

## EDITORIAL

1994 has been a very busy year at AAR with both research and commercial activities running in high gear.

The fruits of research and sound agronomic advices provided by AAR complemented by good management practices can be seen in the good results obtained in the Principals' estates as reported in **THE COMPARATIVE PERFORMANCE OF PLANTATION COMPANIES LISTED ON THE KLSE**, a paper presented at the TPSB Managers' Conference in June 1994.

In this issue of our NEWS, we would like to share with you some of the results of our research by publishing the abstracts/summaries/conclusions of some of the major papers we wrote in 1994. They comprised five papers presented at the recent ISP International Planters Conference and 11 papers presented in other forums and journals.

If you wish to know more details, do not hesitate to write to us for the full papers.  
OOI, L.H.

### ABSTRACTS OF PAPERS PRESENTED AT THE 1994 ISP INTERNATIONAL PLANTERS CONFERENCE

#### An integrated site specific fertiliser recommendation system (INFERS) for high productivity in mature oil palms

K.K.Kee, K.J. Goh, P.S. Chew and S.H. Tey

#### ABSTRACT

Fertiliser input is necessary for high oil palm production on highly leached and low fertility tropical soils. Accurate manuring recommendations are therefore important to ensure high and sustained yields and to avoid excessive inputs which reduce profitability and may have negative impact on the environment. To fulfill these objectives, the manuring recommendation system must be site specific and take into account palm nutrient requirements in relation to climate and soils while achieving good growth and yields.

A simple empirical model for prediction of site yield potential (ASYP 1) has been developed based on palm, soil, site and climate characteristics. Preliminary tests and evaluation of predicted versus actual yields for a range of soil types suggest that the predicted yields (using trials and commercial blocks data) are both realistic and achievable.

An integrated site specific fertiliser recommendation system (INFERS) for mature oil palm based on the nutrient balance concept incorporating target yields from the ASYP 1 model has been developed. A computer programme was written to facilitate the use of INFERS. The system takes into account all important factors that influence nutrient demand and supply. It integrates all agronomic data routinely collected for fertilised fields (eg. vegetative measurements, soil and leaf analysis, rainfall, manuring history, yield etc.) as well as site specific data such as soil type, texture and slope.

INFERS was tested using data from several independent fertiliser trials covering 6 soils. Results indicated that predicted annual yields were generally within 10% (range 0.3 to 16%) of actual achieved. The computed N, P and K nutrients required to attain

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the predicted yields were mainly within 0.5 kg of the actual fertiliser rates applied in the trials. For commercial blocks, nutrient balance estimates indicated net deficits of 0.8 to 1.1 kg N and -0.2 to +0.4 kg K palm<sup>-1</sup> y<sup>-1</sup>. Over the short to medium term, the net nutrient balance appeared acceptable.

In the development of INFERS, it was evident that there are still several areas in the nutrient budget of the oil palm ecosystem that require further research. These areas include more direct and accurate estimation of fertiliser efficiency, nutrient supply from the soil and residues from past

applications. There is also no published information on the recycling of all the major nutrients within the palm.

The fertiliser recommendations system described although only the first approximation, provides an objective, scientific and consistent technique for drawing up accurate fertiliser recommendations to realise sustainable high yields. It also re-emphasises the need for basic agronomic data and integrating the data and knowledge available to achieve the site yield potentials in oil palm estates.

**Prospective solution to current problems in Hevea exploitation in a large group of estates**

Chan Weng Hoong and Ong Tee San

**ABSTRACT**

The AAR Jacket System was developed to overcome the problems of tapper shortage and high cost of production faced by the group and AAR rainguard, to reduce rain interference especially in young mature areas.

Yield per tapper in jacketed fields increased by 15% to 101%. Corresponding increase in yield per ha was however lower. Owing to the higher yield per tapper obtained, tappers' wages were raised by 10% to 57% and cost of tapping reduced by 5% to 22%. Labour for tapping was reduced by 24% to 53% due mainly to lower frequency of tapping and also larger task size in jacketed areas.

AAR rainguards were very effective in the experimental scale trials giving protection to more than 90% of panels against rain interference compared with 9% for unguarded control areas. In the commercial rainguard areas, 12 extra tapping days were obtained over a period of 12 months. Cost of rainguarding was fully recovered only 2 months after installation based on a bread-even yield of 90 kg per task. Overall the AAR Rainguard is a practical, economic, and effective device against rain interference.



