and carbonyl compounds as well as their flavor profiles by gas liquid chromatography. Result showed that the development of maturation degree gives rise to an increase in the relative percentage of edible portions. The snake fruit displayed a non-climacteric pattern of respiration. During maturation stage from 4.5 until 6.5 months after pollination, the fruits exhibited a decrease in ester and an increase in carbonyl compounds. However, fruit picked at 6.5 months after pollination revealed and additional in respiration rate as well as ester content and a addition caused by initial break down of edible tissues. Flavor profile chromatograms which were obtained from head space analyses, showed that changes in volatile compounds in term of type and their relative percentages occur during maturation.

## F62 FISIOLOGI TANAMAN - PERTUMBUHAN DAN PERKEMBANGAN

0300 JOSEPH, B.S.T.
**Pertumbuhan bibit kelapa hibrida pada tanah dengan berbagai bahan induk di sekitar danau Limboto. The growth of hybrid coconut seed planted on soil with different kind of parent materials around Limboto lake**/Joseph, B.S.T. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 4 ill.; 3 tables; 8 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 212-219.

COCOS NUCIFERA; HYBRIDS; SEEDLINGS; SOIL PARENT MATERIALS; AGRONOMIC CHARACTERS; GROWTH RATE.

The green house research was aimed to know the growth of hybrid coconut seed planted on different kind of soil with different parent materials. They were granite, dasit, andesit, limestone-tomalit, and limestone parent materials, The characteristics of these parent materials vary from acidic, intermediate to basaltic. It was found that different parent materials differenty affected the growth of hybrid coconut seed, which was increase from granit to limestone. Therefore, it was concluded that the growth of the crops increased from Dystropepts, Eutropepts, Pellusterts to Rendolls soil, respectively.

## F63 FISIOLOGI TANAMAN - REPRODUKSI

0301 KOMAR, T.E.
**Siklus reproduksi dan produksi benih *Agathis dammara* (Lambert) Rich. Reproductive cycle and seed production in *Agathis dammara* (Lambert) Rich**/Komar, T.E. 6 ill., 31 ref. Summary (En). *Wana Benih (Indonesia)* ISSN 1410-1173 (1999) v. 3(1) p. 1-23.

AGATHIS DAMMARA; REPRODUCTION; SEED PRODUCTION; FLOWERING; POLLINATION; MATURATION; GYNOECIUM; PLANT EMBRYOS.

*A. dammara* reproductive cycle was two years. From pollination to seed maturity was 15 to 18 months or 22 to 24 months from megaspore mother cell stage. Pollen development from pollen mother cell to pollination took 5-6 months. Soon after pollination, pollen germinated and pollen tube grew through nucleus. Pollen tube contains many prothallial cells and a body cell, which was divided and formed two male gametes, one of which fuses with egg nucleus during fertilization. Ovule development is as follows: mature megagametophyte contains 1 to 10 archegonia per megagametophyte, 4-6 archegonia was more frequently found. Various stages of archegonial development in one megagametophyte is common. After fertilization, the formed zygote developed to proembryo and early embryo stage. An observation conducted in Gunung Walat Sukabumi revealed that ovule abortion in *A. dammara* reached over 60%, while seed cone abortion reached 30%. The causes of this abortion is not known and need to be further studied.

0302 WAHYUNI, S.
**Pengaruh penyimpanan serbuk sari jambu mente untuk bahan penyerbuk. [Effect of cashew pollen storage on pollen viability]**/Wahyuni, S.; Bermawie, N. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 ill., 1 table; 6 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 202-207.

ANACARDIUM OCCIDENTALE; STORAGE; MICROSPORA; POLLEN.

Dalam program perbaikan tanaman melalui hibridasi, pengetahuan mengenai penyimpanan serbuk sari tanaman perlu dikuasai untuk mempertahankan viabilitas setinggi mungkin, terutama bila musim pembungaan dari tanaman yang akan disilangkan berbeda atau sumber gen (tetua) berada pada lokasi yang berjauhan. Penyimpanan serbuk sari jambu mente dilakukan pada suhu dingin ($8^0$-$10^0$ C) dan suhu kamar

($27^0$-$29^0$ C). Tepung sari dikoleksi dalam botol kaca dan ditutup dengan kertas alumunium (alumunium foil). Viabilitas tepung sari secara periodik diamati tiap hari selama lima hari, dengan cara menyerbukannya langsung pada bunga yang sedang mekar. Penyerbukan dilakukan terhadap 15-20 kuntum bunga. Tepung sari yang viabel dicirikan dengan terbentuknya tepung sari pada kepala putik bunga yang diserbuki. Tepung sari diamati di bawah mikroskop dengan pewarnaan mengikuti metode Alexander. Hasil studi pendahuluan menunjukkan bahwa sampai dengan lima hari setelah penyimpanan tepung sari pada suhu dingin mempunyai viabilitas 66%, sedang pada suhu kamar telah kehilangan viabilitas. Teknik deteksi ini masih perlu disempurnakan dengan cara menumbuhkan tepung sari pada media buatan.

## H10 HAMA TANAMAN

0303 ANWAR M.
**Hama dan penyakit kakao serta pengendaliannya oleh petani Kabupaten Agam, Propinsi Sumatera Barat. Insect pests and diseases of cacao and their control by farmers in Agam district of West Sumatra Province (Indonesia)**/Anwar M.; Nurdin, F. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 2 tables; 5 ref. Summary (En). *Jurnal Stigma* (Indonesia) ISSN 0853-3776 (1999) v. 7(2) p. 52-54.

THEOBROMA CACAO; HELOPELTIS; DISEASE CONTROL; PEST CONTROL; PHYTOPHTHORA PALMIVORA.

Cacao relatively is a new commodity of estate crops in West Sumatra. In the year of 1994 it planted was about 8,442 ha. To investigate cacao insect pests and diseases in Agam Disrict, West Sumatra Province and how the farmers controlled them, a survey has been conducted during August to September 1998. The results showed that the most harmful insect pests was *Helopeltis spp*. The attack of this insect pest on fruit varied from 0.0 to 90.0 with average 17.17%, and on leaves varied from 0.0 to 35.0 with average of 12.0%. Other minor pest was squarrel (<2.0% infestation). About 2.0% of cacao fruit was infested by disease, which was assumed by *Phytophthora sp*. Only one of 10 farmers interviewed controlled his plants, by using Deltamethrin insecticide for *Helopeltis spp*.

0304 CHAIRUL, S.M.
**Pengujian formulasi penglepasan terkendali insektisida asefat pada tanaman kedelai terhadap serangan hama. Testing of controlled released formulation of acephate insecticides on insect attacked soybean plant**/Chairul, S.M.; Rahayu, A.; Sulistyati M.M.; Ulfa T.S.; Sumatra, M. (Pusat Aplikasi Isotop dan Radiasi, BATAN (Indonesia)). 5 tables; 8 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 91-97.

GLYCINE MAX; ACEPHATE; CONTROLLED RELEASE; YIELDS; RESIDUES; INSECTICIDES.

Telah dilakukan pengujian formulasi penglepasan terkendali insektisida asefat pada tanaman kedelai galur G-58 terhadap serangan hama pada musim hujan dan musim kemarau. Kedelai ditanam pada plot percobaan dengan ukuran 2 x 5 m dan jarak tanam 30 x 20 cm di Instalasi Kebun Percobaan Kuningan. Formulasi penglepasan terkendali asefat diberikan bersama dengan bibit kedelai dengan dosis dua kali dosis yang dianjurkan yaitu 2 x 1 kg/ha. Percobaan pada tanaman kedelai dilakukan dengan membandingkan antara bentuk formulasi penglepasan terkendali asefat dengan tanaman tanpa pemberian pestisida (kontrol), dan dengan perlakuan secara konvensional (penyemprotan oleh petani menggunakan pestisida monokrotofos, endosulfan, dan klorpirifos secara bergantian setiap 10 hari sekali). Hasil penelitian menunjukkan bahwa intensitas serangan lalat bibit, ulat daun, dan hama polong pada musim hujan dari tiga perlakuan yang dicoba yaitu formulasi penglepasan terkendali, disemprot, dan tanpa perlakuan, tidak terdapat perbedaan yang nyata, bila dibandingkan pada musim kemarau. Pada perlakuan

formulasi penglepasan terkendali pada musim kemarau hasil panennya lebih sedikit dari perlakuan normal, tetapi lebih banyak daripada perlakuan kontrol. Pada tanaman kedelai dan tanah bekas percobaan, baik pada musim kemarau maupun pada musim hujan, dengan perlakuan formulasi penglepasan terkendali dan perlakuan normal, ataupun kontrol tidak terdapat residu insektisida di dalamnya.

0305 KARDINAN, A.

**Hama utama benih jahe. [The major pest of ginger seeds]**/Kardinan, A.; Wikardi, E.A.; Siswanto; Iskandar, M. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 table; 3 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 162-166.

ZINGIBER OFFICINALE; PEST CONTROL; RADOPHOLUS SIMILIS.

Jahe komoditas hasil pertanian rakyat, telah berhasil menjangkau pasar ekspor. Diharapkan mampu meningkatkan ekonomi pedesaan. Merupakan komoditas rempah dan obat yang banyak dimanfaatkan untuk obat-obatan tradisional, khusus di Indonesia. Permasalahan dalam benih jahe adalah serangga *Aspidiella hartii* Cock. Akibat serangan hama ini sangat luas, baik di dalam maupun di luar negeri. Cara penanggulangannya berupa pencegahan dan pengendalian. Pencegahan dilakukan dengan cara bercocok tanam (varietas tahan, rotasi tanaman), perlakuan benih dengan insektisida dan penanganan pasca panen yang baik. Pengendalian dapat secara kimiawi ataupun mekanis. Secara kimiawi dengan fumigasi (metil bromida), sedangkan mekanis perendaman dengan air panas. Metil bromida di Indonesia dilarang pada tahun 1998, perlu dilakukan penelitian guna mencari alternatif penggantinya. Penelitian terpadu untuk menangani masalah ini perlu dilakukan antara Pusat Karantina Pertanian, Direktorat Jenderal Perkebunan, Badan Litbang Pertanian dan para eksportir jahe.

0306 KUSWADI, A.N.

**Penandaan interna lalat buah *Bactrocera carambolae* (Drew and Hancock) dewasa dengan P-32. Internal labelling of adults fruit fly of *Bactrocera carambolae* (Drew and Hancock) with P-32**/Kuswadi, A.N.; Indarwatmi, M.; Darmawi; Nasution, I.A. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 2 ill., 12 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 315-319.

BACTROCERA; TRACER TECHNIQUES; RADIOACTIVITY.

Untuk memperoleh serangga bertanda $^{32}P$ lalat buah *B. carambolae* yang dapat digunakan dalam penelitian penyebaran, pengukuran populasi absolut atau pun penelitian dan penentuan parasit dan predator, telah diuji dua cara penandaan yaitu dengan pemberian radiofosfor melalui makanan larva dan melalui minuman lalat dewasa. Pemberian melalui makanan larva tidak menguntungkan, karena retensinya sangat rendah. Pemberian $^{32}P$ dalam bentuk $KH_2 P0_4$-32 dengan dosis: 0,50; 1,00; 1,50 dan 2.00 mikroCi/gr makanan menghasilkan kepompong dengan radioaktivitas masing-masing hanya 0,560; 1,000; 1,450 cpm/ekor. Namun radioaktivitas lalat dewasa yang diperoleh lebih rendah lagi yaitu 0, 115, 180, 254 cpm/ekor, karena sebagian $^{32}P$ terkumpul dalam puparia. Penandaan melalui minuman lebih menguntungkan karena dalam 24 jam atau 48 jam telah dapat diperoleh lalat bertanda dengan radioaktivitas yang cukup tinggi. Pemberian air minum yang mengandung $^{32}P$ dengan radioaktivitas 1 mikro-Ci/ml, telah menyebabkan lalat jantan dan betina dalam koloni bertanda dengan radioaktivitas masing-masing 2.697 dan 4.561 cpm/ekor setelah 24 jam, dan 7,266 dan 6,255 cpm/ekor setelah 48 jam. Dengan cara tidak memberi air pada lalat selama 24 jam sebelum perlakuan dapat mempercepat penandaan. Hanya dalam waktu 1 jam setelah perlakuan telah diperoleh lalat jantan dan betina yang radioaktivitasnya masing-masing 4.382 dan 6.192 cpm. Radioaktivitas tersebut setelah 2, 4, 8, 24 dan 48 jam masing-masing adalah 5.403 dan 3.939 cpm/ekor, 5.987 dan 6.403 cpm/ekor, 6.606 dan 6.946 cpm/ekor, 8.722 dan 9.416 cpm/ekor, dan 11.122 dan 17.940 cpm/ekor.

0307 SARANGA, A.P.

**Effectiveness of *Beauveria bassiana* Vuill. (Hypomycetes:Moniliales) as a microbial control of termites, *Coptotermes spp.* (Rhinotermitidae:Isoptera)**/Saranga, A.P. (Universitas Hasanudin, Ujung Pandang (Indonesia). Fakultas Pertanian dan Kehutanan). 2 tables; 6 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 717-724.

PARASERIANTHES FALCATARIA; CAPTOTERMES; BEAUVERIA BASSIANA; BIOLOGICAL CONTROL; MICROBIAL FUNGI; MORTALITY.

Entomogenous fungi, *Beauveria bassiana*, was isolated from *Hypothenemus hampei* (Ferr) (Coffee berry borer) has been tested as a microbial control on termites, *Coptotermes curvinathus* Holmgr. in the laboratory and *Coptotermes havilandi* Holmgr. in the field. The methods of applying of *B. bassiana* in the laboratory, tested through indirect integument contact and feeding and indirect integument contact method, were able to kill termites. The mortality of termites at the rate of $1.226x10^7$ spores/ml, as the result of the two methods of application were 99.44% and 80.56%, respectively. In the second study, field plots of *Paraserianthes falcataria* in the Industial Plantation Forest of Gowa, South Sulawesi, were treated with *B. bassiana* at the rate of $2.6x10^6$ spores/ml (it was about a solution of 500 ml/plot, 25 trees) by using bamboo as trap feeding to control *C. havilandi*. In this experiment, damage intensity by termites on *P. falcataria* reduced to an average of 65.5% (ranging from 62.2% - 79.6% to 0.0% - 9.1%), recorded 7 days after treatment.

0308 TAUFIQ, E.

**Serangan thrips dan aphid pada bibit jambu mente. [Attack of thrips and aphid on cashew seedlings]**/Taufiq, E. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 tables; 13 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 196-201.

ANACARDIUM OCCIDENTALE; SEEDLINGS; DISEASE CONTROL; APHIDOIDEA; THRIPS (GENUS).

Salah satu kendala budidaya jambu mente adalah serangan hama, baik pada tanaman dewasa maupun di pembibitan. Serangan hama selain menurunkan mutu bibit juga ada yang mematikan. Hama yang berpotensi merusak pembibitan adalah thrips dan kutu (aphid). Serangan thrips pada tanaman berumur 3-12 bulan mengakibatkan kematian tanaman dalam waktu sekitar 30 hari, sedangkan serangan aphid menyebabkan pertumbuhan bibit terhambat. Apalagi thrips dan aphid bersama-sama menyerang suatu areal pembibitan, kerusakan bibit akan berlangsung lebih cepat. Selain itu, thrips lebih merusak dan populasinya lebih cepat menyebar daripada aphid. Hasil identifikasi menunjukkan bahwa spesies thrips yang dominan adalah *Selenothrips rubrocinctus* Giard ("red banded thrips").

0309 ULFA T.S.

**Pengujian lapang formulasi penglepasan terkendali insektisida karbofuran pada tanaman padi. Field test of controlled release formulation of carbofuran insecticide on rice plants**/Ulfa T.S.; Sulistyati, M.M.; Sofnie M.CH.; Kuswadi, A.N.; Made S. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 4 tables; 8 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H.. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 53-56.

ORYZA SATIVA; CARBOFURAN; CONTROLLED RELEASE.

Formulasi terkendali karbofuran (2,3-dihidro 2,2 - dimetil-7-benzofuranil-N-metil karbonat) dalam matril kaolin dan perekat alginat digunakan untuk pengujian lapang pada tanaman padi varietas Cilosari dengan

perlakuan carbofuran di pasaran, dosis 20 Kg/ha, 30 kg/ha, 40 kg/ha dan kontrol. Parameter yang diamati ialah jumlah anakan tiap rumpun padi dan intensitas serangan hama penggerek batang padi *Chilo suppressalis* (Walker), ganjur *Orseolia oryzae* (Wood/Mason) dan hama putih (*Naphalocrosis medinalis* (Guen.)). Hasil yang diperoleh ialah jumlah anakan yang tumbuh lebih banyak pada pemberian formulasi lepas terkendali dibandingkan formulasi komersial dan kontrol. Pengamatan serangan hama dilakukan pada minggu ke 3, 5, 7, 9, dan 11 setelah aplikasi formulasi karbofuran dan insektisida di pasaran. Pada minggu ke 5 serangan penggerek batang padi berbeda nyata, serangan hama ganjur berbeda nyata pada minggu ke 7, sedangkan serangan hama putih hanya terjadi pada minggu ke 7 dan 9 dan tak berbeda nyata pada setiap perlakuan.

0310 YASIN, M.
**Pengaruh serbuk dan ekstrak biji *Annona squamosa* L. terhadap wereng jagung *Peregrinus maidis* ASHM. Effect of powder and annona (*Annona squamosa* L.) seed extracts on maize plant hopper (*Peregrinus maidis*)**/Yasin, M.; Syamsuddin (Balai Penelitian Tanaman Jagung dan Serealia Lain, Maros (Indonesia)). 1 table; 4 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 45-47.

ANNONA SQUAMOSA; PEREGRINUS MAIDIS; ZEA MAYS; PEST CONTROL; EXTRACTS; POWDERS.

Experiment on the effect of powder and extract of annona (*Annona squamosa* L.) seed to maize plant hopper, *Peregrinus maidis* was conducted at laboratory of RIMC (Research Institute for Maize and Other Cereals) in 1998. The experiment consisted of 7 treatments and 4 replications. The treatments such as 1%, 2% and 3% of powder; 1%, 2% and 3% of extract and distilled water was used as a control, were arranged in Completely Randomized Design. The results showed that powder and extract of *Annona squamosa* seed were effective to control maize plant hopper.

## H20 PENYAKIT TANAMAN

0311 ANGGRAENI, I.
**Identifikasi beberapa cendawan penyebab penyakit busuk akar pada tanaman hutan. Identification of some pathogens as causal agents of root rot disease on forest plant**/Anggraeni, I.; Suharti, M. 11 ill., 2 tables.; 13 ref. Summary (En). *Buletin Penelitian Hutan (Indonesia)* ISSN 1410-0649 (1997) (no. 610) p. 17-35.

FOREST TREES; PATHOGENICITY; IDENTIFICATION; ROOT ROTS; MICROSCOPY.

Pathogen the cause of root rot disease, may attack seedling and plantations. As the consequences, the attacking tree may finally die. Recently the occurence of this parasites and its disease intensity are relatively low, however serious attention should be carried out. This research is aimed at identifying the causal agent of root rot disease and studying its ecobiology which plays an important role in determining the control method. The occurence of disease is based on three factors, that is host species and source of inoculum and environmental conditions. Later, field study showed some pathogens are identified that is *Botryodiplodia sp*. the cause of root rot disease on *Paraserianthes falcataria* from HTI Tapin (South Kalimantan), *Pythium sp*. the cause of root rot on *Eucalyptus urophylla* from HTI Aek Nauli (North Sumatera) and *Rhizoctonia sp*. the cause of root rot disease on *Pinus merkusii* from Ciwidey (West Java).

0312 DARMONO, T.W.
**Development of specific antibody for serological detection of *Phytophthora palmivora* associated with cacao**/Darmono, T.W.; Suharyanto (Balai Penelitian Bioteknologi Tanaman Pangan, Bogor (Indonesia)); Darussamin, A. 3 ill., 9 tables, 6 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 615-631.

THEOBROMA CACAO; PHYTOPHTHORA PALMIVORA; ROOT ROTS; ANTIBODIES; IMMUNITY; ELISA.

Pod rot caused by *Phytophthora palmivora* is one of the most important diseases of *Theobroma cacao* worldwide. The use of serological technique provides a high accuracy in the determination and quantification of propagules of fungal pathogens in soil. The objective of this experiment was to develop a specific antibody against *P. palmivora* associated with cacao. Four types of antigens, i.e. extracellular polysaccharide, total protein, fixed mycellium and unfixed mycellium were used in the elicitation of antisera and egg yolk antibody in Red Island laying hens. Antigenic materials in the form of extracellular polysaccharide and total protein were found to be more immunogenic and rapidly induced antibody production. Using indirect-ELISA, it was found that antibody anti extracellular polysaccharide of *P. palmivora* was more specific than that of other forms of antibody preparations. Antibody anti extracellular polysaccharide obtained from egg yolk (Ig Y-α pP) was used in the subsequent study because it was easier to prepare and did not cause any harm to the animal. Based on Western blotting analysis, it was found that the Ig Y-α pP was specifically bound to antigenic polysaccharide at molecular weights of 36, 25, 23, 20, and 17 kDa. Ig Y-α pP produced in this study was highly specific to *P. palmivora* associated with pod rot disease of cacao. The presence of other microorganism in soil did not seem to interfere with the cross-reactivity between that antibody with antigenic materials produced by the pathogen. The Ig Y-α pP did not cross-react with antigens prepared from other microorganisms cultured *in vitro* including yeast and bacteria.

0313 HAZABAR, T.
**Reaction of callus of the susceptible soybean cultivars to filtrate of *Pseudomonas syringae* pv. Glycinea**/Hazabar, T. (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian); Rudolp, K.; Kasli; Chatrii, M. 4 ill., 3 tables, 17 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 605-613.

GLYCINE MAX; PSEUDOMONAS SYRINGAE; BLIGHT DISEASE; CALLUS; GROWTH; INDUCTION; DISEASE RESISTANCE.

