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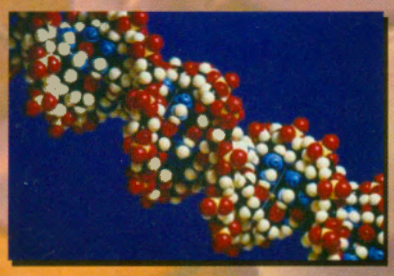

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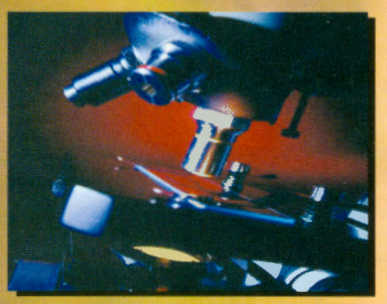

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P26 DETERMINATION OF EXTINCTION COEFFICIENT OF RADIATION INTERCEPTION IN OIL PALM PLANTATION

Wan Ishak WI[1], Awal MA[2], Endan J[3] and Mohd. Haniff H[4]
[1]Professor and Director of Institute of Advance Technology, UPM, Malaysia, [2]Graduate student, Institute of Advance Technology, UPM, Malaysia, [3]Associate Professor, Dept. of Food and Process Engineering, UPM, Malaysia, and [4]ResearchOfficer, Biological Division, M P O B, Bangi, Malaysia
Tel: 013-6911622; E-mail: **mawal69@yahoo.com**

Extinction coefficient is an important attribute for determining indirect LAI using Beer-Lambert Law, which is difficult to measure in oil palm. In this study, Beer-Lambert Law was applied to determine the mean and range of the extinction coefficient, (k). An independent experimental data set of canopy transmittance and LAI were collected from seven different palm age groups, which was used to estimate 'k' values. LAI values were determined by destructive (direct) method, while the circular method was used to determine the radiation interception by the canopy. Results showed that the lowest 'k' value (0.278) was obtained for the 16 -year old palms, and the highest 'k' was (0.762) value obtained for 2-year old palm. The 'k' value of 3, 7, 9, and 12-year old palm groups were 0.755, 0.389, 0.373, and 0.282, respectively. There are several potential factors, which significantly affect 'k' values. In this study, spatial variation, height of the quantum sensor, and canopy depth were evaluated as potential factors affecting 'k'.

P27 SIMULATION MODEL OF OIL PALM GROWTH AND YIELD

Wan Ishak WI[1], Awal MA[2], Endan J[3] and Mohd. Haniff H[4]
[1]Professor and Director of Institute of Advance Technology, UPM, Malaysia, [2]Graduate student, Institute of Advance Technology, UPM, Malaysia, [3]Associate Professor, Dept. of Food and Process Engineering, UPM, Malaysia, and [4]ResearchOfficer, Biological Division, M P O B, Bangi, Malaysia
Tel: 013-6911622; E-mail: **mawal69@yahoo.com**

Simulation models have become powerful tools for investigating agricultural crop dynamics and solving practical problems. Accurate and reliable simulation model would be an alternative source of information that could replace or enhance information derived from costly and laborious field experiments. Particularly in oil palms where field experiments are expensive, time consuming and labour intensive, specially like oil palm where filed experiment are expensive, time consuming and laborious. A computer simulation model was developed using Visual C++ for simulation of growth and yield of oil palm. Light interception was modelled using a modified Monsi-Saeki equation. Leaf area index and growth were modelled based on OPSIM approach (van Kraalingen, 1985). A significant relationship was found between the simulated yield and actual yield. In sensitivity analysis, results showed that the simulated LAI was sensitive to both SLA and 'k' and the simulated yield was sensitive to both VDM and 'k'.