**AAR Jacket System**



**AAR Rainguard**

**Sustainability of Oil Palm Plantations in Malaysia as Assessed by a Framework Approach**

Chew Poh Soon, Quah Yin Thye and Pushparajah, E.<sup>1</sup>  
<sup>1</sup>IBSRAM, P.O. Box 9-109, Bangkok, Thailand

Investment in perennial tree crops such as oil palm are long-term and are people and capital intensive. They are also subject to large fluctuation of yield and prices over the period of cultivation. Management systems must therefore ensure that the plantations are sustainable over the cropping period and beyond to justify the investments.

The immense expansion of oil palm areas since the mid60s in Malaysia has resulted in some plantings in marginal climatic and soil areas. Significant socio-economic changes including greater awareness for preservation of the environment, severe shortage of workers, greater competition and long-term decreasing price trends make it necessary to examine the sustainability of oil palm plantations and the factors and practices that may severely affect it in future.

Sustainable land management (SLM) has been defined as combining technologies, policies, and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously maintain or enhance

production service (production); reduce the level of production risks (stability); protect the potential of natural resources (protection); be economically viable (viability); and socially acceptable (acceptability). This definition fits the requirements for sustainability of oil palm plantations very well.

A group of International Research and Development Agencies has advocated a Framework Approach derived from the FAO's Framework for Land Evaluation for assessment of SLM. The Framework Approach has a formal hierarchy with five levels. It involves the evaluation and analysis of four principal factors i.e. physical, biological, economic and social, and the connection and relationship of these factors with the form of land use expressed as indicators and threshold values of sustainability. There are also elements for verifications and tests of the results for further refinements of the approach and reevaluation of sustainability.

This paper is a preliminary attempt to use this approach to assess the sustainability of oil palm plantations using examples of two existing plantations (the first in Selangor, a favourable environment; the second in Kelantan, a marginal environment) and a potential new development area in Sarawak.

The nature and scale of plantation areas make it advisable to carry out macro-analysis for sustainability initially especially with new development areas. Such macro-analysis with available data on physical factors (location, infrastructure, soil, slopes and land forms), social factors (labour/people, management, environment) and economic factors (cost and market) carried out on the three situations showed that using scores of suitability of the individual parameters, an overall assessment of the sustainability or otherwise of the plantations/new development may be made.

If possibly or probably sustainable, then a further micro-analysis is needed to establish sustainability levels. The micro-analysis requires more detail and site-specific data to formulate the indicators and thresholds required. Fortunately, the plantation industry is characterised by availability of detail records on most aspects including growth, yields, inputs, cost and profits. Planted areas are divided into fields and details of the planting material, agronomic factors including soil and rainfall are known. Further data on socio-economic and industry matters may be obtained from Industry Associations, Research Institutes or Government sources. The preliminary exercise on two typical fields in two estates identified as probably sustainable (in favourable environment) and possibly sustainable (in marginal environment) is drawn up using a database of agronomic data, yield prediction and nutrient balance models being developed. The results indicate that the more formal Framework Approach is useful for evaluation of sustainability and identifying vital issues for sustainability. Useful indicators for sustainability of the plantations include plateau yield levels, palm and plantation

conditions, soil cover, fertility and nutrient balance for agronomic indicators; soil and water quality, ecological conservation and balance, pests and diseases for ecological indicators; crop activity and market conditions for crop and market indicators; input cost, profitability levels, Government support for economic indicators and people and quality of life in the industry as well as social action for social indicators.

The effect of changes in product prices, productivity, management levels and efficacies, inputs and changes in planting practices including possible extraction of byproducts e.g. fronds have marked effects on the indicators and thresholds of sustainability of oil palm plantations. While product prices, may be beyond industry's control, concerted efforts on breeding improved planting materials, development of new products and new markets to increase product yields and demand respectively appear critical to the industry in the long run. The results also show that with current agronomic knowledge and technology given reasonable oil palm prices, adequate fertiliser input and manpower for crop recovery, the industry should be sustainable over several generations. Finally and most importantly, they indicate that high standards of management and resulting efficiencies are critical to the profitability and sustainability of oil palm plantations at all times.