Three kinds of media which generally used for tissue cultures from various plant species (MS, BDS, and M.Soy) were tested for inducing callus of soybeans. MS was the best medium for inducing soybeans callus. Soybeans-callus of Harosoy variety was tested for its ability to grow on BS medium + filtrat from 2 isolates, *P. syringae* p.v. glycinea (P7B, GSPB 2037) race 4 as toxic medium. Fibrate was added in filtrate + bacteria cell, bacteria with various concentration (0%, 5%, 15%, 20%, 25%). Callus was treated with toxic medium as much as 3 times with interval 3 weeks. Soybean-callus capability for growing on toxic medium increased up to toxic medium III with concentration of 20% - 25%.

0314 IDRIS, H.
**Efektifitas mulsa sebagai fungisida botanis terhadap penyakit layu tanaman cabe. The effectivity of mulches as botanical fungicides to plant necrosis of chili**/Idris, H.; Afrizon (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)). 4 tables; 10 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 55-58.

CAPSICUM ANNUUM; CORTICIUM ROLFSII; MULCHES; DISEASE CONTROL; FUNGICIDES; GROWTH; YIELD.

The synthetic pesticides for disease controlling caused negative impact. To gain benefit of botanical pesticides. The *Andopogon nardus* and *Imperata cylindrica* were chosen as potential plant for the research, because of their content: citronelal, citronellol, graniol and phenol (vanilic acid, p hydroxy, benzoate, p coumaric acid and verulic acid). An experiment carried out at IPPTP Laing, Solok (BPTP Sukarami), West Sumatra. The use of *A. nardus* and *I. cylindrica* for controlling *Sclerotium rolfsii*. Sac. caused necrosis of chili. The experiment used Randomized Block Design 4 treatments included mulches: *A. nardus*, *I. cylindrica*, *A. nardus* + *I. cylindrica* and mulches for control, (4 replications: there were 20 plants/replication). The use of mulches and infestation of fungi 600 g/square m on 15 days after planting

and 100 sclerotia/plant. The result showed that mulches *A. nardus* effected fungicide better necrosis of chili rate pathogen 3.25 mm/day, it could suppress percentage up to 87.50% in 30$^{th}$ day. Then the material growth optimum. The primary produce is 175.59% until mulches *I. cylindrica* it, but it is still better than control.

0315 MANOHARA, D.
**Jamur bawaan benih jambu mente. [Fungi infection on cashew seedlings]**/Manohara, D.; Hasnah, M.; Hoveriza, R. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 table; 8 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 171-173.

ANACARDIUM OCCIDENTALE; SEEDLINGS; PATHOGENS; FUNGI.

Jamur bawaan benih terdiri atas jamur patogenik dan jamur non patogenik (jamur gudang). Mutu benih menjadi menurun akibat jamur-jamur tersebut. Benih terkontaminasi merupakan sumber penyebaran patogen efektif. Pada penelitian pendahuluan dengan menggunakan metode kertas hisap, ternyata jamur *Aspergillus spp*., *Penicillium spp*., *Curvularia sp*., *Mucor sp*., *Fusarium sp*. dan satu isolat jamur yang belum teridentifikasi (isolat A) dapat terbawa pada benih jambu mente asal Getas dan Maros. Jamur isolat A dapat menyebabkan gejala layu dan mati pada bibit mente yang berumur 2 bulan.

0316 SANTOSO, D.
**Keberhasilan isolasi gen untuk sifat ketahanan terhadap PBK pada tanaman kakao. [Gene isolation success to fruit borer resistance on cacao]**/Santoso, D.; Chaidamsari, T.; Budiani, A.; Widiastuti, H. (Unit Penelitian Bioteknologi Perkebunan, Bogor (Indonesia)). 5 ill., 15 ref. Summary (In). [Proceeding of technical meeting of plantation biotechnology for practice: Efficiency of plantation enterprise by applied biotechnology approach] Prosiding pertemuan teknis bioteknologi perkebunan untuk praktek: Efisiensi usaha perkebunan melalui pendekatan bioteknologi terapan/Panji, T.; Siswanto; Santoso, D.; Widiastuti, H. (eds.); Unit Penelitian Bioteknologi Perkebunan, Bogor (Indonesia). Bogor (Indonesia): Unit Penelitian Bioteknologi Perkebunan, 1999: p. 49-58.

THEOBROMA CACAO; LEPIDOPTERA; BACILLUS THURINGIENSIS; MOLECULAR CLONING; MICROBIOLOGICAL ANALYSIS; PEST RESISTANCE.

Tanaman kakao toleran terhadap serangan PBK dirakit melalui rekayasa genetik menggunakan konstruk gen cry yang sesuai. Kloning gen dari *Bacillus thuringiensis* umumnya dilakukan melalui skrining pustaka genomik. Prosedur ini panjang dan sulit, dan sering menghasilkan klon tidak utuh mewakili ORFnya. Sebaliknya fragmen gen cryIA penyandi domain toksin dapat diklon dengan cara amplifikasi menggunakan teknik PCR, ligasi dengan vektor-T dan transformasi plasmid rekombinan ke dalam sel E. coli DH5-$\alpha$. Dengan pasangan primer spesifik untuk cryIA, 4 dari 7 preparasi DNA *B. thuringiensis* yang diamplifikasi menghasilkan fragmen 2 kb dan sisanya tidak menunjukkan adanya reaksi amplifikasi. Penetapan peta situs restriksi menggunakan enzim EcoRI dan HindIII menunjukkan bahwa fragmen tersebut berasal dari gen cryIA(b) dan cryIA(c). Ligasi fragmen produk PCR dengan vektor pGEM-T menghasilkan klon rekombinan pGEM/cryIA(c). Hasil sekuensing parsial ujung 3' gen membuktikan fragmen cryIA(c) terklon memiliki tingkat homologi yang tinggi dengan gen cryIA(c) yang dilaporkan sebelumnya (Dardenne et al., 1990).

0317 SULISTYOWATI, E.
**Development of movement protein gene constructs for increased resistance to CMV [Cucumber Mosaic Virus]**/Sulistyowati, E. (Balai Penelitian Tembakau dan Tanaman Serat, Malang (Indonesia)); Polkinghorne, I.; Schenk, P.; Dietzgen, R.G. 6 ill., 9 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 347-358.

TRANSGENIC PLANTS; CUCUMBER MOSAIC CUCUMOVIRUS; DISEASE RESISTANCE; BINDING PROTEINS; GENE TRANSPOSITION; TRANSCRIPTION; PCR.

Cucumber Mosaic Virus (CMV) has a broad plant host range infecting more than 800 plant species, and causes great yield losses in many crops. The lack of natural resistance genes to CMV in the plant population hampers the effort of plant breeder to develop resistant plants. However, recent technological advances enable the introduction of viral resistance genes into susceptible host by genetic transformation. Virus-derived essential genes such as movement protein (MP) gene have been used to generated transgenic plants which are resistant to viral infection. The MP has an important role in the cell-to cell spread of CMV. We aim to isolate the gene for the MP and incorporate it into binary plasmid vectors for use in plant transformation. The 3a gene of CMV Fny strain which codes for the MP has been subcloned from a full lenght clone of RNA 3 (pFny 309). It has been demonstrated for Tobacco Mosaic Virus (TMV) that only a dysfunctional MP may provide (broad spectrum) resistance; whereas expression of functional MP in transgenic plants led to accelerated virus spread. Therefore site-directed mutations of CMV MP were introduced to make it dysfunctional by deleting the 3$^{rd}$, 4$^{th}$, and 5$^{th}$ amino acids and by mutating the putative RNA binding domain. Three sets of oligonucleotide primer were designed to enable the generation of two versions of mutated CMV MP gene by PCR. To meet the cloning purposes, Nco I and Xba I sites were added at the 5' and 3' emds of the gene missing nucleotide 7-15. To introduce a mutation in the potential RNA binding site, two overlapping fragments of 480 bp and 390 which were generated by using the combination of MP5-MP4 and MP3-MP2 primers were blunt-end ligated through attached Stu I sites in each fragment. The amplified products were cloned in the (primary) vector pART7ES originating from pART7 which had received a 200 bp insert containing the Nco I - Xba I sites and the TEV 5'UTR sequence upstream of the Nco I site from pRTL2. In the final step, the fragments resulting from Not I digestion of pART7ES carrying either the deleted CMV MP, or the MP with mutated binding RNA site were transfered into the Not I cut binary vector pART27. Two possible orientations of each construct of CMV-deleted MP and CMV-mutated RNA binding site of MP were observed by digesting the plasmid DNAs with series of restriction endonucleases.

0318 SUPRIADI.
**Deteksi secara serologi *Pseudomonas solanacearum* dalam bibit jahe]. [Serological detection on *Pseudomonas solanacearum* in ginger seedlings]/**Supriadi; Mulya, K.; Febriyanti, D.; Adhi, E.M.; Karyani, N. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 2 tables; 6 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 167-170.

ZINGIBER OFFICINALE; IMMUNOLOGICAL TECHNIQUES; PSEUDOMONAS SOLANACEARUM; SEEDLINGS; ELISA.

Penyakit layu bakteri pada jahe yang disebabkan oleh *P. solanacearum* merupakan salah satu kendala utama budidaya jahe. Ketersediaan bibit jahe bebas patogen merupakan salah satu kunci keberhasilan budidaya jahe. Tulisan ini menguraikan cara mendeteksi patogen dalam bibit jahe menggunakan metode ELISA tidak langsung. Hasil penelitian menunjukkan metode ELISA menggunakan poliklonal antisera T872 bereaksi terhadap isolat-isolat *P. solanacearum, P. syzygii* dan *P. celebensis* dalam kultur murni. Teknik ELISA juga dapat mendeteksi *P. solanacearum* dalam tanaman yang menunjukkan gejala layu bakteri. Untuk mengurangi reaksi non spesifik dari jaringan tanaman (rimpang dan batang), ekstrak tanaman harus dibuat dalam larutan buffer yang mengandung sodium sulfit 0,2% dan merkaptoetanol 1%. Dengan teknik ELISA pemeriksaan sampel bibit jahe dapat dilakukan lebih cepat dibanding dengan cara konvensional.

0319 SURYADI, Y.
**Pengujian umbi kentang bebas infeksi laten dengan ELISA untuk pengendalian penyakit bakteri layu (*Pseudomonas solanacearum*). Testing of latent infection free potato tubers using ELISA to control bacterial wilt disease (*Pseudomonas solanacearum*)**/Suryadi, Y.; Machmud, M. (Balai Penelitian Biotehnologi, Bogor (Indonesia)); Rusmadi. 4 tables; 14 ref. Summaries (En, In). *Jurnal Penelitian Pertanian* (Indonesia) ISSN 0152-1197 (1999) v. 18 (1) p. 39-45.

SOLANUM TUBEROSUM; PSEUDOMONAS SOLANACEARUM; CLONES; SELECTION; LATENT INFECTIONS; ELISA; DISEASE CONTROL.

Pengujian umbi kentang bebas infeksi laten untuk mengendalikan penyakit bakteri layu (*Pseudomonas solanacearum*) pada 18 klon kentang asal International Potato Center (CIP, Peru) dilakukan dengan ELISA, menggunakan antibodi poliklonal spesifik terhadap bakteri layu. Hasil penelitian menunjukkan bahwa uji ELISA tidak langsung yang digunakan dapat mendeteksi adanya infeksi laten bakteri layu pada umbi kentang. Umbi kentang sehat hasil uji ELISA yang ditanam di lapangan tidak mengalami serangan penyakit dan menunjukkan intensitas serangan penyakit bakteri layu berkurang 34,8% dibanding dengan intensitas serangan penyakit pada umbi kentang yang tidak diuji ELISA.

0320 TOMBE, M.
**Penyakit busuk akar Fusarium pada bibit jambu mente. [Fusarium root rots disease on cashew seedlings]**/Tombe, M.; Taufiq, E.; Supriadi; Sitepu, D. (Balai Penelitian Tanaman Rempah dan Obat, Bogor (Indonesia)). 1 ill., 17 ref. Summary (In) . [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 183-190.

ANACARDIUM OCCIDENTALE; ROOT ROTS; FUSARIUM; SEEDLINGS; PATHOGENS.

Serangan patogen penyakit pada pembibitan dan tanaman muda jambu mente di lapangan menjadi kendala besar karena dapat mematikan tanaman atau berakibat pada merosotnya kesehatan tanaman secara menyeluruh. Bila terjadi di pembibitan akan beresiko terbawanya patogen ke lapangan. Serangan *Fusarium spp.* pada bibit jambu mente berumur 1-6 bulan di pembibitan telah menimbulkan kerusakan cukup serius di Nusa Tenggara Barat dan Bali. Hasil isolasi dari tanah dan bibit jambu mente yang sakit diperoleh banyak *F. solani* dan *F. oxysporum*. Jamur patogenik ini diduga telah ada dalam tanah atau terbawa oleh bibit ke lapang. Inokulasi kedua species Fusarium itu menimbulkan gejala pada bibit jambu mente. Upaya menanggulangi penyakit telah dilakukan dengan uji efikasi (*in vitro*) beberapa fungisida dan agensia hayati. Hasil penelitian menunjukkan, patogen-patogen tersebut sensitif terhadap fungisida berbahan aktif benomil, mankozeb dan fungisida nabati eugenol. Beberapa mikroba tanah dari golongan jamur dan bakteri ternyata bersifat antagonistik terhadap patogen. Hasil penelitian di laboratorium menunjukkan pula bahwa *F. solani* masih dapat hidup pada keadaan kritis (kelembaban 20% dan suhu $36^0$ C).

## H50 KELAINAN LAIN PADA TANAMAN

0321 SISWANTO.
**Immunological detection of specific protein from Latex C-serum in relation to tapping panel dryness disorder in *Hevea brasiliensis***/Siswanto; Suharyanto (Balai Penelitian Bioteknologi Tanaman Pangan, Bogor (Indonesia)); Darussamin, A. 6 ill., 12 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 689-698.

HEVEA BRASILIENSIS; PLANT DISEASES; TAPPING; DROUGHT; IMMUNE SERUM; ELECTROPHORESIS; ELISA; PLANT GROWTH SUBSTANCES; PROTEINS.

In rubber plantations, the incidence of Tapping Panel Dryness (TPD), which is normally caused by over exploitation or over stimulation can attain to 30%. In Indonesia, latex production losses due to TPD attack has attributed Rp140 billions/year. To develop a diagnostics tool for early detection of TPD, a research has been conducted to produce a specific egg yolk antibody (IgY). An antibody for TPD detection was developed by immunizing chickens using protein extracts of normal bark trees. Using I-ELISA test, the anti normal bark tree (Ab-N5) antibody was strongly reacted against latex C-serum of normal trees but reacted weakly against TPD infected trees. However, this antibody was not so specific if tested using samples from lutoid and bark protein of normal and TPD trees. The binding sites of Ab-N5 was against protein of C-serum with MW 66 kDa. This protein was disappreared when the trees was infected with TPD. The purification of this protein using sephacryl S-200 HR gel for further characterization and the

development of monoclonal antibody has being investigated. The successful treatment of TPD using bark scraping and added with growth regulators were also discussed.

## H60 GULMA DAN PENGENDALIAN GULMA

0322 ARDI.
**Identifikasi senyawa fenol ekstrak akar rimpang alang-alang (*Imperata cylindrica* (L.) Beauv) dan uji potensi alelopatinya terhadap perkecambahan gulma *Ageratum conyzoides* (L.) dan *Amaranthus spinosus* (L.). Identification of phenolic substances of rhizome of alang-alang (*Imperata cylindrica* (L.) Beauv) and it's allelopathic potential on the germination of *Ageratum conyzoides* (L.) and *Amaranthus spinosus* (L.) weeds**/Ardi; Fitriani; Agustini, D. (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian). 1 table; 6 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 59-61.

AGERATUM CONYZOIDES; AMARANTHUS SPINOSUS; IMPERATA CYLINDRICA; EXTRACTS; ALLELOPATHY; PHENOLIC CONTENT; GERMINABILITY.

An experiment to identify the phenolic substances of rhizome of alang-alang (*Imperata cylindrica* (L.) Beauv) and its allelopathic potential on the germination of *Ageratum conyzoides* (L.) and *Amaranthus spinosus* (L.) weeds was conducted at the Laboratory of Department of Chemistry, Faculty of Mathematics and Natural Sciences and the Laboratory of Department of Agronomy, Faculty of Agriculture, Andalas University during the period of July to October 1998. Phenolic substances of alang-alang rhizome extract was identify by using Thin Layer Chromatography. Mixture of six phenolic substances identified i.e. coumaric acid, anisic acid, isoverulic acid, salisilic acid, vanilin and salisil aldehide, at the concentration of 0, 50 ppm, 100 ppm, 200 ppm, 400 ppm and 800 ppm as treatment that were applied to seeds of *Ageratum conyzoides* and *Amaranthus spinosus*. Treatments were arranged in Complete Randomized Design with five replications. Data were collected on germination percentage and index value, and final data were analyzed statistically. Result indicated that extract of alang-alang rhizome contained phenolic substances such as coumaric acid, anisic acid, isoverulic acid, salisilic acid, vanilin, and salisil aldehide. The mixture of those phenolic substances at the concentration of 800 ppm suppressed the germination of *Ageratum conyzoides* and *Amaranthus spinosus*.

0323 ARDI.
**Pengaruh gabungan beberapa senyawa fenol terhadap perkecambahan gulma Euphorbia prunifolia. Effect of mixture of phenolic substances on germination of Euphorbia prunifolia weed seeds**/Ardi (Universitas Andalas, Padang (Indonesia). Fakultas Pertanian). 1 table; 5 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 62-63.

EUPHORBIA; PHENOLIC CONTENT; GERMINATION.

An experiment to study the effect of mixture of phenolic substances on germination of *Euphorbia prunifolia* weed seeds was carried out at the Laboratory of Department of Agronomy, Faculty of Agriculture, Andalas University Padang during the period of May to June 1999. The experiment was concentrated on mixture of six phenolic substances (coumaric acid, anisic acid, isoverulic acid, salisilic acid, vanilin, and salisil aldehide) i.e. 0, 200 ppm, 400 ppm, 800 ppm, 1200 ppm, and 1600 ppm. Treatments were arranged in Complete Randomized Design with three replications. Data were collected on germination percentage, index value, length of radicle and plumule; and final data were analyzed statistically. Result indicated that mixture of phenolic substances at the concentration up to 1200 suppressed the germination, while at the concentration of 1600 ppm inhibited the germination of *Euphorbia prunifolia* weeds seeds.

0324 PANGEMANAN, L.
**Perubahan komposisi jenis gulma pada pertanaman kedelai : pengaruh dosis herbisida alachlor. Effect of dosage alachlor to weeds composition in Soybean areal**/Pangemanan, L. (Universitas Sam

Ratulangi, Manado (Indonesia). Fakultas Pertanian). 3 tables; 8 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 181-185.

GLYCINE MAX; WEED CONTROL; ALACHLOR; HERBICIDES; BOTANICAL COMPOSITION; DOSAGE EFFECTS.

The research of herbicide dosage alachlor effects on weeds composition in soybean areal was carried out at Pandu Village Minahasa District. The research was use Completely Random Design with seven variation of dosage alachlor : 0,0; 0,5; 1,0; 1,5; 2,0; 2,5; and 3,0 kg/Ha. Each treatment was replicated three times. The result showed that the composition and biomass of weeds was affected by herbicide dosage. The best treatment was 30 kg/Ha alachlor that can reduce biomass and weeds composition in soybean areal.

## J10 PENANGANAN, TRANSPORT, PENYIMPANAN DAN PERLINDUNGAN HASIL PERTANIAN

0325 RAHARDJO, B.
**Koefisien perpindahan panas permukaan bola dengan aliran udara paksa dalam pipa. [The Coefficient of surface ball heat transfer by forced air circulation in the pipe]**/Rahardjo, B.; Suratmo, B. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Teknologi Pertanian); Sukarjo. 3 ill., 2 table., 13 ref. Summary (En). *Agritech (Indonesia)* ISSN 0216-0455 (1998) v. 18 (2) p. 14-18.

AGRICULTURAL PRODUCTS; HEAT TRANSFER; SURFACE AREA; AIR TEMPERATURE; ORGANIC MATTER.

Handling and processing of agricultural products mostly consist of heat transfer. Commonly the heat process of agricultural products is conducted in closed systems with air forced circulation. The process of heat transfer is significantly controlled by the values of the coefficient of surface heat transfer. Therefore the objectives of the research were to determine the pertinent parameters affecting the coefficient of heat transfer of sphere in forced air circulation and then to develop the mathematical relationship of those parameters. The mathematical relationship was determined using dimensional analysis composing dimension less numbers such as Nusselt, Reynolds and size ratio. The coefficient of surface heat transfer were determined by heat capacitance method and analytic approaches using samples of sphere made from copper and wood respectively. The results indicate that the relation of the dimension less groups were significant. The coefficient of surface heat transfer appropriately can be expressed using the pertinent parameters.

## J11 PENANGANAN, TRANSPORT, PENYIMPANAN DAN PERLINDUNGAN HASIL TANAMAN

0326 SUKARMAN.
**Penanganan benih jambu mente bermutu tinggi. [Handling of high quality cashew seedlings]**/Sukarman; Hasanah, M.; Rusmin, D.; Rumiati (Balai Penelitian Rempah dan Obat, Bogor (Indonesia)). 4 tables; 17 ref. Summary (In). [Proceedings of Scientific Consultation of Spices and Medicinal Crops Seedling]. Prosiding Forum Konsultasi Ilmiah Perbenihan Tanaman Rempah dan Obat/Hasanah, M.; Dhalimi, A.; Sitepu, D.; Supriadi; Hobir (eds.). Bogor (Indonesia): Balittro, 1997: p. 191-195.

ANACARDIUM OCCIDENTALE; SEEDLINGS; FUSARIUM; DISEASE CONTROL.