P28 SIMULATING OIL PALM GROWTH AND YIELD

Teh CBS[1], Henson I[2], Harun H[2], Goh KJ[3] and Husni MHA[1]
[1] Dept. Land Management, Uni. Putra Malaysia, Serdang, Selangor, [2] Malaysian Palm Oil Board, Bangi, Selangor,and [3]Applied Agric. Res. Sdn. Bhd., Sg. Buloh, Selangor

The objective of this study was to develop a semi-mechanistic model to simulate the oil palm growth and yield. The model consisted of four core components: a) 3-D ray tracing to simulate the plant-radiation regime, b) growth model, adapting from the growth model by van Kraalingen *et al.* (1989), c) water balance model, allowing for interaction between the heat and water fluxes from the soil and plant, and d) flowering cycle model. The growth and yield of oil palm was effected by water and flower cycle stresses. Simulation of oil palm growth and yield for a 30-year period from 1974 to 2003, using actual weather and field

conditions, were done. Simulations followed trend usually observed in field conditions. Ongoing work is now to compare model simulations and field measurements.

P29 SOYBEAN (*Glycine max*) SEED YIELD AND SEED QUALITY AS INFLUENCED BY PLANT CANOPY MODIFICATION AND SEASONAL VARIATION

Erenso D[1], Adam P[1], Mohd Fauzi R[1], Kamaruzaman S[2] and Mohamad L[1]
[1]Department of Plant Science, [2]Department of Plant Protection, Faculty of AgricultureUniversiti Putra Malaysia, Serdang, Selangor.

Plant canopy architecture, seasonal variations and wet and warm environments may have significant effect on seed yield and seed quality in soybean [*Glycine max* (L.) Merrill.]. Cultivars with modified architectures for better light interception and canopy photosynthesis have not been fully exploited in wet and warm tropical areas. This study was carried out to evaluate the effect of plant canopy modification and seasonal variations on seed yield and seed quality. Field experiments were conducted in 2003 and 2004 with four soybean cultivars at Universiti Putra Malaysia, Serdang. To modify the plant canopy, defoliation treatments (0%, 25%, 50%, and75%) were imposed at R3 plant growth stage. Defoliation from 25% to 75% resulted in increased percent germination and 3 day seedling height. Thirteen percent germination increment was observed when 75% defoliation was imposed. On the other hand, the seed yield was affected by seasonal variations and defoliation treatments which in turn influenced the performance of the cultivars differently. The study indicated that canopy modification appears to improve seed quality under wet and warm tropical environments. The study also indicated the identification of open canopy cultivars and rain free harvesting seasons can help the production of good quality seeds without affecting the yield significantly.

P30 INDUCTION BY GROWTH STIMULATOR LEADING TO PRODUCTION OF SECONDARY METABOLITES IN *Michelia alba* CALLUS CULTURES

Hazniza A[1], Sanimah S[1], Siti Shaleha T[1] and Hapsah MG[1]
[1]Biotechnology Research Centre, Malaysian Agricultural Research and Development Institute G.P.O. Box 12301, 50774 Kuala Lumpur.

The essential oil from established callus culture of *Michelia alba* (*M. alba*), which were, supplemented with different growth stimulators, namely, L-phenylalanine, pectinase and yeast extract have been investigated for their production in secondary metabolite compounds. Fresh callus samples were extracted using Simultaneous Distillation Extraction (SDE) and the essential oils obtained were analysed using gas chromatography-mass spectrometry (GC-MS). Approximately up to 87 chemical compounds were identified in the essential oils obtained from the selected *M.alba* cell lines. The chemical compounds presented however were varied from each other as well as their percentage. The major secondary compounds identified using each growth stimulator was different from each other. Production of linalool, a fragrance marker of *M. alba* secondary metabolite compounds was only detected in callus culture treated with L-phenylalanine, but was absent in callus culture treated with pectinase and yeast extract. Other secondary metabolite compounds induced by L-phenylalanine in *M. alba* callus cultures were 1,6,10,dodecatrien-3-ol,3,7,11-trimethyl, caryophyllene oxide, α-cadinol, cadina-1(10),4-diene and 1,3,6-octriene,3,7-dimethyl. Results show that production of secondary metabolites in *M. alba* callus culture using pectinase and yeast extract as a growth stimulator were not satisfactory due to absent of linalool and other secondary metabolites that related to floral fragrance compounds. In this study, L-phenylalanine was a good growth stimulator compared with pectinase and yeast extract in inducing the production of secondary metabolite compounds in *M. alba* callus culture.