**Maximising and maintaining  
oil palm yields on  
commercial scale in Malaysia**

Goh Kah Joo, Chew Poh Soon and Teo Chor Boo

**ABSTRACT**

The economic impact of maximising and maintaining high yields is obvious. This has prompted the concept of maximum exploitation of genetic yield potential (MEGYP) in 1993. This study shows that MEGYP can be achieved on a large commercial scale (74,025 ha) in Malaysia. These yields were achieved on a wide range of soils, rainfalls and planting density of 108 to 161 palms per hectare.

The site yield potential of oil palms was influenced by agroecological zones and soil properties. The former can be simplified to 3 zones based on rainfall and yield pattern. A multidisciplinary, multifactors and site specific approach is essential to maximise and maintain oil palm yields. High yields can be obtained from palms above 20 years old provided the agro- management inputs are correct and not reduced.

The present information on agronomy and management is sufficient to maximise and maintain high oil palm yields in Malaysia. It is now up to us to properly implement them and make cultural practices easier, cheaper and less labour intensive while maintaining their efficiencies and environmental friendliness.

## Oil Palm Breeding : The Previous and The Next 50 years

Soh, A.C., Rajanaidu, N<sup>2</sup>. and Cheah, S.C.<sup>2</sup>

### ABSTRACT

In the previous 50 years, palm oil yields have increased 4-fold, 70% of which attributable to breeding improvement, along with a 50% improvement in oil to bunch and 10-20% height reduction. These achievements have been obtained by adopting genetic and breeding principles and advancements made in other crops. Within 2-3 decades, oil palm clones and genes from the recent *Elaeis guineensis* and *E. oleifera* accessions are expected to be manifested in cultivars having 30% or more oil production, 40-50% height reduction and about 65% unsaturated oil. In the next 50 years with anticipated new discoveries and uses for palm products, more sophisticated and discriminating consumer requirements and rising land and labour costs, breeding objectives and strategies will have to be realigned to meet these challenges.

Palm oil, being a highly productive, versatile,

environmentally friendly and renewable resource will likely dominate the oils and fats market, not only as food to feed the growing populations but also as feedstock for the oleochemical industries to produce a wide range of products e.g. detergents, emulsifiers, plasticisers, pharmaceuticals cosmetics, lubricants and fuels. A breeding programme with so many agronomic and economic objectives will be a daunting task in terms of effort and time. Fortunately with the developments of transgenic plant technology which can widen considerably the genetic base of a crop, marker-assisted selection methodology which allows more precise selection, and assisted by cloning, new cultivar development can be expedited.

To sustain the competitiveness of oil palm breeding and the Industry, superior plant, human and institutional resources are essential: the first to provide the genetic base, the second to provide breeders who are well educated, versatile, adaptable and committed visionaries and the last to provide the financial and infrastructural support to set the breeding programme into motion NOW!

2. PORIM, Persiaran Institusi, 43650 Bandar Barn, Bangi, Selangor.

## OTHER MAJOR PAPERS PUBLISHED

### Characterisation of phosphate rock reactivity and implications on management practices in Malaysia.

Chan Khoon San and Goh Kah Joo  
Paper presented at MSSS Soils Conference, K.L., 1994

### ABSTRACT

The reactivity of four phosphate rocks (PR), finely ground to 100 mesh were estimated by their solubilities in 2% citric acid, 2% formic acid and by incubation studies in two Malaysian soils. In the incubation experiment, the PR at equivalent rates of 125, 250, 500 and 1000 mg P kg<sup>-1</sup> soil were incubated in thoroughly wetted soil at ambient temperature over 8 weeks. The dissolution of PR was determined by measuring the difference in extractable calcium between treated and untreated soils using BaCl<sub>2</sub> triethanolamine, that is, the delta calcium ( $\Delta$ Ca) technique.

Results of the incubation experiment showed that dissolution of PR decreased exponentially with increasing application rates. A linear relationship is obtained using logarithmic transformation of the PR rates. PR dissolution was generally better in the more acidic Rengam series soil. However, when high rate of a reactive rock was used, the soil C.E.C became the dominant factor controlling the dissolution rate. The PR dissolution rate was better correlated to formic acid solubility than to citric acid solubility. Results also showed that formic acid-P provided a good index of the reactivity of PR. These experiments also indicated that the choice of PR for plantation crops is dependent on the soil properties and application rate. At high rate, the PR should be applied evenly and broadly to improve its dissolution rate.