Ketersediaan benih bermutu tinggi dari klon-klon/nomor unggul dalam jumlah yang tepat sangat diperlukan guna menunjang program pengembangan jambu mente, khususnya di Kawasan Timur Indonesia. Salah satu faktor yang berpengaruh terhadap mutu fisiologis benih klon-klon atau nomor unggul adalah penanganan benih setelah panen yang mencakup: pengeringan atau penjemuran, sortasi,

penyimpanan dan perlakuan benih. Untuk mempertahankan mutu fisiologis benih setelah panen, benih harus segera dikeringkan sampai mencapai kadar air 6-7%, disortasi dan disimpan dalam kemasan kantong plastik kedap udara. Beberapa penelitian telah dilakukan dalam rangka mempertahankan mutu fisiologis benih jambu mente.

## J13 PENANGANAN, TRANSPORT, PENYIMPANAN DAN PERLINDUNGAN HASIL HUTAN

0327 IRAWATI, Z.

**Pengaruh iradiasi gamma pada kualitas daging segar; 2. Beberapa karakteristika kimia daging sapi. Effect of gamma irradiation on the quality of fresh meat; 2. some chemical characteristics of beef**/Irawati, Z.; Iriawan, T. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)); Agustina, R.N.; Giyatmi. 3 tables; 12 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 215-221.

BEEF; GAMMA IRRADIATION; KEEPING QUALITY.

Suatu penelitian telah dilakukan untuk menentukan pengaruh iradiasi gamma pada beberapa karakteristik kimia daging sapi segar. Sampel daging sapi segar dipotong kecil-kecil, kemudian dikemas dalam kantong poliamida laminase yang divakum, lalu diiradiasikan dengan dosis 10 dan 20 kGy pada suhu $-79^0$ C. Sampel selanjutnya disimpan selama 2 bulan pada suhu $-4^0$ C dengan kelembaban nisbi 75-77%. Parameter objektif yang diamati ialah pengukuran warna, kandungan kolagen, kadar lemak, identifikasi gugus fungsional, dan identifikasi asam lemak. Hasil yang diperoleh menunjukkan bahwa daging sapi segar dalam kemasan kantong poliamida laminasi yang divakum dan diiradiasi dengan dosis 10 dan 20 kGy pada kondisi beku ($-79^0$ C) mengalami penurunan secara nyata pada intensitas warna dengan meningkatnya dosis iradiasi. Iradiasi dengan dosis sampai 20 kGy ternyata tidak menyebabkan perubahan yang nyata pada kandungan kolagen, kadar lemak, perubahan gugus fungsional dan komponen asam lemak dari sampel yang diamati, baik sebelum maupun sesudah penyimpanan sampai 2 bulan.

## J14 PENANGANAN, TRANSPORT, PENYIMPANAN DAN PERLINDUNGAN HASIL PERIKANAN DAN BUDIDAYA PERAIRAN

0328 NITIBASKARA, R.

**Pengaruh insulasi pada alat angkut udang hidup untuk trasnportasi sistem basah terbuka dengan rak bertingkat. [Effect of insulation on transport equipment of live prawns for open wet system transportation by multistored rack]**/Nitibaskara, R.; Wibowo, S.; Affandi, R. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 5 ill.; 2 tables; 22 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 34-42.

PENAEUS MONODON; TRANSPORT OF ANIMALS; INSULATION; HARVESTING; MORTALITY; WATER QUALITY; WATER TEMPERATURE.

Penggunaan rak bertingkat untuk transportasi sistem basah merupakan salah satu upaya untuk meningkatkan kapasitas angkut. Penekanan metabolisme dan respirasi dengan menggunakan suhu rendah, selain meningkatkan ketahanan hidup juga meningkatkan kapasitas, menghemat air serta mengurangi pencemaran air oleh hasil metabolisme. Penelitian terhadap masalah ini sudah dilakukan, udang yang diangkut hidup dengan rak bertingkat (15 kg udang/bak, kepadatan 1 kg udang/10 l air) menghasilkan tingkat kelulusan hidup 81,9% untuk waktu transpotasi 10 jam. Masalah yang dihadapi adalah suhu air cepat meningkat, dan kandungan metabolit juga meningkat. Apabila kenaikan suhu dan metabolit dapat ditekan diduga ketahanan hidup udang meningkat. Untuk itu, bak pengangkut yang digunakan

dimodifikasi dengan menambahkan sistem insulasi untuk membantu mempertahankan suhu air tetap stabil rendah. Setelah dimodifikasi, bak pengangkut digunakan untuk mengangkut udang hidup dari tambak. Hasilnya menunjukkan bahwa pemasangan insulasi pada alat angkut transportasi udang hidup secara langsung mampu menahan laju kenaikan suhu air selama transportasi dan mencapai suhu $21^0$ C setelah jam ke 10, atau 6-7 jam lebih lama daripada alat angkut tanpa insulasi. Selain itu, upaya mempertahankan suhu media air tersebut secara langsung mampu menahan laju kenaikan kandungan $NO_2$ dan $CO_2$, meningkatkan tingkat kelulusan hidup udang dan waktu angkut, akan tetapi belum mampu menekan kenaikan kandungan $NH_3$. Transportasi udang hidup dengan bak berinsulasi dengan rak bertingkat setelah diimotilisasi pada suhu $19^0$ C langsung menghasilkan tingkat kelangsungan hidup 91,86% untuk 12 jam transportasi.

## K50 PENGOLAHAN HASIL HUTAN

0329 DANU, S.

**Uji produksi pelapisan kayu sengon (*Paraserianthes falcataria*) dengan radiasi Ultra-violet. Production test of surface coating of sengon wood (*Paraserianthes falcataria*) using ultra-violet radiation** /Danu, S.; Darsono; Sunarni, A. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 6 tables; 11 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 277-283.

PARASERIANTHES FALCATARIA; LAMINATED WOOD; ULTRAVIOLET IRRADIATION; VISCOSITY; MECHANICAL PROPERTIES.

Uji produksi pada proses pelapisan papan kayu sengon (100 x 40 x 1,2 cm) telah dilakukan menggunakan resin epoksi akrilat dan poliester tak jenuh sebagai bahan pelapis radiasi, dan ultra-violet (UV) sebagai sumber radiasi. Proses pelapisan meliputi pekerjaan pengampelasan, pelapisan, dan iradiasi. Peralatan utama yang dipakai terdiri dari 3 buah mesin ampelas tangan, sebuah alat pelapis tipe lebar 60 cm, dan sumber radiasi UV 1 lampu dengan daya 80 Watt/cm yang dilengkapi konveyor. Proses produksi dilakukan dalam 3 kelompok, dan terhadap masing-masing kelompok dilakukan pengujian sifat bahan pelapis dan lapisan hasil iradiasi. Sifat bahan pelapis yang diuji meliputi densitas, viskositas, dan kandungan bahan menguap, sedangkan sifat lapisan yang diuji meliputi kilap, kekerasan dan adesi. Hasil uji produksi menunjukkan bahwa tidak terdapat perbedaan yang berarti pada sifat bahan pelapis dan sifat lapisan antara kelompok, kecuali adesi pada penggunaan metode uji tarik. Bahan pelapis epoksi akrilat menghasilkan lapisan lebih baik dibanding bahan pelapis poliester tak jenuh, baik ditinjau dari segi penampilan, maupun sifat lapisan.

0330 HOLIS, Y.M.

**Pengaruh penstabil ultra violet terhadap sifat lapisan poliestier tak jenuh pada kayu kamper (*Dryobalanops spp.*) hasil iradiasi sinar ultra violet. Effect of ultra violet stabilizer on the properties of unsaturated polyester film on ultra violet irradiated kamper (*Dryobalanops spp.*)**/Holis, Y.M.; Hadi, Y.S. (Institut Pertanian Bogor (Indonesia). Fakultas Kehutanan); Danu, S. 1 ill., 10 tables; 8 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 231-236.

DRYOBALANOPS; LAMINATED WOOD; ULTRAVIOLET IRRADIATION; MECHANICAL PROPERTIES.

Jenis penstabil ultra violet (UV) telah dipakai dalam penelitian ini untuk mengetahui pengaruhnya terhadap sifat lapisan poliester tak jenuh hasil pengeringan menggunakan radiasi sinar UV. Campuran resin poliester tak jenuh dengan monomer stiren ditambah penstabil UV, yaitu Bis (2,2,6,6-tetramethyl-4-piperidyl), pada variasi konsentrasi 0, 0,25 dan 0,5% berat. Iradiasi dilakukan menggunakan sumber radiasi UV dengan intensitas 80 Watt/cm pada kecepatan konveyor 2,3,4 dan 5 m/menit. Parameter yang diukur meliputi viskositas, kekerasan pendulum, ketahanan kikis, adesi, kilap dan ketahanan terhadap bahan kimia, pelarut dan noda. Hasil pengujian menunjukkan bahwa pada umumnya penambahan penstabil UV berpengaruh positif terhadap sifat lapisan poliester, yaitu dengan meningkatkan viskositas, kilap, kekerasan, ketahanan kikis, tetapi tidak berpengaruh pada adesi serta ketahanan terhadap bahan kimia, pelarut dan noda.

0331 SANTOSO, D.
**Identification of proteins from natural rubber latex potentially causing allergic reaction**/Santoso, D.; Siswanto (Balai Penelitian Bioteknologi Tanaman Pangan, Bogor (Indonesia)). 4 ill., 2 tables; 18 ref. Summary (En). Proceedings of the Indonesian biotechnology conference, vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 659-669.

RUBBER CROPS; LATEX; HYPERSENSITIVITY; ANTIBODIES; IMMUNE SERUM; ANTIGENS; ELISA.

Identification and isolation of protein allergens in natural rubber latex were conducted to produce antibody with which a marker to select rubber-tree clones expressing less allergens will be developed. The total proteins of the lutoid fraction of natural rubber latex were fractionated on SDS-PAGE. The major proteins were cut from a preparative gel and assayed for skin prick test on a New Zealand White rabbit to determine their allergenicity. Three of the six major bands indicated positive reaction. These reactive proteins were also utilized for production of antisera in the rabbit. The anti-allergen antisera were then tested for the presence of the respective antibody using ELISA. In both cases we found that the 36 kDa protein was the most reactive. Therefore we conclude that the 36 kDa lutoid protein was an allergen.

## L01 PETERNAKAN

0332 BUTARBUTAR, T.B.
**Subtitusi sebagian ransum dengan limbah pertanian terhadap kolestrol darah dan karkas ayam broiler. Subtitution of ration with agriculture waste on blood cholesterol and carcass of broiler**/Butarbutar, T.B. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 1 ill.; 4 tables; 10 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 220-225.

BROILER CHICKENS; RATIONS; SUPPLEMENTS; AGRICULTURAL WASTES; FEED CONVERSION EFFICIENCY; CHOLESTEROL; CARCASS COMPOSITION; NUTRITIVE VALUE.

The effects of substitution of agriculture waste as feed supplement has been reported on some literatures. The data however varied according to the environment condition. The objective of this study was to evaluate the effects of agriculture was supplement on feed conversion, carcass percentage, and blood cholesterol. The experimental animal was 28 broilers at the age of 8 weeks. The experiment was carried out in Completely Randomized Design of four treatments and seven replications. The treatment consisted of A=30% corn, B=30% corn strow, C=30% banana leaf and D=30% rice brand. The variables observed were carcass percentage, feed conversion and blood cholesterol. The results showed that corn strow reduced blood cholesterol, where as rice brand and corn reduced feed conversion.

## L02 MAKANAN HEWAN DARAT

0333 SASANGKA, B.H.
**Pengaruh pemberian suplementasi pakan pada sapi potong peranakan Onggole (PO) terhadap kenaikan bobot dan dampak peningkatan ekonomi petani peternak. The effects of feed**

**supplementation of Onggole inbred (PO) beef cattle on the increase of body weight and the impact on the economic income of farmers**/Sasangka, B.H. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 2 ill., 5 tables; 9 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 325-330.

BEEF CATTLE; SUPPLEMENTARY FEEDING; BODY WEIGHT; FARM INCOME.

Suatu penelitian pemberian suplementasi pakan pada sapi potong terhadap peningkatan bobot dan dampaknya ekonomi peternak telah dilakukan. Dalam penelitian ini digunakan sapi potong PO milik petani peternak sebanyak 20 ekor di Kel. Sumberrejo dan 24 ekor di Kel. Mojopuro. Sapi-sapi tersebut dibagi dalam dua kelompok, kelompok pertama diberi suplemen dan kelompok kedua diperlakukan sebagai kontrol. Sebagai pakan basal digunakan rumput/jerami yang diberikan secara ad libitum dan suplemen diberikan sebanyak 300 gram/ekor/hari. Penelitian ini dilakukan selama 16 minggu untuk mengetahui pengaruh pemberian suplemen pakan terhadap kenaikan bobot badan dan peningkatan ekonomi petani peternak. Hasil penelitian menunjukkan bahwa kenaikan bobot pada sapi yang diberi suplemen lebih tinggi dari kontrol yaitu sebesar 0,50 kg/hari vs 0,31 kg/hari untuk Kel. Sumberrejo, dan 0,40 kg/hari vs 0,26 kg/hari untuk Kel. Mojopuro. Pemberian suplemen juga meningkatkan pendapatan ekonomi peternak sebesar Rp 612,57/ekor/hari untuk di Kel. Sumberrejo dan Rp 392,57/ekor/hari di Kel. Mojopuro.

## L10 GENETIKA DAN PEMULIAAN HEWAN

0334 ROVARA, O.
**Methods of initiating animal tissue culture**/Rovara, O. (Pusat Pengembangan Ilmu Pengetahuan dan Teknologi, Serpong (Indonesia)). 5 ill., 1 table; 18 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 481-496.

RABBITS; EWES; ANIMAL BIOTECHNOLOGY; EXPLANTS; ORGAN CULTURE; CELL CULTURE; TRYPSIN; PROTEASES; ENZYME INHIBITORS; METHODS.

This paper describe some methods of animal tissue culture. Animal tissue culture technique can be used in medical or biological research such as the understanding of neoplasia, genetic analysis and the production of vaccines, hormones, monoclonal antibodies etc. This technique has been also adopted into many routine applications in medicine and industry. There are three main methods of initiating a culture; (1) Organ culture implies that the architecture characteristic of the tissue in vivo is retained in the culture (2) in primary explant culture, a fragment of tissue is placed at a glass (or plastic) or liquid interfase where following attachment, migration is promoted in the plane of the solid surface (3) Cell culture implies that the tissue or outgrowth from the primary explant is dispresed (mechanically or enzimatically) into a cell suspension which may then be cultured as an adherent monolayer on a solid substrate or as a suspension in the culture medium. The production of steroid sex hormone by organ culture using rabbit ovarian and primary culture technique using ewe ovarian are discussed.

0335 SUTARNO.
**Genetic markers for production traits in beef cattle**/Sutarno; Lymbery, A.J. (Murdoch University, Perth (Australia)). 3 ill., 6 tables; 34 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 563-575.

BEEF CATTLE; GENETIC MARKERS; MOLECULAR GENETICS; LOCI; ANIMAL PERFORMANCE; PCR; RFLP; ENZYMES.

New technologies in molecular genetics potentially enable direct analysis of traits at the level of the gene. Coupled with the innovations in quantitative genetics, advances in molecular genetics enable us to identify, map and measure the effect of Quantitaive Trait Loci (QTL) affecting production traits. A genetic marker is a variable DNA sequence which co-occurs with a variable quantitative trait. Polymerase Chain Reaction-Restriction Fragment Length Poly morphism (PCR-RFLP), a PCR based technique, is now extensively used in genetic marker analysis. The growth hormone gene and mitochondrial DNA of 278 purebreed and composite cattle were genotyped using PCR-RFLP. Contrary to theoretical expectation, there were no differences in genetic diversity between purebreed and composite cattle. We found an additional TaqI site in the mitochondrial D-loop region to be associated with decreased breeding values for the maternal component of pre-weaning growth rate in composite cattle. In herefords, we found substitution of a leucine to valine at animo acid position 127 in exon V of the growth hormone gene to be associated with greater pre-weaning growth rates and greater breeding values for birth weight and direct (not maternal) growth to weaning.

## L50 FISIOLOGI HEWAN DAN BIOKIMIA HEWAN

0336 RUMIYATI, V.S.P.
**Isolasi bakteri enzim lipase alkali dari kulit hewan. [Isolation of bacteria produced alkaline lipase enzyme from animal skin]**/Rumiyati, V.S.P. (Balai Besar Litbang Kulit, Karet, dan Plastik, Yogyakarta (Indonesia)); Indrati, R. 5 ill.; 19 ref. Summary (En). *Agritech (Indonesia)* ISSN 0216-0455 (Jul 1999) v. 18 (2) p. 5-9.

BACTERIA; MICROBIOLOGICAL ANALYSIS; SKIN PRODUCING ANIMALS; TRIACYLGLYCEROL LIPASE; ENZYMIC ACTIVITY; ANTIMICROBIALS.

Twenty seven bacterial strains isolated on a medium containing 0.50% palm oil as substrate and 0.015% spirit blue as an indicator from several raw hides of chicken, goat and cow showed an extracellular lipase activity. Of these strains, 10 were higher lipase producers. Lipases produced from five of these 10 isolates were stable on alkaline conditions, ranging from pH 8.0 to 11.0. Furthermore activity of these enzymes was not inhibited by the presence of non-ionic, cationic nor ionic surfactants at concentration of 0.05% or 0.10%. Conversely, some of these surfactans could even activate the enzyme.

## L51 FISIOLOGI TERNAK DAN NUTRISI

0337 KHOTIJAH, L.
**Neraca nitrogen kambing Kacang yang mendapatkan ransum dengan berbagai tingkat ampas sagu (*Metroxylon sp.*). [The nitrogen ratio of "Kacang" goats feeding with different level of sago by product]**/Khotijah, L.; Parakkasi, A.; Herman, R. (Institut Pertanian Bogor (Indonesia). Fakultas Peternakan). 3 tables; 9 ref. Summary (En). *Media Peternakan (Indonesia)* ISSN 0126-0472 (1999) v.22(1) p. 18-24.

GOATS; SAGO BYPRODUCTS; FEEDING LEVEL; NITROGEN; METABOLISM; ANIMAL FEEDING; PROXIMATE COMPOSITION.

The aim of this study was to evaluate the effect of level of sago by products (*Metroxylon sp*.) on nitrogen metabolism. This research used five female kacang statis which age 10 months and average weight 10.4 kg. The goats were fed five kind of ration randomly can one and another during the experiment. The rations were R1=0% sago by products; R2=10% sago by products; R3=20% sago by products; R4=30% sago by products; R5=40% sago by products. The design of experiment was Latin Square 5 x 5 where animal as a colomn and period as line. The significantly influence nitrogen comsumption, nitrogen faeces, nitrogen urine N-$NH_3$ production and nitrogen retention. This study concluded that sago by products can be used up to 40% as energy source in ruminant rations.

0338 WIDYANI, R.R.
**Sulfur amino acid requirement for maximum growth of broiler chicks in Indonesia**/Widyani, R.R.; Prawirokusumo, S.; Nasroedin (Universitas Swadana Gunung Djati, Cirebon (Indonesia)); Zuprizal. 9 tables; 25 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 513-524.

BROILER CHICKENS; NUTRIENT INTAKE; SULPHUR AMINO ACIDS; DIET TREATMENT; GROWTH; INDONESIA.

This experiment was designed to estimate the sulfur amino acid (SAA) requirement of broiler chicks diet using on endogenous feedstuff. One hundred and seventy five (175) broiler chicks unsex in this experiment, set on 3 experimental factors design consisted of elevations (0 and 600 m above the sea level), seasons (rainy, dry and intermediate), breeds (Arbor Acres and Hubbard). Two periods of experiments were carried out to estimate the requirement of SAA at stater (0-21 day) and finisher (22-42 day) periods. SAA were used at level of 0.51%, 0.63%, 0.75%, 0.87%, 0.99%, and 0.52%, 0.575%, 0.63%, 0.685%, 0.74% at starter and finisher periods, respectively. Experimental diets contained 15% crude protein and metabolism energy 2900 Kcal/kg and 3200 Kcal/kg at starter and finisher periods. Data of growth rate used to see of curves response reached plateau. Data analyzed by ANOVA and data of growth rate analyzed by regressi non linear asymtotic. Exponensial response curves were fitted to experimental data poins using the following equations: $Y=A+B(1-EXP^{-C(X-D)})$ used SPSS for Windows to calculate parametric approach and Microsoft Excell program to calculate value of X on Y 95% maximum. The result of this experiment indicated that the effect of elevations and seasons highly significant ($P<0.01$), but the effect of breed non significant. Interactions the experimental factors and level of SAA was significant ($P<0.05$). The requirement of SAA on elevation 0 m above the sea level was estimated 0.90% and 0.73%, 600 m above the sea level 0.91% and 0.71%, dry season 0.89% and 0.67%, intermediate season 0.90% and 0.71%, rainy season 0.88% and 0.71%, breed Arbor Acres and Hubbard 0.90% and 0.68% at starter and finisher period, respectively. Based on pooling using means of growth rate, the results of this experiment indicated that the requirement of SAA level for maximum growth was estimated 0.87% and 0.72% based from exponential response curve $Y=282+68(1-EXP^{-6.86\ (X-0.27)})$ and $Y=900+80(1-EXP^{-3.74\ (X-0.29)})$ at starter and finisher periods, respectively. Requirement SAA in subtropical countries were 0.74% and 0.66%, so this requirement 0.13% and 0.06% higher than sub tropical recommendation at starter and finisher periods, respectively. Based on this experiment indicated that in Indonesia need amino acids higher for maximum growth.

## L73 PENYAKIT HEWAN

0339 BERIAJAYA.
**Pengaruh vaksinasi dengan larva tiga *Haemonchus contortus* Rudolphi yang diradiasi terhadap nilai fraksi protein dan nisbah gamma globulin pada domba. The effect of vaccination with irradiated larvae of *H. contortus* Rudolphi on total protein and gamma globulin in sheep**/Beriajaya (Balai Penelitian Veteriner, Bogor (Indonesia)). 2 ill., 18 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 303-308.

SHEEP; HAEMONCHUS CONTORTUS; VACCINATION; GAMMA RADIATION; IMMUNOGLOBULINS.

Tujuan dari penelitian ini untuk mengetahui pengaruh pemberian larva tiga cacing *Haemonchus contortus* Rudolphi yang diradiasi pada domba terhadap nilai fraksi protein dan nisbah gamma globulin. Sebanyak 10 ekor domba jantan muda yang berumur 4-5 bulan dan telah bebas cacing dibagi menjadi 2 kelompok masing-masing terdiri dari 5 ekor. Kelompok pertama diberi secara per oral 10.000 larva tiga *H. contortus* yang telah diradiasi pada minggu ke 4, 7 dan 10 mulai dari saat pengambilan sampel, kemudian ditantang

secara per oral dengan 20.000 larva tiga *H. contortus* pada minggu ke 13. Kelompok kedua merupakan kelompok kontrol tanpa pemberian larva tiga *H. contortus* yang diradiasi tetapi mendapat tantangan secara per oral dengan 20.000 larva tiga *H. contortus* pada minggu ke 13. Pengamatan terhadap nilai fraksi protein dan nisbah gamma globulin dari serum domba dilakukan setiap minggu selama 19 minggu. Hasil penelitian menunjukkan bahwa nilai fraksi protein lebih tinggi (P[0,05) pada kelompok domba yang diberi larva radiasi (5,93 g/dl) dibanding kelompok kontrol (4,92 g/dl). Selain itu rata-rata nisbah gamma globulin juga lebih tinggi (P[0,05) pada kelompok pertama yang diberi larva radiasi (365,73 mg/ml) dibanding kelompok kontrol (256,70 mg/dl). Hasil ini menunjukkan bahwa pemberian larva radiasi pada domba kemungkinan menimbulkan respon kekebalan terhadap infeksi cacing, tetapi belum diketahui daya protektifnya.

0340 HARYANA, S.M.
**The expression of immediate early gene in leukemia**/Haryana, S.M. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Kedokteran). 2 ill., 4 tables; 20 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 807-817.

BLOOD DISORDERS; GENETIC DISORDERS; ANAEMIA; GENE EXPRESSION.

The aim of this study was to analyse the expression of immediate early Genes (IEG) c-myc, c-myb and c-fos on leukemia cells. The relation of overexpression were also studied. The expression of Acute Lymphoblastic Leukemia (ALL), Acute Myeloblastic Leukemia (AML) and Chronic Myeloblastic Luekemia (CML) were examined in total RNA by Northern hybridization. The results showed that overexpressions of c-myb related to poor prognosis of the ALL, but no difference of a rate of good prognosis between c-myc mRNA alone and c-myc plus c-myb mRNA. C-myc overexpression in ALL, AML, and CML showed poor prognosis and in leukemia patiens who did not express c-myc mRNA survived for more than 2 years. However, c-fos expression did not related to the prognosis of leukemia. The mRNA turnover of c-myc, c-myb, and c-fos more than 75' (normally + 30'). This study concluded that overexpression of c-myc increased the agressiveness of the disease (poor prognosis) and the mechanism of this overexpression partly caused by prolongation was of mRNA turnover.

0341 NUGROHO, T.T.
**A model for the regulation od cyclin-dependent kinase inhibitors important in cell-cycle control**/Nugroho, T.T. (Universitas Riau, Pekanbaru (Indonesia)); Al-Jumaily, W.; Mendenhall, M.D. 5 ill., 25 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 779-795.

HUMAN DISEASES; NEOPLASMUS; CYCLING; GROWTH INHIBITORS; PHOSPHORYLATION; CYTOKINES.

Genetic instability is a common feature of cancer cells, and plays an important role in accelerating progression from normal cells to cancerous cells. Cyclin-dependent kinase inhibitors (CKIs) is considered a new important class of tumor suppressors, and the loss of function of CKIs has been implicated in genetic instability leading to progression of cancer cells. CKIs act by inhibition of cyclindependent kinases (CDKs) that play an important role in the proper timing of cell cycle events. Yeast cells provide a good model to study the molecular mechanism underlying the cell cycle and events in the cell cycle that can lead to the progression of tomorigenecity. This is possible because of a high homology between the CDKs of yeast cells and human cells, the apparent functional homology between CKIs from yeast and human cells, the ease of growing yeast cells, manipulating it genetically and studying its cell cycle progression. Sicl is a yeast CDK that plays an important role in maintaining genetic stability through multiple cell division, and is required to prevent premature DNA replication. Sicl has been shown to be a substrate and inhibitor the yeast CDK. Cdc28. Here we present data showing the importance of Sicl phosphorylation by Cdc28 on specific CDK substrate concensus sequence sites, for the ubiquitin mediated proteolysis of Sicl required for cells to enter S phase. Single site-directed mutations of T33 to V, T45 to A or S76 to A on Sicl arrest the yeast cell cycle with a multibudded phenotype when overexpressed, while mutations of S 191 to A or wild-type overexpression did not. This multibudded pnenotype is similar to the

phenotype produced when an ubiquitin-conjugating enzyme gene is deleted from yeast cells. The multibuddes phenotype is also observed at wild-type levels of a T33VT45A double mutant. Evidenve show that the effect of phosphorylation on multiple sites on Sicl is additive. We present a model mechanism for the regulation of CKIs involving multiple phosphorylation of CKIs as a signat for degradation through a ubiquitin mediated pathway. It is possible that such a mechanism exists in mammalian cell cycle regulation. Parallels exists between the model proposed in yeast cells and evidencelhomologous protcins found in mammalian cells. Understanding better the regulation of CKIs and its role in the cell cycle will aid in finding effective therapies for cancer or for finding ways to induce cell proliferation in damaged organs or tissues.

0342 ROZA, D.
**Pengendalian Vibrio harveyi pada larva kepiting bakau (*Scylla serrata* Forskal) melalui desinfeksi induk selama pengeraman telur. Control of Vibrio harveyi on mangrove crab larvae (*Scylla serrata* Forskal) by disinfection of spawner during egg incubation**/Roza, D.; Johnny, F. (Loka Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 4 tables; 14 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 28-34.

SCYLLA; LARVAE; DISINFECTION; VIBRIO; OXYTETRACYCLINE; DISEASE CONTROL; BROODING; PATHOGENICITY; ISOLATION TECHNIQUES; MORTALITY; HATCHING.

*Vibrio harveyi* merupakan salah satu patogen pada pembenihan kepiting bakau dan dapat menginfeksi telur maupun larva. Tujuan percobaan untuk mengetahui efektivitas tiga jenis antibiotik sebagai desinfektan pada induk yang sedang mengerami telur guna mencegah infeksi *Vibrio harveyi* pada telur dan larva kepiting bakau. *Vibrio harveyi* diisolasi dari larva kepiting bakau stadia zoea-1 yang terinfeksi. Larva kepiting bakau rentan terhadap *Vibrio harveyi* yang mana pada perlakuan infeksi pada kepadatan 10 pangkat 5, 10 pangkat 4, 10 pangkat 3 dan 10 pangkat 2 cfu/mL media mortalitasnya masing-masing sebesar 72,33 %, 64,33 %, 52,00 % dan 27,33 %, sedangkan pada kontrol (tanpa infeksi *Vibrio harveyi*) hanya sebesar 3,33 %. Tiga jenis antibiotik uji yang digunakan yaitu oksitetrasiklin (OTC), prefuran dan furazolidon dengan konsentrasi efektif terendah masing-masing 31,2 mg/L, 7,8 mg/L, dan 31,2 mg/L. Setelah diaplikasikan untuk mendesinfeksi induk yang sedang mengerami telur yang diinfeksi dengan *V. harveyi* pada kepadatan 10 pangkat 3 cfu/mL, ternyata perlakuan antibiotik pada konsentrasi efektif terendah dapat mengurangi jumlah *V. harveyi* serta dapat meningkatkan daya tetas telur dan kinerja larva kepiting bakau.

0343 RUDIRETNA, A.
**Amplification and sequencing of a 0.6 Kb Salmonella typhi DNA fragment CA-1 and CA-2 primers**/Rudiretna, A.; Noer, A.S.; Kisman, S.; Liang, O.B. (Institut Teknologi Bandung (Indonesia)). 8 ill., 10 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 837-849.

SALMONELLA TYPHIMURIUM; HUMAN DISEASES; TYPHOID; DNA; NUCLEOTIDE SEQUENCE; IN VIVO EXPERIMENTATION.

*Salmonella typhi* is a pathogenic bacteria that causes typhoid fever in man. Until now, not much had been known about the molecular pathogenesis mechanism of *S. typhi*. Not a single gene responsible for this bacterial virulence had been identified. This research had been part of a larger design with the objective to isolate and characterize *S. typhi* genes that are specific or expressed only *in vivo*. Mekalanos et al. (1993) had developed a new method which was called IVET (*In Vivo* Expression Technology) that was used to identify ivi (*in vivo* induced) genes in *S. typhimurium* that are thought to be intimately related to the pathogenesis mechanism of typhoid like diseases in mice. Five ivi genes had been identified namely the iviI, II, III, IV, V genes. This IVET method cannot be used in this research with *S. typhi* due to the fact that *S. typhi* host is man. Because of this inability to use man as the host organism for this research, the following approach was followed in the identification of *S. typhi* genes that are only expressed *in vivo*. A homology study was conducted between the genes of *S. typhi* and the ivi genes of *S. typhimurium*, leading to the identification of *S. typhi* genes that are specific or are expressed only *in vivo*. This will provide a more solid basis for the study of the molecular pathogenesis of *S. typhi*. Consequently, the knowledge of

the nucleotide sequence of *S. typhi* specific gene will enable the construction of primers for the PCR detection of *S. typhi*, which is specific, sensitive, and fast. The paper will discuss the construction of primers called CA-1 and CA-2 based on the operon nucleotide sequence of the carAB operon in *E. coli* K12. According to a study at the IUC for Biotechnology ITB, the *E. coli* K car operon had been found homologous with the ivi I gene in *S. typhimurium*. The constructed primers had been successfully used to amplify 0.6 kb DNA fragments of E. coli K12, *S. typhimurium*, *S. typhi*, and man. Restriction analyses using EcoRV, HinfI and Sau3 Al enzymes has shown that the 0.6 kb DNA fragments were the correctly intended fragments. These DNA fragments were then cloned using the TpMosBlue vector and plasmids of several white colonies clones were then subjected to restriction analyses using HindIII, EcoRI and EcoRV enzymes. The sequencing results of the insert of recombinant plasmids of *S. typhi*, using universal, T7, CA-1 and CA-2 primers had shown that the 0.6 kb DNA fragment of *S. typhi* consisted of 618 bp, compared with the inserts from *E. coli* K12, *S. typhimurium*, and human DNA which consisted of the 618 bp, 618 bp and 624 bp respectively. Homology studies were then carried out using the Genmon computer software and results of these studies will be presented in extenso.

0344 SUGIAMAN, E.S.

**Studies on regulation of cholesterol synthesis and degradation with emphasis on the coordinate regulation between the two rate-limiting enzymes**/Sugiaman, E.S. (Rumah Sakit Rajawali, Bandung (Indonesia)); Eggertsen, G.; Shen, D.; Bjorkhem, I. 3 ill., 2 tables; 25 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 851-863 .

CHOLESTEROL; HOMEOSTATIS; RNA; NUCLEOTIDE SEQUENCE.

Cholesterol homeostatis in the body is dependent upon the activity of a number of key structures HMG-CoA synthase. HMG-CoA reductase, Acyl-CoA: cholesterol acyltransferase, Cholesterol 7 α-hydroxylase and the LDL receptor. Among the above enzymes, HMG-CoA reductase and cholesterol 7 α-hydroxylase are particular important, being rate-limiting for the synthesis of cholesterol and degradation of cholesterol to bile acids, respectively. The linkage of the activity between the two enzymes is of fundamental importance for cholesterol homeostatis. Thus, an increased synthesis of cholesterol is almost invariably associated with a compensatory increase in the degradation of cholesterol. The linkage between the two rate-limiting enzymes is important to understand the mechanism of cholesterol metabolism in the liver and particularly to study hyperlipidemia. The present investigation is an attempt to expand our understanding of the functional linkage between the two rate-limiting enzymes. The general approach was to induce an effect believed to be a primary one on the cholesterol 7 α-hydroxylase activity and then study consequences of this on the HMG-CoA reductase activity. Under most experimental condition the activity of HMG-CoA reductase covariates with that of cholesterol 7 α-hydroxylase activity as well as mRNA level. In the present work the co-ordination between the two enzymes was studied in three different experimental model 1) Lymph fistula rats exposed to bile acids (CA and CDCA) in the diet; 2) Normal rats treated with Phenobarbital; 3)COS cells transfected with a cDNA coding for human cholesterol 7 α–hydroxylase. 1. CA and CDCA were shown to downregulate the activity of the two enzymes, mRNA levels and transcription rates in lymph fistula rats, showing that the underlying mechanism is independent of the effect of bile acids on cholesterol absorbtion. 2. Of nine investigated rats, two were found to respond to phenobarbital treatment with increase activity of hepatic cholesterol 7 α-hydroxylase. This increased activity of hepatic cholesterol 7 α–hydroxylase was also associated with an increased activity of hepatic HMG-CoA reductase. Most of the stimulation occurred at a pretranslatory level since the mRNA levels paralleled the corresponding activities. The treatment resulted in a decreased content of free cholesterol in the liver microsomes in one of the two rat strains that responded with increased cholesterol 7 α-hydroxylase activity. Depletion of cholesterol in the responding strain by lymph fistulation was also associated with a parallel increase in levels of HMG-CoA reductase actvity and mRNA level. The possibility is discussed that there is a small poll of cholesterol in the liver, which is of regulatory importance for the HMG-CoA reductase. If such a pool of cholesterol exists and if it is available for the cholesterol 7 α–hydroxylase, this would explain most or all of the results obtained. Direct evidence for the suggested mechanism is still lacking, however, and alternative mechanisms are possible.

0345 SYUKUR, S.
**Cloning fragment Gamma-chain human fibrinogen by Trioredoxin gene fusion**/Syukur, S. (Universitas Andalas, Padang (Indonesia)); Schweizer, B. 5 ill., 6 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 819-825.

HUMAN DISEASES; FIBRINOGEN; GENE FUSION; DNA CLEAVAGE; CLONING; THIOUREA.

It has been very difficult to produce heterologues human protein in *E. coli* cells expression system. We tried a new fusion gene expression system based on the used of *E. coli*. Thioredoxin as the fusion partner. Position of DNA N-terminal peptide (340 bp) from gamma-chain human fibrinogen was isolated as foreign genes. Thioredoxin vector (3.6 kb) was used to clone foreign genes into multiple cloning site of the expression vector. The recombinant vector transferred by electrophoration method into competent cells *E. coli* G1724. The fusion protein was analyzed by SDS-PAGE gel. Enterokinase cleavage site allows release of N-terminal peptide of gamma-chain human fibrinogen from C-terminal peptide Thioredoxin. The purified gamma-chain will continue to study the binding site domain by using NMR (600 MHz).

0346 UMAYAH.
**Detection of toxoplasmosis in pregnant women using monoclonal antibodies against membrane antigen of Toxoplasma gondii**/Umayah (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Kedokteran); Winarto; Artama, W.T. 4 tables; 11 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 827-834.

PREGNANCY; TOXOPLASMA GONDII; TOXOPLASMOSIS; MONOCLONAL ANTIBODIES; ELISA.

Monoclonal antibodies specific against membrane antigen of Toxoplasma gondii were used to determine the sensitivity of diagnosis many different stages of toxoplasmosis in pregnant women. Samples were collected from the first and second trimester of pregnant women, who underwent routine examination at the Obstetric and Gynaecologic outpatient Clinic, Sardjito Hospital. The samples were selected from women who has a risk factors to toxoplasmosis. Ninety samples serum had been collected and examined for IgM and IgG using agglutination test and ELISA respectively. Circulating antigen in serum were examined by Sandwich ELISA using specific monoclonal antibodies. The sensitivity and Mc Nemar's test were used to analyze the data. The results indicated that Tox-13 monoclonal antibody showed a high sensitivity for detection of toxoplasmosis in pregnant women. Therefore, this monoclonal antibody was able to recognize the stage specific and could be used for an early dignosis of toxoplasmosis.

0347 YUQING, L.
**Screening cardiovascular associated genes by expression sequence tags (ESTs)**/Yuqing, L. (Chinese Academy of Medical Sciences, Beijing, (China)); Shen, D.; Sugiaman, E.; Jinfeng, D.; Liew, C.C. 1 ill., 3 tables; 15 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 865-878.

CARDIOVASCULAR; RNA; DNA; NUCLEOTIDE SEQUENCE; PCR; MARKING.

The heart, which is composed of cellular components of the circulatory system, is a representative organ for obtaining genes expressed in the cardiovascular system. In order to screen cardiovascular associated genes, we used partial sequences of a human fetal heart (HFH) cDNA library, or expressed sequence tags. To construct HFH cDNA library, the total RNA was extracted from fetal heart and picking up the plaques to prepare sequencing template. The cDNA inserts were enriched by PCR in the presence of vector primers flanking the inserts using T3 forward and T7 reverse primer. The PCR products were used directly for cycles sequencing using a flourescence-conjugated T3B primer, following sequence generation using automated DNA sequencer. Of 3132 cDNA clones (about 70% positive clones) analysed by sequence similarity searching against the GenBank data bases, the new sequences were 47.4% and the known genes were 44.1%. These results shows that the method is available to screen and identify characteristics of all

specific clones of heart. Various application requiring high quality Cdna libraries are outlined, including large-scale single pass sequencing of cDNA clones to ESTs and differential screening of cDNA library but one of the most crucial steps in the preparation of high quality cDNA library is the purification of intact, undegraded mRNA.

0348 YUSWANTO, A.
**Analysis of the gene conferring resistance to Nalidixic acid in *Saccharomyces cerevisiae***/Yuswanto, A. (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Farmasi); Orr, E. 2 ill., 1 table; 27 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 767-777.

SACCHAROMYCES CEREVISIAE; GENETIC RESISTANCE; ACIDS; MUTANTS.

*Saccharomyces cerevisiae* mutants which are simultaneously resistant to nalidixic acid and temperature-sensitive, have been isolated. Phenotypic analysis showed that the cycle of the mutant is arrested at or arround the S phase (DNA synthesis phase) at the non-permissive temperature, although the arrest is not immediate. The mutant is hypersensitive to drugs and chemicals that affect the plasma membrane, suggesting the mutation might alter membrane permeabiliy. The wild gene has been cloned by complementation of the Ts phenotype in YEp 13. Two positive clones, 4.3 and 5.4 kbp were successfully isolated. The two-cloned showed identical restrictionmaps, only differ in length. Sequencing to the shorter cloned exhibited 2 major open reading frame (ORF). However, sequence analysis revealed that the two ORFs were separate. Moreover, database scanning indicated that the larger ORF (nal genes) was the LCB gene encoding subunits of serine palmitoyltransferase, responsible for the first step of sphingolipid synthesis.

## M11 PRODUKSI PERIKANAN

0349 AN PRALAMPITA, W.
**Laju tangkap dan analisis usaha penangkapan ikan karang dengan pancing rawai di perairan Batukaras, Jawa Barat. Catch rates and exploitation analysis of coral reef fishes in Batukaras, West Java (Indonesia)**/An Pralampita, W.; Putra, I.E. (Balai Penelitian Perikanan Laut, Jakarta (Indonesia)). 3 ill., 6 tables; 13 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 44-51.

SNAPPERS; GROUPERS; CORAL REEFS; FISHERY DATA; COST ANALYSIS; GILLNETS; CATCH COMPOSITION; DOMINANT SPECIES; OPERATING COSTS; PROFITABILITY; JAVA.

Penelitian tentang laju tangkap dan analisis usaha ikan karang di perairan Batukaras, Ciamis, Jawa Barat telah dilakukan pada tahun 1992. Data yang dikumpulkan dianalisis secara deskriptif dengan tabulasi silang dan metode Rapid Rural Appraisal. Hasil Penelitian menyimpulkan bahwa ikan karang yang tertangkap di perairan Batukaras didominasi oleh kakap merah (Lutjanidae) dan kerapu (Serranidae). Laju tangkap (CPUE) ikan karang cenderung naik pada musim Barat maupun musim Timur dan sebaliknya cenderung turun pada musim peralihan. Nilai R/C ratio adalah sebesar 2,5 yang berarti bahwa usaha penangkapan ikan karang di perairan Batukaras adalah efisien atau menguntungkan.

0350 BARUS, H.R.
**Teknologi penangkapan dan analisis ekonomi KM Sardinela menggunakan alat tangkap pukat cincin di laut Jawa. Fishing technology and economic analysis of MV Sardinella operated using purse seine in the Java Sea (Indonesia)**/Barus, H.R.; Anung, A. (Balai Penelitian Perikanan Laut, Jakarta (Indonesia)). 5 tables; 4 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 52-57.

DECAPTERUS; RASTRELLIGER; LOLIGO; SELAR; FISHING METHODS; ECONOMIC ANALYSIS; FISHING GEAR; FISHING VESSELS; CATCH COMPOSITION; INCOME; PROFITABILITY.

Usaha penangkapan dengan pukat cincin di perairan Laut Jawa pada umumnya belum menggunakan teknologi yang memadai, sehingga efektivitasnya belum optimal yang ditandai dengan masih rendahnya produktivitas. Dalam upaya peningkatan efektivitas, telah dilakukan penelitian melalui pengoperasian kapal pukat cicin prototipe yaitu KM Sardinela 64 GT dengan kekuatan mesin 300 HP milik Balai Penelitian Perikanan Laut. Kapal tersebut dilengkapi antara lain GPS, fish finder, SSB, lampu pengumpul ikan dan rumpon. Pukat cincin yang digunakan mempunyai panjang 374 m. Penelitian penangkapan dilakukan bersama-sama antara peneliti, teknisi dan nelayan. Hasil penelitian menunjukkan bahwa rata-rata produksi ikan adalah 19.912 kg per trip atau 2.096 kg per tawur dengan keuntungan Rp 4.757.701 per trip. Dari analisis biaya dan keuntungan, diketahui bahwa tingkat pengembalian investasi sebesar 42,9% per tahun dengan jangka waktu 2,3 tahun. Dari sistem bagi hasil, masing-masing nelayan mendapat bagian antara Rp 58.015,- sampai Rp 174.015,-.