### Commercial Yield Performances of Oil Palms in Sabah, Malaysia

Goh Kah Joo, Chew Poh Soon and Teo Chor Boo  
Paper submitted for publication in the Planter

### ABSTRACT

The yield performances of oil palms under the advisory services of Applied Agricultural Research Sdn. Bhd. in Sabah, Malaysia were examined. The palms were between 3 and 21 years old and the total area was 22,854 ha. The mean yield obtained in 1992 was 23 t ha<sup>-1</sup> with a range of 4 to 40 t ha<sup>-1</sup>. In the same year, about 19% of the areas achieved at least 30 t ha<sup>-1</sup> and another 55% of the areas achieved at least 24 t ha<sup>-1</sup> with mean yields of 31 t ha<sup>-1</sup> and 29 t ha<sup>-1</sup> respectively. These yield performances were largely influenced by palm age, location and soil type. Approximately 26% of the areas yielded below 20 t ha<sup>-1</sup> yr<sup>-1</sup>. These

plantings were in their first two years of harvesting, palms above 16 years old and areas recently purchased and undergoing rehabilitation. Results also indicated that peak yields of the best plantings between 1971 and 1984 were similar at 30 t ha<sup>-1</sup> yr<sup>-1</sup>. However, the years taken to achieve peak yields were reduced from 12 years to 6 years in the younger plantings. The oil palms planted in 1985 to 1989 showed higher peak yield of 40 t ha<sup>-1</sup> y<sup>-1</sup> at the 7th year after planting. This study clearly illustrates that good oil palm yields can be obtained in Sabah with proper agromanagement inputs.

### Genetic Improvement of Plantation Crops In Malaysia

Soh, A.C.<sup>1</sup>, Tan, H.<sup>2</sup>, Ooi L.H.<sup>1</sup>, Rajanaidu<sup>3</sup>, N.,  
Cheah, S.C.<sup>3</sup>, Low, F.C.<sup>2</sup>

Paper presented at the First National Congress  
on Genetics, K.L., 1994

#### ABSTRACT

Malaysia ranks first in palm oil production, third in rubber (first previously) production and until very recently fourth in cocoa production in the world. The assumption of a leading position in these three plantation crops which are not indigenous to Malaysia, resulted from the great improvements (4-5 fold) in the yields obtained. Seventy to 80% of this improvement can be attributed to genetic improvement which resulted from the applications of the basic principles of Mendelian genetics, quantitative genetics and plant breeding. In recent years breeding improvements have levelled off in all three crops, due to their narrow base and the intense selection

practised previously. Efforts to broaden the genetic base with introductions of new genetic materials from other research stations and from prospecting in the centres of diversity/origin have been made but will require time for their exploitation into commercial varieties. Similarly in the quest for improved varieties and partly because of the greater effort and time needed, (as they are perennial tree crops) genetic studies on many of the economic and agronomic traits and breeding methodology have lagged much behind those of annual crops; and do not commensurate with the economic importance of these crops. To make further strides in genetic improvement, more investment in time and effort to gather genetic information is needed especially if we want to exploit the full potential of transgenic plant and marker assisted selection technologies. Experiences and principles developed from animal and forest tree breeding can also provide useful guidelines in this quest.

1. Applied Agricultural Research Sdn. Bhd.,
2. Rubber Research Institute of Malaysia, Sg. Buloh
3. Palm Oil Research Institute of Malaysia

### Comparative performance of plantation companies listed on the KLSE

Ooi Ling Hoak

Paper presented at the TPSB Managers' Conference, 28th June, 1994, Ipoh

#### SUMMARY

#### OIL PALM

The mean figures for the 5-year period between 1989 and 1993 placed KLK in the number one spot for ffb yield and profit (before replanting) per hectare. It was the 3rd lowest in ffb production cost.

#### RUBBER

In terms of yield and profit (before replanting) per hectare, KLK was placed 3rd and 2nd respectively for the 5-year period between 1989 and 1993. It was the 2nd lowest in production cost.

#### COCOA

KLK occupied the top spot in yield per hectare for the 5-year period between 1989 and 1993. Unfortunately, the price of dry cocoa beans was extremely low during the period. This has resulted in a loss of about RM370/ha on average for the period reviewed. However, the price of cocoa has improved significantly lately. It is anticipated that some profits could be realised in the current financial year.