0351 WUDIANTO.
**Pengaruh ukuran benang dan lebar mata jaring trammel terhadap hasil tangkapan ikan demersal. Effect of twine diameters and mesh size of trammel net on demersal fish catch**/Wudianto; Harifin, H. (Balai Penelitian Perikanan Laut, Jakarta (Indonesia)). 2 ill., 6 tables; 10 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 35-43.

RASTRELLIGER; SAURIDA; FISHING NETS; FISH CAGES; DESIGN; DIAMETER; CATCH COMPOSITION; DOMINANT SPECIES.

Penelitian pengaruh ukuran benang dan mata jaring trammel terhadap hasil tangkapan ikan demersal dilakukan di Perairan Indramayu, Jawa Barat bulan Juli-November 1995 dengan 46 stasiun penangkapan. Sebanyak enam tipe jaring trammel yang dibuat dengan ukuran benang dan mata jaring berbeda, dioperasikan dalam waktu yang bersamaan. Hasil analisis statistik menunjukkan bahwa hasil tangkapan ikan berbeda nyata jika dilihat dari jumlah ikan yang tertangkap ($P<0,05$), tetapi tidak berbeda nyata jika dilihat dari bobot ikan ($P>0,05$). Hasil tangkapan lebih nyata dipengaruhi oleh perbedaan ukuran mata jaring dibanding ukuran benang. Dari 44 jenis ikan dan non-ikan yang tertangkap oleh jaring trammel hasil tangkapan dominan adalah ikan gulamah (*Johnius spp*.) 19,79%, ikan sebelah (*Psettodes erumei*) 11,11%, ikan kembung (*Rastrelliger spp.*) 10,43%, ikan lidah (*Cynoglossus spp.*) 6,92%, petek (*Leiognathus spp.*) 6.73%, dan ikan beloso (*Saurida spp*.) 5,75%. Berdasarkan ukuran mata jaring, jenis ikan gulamah dan petek mempunyai perbedaan modus panjang yang jelas, sedang bagi ikan sebelah, ikan lidah, dan beloso tidak terjadi perbedaan yang nyata.

## M12 PRODUKSI DAN PENGELOLAAN BUDIDAYA PERAIRAN

0352 DJAJASEWAKA, H.
**Nilai kecernaan beberapa bahan pakan dalam pencernaan ikan tambakan (*Helostoma temminckii*). The apparent digestibility of several feedstuffs in kissing gouramy (*Helostoma temminckii*)**/Djajasewaka, H.; Tahapari, E. (Balai Penelitian Perikanan Air Tawar, Sukamandi (Indonesia)). 4 tables; 5 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 14-18.

FRESHWATER FISHES; FEEDS; DIGESTIBILITY; DIGESTIBLE NITROGEN; DIETARY FIBRES; FISH MEAL; RICE HUSKS; HYDRILLA; PROXIMATE COMPOSITION.

Penelitian nilai kecernaan untuk berbagai bahan pakan ikan tambakan (*Helostoma temminckii*) dilakukan selama 12 hari di Laboratorium Basah Nutrisi, Sukamandi. Tujuan penelitian untuk mendapatkan nilai kecernaan protein, lemak, abu dan karbohidrat dari bahan baku pakan tepung ikan, bekatul, tepung pollar, tepung hydrilla dan tepung nitella pada ikan tambakan. Penelitian ini menggunakan metode Watanabe dengan campuran 1% $Cr_2O_3$ dalam pakan sebagai internal marker. Lima bahan pakan perlakuan yaitu: 30% tepung ikan, 30% bekatul, 30% tepung pollar, 30% tepung hydrilla dan 30% tepung nitella, masing-masing dicampur dengan 70% pakan standar. Bobot awal ikan tambakan 9,25 g/ekor dengan padat tebar 30 ekor/60 L. Hasil penelitian menunjukkan bahwa nilai kecernaan tepung ikan dan tepung hydrilla lebih

baik dibandingkan dengan bahan pakan lainnya (P<0,05). Tepung ikan dan tepung hydrilla dapat digunakan sebagai pakan dalam formulasi pakan ikan tambakan.

0353 ERUNGAN, A.C.
**Pengaruh pemberoan dan jenis asam terhadap cita rasa lumpur bandeng (*Chanos chanos* Forsk) presto. [Effect of fallow and acid on muddy flavour of milk fish product]**/Erungan, A.C.; Assik, A.N.; Erlina, M.D.; Siringoringo (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 1 table; 3 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 17-18.

MILKFISH; FALLOW; ACIDS; PLANKTON; FLAVOUR.

Cita rasa lumpur pada ikan olahan merupakan salah satu masalah budidaya perikanan, yang dapat menyebabkan permintaan ikan tersebut berkurang. Penyebab utama rasa lumpur adalah geosmin yang merupakan senyawa metabolit yang dihasilkan oleh spesies tertentu alga hijau biru. Penelitian ini bertujuan untuk menetralizer atau menghilangkan rasa lumpur tersebut dengan cara pemberoan dan perendaman dalam beberapa jenis asam. Hasil penelitian menunjukkan, pemberoan berpengaruh terhadap citarasa lumpur sedangkan jenis asam tidak.

0354 PRIJONO, A.
**Pengaruh frekuensi pemberian pakan pada tingkatan umur terhadap sintasan larva bandeng (*Chanos chanos* Forskal). Effect of age-based feeding frequency on the survival rate of milkfish larvae (*Chanos chanos* Forskal)**/Prijono, A.; Setiadharma, T.; Aslianti, T. (Loka Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 2 tables; 13 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 19-22.

CHANOS; LARVAE; FEEDING FREQUENCY; AGE STRUCTURE; SURVIVAL; GROWTH; WATER QUALITY.

Tujuan penelitian untuk mengetahui frekuensi pemberian pakan yang tepat pada tingkatan umur sehingga sintasan benih bandeng yang dihasilkan dapat ditingkatkan. Wadah penelitian berupa bak silinder serat gelas volume 1 m3 sebanyak 12 buah. Masing-masing wadah diisi air laut 600 L dan telur bandeng dengan kepadatan 30 butir/L. Percobaan dilakukan dengan menggunakan Rancangan Acak Lengkap yang terdiri atas 4 perlakuan frekuensi pemberian pakan dan masing-masing memiliki 3 ulangan. Selama pemeliharaan (23 hari) larva diberi pakan rotifer sesuai perlakuan yakni: (A) satu kali/hari, (B) dua kali/hari, (C) tiga kali/hari dan (D) satu kali pada umur 2-10 hari, dua kali pada umur 11-15 hari dan tiga kali pada umur 16-23 hari. Hasil penelitian menunjukkan bahwa sintasan rata-rata tertinggi (42,53 %) diperoleh dari perlakuan A (satu kali/hari), yang secara nyata berbeda (P<0,05) dengan perlakuan B, C dan D dengan sintasan berturut-turut 22,60, 21,63 dan 8,62 %.

0355 SETIAWATI, K.M.
**Pengaruh pengkayaan rotifer dengan beberapa pakan komersial terhadap sintasan dan pertumbuhan larva ikan kerapu bebek (*Cromileptes altivelis*). Effect of the rotifer enrichment with different artificial feeds on survival rate and growth of polkadots grouper (*Cromileptes altivelis*) larvae**/Setiawati, K.M.; Ismi, S. (Loka Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 1 ill., 4 tables; 9 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 1-5.

EPINEPHELUS; GROUPERS; LARVAE; ROTIFERA; FOOD ENRICHMENT; GROWTH; SURVIVAL; SUPPLEMENTARY FEEDING; FATTY ACIDS.

Keberhasilan pembenihan ikan ditunjang kualitas pakan alami yang digunakan. Peningkatan kualitas pakan alami dapat dilakukan melalui pengkayaan rotifer. Penelitian ini dilakukan guna mengetahui pengaruh pengkayaan rotifer dengan beberapa bahan pengkaya terhadap pertumbuhan dan sintasan larva ikan kerapu bebek. Pemeliharaan larva dilakukan pada bak 300 L dengan tinggi bak 64 cm, diisi larva

umur satu hari sebanyak 8.000 ekor/bak. Mulai hari ke tiga setelah menetas larva diberi pakan rotifer yang telah diperkaya dengan tiga bahan pengkaya sebagai perlakuan (fripak booster, tepung telur ikan, super rotifer) dan Chlorella (kontrol). Masing-masing perlakuan dengan tiga kali ulangan. Hasil penelitian menunjukkan bahwa larva pada perlakuan tepung telur ikan memiliki sintasan lebih baik daripada perlakuan lainnya. Tepung telur ikan mengandung total n-3 HUFA dan vitamin C yang cukup.

0356 SUWIRYA, K.

**Sintasan, pertumbuhan dan vitalitas larva ikan bandeng (*Chanos chanos*) yang diberi pakan mikro. Survival, growth and vitality of milkfish, *Chanos chanos* larvae fed with micro diet**/Suwirya, K.; Marzuqi; Hersapto; Prijono, A. (Loka Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 5 tables; 8 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 23-27.

CHANOS; LARVAE; FEEDS; INGREDIENTS; SURVIVAL; GROWTH; VIABILITY; NUTRITIONAL REQUIREMENTS; PROTEINS; PROXIMATE COMPOSITION.

Produksi larva bandeng sampai saat ini sangat tergantung pada pakan alami seperti rotifer. Kekurangan nutrisi akan menyebabkan mortalitas yang tinggi dan abnormalitas pada larva sementara ketersediaan pakan alami sangat dipengaruhi kondisi alam. Untuk mengantisipasi penggunaan pakan buatan pada produksi larva telah dilaksanakan dua percobaan. Percobaan 1 menggunakan larva umur 15 hari dengan bak ukuran 300 liter dan kepadatan benih 4 ekor/L. Lama percobaan adalah 15 hari. Perlakuannya adalah penggunaan pakan buatan dibandingkan dengan pakan alami. Hasilnya terlihat bahwa pakan buatan dapat meningkatkan sintasan dan vitalitas benih. Percobaan 2 menggunakan bak 1 ton dengan larva yang baru menetas (D-0) pada kepadatan 12.000 ekor/bak. Umur larva 1-10 hari diberi rotifer dengan kepadatan 10-40 ind/mL. Pada umur 11 hari mulai diberi pakan buatan dengan sumber protein berbeda yaitu A : tepung ikan; B: tepung ikan dan rebon, C: tepung ikan, rebon dan cumi: D: tepung ikan dan cumi. Hasil yang diperoleh menunjukkan bahwa sintasan dan pertumbuhan larva bandeng lebih tinggi jika diberikan beberapa sumber protein (pakan B, C dan D) dibandingkan hanya satu sumber yakni tepung ikan (pakan A).

0357 YUNUS.

**Pengaruh substitusi alga *Nannochloropsis oculata* dengan pakan buatan dalam budidaya rotifer (*Brachionus plicatilis*). Effect of substitute of *Nammochloropsis oculata* algae with artificial feed for rotifer (*Brachionus plicatilis*) culture**/Yunus; Suwirya, K. (Loka Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 5 tables; 39 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 6-13.

BRACHIONUS; FISH CULTURE; ALGAE; SIMULATED FOODS; FEEDING FREQUENCY; STOCKING DENSITY; FATTY ACIDS; NUTRITIVE VALUE; PROTEIN CONTENT; MOISTURE CONTENT.

Budidaya rotifer umumnya menggunakan pakan berupa fitoplankton. Kesulitan penyediaan fitoplankton secara massal dan tepat waktu perlu upaya penggunaan jenis pakan lain, seperti pakan buatan. Percobaan ini bertujuan untuk mengetahui pengaruh pemberian pakan buatan untuk budi daya rotifer. Budi daya rotifer dilakukan dalam bak polikarbonat dengan volume 30 liter dengan kepadatan awal rotifer 200 ind/mL. Percobaan menggunakan Rancangan Acak Lengkap dengan tiga taraf perlakuan yaitu rotifer yang diberi pakan buatan dengan frekuensi pemberian dua dan tiga kali sehari serta rotifer yang diberi pakan alga *Nannochloropsis oculata* sebagai kontrol. Setiap perlakuan diulang tiga kali. Rotifer dibudidayakan dengan cara panen 50% per hari. Percobaan berlangsung sampai dengan hari ke empat. Hasil penelitian menunjukkan pengaruh yang tidak nyata antar perlakuan ($P>0,05$) terhadap rata-rata kepadatan rotifer sebelum dipanen, jumlah telur yang dihasilkan dan ukuran rotifer. Pakan buatan dapat diaplikasikan penggunaanya dalam budi daya rotifer (*B. plicatilis*) dengan frekuensi pemberian 2 kali/hari. Namun sebelum digunakan sebagai pakan alami sebaiknya rotifer diperkaya dengan asam lemak untuk meningkatkan nilai gizinya.

## P10 SUMBERDAYA AIR DAN PENGELOLAANNYA

0358 SUHARYONO.
**Pengkajian dan penanganan daerah aliran sungai bagian hulu dengan pendekatan model Answers. [Handling and investigation of the area nonpoint sources watershed environment response simulation model]**/Suharyono (Universitas Gadjah Mada, Yogyakarta (Indonesia). Fakultas Teknologi Pertanian); Sudira, P.; Sukirno. 3 ill., 2 tables.; 9 ref. Summary (En). *Agritech (Indonesia)* ISSN 0216-0455 (1998) v. 18 (2) p. 19-22.

JAVA; RUNOFF WATER; WATERSHEDS; HIDROGRAPHY; WATER SUPPLY; SIMULATION MODELS.

The Area Nonpoint Sources Watershed Environment Response Simulation (ANSWERS) model as the distributed hydrologic model for the simulation of 10 scenarios of land uses is presented. The model is based on the assumption that at any point of watershed spatial, runoff volume is closely related to the hydrolic and physiographic processes such as, rainfall intensity, infiltration rate, soil moisture content, soil behaviour, land slope and vegetative cover. The discharge hydrograph of the model gave a good result and was statistically significant to the observed hydrography. Among the ten scenarios of land uses, the lowest peak discharge of 7.7 $m^3$/second was obtained at the simulation of 80% of forest land, meanwhile the highest peak discharge of 33.36 $m^3$/second was obtained when there was no forest land at the study area.

0359 SYAFALNI.
**Studi air tanah dangkal daerah Bogor dan Jakarta bagian selatan dengan hidroisotop. Study of shallow groundwater in Bogor and southern part of Jakarta by using hydroisotope (Indonesia)**/Syafalni; Barokah A.; Djiono; Paston S.; Martinus, A. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 7 tables; 6 ref. Summaries (En, In), Appendix. [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 109-114.

GROUNDWATER; WATER RESOURCES; WATER QUALITY; JAVA.

Telah dilakukan penelitian dengan hidroisotop yang dilengkapi dengan analisis hidrokimia untuk mempelajari hubungan air tanah dangkal Bogor dan Jakarta bagian Selatan yang diuji dengan uji t-student distribusi. Dari hasil evaluasi data kemungkinan terdapat hubungan antara air tanah dangkal Bogor dan air tanah ke I Jakarta pada taraf nyata 0,05 dan 0,01. Air hujan Bogor dan air tanah dangkal Bogor Jakarta pada taraf nyata 0,05 dan 0,01 juga berbeda nyata yang mungkin disebabkan penguapan selama infiltrasi. Sedangkan kualitas air dari 29 sampel yang diambil untuk air tanah dangkal daerah Bogor dan Jakarta bagian Selatan adalah baik sebagai sumber air bersih dengan zat terlarut total lebih kecil dari 225 ppm.

0360 WANDOWO.
**Dinamika aliran air tanah dalam di cekungan Jakarta. Flow dynamic of the deep groundwater in Jakarta basin (Indonesia)**/Wandowo; Abidin, Z.; Satrio; Djino; Alip (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 1 tables; 8 ref. Summaries (En, In), Appendices. [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 99-107.

JAVA; GROUNDWATER FLOW; WATER RESOURCES.

Dalam sistem hidrologi yang menyangkut air tanah dalam, apabila ada gangguan terhadap alirannya maka akan terjadi ketidak seimbangan sistem yang dapat berdampak terjadinya perubahan pola aliran atau fenomena lain. Gangguan tersebut berupa perubahan input dan output pada sistem hidrologi yang menyebabkan terjadinya penurunan muka air tanah sehingga mengubah dinamika pola alirannya. Telah dilakukan penelitian untuk mempelajari dinamika pola aliran air tanah dalam pada cekungan Jakarta berdasarkan distribusi umur air tanah yang dihitung dari konsentrasi C-14 nya. Sampel air tanah diperoleh dari sumur di wilayah Jakarta dan sekitarnya, yang meliputi wilayah Tangerang, Bekasi, Depok dan Bogor yang mempunyai kedalaman saringan antara 60 - 150 meter di bawah permukaan tanah. C-14 dalam air tanah diperoleh dengan cara mengendapkan karbonat terlarut dengan $BaCI_2$ yang dilakukan di lapangan sehingga diperoleh endapan $BaCO_3$. Endapan tersebut dibawa ke laboratorium untuk mengubah karbon menjadi senyawa benzena dimana C-14 dalam senyawa tersebut kemudian dicacah dengan alat pencacah sintilasi cair. Hasil cacahan dikonversikan ke dalam umur yang merepresentasikan umur air tanah yang diambil dari berbagai lokasi di wilayah Jakarta dan sekitarnya. Dari pola kontur umur air tanah maka diperoleh informasi tentang dinamika pola aliran air tanah Jakarta dan sekitarnya yang mana umumnya air tanah bergerak dari Selatan ke Utara dan pada arah Utara-Timur Laut dan arah Utara-Barat Laut terjadi percepatan aliran.

0361 YASIN, M.

**Pengendalian hama penggerek batang jagung *Ostrinia furnacalis* dengan cendawan *Beauveria bassiana* Vuillemin. Control of maize stem borer (*Ostrinia furnacalis*) with *Beauveria bassiana* Vuillemin fungi** /Yasin, M.; Soenartiningsih; Surtikanti; Syamsuddin (Balai Penelitian Jagung dan Serealia Lain, Maros (Indonesia)). 4 tables; 5 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 48-51.

OSTRINIA FURNCALIS; BEAUVERIA BASSIANA; BIOLOGICAL CONTROL; DOSAGE; MORTALITY.

Experiment on control of *Ostrinia furnacalis* with *Beauveria bassiana* Vuillemin fungi was conducted in the laboratory of Balitjas (Research Institute for Maize and Cereals), Maros in 1996. The objective of the experiment was to investigate the effectiveness of this fungi on larvae instar of *Ostrinia furnacalis*. The experiment was arranged factorials in Randomized Block Design, with four replications. Treatments were six concentrations of inoculant i.e: $5 \times 10^7$, $5 \times 10^6$, $5 \times 10^5$, $5 \times 10^4$, $5 \times 10^3$, and control; and number of larvae instar i.e: 2, 3, 4, and 5. Result indicated that the effectiveness of fungi began at three days after inoculation and inoculant concentrations $5 \times 10^5$ conidial/ml or above were effective to control larvae of *O. furnacalis*.

## P32 KLASIFIKASI DAN PEMBENTUKAN TANAH

0362 BASYARUDDIN.

**Mineralogi dan tingkat pelapukan andisol yang digunakan sebagai areal persawahan, peladangan, dan hutan di Sumatera Utara. Mineralogy and degree of weathering of andisol used as rainfed, dry field, and forest in North Sumatera**/Basyaruddin (Universitas Islam Sumatera Utara, Medan (Indonesia). Fakultas Pertanian). 4 ill., 3 tables; 18 ref. Summary (En). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 1-10.

SUMATRA; ANDOSOLS; WEATHERING; MINERALCONTENT; DRY FARMING; RICE FIELDS; FOREST LAND.

Andisols around Berastagi, North Sumatra were generally used as rain fed, dry field, and forest area. This research was carried out to study the mineral composition of sand and clay fraction and the degree of weathering of the andisols. The results showed that the amount of weathereable minerals (plagioklas, sanidin, augit, hiperstin, hornblende, and rock fragment) were relatively lower in rainfed area than those of dry field and forest land, the amount of weathereable minerals were not significantly different. Based on

mineral composition of heavy fraction, it was assumed that the mineral association was amphibole-hiperstin in all land uses. In clay fraction, the content of allophane was relatively lower, but halloysite was higher in rain fed compared with dry field and forest land; while the content of gibsite between rain fed and forest land were not significantly different but the content of gibsite in both soils were higher than that of dry field land. The composition of clay mineral in rainfed consisted of allophane, halloysite, and gibsite and its proportion was not significantly different (allophane = halloysite = gibsite): while in dry field and forest land, allophane was very dominant in clay fraction, followed by gibsite and small amount of halloysite (allophane more than gibsite halloysite). Based on the clay mineral composition, it was from the weathering of allophane where under rain fed condition the process was more intensive than that in dry field and forest land. The weathering degree of Andisol used as rainfed was relatively higher compared with dry field and forest land; while between dry field and forest land the difference were not significant.

0363 SUHARDJO, H.

**Tanah, landform, dan potensinya untuk perkebunan dataran rendah di Sumatera Utara daratan. Soil, landforms and the potentially for lowland estate crops in the mainland area of North Sumatera**/Suhardjo, H. (Pusat Penelitian Tanah dan Agroklimat, Bogor (Indonesia)). 1 ill., 5 tables; 9 ref. Summaries (En, In). *Jurnal Penelitian Pertanian (Indonesia)* ISSN 0152-1197 (1999) v. 18 (1) p. 46-60.

SUMATRA; LOWLAND; PLANTATIONS; LAND SUITABILITY; SOIL TYPES.

Hasil pengukuran dengan GIS menunjukkan bahwa luas bagian daratan untuk dataran rendah Propinsi Sumatera Utara adalah 4.142.100 ha. Data luas diperoleh dari peta LREP-I dengan menghitung luas peta satuan lahan dan tanah skala 1:250.000 pada sistem GIS dengan program Arc-Info, berdasar poligon yang ada. Data-data tersebut dikumpulkan dan diolah untuk memperoleh luasan: tanah, landform, lereng dan potensi lahan untuk tanaman perkebunan. Hasilnya menunjukkan bahwa tanah di wilayah ini terdiri atas : Inceptisols (2.409.400 ha), Entisols (597.700 ha), Ultisols (568.500 ha), Histosols (287.600 ha), Oxisols (258.500 ha), Alfisols (15.600 ha) dan Spodosols (4.600 ha). Landform dibedakan atas : tufa Toba 992.200 ha), dataran/plain (744.300 ha), dataran aluvial (588.200 ha), perbukitan (540.300 ha), dataran marin (345.500 ha), pegunungan (337.900 ha), kubah gambut (267.300 ha), volkan (237.400 ha), teras marin (48.800 ha), dan karst (40.200 ha). Hasil evaluasi lahan untuk tanaman perkebunan daerah dataran rendah menunjukkan bahwa 1.318.600 ha sesuai (klas S), 1.726.100 ha sesuai bersyarat (klas CS) dan 1.097.400 ha tidak sesuai (klas N). Pengembangannya masih memungkinkan untuk areal 1.000.000 ha dengan perlu adanya klasifikasi terhadap lokasi dan status lahan.

## P33 KIMIA DAN FISIKA TANAH

0364 ZUBAIDAH, Y.

**Pencampuran tanah mineral pada tanah gambut dan lama inkubasi terhadap sifat kimia tanah gambut. Mineral soil mixed in peat soil and incubation time to peat soil chemistry properties**/Zubaidah, Y. (Balai Pengkajian Teknologi Pertanian, Sukarami (Indonesia)); Burhanuddin; Siahaan, M.. 6 tables; 9 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 30-33.

PEAT SOILS; MINERAL SOILS; SOIL CHEMICOPHYSICAL PROPERTIES; SOIL PH; CATIONS.

The experiment was conducted at a screen house in the Faculty of Agriculture of Andalas University and Soil Department Laboratory, from July to September 1998. Factorial Completely Randomized Design (CRD) with three replications was used in this experiment. The first factor was mineral soil dosages (0, 1, 2, and 3 kg/pot) and the second factor was incubation time (1, 2, 3 month). Analysis of soil chemistry properties with sample rate of three replications. The results showed that mineral soil mixed was decreased to C-organic, N-Total, and CEC (Cation Exchange Capacity) respectively, and was increased to P-available, exchangable Al, pH and base saturation. Time incubation was decreased to C-organic, N-Total, Exchange Al and CEC, and was increased to P-available, pH and base saturation respectively.

## P34 BIOLOGI TANAH

0365 BAON, J.B.

**Nutrient efficiency and growth response variation of *Theobroma cacao* infected by three Mychorrizal fungi**/Baon, J.B.; Nurkholis (Pusat Penelitian Kopi dan Kakao, Jember (Indonesia)); Naviudin, Y.; Soetanto, S.; Sakdijah, Z. 6 ill., 14 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 397-410.

THEOBROMA CACAO; VESICULAR ARBUSCULAR MYCORRHIZAE; GIGASPORA; GLOMUS; INOCULATION; NUTRIENT UPTAKE; GROWTH.

Cocoa (*Theobroma cacao* L.) as an important cash crop plays a significant role in Indonesian agriculture. Interest in manupulating its association with mycorrhizal fungi to improve the productivity of this crop on soils with limited application of fertilizer has not been given much attention. The aim of this study was to investigate the variation in nutrient efficiency and growth response of cocoa to the infection by three vesicular-arbuscular (VA) mycorrhizal fungi. Seedlings of a cocoa cultivar (ICS 60) were inoculated with three mycorrhizal fungi, *Gigaspora margarita*, *Glomus sp.* "Padang" and *Glomus sp.* "Takengon". Nutrient uptake efficiency for both macro and micronutrients of plant infected by mycorrhizal fungi was higher than plants left uninfected, particularly in soil with low amount of available P. However, in the same soil mycorrhizal infection reduced use efficiency of P, N and Cu, but not of Zn and Mg. Influence of mycorrhizal colonization on P uptake efficiency varied among the species of mycorrhizal fungi. In no P added soil, P and N uptake efficiency in plants infected by *Glomus sp*. "Takengon" was higher than by *Gigaspora margarita* and *Glomus sp*. "Padang". However, the addition of rock phosphate resulted in the highest P uptake by *G. margarita*. Growth response of the cocoa grown in no addition of P was mostly affected by *Glomus sp.* "Takengon" but less by the other two fungi. There was clearly greater fungal type effect variation as the characteristic indicative of VA mycorrhizal-dependent phosphate mobilization, nutrient uptake and use efficiency which eventually resulted in growth response variation. The results of this study suggest that cocoa may make use of *Glomus sp.* "Takengon" to increase the availability of P and of *G. margarita* to increase the availability of rock phosphate and plant growth in this specific situation. The understanding gained from this study would certainly be of practical implication and high potential for application in the agriculture biotechnology.

0366 BINTORO, A.

**Pengaruh pemberian batuan fosfat dan arang sekam padi dan inokulasi tanah bermikoriza pada medium tanah latosol terhadap pertumbuhan semai Merawan. Effect of rock phosphate and rice husk charcoal and mycorrhizal inoculation on Merawan (*Hopea drybalanoides*) seedling growth**/Bintoro, A. (Universitas Lampung, Bandar Lampung (Indonesia)); Suhardi; Supriyo, H. 5 tables; 13 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 167-172.

HOPEA; ROCK PHOSPHATE; RICE HUSKS; MYCORRHIZAE; INOCULATION; SEEDLINGS; GROWTH; CULTURE MEDIA; CHARCOAL; FERRALSOLS.

Site quality is a factor affected seedling growth. To increase the site quality, fertilization and mycorrhizal inoculation should be done. The objectives of this experiment was to observe the effect of rock phosphate, rice husk charcoal and mycorrhizal inoculation on Merawan seedling growth. Treatments were arranged in factorial experiment in a Completely Randomized Design (CRD). When the treatment was significant, Least Significant Difference (LSD) test was used. By analysing the variance, the results showed that those treatments significantly affected Merawan seedling root. LSD test showed that seedling in Latosol with rock-phosphate and Latosol plus rice-husk charcoal had better growth than just Latosol. Latosol rice-husk charcoal showed no significantly different effect compared to Latosol plus rock phosphate. Inoculated

mycorrhizal soil showed had better effect than the control. Inoculation of 10% showed no significant difference effect compared to that of 5%.

0367 KAWURI, R.
**The efffect of growth pH on survival and growth of Rhizobium meliloti WSM 419 in acid peats**/Kawuri, R.; O'Hara, G.W. (Murdoch University, Perth (Australia)). 5 ill., 16 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 505-512.

RHIZOBIUM MELILOTI; MEDICAGO; ROOT NODULATION; PH; GROWTH; PREPLANTING TREATMENT; PEAT SOILS; ACID SOILS.

A study was undertaken to determine the effect of growth pH on the survival and growth of *R. meliloti* WSM 419 in acid peat. Cultures of *R. meliloti* WSM 419 were grown to exponential phase in tryptone yeast broth either buffered at pH 7.0 with 20 mM HEPES or buffered at pH 5.8 with 20 mM MES, and were used to inoculate sterile peat adjusted with KHSO4 to pH 4.5, pH 5.0, pH 5.5, pH 6.0. Control peats at pH 6.4 - 7.0, contained an equivalent amount of $SO_4^{2-}$ as $K_2SO_4$. The survival of the inoculum was determined using the Miles and Misra viable count method. Larger populations were present at 28 days in peat at pH's 5.0, 5.5, and 6.0 inoculated with cultures grown at pH 5.8 then in peat inoculated with cultures grown at pH 7.0.

0368 NOLI, Z.A.
**Pengaruh inokulasi ektomikoriza terhadap pertumbuhan anakan melinjo (*Gnetum gnemon* L.) pada tanah Ultisol. Effects of ectomycorhiza to the growth of melinjo (*Gnetum gnemon* L.) seedling in Ultisol**/Noli, Z.A.; Syahbuddin; Syam, M.H. (Universitas Andalas, Padang (Indonesia). Fakultas Matematika dan Ilmu Pengetahuan Alam). 2 ill., 2 tables; 14 ref. Summary (En). *Jurnal Stigma (Indonesia)* ISSN 0853-3776 (1999) v. 7(2) p. 40-44.

GNETUM GNEMON; MYCORRHIZAE; INOCULATION; GROWTH; ACRISOLS.

The study about inoculation effects of ectomycorrhiza to the growth of melinjo seedling (*Gnetum gnemon* L.) on Ultisol had been done from October 1997 until March 1998 in Laboratory of Plant Ecology, Biology Department, Mathematic and Natural Science Faculty, Andalas University, Padang. This study was designed in Completely Randomized Design (CRD) with four treatments and six replicates, whereas treatments was without inoculation, inoculation with *Scleroderma columnare*, *S. simamariense* and *S. dictyosporum*. The results showed that there was no significant effect for the fresh weight of root and the fresh weight of shoot, but it was significant infection degree of mycorrhiza. Infection degree on melinjo seedling that was inoculated by *S. dictyosporum* and *S. simamariense* was very good category and that inoculated by *S. columnare* and without inoculation was moderate category.

0369 TRIWAHYUNINGSIH, N.
**The study of Mycorrhyzal and Rhizobial inoculation on soybean (*Glycine max* (L.) Merr.) in coastal sandy soil**/Triwahyuningsih, N. (Universitas Muhammadiyah, Yogyakarta (Indonesia). Fakultas Pertanian). 1 ill., 3 tables; 2 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 475-480.

GLYCINE MAX; VESICULAR ARBUSCULAR MYCORRHIZAE; RHIZOBIUM JAPONICUM; GLOMUS; GIGASPORA; INOCULATION; ROOTING; GROWTH; YIELDS; SANDY SOILS.

The potential of mycorrhyzal and rhizobial inoculation to increase vegetative growth and yield of soybean (*Glycine max* (L.) Merr.) in coastal sandy soil was evaluated under glasshouse condition in three replicated experiments conducted in research field of Muhammadiyah University of Yogyakarta from December 1995 to March 1996. The focus of this research was to evaluate the influence of the variables which contributed to the variability observed. The treatment was arranged in Completely Randomized Design. Two spesies of VA mycorrhyzae (i.e. *Glomus spp.* and *Gigaspora spp.*) and Legin (*Rhizobium*

*japonicum*) were inoculated on soybean seeds and tested in a sterile sandy soil. The treatments tested were: S (soil with no inoculation); S-R (soil inoculated with Rhizobium); S-Gm (soil inoculated with *Glomus spp.*); S-Gs (soil inoculated with *Gigaspora spp*.); S-R-Gm (soil inoculated with Rhizobium and *Glomus spp*.); S-R-Gs (soil inoculated with Rhizobium and *Gigaspora spp*.). The results showed that vegetative growth and yield of soybean increased when the plants were inoculated with VA mycorrhyzae with or without Rhizobium. It was observed that there were no significant difference between the two species of VA mycorrhyzae and *Rhizobium japonicum* treatment to all parameters. Vegetative growth and yield decreased when plants were not inoculated or inoculated only with Rhizobium.

0370 WINARSIH, S.

**The effect of some media substances on mycorrhizal infection in several Arabica coffee clones *in vitro***/Winarsih, S.; Baon, J.B. (Pusat Penelitian Kopi dan Kakao, Jember (Indonesia)). 3 tables; 17 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 535-543.

COFFEA ARABICA; VESICULAR ARBUSCULAR MYCORRHIZAE; SYMBIOSIS; iNOCULATION; IN VITRO CULTURE; GROWTH INHIBITORS; PLANT RESPONSE; CHEMICAL COMPOSITION; SALTS.

Mycorrhizal infection may be influenced by the rate of hyphal growth which is also affected by the presence of inhibitor substances in media. Some nutrients added to media for in vitro culture, such as $MnSO_4$, $ZnSO_4$, and $CuSO_4$ may also act as inhibitor substances. An experiment to investigate the effect of inhibitor substance on Vesicular-arbuscular mycorrhizal infection has been carried out in Tissue Culture Laboratory of Indonesian Coffee and Cocoa Research Institute, Jember. Arabica coffee plantlets of USDA 230762, Kartika 2 and S 795 clones were used in this study. The experiment was designed in Completely Randomized with 11 treatments, i.e. control-1 (without inoculation), control-2 (inoculated): $MnSO_4$, $4H_2O$ 11.15 mg/l, 22.30 mg/l, 44.60 mg/l: $ZnSO_4$, $7H_2O$ 4.30 mg/l, 8.60 mg/l, 17.20 mg/l, $CuSO_4$, $5H_2O$ 0.0125 mg/l, 0.025 mg/l and 0.050 mg/l. The level of mycorrhizal infection was expressed by the number of sporocarps formed in each treatment. The results of this study showed that the amount of salts added to media for in vitro culture and assumed act as inhibitor substances did not affect growth of coffee plantlets. Among the three varieties tested, USDA 230762 showed the slowest growth, especialy in fresh weight. However, the substances inhibited mycorrhizal infection of coffee. Inhibition was enhanced by increased concentration of the substances. Plantlets grown in medium contained high level concentration of $ZnSO_4$ and $CuSO_4$ resulted in 1-2 clusters of sporocarp while in low level concentration results resulted in 27 and 15 clusters for $ZnSO_4$ and $CuSO_4$, respectively. Level of infection in USDA 230762 was lower compared with the other two clones.

## P35 KESUBURAN TANAH

0371 DJUNIWATI, S.

**Perbedaan sumber kompos dalam menurunkan kelarutan tembaga dan seng asal larutan baku logam di dalam tanah PMK Tanjungan dan Latosol Jabung, Lampung. The difference of compost sources in reducing the solubilities of copper and zinc from metal standard solution in Red Yellow Podzolic soil from Tanjungan and Latosol from Jabung, Lampung (Indonesia)**/Djuniwati, S.; Salam, A.K.; Sarno (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian). 2 ill., 7 tables; 17 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p.193-201.

SUMATRA; COMPOSTS; COPPER; ZINC; PH; CATIONS; SOIL CHEMICOPHYSICAL PROPERTIES.

The difference sources of organic compost are suggested to be different in decreasing the solubilities of heavy metals in soils with different characteristics. Soil samples from upper horizons (0-20 cm) of Red Yellow Podzolic Tanjungan and Latosol Jabung were factorially treated with 2 levels of metal standard solution containing Cu and Zn with the concentration of 0 and 10 mg/kg, and 5 source of organic compost at the rate of 10 ton/ha dry weight i.e: without compost, cassava-leaf, alang-alang leaf, soybean leaf. The soil treated were incubated for 8 weeks at 40% moisture content. The result showed that corn-leaf and alang-alang compost in Red Yellow Podzolic soil reduced the solubilities of Cu 13.4% and 15.8% lower than without compost, respectively. However, among corn-leaf and alang-alang-leaf, corn-leaf and cassava-leaf, and without compost were not different. In Latosol soil, cassava-leaf compost reduced the solubilities of Cu as much as 19.3% lower than without compost, 20.4% lower than alang-alang-leaf compost. However, among cassava-leaf, corn-leaf, and soybean-leaf composts were also not different. Addition of cassava-leaf with metal standard solution is the most significant reduced the solubilities of Zn in Latosol. Although solubilities of Zn in Red Yellow Podzolic soil increased, the solubility of Zn soil treated with cassava leaf was lower than in those treated with corn, alang-alang, and soybean-leaves compost. However, in Latosol soil treated with cassava-leaf compost reduced solubilities of Zn 36.6% lower than without compost, 24.7% lower than with corn-leaf compost, 33.3% lower than with alang-alang-leaf compost, and 35.5% lower than with soybean-leaf compost. Comparing the two kind soils showed that Latosol soil from Jabung possesed higher buffering capacity for Cu and Zn than Red Yellow Podsolic soil from Tanjungan.

0372 MILE, M.Y.

**Perubahan kesuburan tanah akibat konversi hutan menjadi areal HTI. Change in soil fertilies following conversion natural forest for industrial forest plantation**/Mile, M.Y. 5 ill., 3 tables.; 10 ref. Summary (En). *Buletin Penelitian Hutan (Indonesia)* ISSN 1410-0649 (1997) (no. 610) p. 37-50.

FOREST PLANTATION; VIRGIN FORESTS; SOIL FERTILITY; SOIL CHEMICOPHYSICAL PROPERTIES.

Study on "Change in soil fertilies following conversion natural forest for Industrial Forest Plantation" have been conducted at Muara Dua, North Lampung with the soil classified as ultisol and exisol. Three methods of land clearing (manual, semi mechanized and full mechanized) were treated in plots size 1 ha for each treatment using Randomized Block Design with three replication. The preliminary result (1 year observation) shows that land clearing using heavy vehicles (tractor, buldozer, etc.) showing effect on the phisical and chemical properties of the soil in form of degradation of top soil, compaction of soil by increasing bulk density with significant effect up to 60 cm which may cause decreasing soil porosity and infiltration capacity as well as decreasing nutrients content in the soil. Manual land clearing using control fire show a positif change in chemical properties of the soil by increasing Nutrient content while no change in physical properties.

0373 SALAM, A.K.

**Perubahan ketersediaan unsur hara mikro kelompok logam berat dalam tanah akibat perlakuan pupuk fosfat. Change in availability of heavy-metal micronutrients in soils treated by P-fertilizers**/Salam, A.K. (Universitas Lampung, Bandar Lampung (Indonesia). Fakultas Pertanian). 3 ill., 1 table; 16 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997: p. 178-183.

PHOSPHATE FERTILIZERS; NUTRIENT AVAILABILITY; HEAVY METALS; TRACE ELEMENTS; LIMING; ACRISOLS.

Heavy-metal micronutrients availability in soil are suggested to be reduced by phosphate fertilization. This research aimed to evaluate the effect of P-fertilizer and a pure chemical phosphate on availability of

heavy-metal micronutrients in an Ultisol from Central Lampung, Indonesia. The two different kind experiments was conducted. At the first experiment, soil was field-treated with different kind of P-fertilizers (TSP, SP-36 and Rock Phosphate) at ranging from 0 to 250 kg/ha for TSP and SP-36 and from 0 to 500 kg/ha for Rock Phosphate. It was sampled after a 4 week planting with soybean. Soil pH, availability P and metal micronutrients were then determined. At the second experiment, soil sample from an untreated field adjacent to the treatment plots of the first experiment that was treated with KH2PO4 at rates ranging from 0 t0 800 kg P/ha and/or lime at rates equivalent to 0-6 $CaCO_3$/ha in a laboratory experiment. The available Cu and Mn were negatively correlated with P-fertilizer additions, that tended also to increase the soil pH. The lime additions consistently decreased the metal micronutrients. However, the laboratory experiment showed that the available metal micronutrients were not reduced by $KH_2PO_4$ treatments. These observations suggested that P fertilizers reduce the availabilities of metal micronutrients due to their effect on soil by increasing soil pH, but not to their liming phosphate component's reaction with soil solid surfaces.

## P36 EROSI, PELESTARIAN DAN PERBAIKAN TANAH

0374 LENGKONG, J.E.
**Hubungan erosi dan produksi tanaman sela di areal pertanian cengkeh. Correlation between erosion and production of intercrops in the clove plantation**/Lengkong, J.E. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 3 ill.; 2 tables; 5 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 155-159.

EUGENIA CARYOPHYLLUS; INTERCROPPING; CATCH CROPS; PLANT PRODUCTION; EROSION CONTROL PLANTS.

The objective of the experiment was to know the correlation between soil erosion and production of intercrops on a clove plantation area. The result indicated that corn and peanut productions had a significant correlation with soil erosion with the correlation coeffisient of -0,739 and -0,808, respectively. Meanwhile the production of sweet potatoes had a non significant correlation with soil erosion with correlation coeffisient of 0,299.

0375 WIRALAGA, A.Y.
**Pengendalian kehilangan hara dan bahan organic dari areal tanaman sayuran melalui penerapan teknik konservasi tanah. Controlling losses of plant nutrients, organic matter, and sediment from vegetable farming areas through soil conservation practices**/Wiralaga, A.Y. (Universitas Sriwijaya, Palembang (Indonesia). Fakultas Pertanian). 5 tables; 14 ref. Summary (En). [Proceedings of National Seminar on the Identification of National Fertilizer Problems and Effective Quality Standardization]. Prosiding Seminar Nasional Identifikasi Masalah Pupuk Nasional dan Standardisasi Mutu yang Efektif/Lumbanraja, J.; Dermiyati; Yuwono, S.B.; Sarno; Afandi; Niswati, A.; Yusnaini, S.; Syam, T.; Erwanto (eds.); Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung (Indonesia). Bandar Lampung (Indonesia): Himpunan Ilmu Tanah Indonesia (HITI) KOMDA Lampung, 1997 : p. 212-219.

VEGETABLE CROPS; SOIL CONSERVATION; NUTRITIONAL LOSSES; NUTRIENTS; ORGANIC MATTER; WATER QUALITY.

Vegetable farming in Indonesia, generally cultivated on sloping land without applying Soil Conservation Practices (SCP), but using high fertilizers doses. It caused losses some fertilizer from the cropping areas and polluted surface water. Such case could be controlled by applying SCP, which could reduce run off and soil erosion. A Study on such phenomena conducted in farmer's field in Pangalengan District, West Java in rainy season of the year 1993/94. Five treatments were tested at experiment plots, one was in farmer's cultivated plot (P1), compared to four SCP treatments. Water pollution was determined by measuring the water quality parameters from drainage ditch which covering 15 ha cropped areas (a small watershed). The results of the study showed that the effect of SCP treatments would be greater and closer

orientation of the ridges to the contour on reducing plant nutrients, organic matter, and sediment lost from cropping areas. The best result was obtained from the plot which following the contour (P4), in which lost plant nutrients, organic matter, and sediment were reduced by 70%, 80%, and 90 %, respectively, compared to P1 by using soil erosion data from the experiment plots and sediment delivery ratio of the 15 ha cropping area. The role of SCP in reducing plant nutrients, organic matter, and sediment concentrations in surface water could be predicted. Supposing the two best SCP treatments were applied, they were planting on the ridges at 15 degrees to the contour (P3) and following the contour (P4). The concentrations of plant nutrients and organic matter in surface water could be reduced by 82% and 90 % sediment concentrations decreased by 80% and 90 % respectively, compared to P1.

## Q02 PENGOLAHAN DAN PENGAWETAN MAKANAN

0376 ARIFIN, M.

**Efektivitas antigen parasit Trypanosoma evansi iradiasi untuk mendeteksi respon kekebalan ternak yang terinfeksi. Effectiveness of irradiated parasite Trypanosoma evansi antigen**/Arifin, M. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)); Irtisam; Estiqomah; Andayani, S.S.; Suprayogi, B. 1 tables; 12 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 320-324.

TRYPANOSOMA EVANSI; ANTIGENS; GAMMA IRRADIATION; ELISA.

Percobaan dilakukan dengan menggunakan mencit atau tikus putih untuk pengembangbiakan dan pembuatan stok parasit; kelinci untuk membuat immunoglobulin anti bovin serum; dan sapi untuk membuat serum kebal dan normal. Parasit diiradiasi dengan sinar gamma 60 Co dengan dosis 300 Gy. Penemuan Titer antigen (Ag) dilakukan dengan uji ELISA. Hasil yang diperoleh menunjukkan bahwa antigen (Ag) parasit iradiasi memberikan reaksi positif terhadap serum hewan penderita (terinfeksi).

0377 BASMAL, J.

**Fermentasi alami ikan kayu (Arabushi) cakalang (*Katsuwonus pelamis*) dan tongkol (*Auxis thazard*) dalam desikator. Natural fermentation of dried fish stick (Arabushi) skipjack tuna (*Katsuwonus pelamis*) and frigate mackerel (*Auxis thazard*) in desiccator**/Basmal, J.; Indriati, N.; Hak, N.; Nasran, S. (Balai Penelitian Perikanan Laut, Jakarta (Indonesia)). 4 ill., 4 tables; 17 ref. Summaries (En, In). *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 58-67.

TUNA; AUXIS THAZARD; PROCESSING; FERMENTATION; DRIED FISH; RELATIVE HUMIDITY; VACUUM DRYING; ASPERGILLUS; PENICILLIUM; NUTRITIVE VALUE; PROXIMATE COMPOSITION; MOISTURE CONTENT.

Percobaan fermentasi alami ikan kayu (arabushi) cakalang (*Katsuwonus pelamis*) dan tongkol (*Auxis thazard*) menjadi katsuobushi telah dilakukan di dalam desikator berdiameter 29 cm dan tinggi 26 cm. Arabushi disusun di dalam desikator secara bersilangan dan untuk meningkatkan kelembaban relatif udara ruangan fermentasi diletakkan kapas yang telah dibasahi dengan air sebanyak 50 mL pada dasar desikator. Fermentasi dilakukan melalui lima tahap dan setiap tahap diakhiri bila kapang tumbuh merata dan telah terjadi perubahan warna kapang dari putih menjadi abu-abu kehijauan atau abu-abu. Hasil percobaan fermentasi arabushi menjadi katsuobushi cakalang dan tongkol menunjukkan terjadinya penurunan kadar fenol sebesar 4,9% bk (bobot kering) dan 3,8% bk, nilai aktivitas air (aw) katsuobushi cakalang cenderung konstan sebesar 0,87, sedangkan katsuobushi tongkol cenderung menurun dari 0,84 menjadi 0,81 setelah akhir fermentasi tahap V. Jumlah protein kasar yang dapat diuraikan menjadi asam-asam amino sederhana sebesar 13,69% bk dan 80,75% bk masing-masing untuk katsuobushi cakalang dan tongkol. Jenis asam amino yang tidak terdeteksi selama proses fermentasi pada katsuobushi cakalang adalah asam amino alanin, leusin, dan fenilalanin, sedangkan pada katsuobushi tongkol hanya asam amino

prolin. Jenis kapang yang tumbuh selama tahapan fermentasi adalah *Eurotium repens*, *Aspergillus flavus*, *Penicillium citrinum*, dan *Penicillium spp*.

0378 ERUNGAN, A.C.

**Pengaruh penambahan tepung tapioka dan jenis ikan terhadap mutu empek-empek. [Effect of tapioca flour and fish kind on quality of "empek-empek" (fish cake)]**/Erungan, A.C.; Zahiruddin, W.; Nazili, M. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 3 tables; 6 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 27-29.

FISH; FISH PRODUCTS; TAPIOCA; NUTRITIVE VALUE.

Empek-empek adalah salah satu bentuk pangan tradisional daerah Sumatera Selatan dengan bahan utama tepung tapioka dan ikan. Empek-empek sudah dikenal oleh masyarakat luas dan digemari bukan hanya oleh masyarakat Sumatera Selatan tapi juga oleh masyarakat dari daerah lain. Penelitian ini bertujuan untuk mempelajari jenis ikan dan konsentrasi tepung tapioka terhadap mutu empek-empek yang dihasilkan. Hasil penelitian menunjukkan bahwa jenis ikan berpengaruh terhadap kadar protein, penampakan dan rasa empek-empek, sedangkan tepung tapioka berpengaruh terhadap kadar protein, kadar abu, karbohidrat, nilai kekerasan dan elastisitas.

0379 ERUNGAN, A.C.

**Pengaruh pH larutan rendaman terhadap penurunan kandungan Hg dan mutu kerang hijau (*Mytilus virids*). [Effect of pH of soaking agent solution on Hg content and quality of green mussel (*Mytilus virids*)]**/Erungan, A.C.; Ibrahim, B.; Porsepwandi, W. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 1 ill.; 4 tables; 8 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 30-33.

MUSSELS; MERCURY; SOAKING; PH; PROXIMATE COMPOSITION; ORGANOLEPTIC ANALYSIS.

Logam atau unsur baik sebagai unsur bebas terikat pada umumnya dapat larut dalam larutan asam terutama asam-asam kuat seperti asam khlorida (HCl), asam sulfat ($H_2SO_4$) dan asam nitrat ($HNO_3$). Kandungan logam berat raksa (Hg) pada kerang hijau yang didapat dari tempat budidaya di Muara Kamal pada bulan Oktober 1997 adalah sebesar 3,95 x $10^3$ ppm. Perendaman dalam larutan HCl ber pH 3 dapat menurunkan kandungan logam berat raksa sekitar 51,64%, menurunkan protein 5,20%, menurunkan lemak 24,47% dan mempengaruhi penampakan dari kerang tersebut.

0380 SANTOSO, B.A.S.

**Pengaruh rasio bungkil kedelai dan kacang gude terhadap karakteristik produk tahu. [Effect of soybean and pigeonpea ratio oil cake on tofu characteristics]**/Santoso, B.A.S.; Narta (Balai Penelitian Tanaman Pangan, Sukamandi (Indonesia)); Widowati, S. 5 tables; 8 ref. Summary (En). *Agritech (Indonesia)* ISSN 0216-0455 (1998) v. 18 (2) p. 10-13.

SOY FOODS; SOYBEANS; PIGEON PEAS; BY PRODUCTS; ORGANIC MATTER; ORGANOLEPTIC PROPERTIES; CHEMICOPHYSICAL CHARACTERISTICS.

Soybean oil cake and pigeonpea were the alternatives vegetable protein sources besides soybean. Their high protein content has not been considered yet in the food processing technology especially for tofu product. This study evaluated ratio of soybean oil cake to pigeonpea used in tofu processing, tofu characteristics and recovery, anti nutrition content and organoleptics characteristics of tofu. Ratio of soybean oil cake to pigeonpea used in this study were 100:0; 90:10; 80:20; 70:30; 60:40; and 50:50. The result showed that ratio of soybean oil cake to pigeonpea effected tofu characteristics and recovery. Ratio 100:0 gave the best result either in nutrition (protein) content or recovery, but the tofu contains the highest anti nutrition too. Tofu made from material with ratio of 90:10 and 80:20 had the same characteristics and better than others. Organoptically, tofu made from material with ratio 100:0; 90:10 and 80:20 were valued higher than others. This study needs to be developed in order to find the best processing technique and condition in larger scale.

0381 SUPTIJAH, P.

**Pemanfaatan ekstrak protease dalam fermentasi kecap udang. [Utilization of protease extracts on fermentation of shrimp sauce]**/Suptijah, P. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 2 ill.; 2 tables; 13 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 19-23.

PRAWNS AND SHRIMPS; SAUCES; PROTEASES; FERMENTATION; ORGANOLEPTIC PROPERTIES.

Kecap udang merupakan produk fermentasi yang banyak digunakan dalam makanan khas Cina (Chiness food). Kecap ini ditambahkan sebagai bahan penyedap yang dapat menimbulkan rasa yang khas, enak dan gurih. Hampir semua resep makanan Cina mengandung bahan tambahan ini, oleh karena itu kebutuhan akan kecap udang semakin meningkat sehingga perlu dicari metode pembuatannya yang lebih singkat dan dengan mutu yang lebih baik, artinya kandungan gizinya lebih tinggi. Dengan tujuan memanfaatkan ekstrak enzim protease dalam proses fermentasi kecap udang diharapkan dapat mempercepat waktu proses fermentasi bahkan dapat meningkatkan mutu kecap udang. Dalam pembuatannya kecap udang memerlukan waktu yang cukup lama, berminggu-minggu bahkan berbulan-bulan, tetapi penggunaan enzim dapat menyebabkan waktu proses fermentasi dipercepat, bahkan akibat hidrolisa enzimatik pada produk ini, mutu produkpun jadi lebih baik, gizinya lebih meningkat, aromanya lebih sedap sehingga kesukaanpun semakin tinggi. Pada penambahan ekstrak enzim 1% ditentukan waktu proses 1 hari uji pada saat mencapai pH 6 dan diperoleh hasil pengujian kimia dan organoleptik uji lebih baik dibandingkan kontrol. Hal ini berarti perlu proses fermentasi kecap udang lebih cepat 50% dibanding proses fermentasi alami (tanpa penambahan enzim).

0382 TANHINDARTO, R.P.

**Pengaruh iradiasi gamma dan teknik pengemasan terhadap mutu makanan tradisional bakpia. The effect of gamma irradiation and technical packaging on quality of ethnic food bakpia**/Tanhindarto, R.P.; Rosalina S. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)); Situmorang N.; Almatsier, S. 4 ill., 4 tables; 9 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 223-230.

FOODS; GAMMA IRRADIATION; PACKAGING; KEEPING QUALITY; ORGANOLEPTIC PROPERTIES; PROXIMATE COMPOSITION; PROCESSED FOODS.

Penelitian ini dilakukan untuk mendapatkan teknik pengemasan yang dikombinasikan dengan iradiasi untuk memperpanjang daya simpan bakpia pada suhu kamar. Penelitian dengan menggunakan 2 jenis pengemas, yaitu kertas laminasi PP dan nilon laminasi PE. Sampel dikemas non vakum dan vakum. Total dosis yang diterima ialah 0; 2,5 dan 5 kGy. Kualitas sampel ditentukan berdasarkan uji organoleptik, mikrobiologi, dan kimia. Hasil yang diperoleh, menunjukkan bahwa daya simpan sampel dengan bahan pengemas kertas laminasi PP yang dikemas non vakum dan vakum dan diiradiasi 2,5 kGy masing-masing 12 dan 20 hari, sedang bahan pengemas nilon laminasi PE baik yang non vakum maupun vakum yaitu 14 hari. Sampel iradiasi 5kGy dengan bahan pengemas kertas laminasi PP yang dikemas non vakum dan vakum mempunyai daya simpan masing-masing 25 dan 45 hari, sedang jenis pengemas nilon laminasi PE non vakum maupun vakum masing-masing 21 dan 28 hari. Daya simpan bakpia tanpa iradiasi yang dikemas non vakum dan vakum untuk bahan pengemas kertas laminasi PP masing-masing 6 dan 9 hari, sedang jenis pengemas nilon laminasi PE ialah 7 hari.

0383 UMAR, L.

**Pengaruh iradiasi Netron cepat terhadap produksi asam sitrat pada *Aspergillus niger*. The influences of fast Neutron irradiation on the productions of citric acid of *Aspergillus niger***/Umar, L.

(Pusat Penelitian Teknik Nuklir, Bandung (Indonesia)). 2 ill., 1 tables; 8 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 291-295.

ASPERGILLUS NIGER; IRRADIATION; CITRIC ACID.

Telah dipelajari pengaruh iradiasi Netron cepat terhadap produksi asam sitrat, sisa gula, kadar total asam dan keasaman (pH) Supernatan *A. niger* setelah dilakukan fermentasi berdasarkan modifikasi dari metode Marier and Boulet. Biakan murni *A. niger* tipe liar diisolasi dari bahan makanan. Suspensi biakan murni tersebut diiradiasi netron cepat di USIF (Uranium Sheilded Irradiation Facilities), Reaktor TRIGA MARK II, PPTN-BATAN, Bandung pada dosis 0 (kontrol), 5, 10, 15 dan 20 Gy. Hasil pengamatan menunjukkan bahwa iradiasi netron cepat menekan pertumbuhan koloni. D10 (dosis yang menyebabkan tingkat kematian mencapai 90%) *A. niger* tercapai pada dosis sekitar 22,5 Gy. Peningkatan kadar asam sitrat terjadi pada dosis 5 dan 10 Gy berturut-turut sebesar 20% dan 30%, sedangkan pada dosis 15 dan 20 Gy produksi asam menurun masing-masing sebesar 12% dan 29%. Dengan demikian seleksi untuk mendapatkan strain-strain baru *A. niger* yang lebih produktif dalam memproduksi asam sitrat dapat dilakukan pada perlakuan antara dosis 5 - 10 Gy.

## Q03 KONTAMINASI DAN TOKSIKOLOGI PANGAN

0384 NURJANAH.
**Analisa kandungan logam berat Hg, Pb, Cd, Cu dan As pada beberapa jenis ikan konsumsi serta pengaruh penggunaan asam cuka terhadap kandungan logam berat dalam tubuh ikan. [Analysis of heavy metal contents: Hg, Pb, Cd, Cu and As on several consumption fishes and effect of vinegar on heavy metal contents of fish]**/Nurjanah; Suwandi, R.; Setyowati, D.B. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 2 tables; 5 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 11-14.

FISH; HEAVY METALS; CHEMICAL CONTAMINATION; VINEGAR; DETOXIFICATION.

Studi ini dilakukan pada bulan April-Agustus 1997. Ikan yang dianalisa meliputi ikan kakap merah, kembung, bawal hitam, tongkol, dan beronang. Pengambilan sampel dilakukan sebanyak 3 kali di tempat pendaratan ikan dan pasar ikan Muara Angke Jakarta. Hasil analisa menunjukkan bahwa semua jenis ikan tersebut mengandung logam Hg dan As di bawah ambang batas yang ditetapkan oleh FAO/WHO dan Depkes RI (ambang batas Hg sebesar 0,5 ppm dan As sebesar 1 ppm), sedangkan logam berat Pb pada semua jenis ikan tersebut telah melebihi ambang batas yang telah ditetapkan oleh FAO (ambang batas Pb adalah sebesar 2 ppm), dan untuk logam Cd yang telah melebihi ambang batas terdapat pada ikam kembung dan tongkol sampling ke-2 (ambang batas Cu sebesar 1 ppm). Penggunaan cuka pada studi ini, pada umumnya dapat menurunkan kandungan logam berat yang ada pada daging ikan.

## Q04 KOMPOSISI MAKANAN

0385 KOMARIAH.
**Kandungan kolesterol daging sapi Bali, peranakan Ongole dan kerbau pada umur yang berbeda. [The cholesterol content of meat of "Bali" cattle Ongole bred and local buffalo on different age]**/Komariah (Institut Pertanian Bogor (Indonesia). Fakultas Peternakan). 2 tables; 10 ref. Summary (En). *Media Peternakan (Indonesia)* ISSN 0126-0472 (1999) v.22(1) p. 12-17.

CATTLE; WATER BUFFALOES; MEAT; CHOLESTEROL; AGE.

An investigation was conducted on local cattle and buffalo in order to examine the changes occuring in cholesterol content of lean meat with advancing age. Thirty six animals comprising Peranakan Ongole, Bali cattle and local buffalo. The animals of each species were slaughtered sequentially to obtain from longissimus muscle between $5^{th}$ - $6^{th}$ rib. This experiment implemented Factorial Design with breed and age group as the factors. The cholesterol content of meat was significantly higher in local buffalo than in Bali cattle; and the content was significantly higher in Bali cattle than in Peranakan Ongole ($P<0.05$). The influence of age on cholesterol content of meat from the Bali cattle. Peranakan Ongole and local Buffalo was not important.

0386 RAMPENGAN, V.F.
**Identifikasi komponen minyak atsiri daging buah pala (*Myristica fragrans* HOUTT) yang dihidrolisis oleh enzim Beta-Glukosidase. The identification of nutmeg fruit (*Myristica fragrans* HOUTT) essential oil components hydrolyzed by Beta-Glucosidase enzyme**/Rampengan, V.F. (Universitas Sam Ratulangi, Manado (Indonesia), Fakultas Pertanian). 1 ill.; 1 table; 5 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 206-211.

NUTMEGS; ESSENTIAL OILS; ENZYMATIC HYDROLYSIS; GLUCOSIDASES; VOLATILE COMPOUNDS; IDENTIFICATION.

The objective of the research was to identify the essential oil components in nutmeg fruit after Beta-Glucosidae enzyme hydrolysis. The identification of each components was done by Gas Chromatography-Mass Spectrometry. The result showed that the glycosidically bound aroma components hydrolyzed by 30 mg Beta-Glucosidase were 62 volatile components. These consisted of monoterpenes, aromatics, fatty acids, esters, fenol derivatives, alicyclics, and alifatic hydrocarbons.

## Q05 ZAT TAMBAHAN PADA PANGAN

0387 YUNIZAL.
**Pengaruh antioksidan terhadap stabilitas konsentrasi asam lemak Omega-3 dari hasil samping pengalengan dan penepungan ikan lemuru (Sardinella lemuru). [Effect of antioxidant on stability of Omega-3 fatty acid concentrat made from by-product of Sardine (Sardinella lemuru) canning and fish meal manufacturing]**/Yunizal (Instalasi Penelitian Perikanan Laut Slipi, Jakarta (Indonesia)). 9 ill.; 9 ref. Summaries (En, In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 1-10.

SARDINELLA; FISH OILS; FATTY ACIDS; FISHERY BYPRODUCTS; ANTIOXIDANTS; OXIDATION; STORAGE.

Penelitian tentang pengaruh antioksidan terbutyl hydroquinone (TBHQ) dan tokoferol dengan tingkat penambahan 0 ppm, 100 ppm dan 200 ppm terhadap mutu konsentrat asam lemak omega-3 dari minyak-minyak hasil samping pengalengan dan minyak hasil samping penepungan selama penyimpanan suhu kamar (0, 4, 8, 12, dan 16 hari) telah dilakukan. Hasil penelitian menunjukkan bahwa antioksidan TBHQ 200 ppm dapat digunakan untuk menjaga mutu konsentrat asam lemak omega-3 dari minyak ikan hasil samping penepungan selama 16 hari dengan nilai total oksidasi 8. Sedangkan antioksidan TBHQ 100 ppm dapat digunakan untuk menjaga mutu konsentrat asam lemak omega-3 dari minyak ikan hasil samping pengalengan hingga penyimpanan hari ke-9 dengan nilai total oksidasi 10.

## Q52 PENGOLAHAN DAN PENGAWETAN PAKAN

0388 KAMIL.
**Pengaruh metode pengolahan terhadap mutu tepung siput murbei (*Pomaceae sp.*). [Effect of processing method on *Pomaceae sp.* flour quality]**/Kamil; Zahiruddin, W.; Sumaryanto, H. (Institut

Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 3 tables; 5 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 24-26.

SNAILS; ANIMAL MEAL; PROCESSING; PROXIMATE COMPOSITION; FISH FEEDING.

Penelitian dilakukan untuk memanfaatkan daging siput murbei sebagai bahan baku untuk dijadikan tepung ikan (fish meal), selain itu juga untuk mengetahui pengaruh metode pengolahan yaitu pemasakan prapengeringan (pengukusan dan perebusan) dan pengeringan (oven dan sinar matahari) terhadap mutu tepung sifut murbei yang dihasilkan. Tahapan proses pembuatan tepung siput murbei yaitu pencucian siput, pencungkilan, pencucian daging, pemasakan, pengepresan, pengeringan dan penggilingan. Hasil analisis proksimat daging siput murbei segar untuk protein (8,69%), lemak (0,78%), abu (1,47%), serat (6,68%), dan air (82,37%). Rendemen dagingnya sebesar 29,83%. Tepung siput murbei memiliki kadar protein (65,50% - 70,67%), lemak (1,27% - 1,43%), abu (9,13% - 10,47%), serat (8,19% - 9,59%), dan garam (0,56% - 1,69%). Kadar asam amino essensial tepung siput murbei paling tinggi adalah leusin (44,8 mg/g protein) dan terendah adalah metionin (10,54 mg/g protein). Jenis asam amino essensial yang paling defisien dari tepung siput murnei adalah tritofan. Sedangkan lisin yang biasanya sebagai asam amino pembatas, ternyata pada tepung ini tidak merupakan asam amino pembatas dan memiliki skor kimia yang cukup baik, sehingga dapat digunakan sebagai suplemen pakan lain yang kekurangan lisin. Tepung siput murbei yang dihasilkan dari kombinasi perlakuan perebusan dan kemudian dikeringkan pada sinar matahari memiliki mutu terbaik. Metode ini lebih sederhana, murah dalam proses pembuatannya, serta memiliki kadar lemak dan serat kasar yang relatif rendah sedangkan kadar protein dan nilai organoleptiknya kurang.

## Q54 KOMPOSISI PAKAN

0389 KHALIL.
**Pengaruh kandungan air dan ukuran partikel terhadap sifat fisik pakan lokal; kerapatan tumpukan; kerapatan pemadatan tumpukan dan berat jenis. [Effect of water content and particle size on the physical properties of local feedstuff; specific density; compacted specific density and specific weight]**/Khalil (Institut Pertanian Bogor (Indonesia). Fakultas Peternakan). 5 tables; 10 ref. Summary (En). *Media Peternakan (Indonesia)* ISSN 0126-0472 (1999) v.22(1) p. 1-11.

FEEDS; MOISTURE CONTENT; PARTICLE SIZE; CHEMICOPHYSICAL PROPERTIES; MINERAL NUTRIENTS.

The experiment was carried out to measure three physical properties (specific density, compacted specific density and specific weight) of local fedstuff and to study the effect of moisture content and particle size on the physical properties measured. Twenty five kinds of feedstuff divided in 5 groups according to their nutritional function in the animal diet and obtained from the local producers or market were used as samples in the experiment. The feed samples of about 27 kg each were prepared by grinding into 3 different particle sizes, i.e. normal, medium (screen : 3 mm) and small (1 mm). The particle size was not changed for the meal form feedstuff. The feed of each particle size were then subdivided into 3 groups and their moisture content was adjusted into 3 different levels, i.e. normal, high (2% higher than the normal) and low (2% lower than the normal). After that, the physical properties were measured for 3 times as replications. The data were analysis statistically analyzed by using variance analysis in the completely randomized design. The mean value were then compared by using least significant different. Results of the experiment showed that mineral feed source in the normal form had the highest value of specific density (938.3 kg/m$^3$), compacted specific density (1196.6 kg/m$^3$) and specific weight (1920.1 kg/m$^3$) with the lowest coefficient variation (28.4%; 25.5% and 19.2%). On the other hand, forages and roughage showed the lowest mean value with the highest variation. Specific and compacted specific densities were significantly affected by both moisture content and particle size, but the intensity and pattern of their effect were not same in different kinds of feedstuff and physical properties. In general, the mean value of compacted specific density increased, while the specific density decreased, when the moisture content and particle size of the feedstuff were reduced.

## Q60 PENGOLAHAN HASIL PERTANIAN NON PANGAN DAN NON PAKAN

0390 HERWINARNI S.

**Pengaruh iradiasi terhadap kerapatan ikatan silang latexs karet alam. The effect of radiation on crosslink density of the natural rubber latex**/Herwinarni S.; Marlianti, I.; Sumarti, M. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta Indonesia)). 12 ill., 2 tables; 6 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 255-262.

RUBBER; GAMMA IRRADIATION; MECHANICAL PROPERTIES.

Telah diperoleh pengaruh iradiasi terhadap kerapatan ikatan silang, sifat fisik dan mekanik lateks karet alam iradiasi dengan sinar gamma dari sumber Co-60. Lateks karet alam dengan penambahan bahan pemeka normal-butil akrilat (n-BA) dalam bentuk emulsi yang digunakan adalah 0, 2, 3, dan 5 psk (per seratus karet). Iradiasi dilakukan pada dosis 0, 20, 30 dan 40 kGy, dengan kecepatan dosis 10 kGy/jam. Sifat kestabilan lateks meliputi viskositas, modulus, tegangan putus, perpanjangan putus serta kerapatan ikatan silang film lateks karet alam pada penyimpanan 1, 7, 14 sampai 28 hari telah ditentukan. Ukuran partikel karet sebelum dan sesudah iradiasi juga dikerjakan dengan SEM. Hasil pengujian menunjukkan bahwa harga kerapatan silang sangat mempengaruhi sifat fisik dan mekanik film karet setelah penyimpanan. Lateks karet alam dengan penambahan n-BA sebanyak 3 psk dosis iradiasi 20 kGy, tegangan putus film karet 20 MPa menghasilkan lateks vulkanisasi iradiasi yang layak untuk pembuatan barang jadi karet. Bahkan setelah disimpan 14 hari, lateks karet alam mempunyai harga kerapatan ikatan silang sekitar $65x10^{20}$ unit ikatan silang/ml dan diikuti dengan naiknya tegangan putus sekitar 10%.

0391 ISKANDAR, S.

**Pengaruh penambahan karet alam dan karet sintetis poliisopren terhadap ketahanan iradiasi sinar gamma campuran polipropilen-tepung tapioka. The effect of addition of natural rubber and synthetic rubber polyisoprene on gamma radiation resistance of polypropilene-tapioca blend**/Iskandar, S.; Marliyanti, I.; Kadariyah (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 1 ill., 3 tables; 13 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 245-248.

RUBBER; POLYMERS; GAMMA IRRADIATION; MECHANICAL PROPERTIES.

Untuk memanfaatkan teknologi radiasi pada pembuatan polimer yang mudah terdegradasi di alam dari campuran polipropilen (PP)-tepung tapioka (TT), telah dilakukan penelitian pengaruh iradiasi sinar gamma dan penambahan karet alam (KA) serta karet sintetis poliisopren (KSP) terhadap sifat fisika campuran PP-TT. Untuk itu dibuat dua seri campuran PP-TT-KA dan PP-TT-KSP dengan berbagai variasi komposisi. Pencampuran dilakukan dengan alat laboplastomil. Sampel berupa film diperoleh dengan metode pengepresan. Film yang terbentuk selanjutnya diiradiasi dengan sinar gamma dari sumber Co-60 pada dosis yang bervariasi sampai 50 kGy. Analisis pengaruh komposisi dan iradiasi dilakukan dengan menggunakan alat uji tarik dan SEM. Hasil penelitian menunjukkan bahwa dengan penambahan KA ataupun KSP, ketahanan terhadap iradiasi sinar gamma campuran PP-TT dapat ditingkatkan. Ketahanan iradiasi sampai dosis 25 kGy dari campuran PP-TT dengan kadar TT sekitar 6 psp (bagian per seratus bagian polipropilen) dapat dicapai dengan penambahan KSP 2 psp.

0392 MARSONGKO.

**Pengaruh bahan pengemulsi untuk antioksidan ionol pada kualitas lateks alam iradiasi. The effect of emulsifier agent for ionol antioxidant on the quality of irradiated natural rubber**

**latex**/Marsongko; Utama, M.; Sumarti, M.K. (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). tables; 3 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: P. 263-268.

RUBBER; GAMMA IRRADIATION; EMULSIFIERS; CHEMICAL COMPOSITION; MECHANICAL PROPERTIES.

Enam macam bahan pengemulsi yaitu: triethanol amine lauryl sulfate (Emal TD), sodium dialkyl sulfosuccinate (Pelex OTP), Pelex OTP-30, naphthlene sulfonic acid formaldehyde condensate (Demol RLN-A), dodecyl benzene sulfonic acid (Neopelex FS), sodium polyoxyethylene alkyl phenol ether sulfate (Levenol FS) dengan konsentrasi bahan pengemulsi masing-masing adalah 2,5%; 5,0% dan 10,0% berat telah ditambahkan ke dalam lateks alam iradiasi. Sifat lateks (pH, kekentalan, kadar jumlah padatan) dan film karetnya (modulus-300, modulus-600, tegangan putus, perpanjangan putus) dari lateks alam iradasi yang belum dan yang sudah dipanaskan pada suhu $70^0$ C selama 0; 3; dan 7 hari. Ternyata penambahan bahan pengemulsi untuk antioksidan ionol sebanyak 2,5%; 5,0% dan 10,0% berat ke dalam lateks alam iradiasi tidak mempengaruhi pH, kekentalan, dan kadar jumlah padatan. Sedangkan kekuatan tarik dan perpanjangan putus film karet menunjukkan adanya kenaikan setelah pemanasan $70^0$ C selama 3 dan 7 hari.

0393 SUHARTINI, M.
**Physical, mechanical and thermal properties study on the mixing of styren natural rubber copolimer with polyethylene**/Suhartini, M.; Utama, M.; Sumarti, M.; Susilowati, S.; Puspitasari, T.; Listina, D.; Marsongko (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 4 ill., 4 tables; 6 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 237-243.

RUBBER; POLYETHYLENE; ADDITIVES; MECHANICAL PROPERTIES.

Penelitian ini dilakukan untuk memperbaiki sifat fisik kopolimer karet alam stiren. Kopolimer karet alam stiren dicampur dengan polietilen densitas rendah (LDPE) pada konsentrasi 5, 20, 50, 70,90 psk (perseratus karet) dan masing-masing digiling sebanyak 20, 40, 60, 80 kali pada temperatur $140^0$ C. Hasil penggilingan kemudian dilakukan proses pengepresan masing-masing pada 20, 40, 60, 80, 100, 130, 200 kg/cm2 pada temperatur $160^0$ C. Hasil percobaan kemudian dianalisis sifat fisik, mekanik dan termal. Hasil analisis menunjukkan bahwa kopolimer karet alam stiren yang dicampur dengan PE sebanyak 20 psk digiling 60 kali pada temperatur $140^0$ C dan ditekan pada 200 kg/cm2 pada temperatur $160^0$ C mempunyai sifat fisik lebih baik dibandingkan yang diproses dengan kondisi operasi yang lain. Bahan tersebut mengalami penurunan kualitas sifat fisik sebesar rata-rata 3,16 pada daur ulang secara langsung 22,67% pada daur ulang yang dilakukan setelah proses pengusangan. Pengukuran titik leleh dari campuran tersebut mempunyai temperatur $112,09^0$ C.

0394 SUMARTI, M.
**Kopolimerisasi radiasi metil metakrilat ke dalam larutan karet alam dalam Toluena. Radiation copolymerization of methyl methacrylate into a mixture of natural rubber in Toluena**/Sumarti, M.; Utama, M.; Marsongko (Pusat Aplikasi Isotop dan Radiasi, BATAN, Jakarta (Indonesia)). 8 ill., 1 table; 6 ref. Summaries (En, In). [Proceedings of scientific meeting research and development of application of isotop and radiation : Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha,

H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 269-276.

RUBBER; POLYMERS; GAMMA IRRADIATION; VISCOSITY.

Larutan karet alam dalam Toluena berkadar 10%, diberi larutan MMA sebanyak: 70, 80, 90, dan 100 psk (per seratus bagian berat karet), kemudian diiradiasi dengan sinar gamma Co-60 pada dosis 0, 1, 3, 5, 7, dan 10 kGy telah dikerjakan. Sifat larutan kopolimer yang dihasilkan yaitu derajat konversi, kandungan poli MMA, kekentalan, dan daya rekat terhadap beberapa matrik film polimer (film dari etilen vinil asetat atau EVA, vulkanisat karet, kulit alam, dan film poli vinil clorida) dievaluasi. Hasil menunjukkan kopolimer karet alam-MMA yang mengandung 100 psk MMA berdosis iradiasi antara 5 - 7 kGy memiliki derajat konversi dan daya rekat pada beberapa macam matrik maksimum yaitu masing-masing 70% dan antara 0,3 - 0,6 kg/cm.

0395 TAMPUBOLON, K.
**Senyawa antibiotik dari teripang. [Antibiotic compound from sea cucumber]**/Tampubolon, K. (Institut Pertanian Bogor (Indonesia). Fakultas Perikanan Ilmu Kelautan). 1 table ; 9 ref. Summary (In). *Buletin Teknologi Hasil Perikanan (Indonesia)* ISSN 0854-9230 (1998) v.5(2) p. 14-16.

SEA CUCUMBERS; ESCHERICHIA COLI; STAPHYLOCOCCUS; AUREUS; FISH EXTRACTS; ANTIBIOTICS.

Penelitian ini untuk mengetahui besarnya daya antibiotik dari senyawa bioaktif yang diperoleh dari ekstrak kering beberapa jenis teripang (*Holothuria sp.*). Ekstrak kasar kering dari bagian tubuh dan viseral teripang pasir (*Holothuria scarba*), teripang keling (*Actinopyga miliaris*) dan teripang gama (*Stichopus variegatus*) ternyata mempunyai daya hambat terhadap pertumbuhan bakteri *Escherichia coli* dan *Staphylococcus aureus*. Ekstrak dari bagian dalam teripang pasir dengan pelarut aseton daya hambatnya terhadap *Escherichia coli* 0,5 cm dan dari bagian viseral 0,4 cm. Sedangkan ekstraksi dari ke 3 jenis teripang tersebut dengan pelarut metanol, zone hambatnya terhadap *E. coli* dan *S. aureus*, masing-masing sekitar 0,3 - 0,6 cm dan 0,1 - 0,2 cm. Daya antibiotik tertinggi dihasilkan dari viseral teripang pasir, yaitu sebesar 0,6 cm.

0396 TUMBEL, N.
**[Study of active charcoal quality increase] Penelitian peningkatan mutu arang aktif produksi industri**/Tumbel, N.; Simanjuntak, H.; Rumbay, J.O.; Pangkerego, D.; Andriana, A.J.; Sumbung-Rumayar, H.A.Y. (Balai Penelitian dan Pengembangan Industri, Manado (Indonesia). 1 ill., 7 tables; 17 ref. Summary (In). Manado (Indonesia): Balitbang Industri, 1999: 19 p. *Komunikasi Balai Penelitian dan Pengembangan Industri (Indonesia)* ISSN 0126-2343 (no. 186).

CHARCOAL; QUALITY; ACTIVATED CARBON; COLOUR; MOISTURE CONTENT.

Telah dilakukan penelitian peningkatan mutu arang aktif produksi industri. Tujuan penelitian mempelajari dan menganalisis mutu arang aktif bahan baku tempurung kelapa dan penggunaan arang aktif pada sampel air sumur dan minyak makan. Metode penelitian bersifat eksploratif, data hasil penelitian dianalisis secara deskriptif menggunakan tabelaris. Pengamatan difokuskan pada: mutu arang tempurung sesuai Standar Nasional Indonesia (SNI), mutu arang aktif sesuai SNI dan penggunaan arang aktif pada air minum dengan uji kekeruhan air, serta minyak makan dengan uji warna secara visual. Hasil analisis laboratorium sampel arang tempurung produksi perusahaan untuk parameter: kadar air, kadar abu, kadar zat menguap, dan "fixed carbon" tidak memenuhi syarat mutu arang tempurung (SNI 01-1682-1989). Hasil pengamatan laboratorium arang aktif produksi perusahaan menunjukkan bahwa parameter-parameter yang diuji memenuhi syarat mutu arang aktif teknis (SNI 06-3730-1995). Hasil pengamatan produk arang aktif pada uji kekeruhan air dan uji warna dapat digunakan untuk pemrosesan air minum dan pemurnian minyak makan.

## T01 POLUSI

0397 ARIFIN, M.

**Bioakumulasi C-14 monokrotofos dalam otot Longissimus dorsi dan Biceps femoris kambing pada pemberian dosis sub-akut. [Bioaccumulation of C-14 monocrotophos on Longissimus dorsi and Biceps femoris muscles of goat by sub-acute dosage application]**/Arifin, M. (Universitas Diponegoro, Semarang (Indonesia). Fakultas Peternakan). 1 ill., 16 ref. Summaries (En, In). [Proceedings on scientific meeting research and development of application of isotop and radiation: Agriculture, chemistry, environment, radiation process, industry and biology]. Risalah pertemuan ilmiah penelitian dan pengembangan aplikasi isotop dan radiasi/Suhadi, F.; Maha, H.M.; Manurung, S.; Ismachin, M.; Sisworo, E.L.; Hilmy, N.; Sutrisno, S.; Sumatra, M.; Mugiono; Abidin, Z.; Ilmi, M.; Winarno, H. Jakarta (Indonesia): Pusat Penelitian dan Pengembangan Teknologi Isotop dan Radiasi, 1999: p. 309-314.

GOAT MEAT; MONOCROTOPHOS; BIOACCUMULATION.

Percobaan tentang bioakumulasi monokrotofos dalam daging kambing telah dilakukan melalui pemberian dosis subakut per-oral yang diikuti dengan pemotongan secara serial. Sebanyak 12 ekor kambing berumur satu tahun dengan pakan rumput gajah secara ad libitum dan 120 gr konsentrat (17% protein kasar), setiap hari diberi perlakuan 14C monokrotofos secara oral sebanyak 0,006 mg/kg bobot badan. Selama periode penelitian, materi ini dipilih secara acak untuk dipotong setiap 3 hari, sejak hari ke-3 sampai ke-36 pemberian dosis. Urin dan feses dikumpulkan secara terpisah untuk dianalisis tingkat eliminasi monokrotofos yang dikonsumsi. Sementara itu sampel daging dari Longissimus dorsi dan Biceps femoris diambil untuk dianalisis kandungan monokrotofos melalui pengukuran radioaktifitas. Hasil percobaan menunjukkan bahwa rata-rata kandungan monokrotofos dalam Longissimua dorsi sebesar 0,047 ppm, sementara dalam Biceps femoris sebesar 0,024 ppm. Berdasarkan analisis regresi non-linier menggunakan model toksikokinetik dua kompartemen didapatkan bahwa konstanta laju akumulasi monokrotofos di dalam Longissimus dorsi dan Biceps femoris masing-masing sebesar 0,02356; ±0,00266; 0,00784; ±0,0021 mg/g jaringan/hari. Pola bioakumulasi monocrotofos dalam jaringan daging Longissimus dorsi dan Biceps femoris tersebut masing-masing mengikuti persamaan Q(t)=0,057(e/0,0066t -e/-0,25665t) dengan nilai R2=0,86 dan Q(t)=0,027(e exp 0,00025t -e/0,17474t) dengan nilai R exp 2 = 0,67.

0398 RACHMANSYAH.

**Distribusi residu endosulfan di perairan pantai barat Sulawesi Selatan. Distribution of endosulfan residue along the west coast of South Sulawesi (Indonesia)**/Rachmansyah; Usman; Yulianingsih, R.; Radiarta, I.N. (Balai Penelitian Perikanan Pantai Gondol, Bali (Indonesia)). 1 table; 19 ref. Summaries (En, In). Appendices. *Jurnal Penelitian Perikanan Indonesia (Indonesia)* ISSN 0853-5884 (1999) v. 5(2) p. 68-82.

SULAWESI; COASTAL WATERS; ENDOSULFAN; RESIDUES; PESTICIDES RESISTANCE; FISHERY MANAGEMENT.

Peneraan residu endosulfan di perairan Pantai Barat Sulawesi dan Tenggara telah dilakukan dari bulan Juli - September 1995. Kajian bertujuan mengetahui status dan distribusi endosulfan di perairan pantai sebagai pertimbangan dalam pemanfaatan dan pengelolaan lingkungan budi daya perikanan pantai secara rasional. Metode survai diaplikasikan dan contoh diambil secara komposit pada stasiun yang ditetapkan dari wilayah muara ke arah daratan. Posisi geografi lokasi contoh ditentukan dengan menggunakan GPS (Global Positioning System). Residu endosulfan dianalisis dari contoh tanah, lumut, kelekap dan trisipan dengan alat bantu gas kromatografi. Hasil analisis menunjukkan bahwa residu endosulfan dari contoh tanah berkisar dari tidak terdeteksi (tt) sampai 33.296,04 ppb; kelekap (tt. 222,95 ppb); lumut (tt. 659,96 ppb); sedangkan residu endosulfan dalam daging trisipan tidak terdeteksi.

0399 RANTUNG, J.L.

**Lumut kerak (Lichen) sebagai indikator biologi cemaran udara sulfur dioksida ($S0_2$). Lichen as biological indicator of sulphur dioksida polutan**/Rantung, J.L. (Universitas Sam Ratulangi, Manado (Indonesia). Fakultas Pertanian). 3 tables; 7 ref. Summary (En). *Eugenia (Indonesia)* ISSN 0854-0276 (1999) v. 5 (4) p. 198-205.

LICHENES; BIODIVERSITY; INDICATOR ORGANISMS; AIR POLLUTION; SULPHUR DIOXIDE; FUNGAL MORPHOLOGY.

The purposes of this study were to identify the lichen found in the exposured and unexposured areas, to study the diversity index and sulphur content of lichen, and to study the morphology of lichen in both areas. This study was observational or ex post facto in nature using cross sectional design. The results showed that the morphology of lichen found in exposured area (Randu Agung) differed from that in unexposured area; there was no lichen found in exposured area of Tlogopatut and Roomo. Two species (*Graphia sp.* and *Parmelia sp.*) were found in exposured area of Randu Agung, four species (*Graphia sp., Parmelia sp.*, *Xanthoria sp.*, and *Physera sp.*) existed in unexposured area

## U30 METODE PENELITIAN

0400 WAGIH, M.E.

**The zymoblot technique: potentials in agricultural biotechnology**/Wagih, M.E.; Wagih, E.E. (The PNG University of Technology, Lae (Papua New Guinea)). 2 ill., 5 ref. Summary (En). Proceedings of the Indonesian biotechnology conference: vol 2/Jenie, U.A. [et al.] (eds.); Institut Pertanian Bogor (Indonesia). Bogor (Indonesia): IPB, 1997: p. 633-640.

COLOCASIA; PLANT BIOTECHNOLOGY; ENZYMIC ACTIVITY; ENZYMATIC ANALYSIS; METHODS.

Zymoblot, a new semi quantitative micro-technique first described by Wagih and Fletcher (1993) to detect enzyme activities in micro-organism is recommended here as a tool in plant biotechnology research for comparative analysis of enzyme activities. The technique is based on immobilization of negatively charged enzymes from alkaline extracts spotted onto nitrocellulose membrane. For example, peroxidase (PO) activity in taro (*Colocasia spp.*) leaf extracts is selectively assayed with a reaction mixture containing the substrate 4-chloro-1-naphthol. The technique detected differences in PO activity among leaves at different growth and developmental stages of five genotypes of taro, each of which showed different patterns of PO activity. There was no difference in PO activity between fresh and frozen ($0^0$ C/3 days) tissue. Results were photographed and/or computer scanned. The enzyme-substrate reaction produced an insoluble blue product on spot sites, allowing a semi-quantitative analysis of PO activity. The reaction can be quantified using densitometry (Wagih and Wagih, 1997). The Zymoblot technique is simple, cheaper, reliable and less time consuming than all known procedures for enzyme assays in plants, animals or micro-organism. The technique is highly competitive in price with all commercially available kits. Such advantages should qualify the Zymoblot technique for wide potential uses in the studies of routine enzyme screening and distribution, differential diagnosis of pathogens, and immunological pathogens detection based on enzyme-labelling, plant biotaxonomy, strees and pathogenicity physiology, physiological basis for disease resistance, developmental physiology and screening for commercially important enzymes etc. Such advantages and potential areas of application should qualify the Zymoblot technique for wide potential uses in agricultural biotechnology and, more broadly, in general biotechnology application.

## INDEKS PENGARANG

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## INDEKS BADAN KORPORASI

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# INDEKS JURNAL