In regard to production cost, KLK was the 2nd lowest.

#### General

- 1) Results achieved in the last 5 years were generally better than the other major plantation companies in regard to yield, production cost and profit per hectare.
- 2) The full potentials of the crops have yet to be fully exploited.
- 3) Profitability could be further improved by improving the productivity of both land and labour as indicated by the following three equations.
  - i) Profit = Revenue - Production cost
  - ii) Revenue = yield x price
  - iii) Production cost =  $\frac{\text{field maintenance} + \text{depreciation} + \text{indirect costs}}{\text{Yield}}$  + harvesting and processing costs

## Further advances in agronomic management of oil palm plantations

P.S. Chew, K.K. Kee, K.J. Goh and S.H. Tey  
Paper presented at International Conference on  
Oils and Fats, K.L., 1994

### ABSTRACT

The oil palm industry has a relatively recent history in Malaysia but, despite the long-term nature of experimentation, significant advances in productivity of the crop have been achieved through use of multi-disciplinary approaches combining soil science, plant nutrition and agronomy. The major advances through improved palm nutrition; correction of problem soil areas, adjustment of planting densities; and applying concepts of high precocity and genetic yield potentials as well as sustainable optimum yields with high quality of produce and lowest possible effect to the environment, till 1983 have been laid out by Ng Siew Kee.

Since then, further advances have been made within these broad areas. These are mainly in the further development of concepts and better understanding and quantification of the processes involved through experiments laid down in the 1970s and 80s. There are now more data on the nutrient and water balances and the growth and productivity of the oil palm. Factors affecting fertilizer efficiencies, growth and yield as well as water and nutrient balances are now better understood allowing improved results and efficiencies on specific sites.

Site specific approaches for best results are now being promoted to take advantage of the new information. Numerous agronomic factors and data on climate, soil, nutrients, plant growth at each site have to be taken into account. Databases, models and computerised systems to predict growth, expected yields and site yield potentials as well as fertiliser requirement based on the nutrient balance concept for site specific fertiliser recommendations are now being developed. Interpretation of widely used leaf analysis for fertilizer requirements using computers is now possible. Research on interactions between nutrients and cultural practices is underway which should improve the models when completed.

Analysis of sustainability of oil palm plantations highlights the importance of correct treatment of areas from land clearing to full soil cover through soil and water conservation measures; disposal of the biomass of the previous crop at replanting, e.g. 'no-burning' or 'minimal' burn techniques, waste-management and recycling of other plant products to maintain soil fertility and reduce agronomic inputs.

Advanced agronomic systems are now in place to realise optimal yields and efficiencies from current plantings. Further research will, however, be required in treatment of new areas and environments in Sarawak and Sabah now planted with oil palm as well as onset of clonal plantings where very specific treatments may be required to realise optimal results.

## Utilization of PORIM's Nigerian Prospected Materials. Very preliminary results of crosses Of Nigerian dura and tenera - selections with AAR's selected duras and teneras/pisoferas

Soh, A.C. and Rajanaidu, N.

Porim's Colloquim on Utilization of  
Oil Palm Genetic Materials, K.L., 1994

### Results and Discussions

The results are very preliminary. Only the first 6 months FFB results and limited bunch analysis and oil quality test results are available. As such the results provide at best some early indications of the likely trend and no firm conclusions should be drawn.

#### FFB Results BP5-90

All the Nigerian T x AAR T/O progenies yielded lower than the DxP control. It appeared that the TxT/P progenies lost out in having smaller bunches than in lower number of bunches. A couple of crosses yielded close to that of the DxP control.

#### BOQ1-90

The trend in results were similar to BP5-90 except having a few more crosses yielding close to that of the DxP control.

#### BT5-90

The Nigerian D/T x AAR D/T/P crosses appeared to yield better than the Nigerian D x AAR D crosses although it can be argued that only 1 AAR D parent was represented in the latter crosses. The Nigerian T x AAR D crosses appeared to yield consistently higher than the Nigerian D x AAR T/P crosses.

As the three trials were planted simultaneously and continuously and yielding similarly judging from the yields of the DxP control; the results of all three trials were combined and displayed on a two-way table of the crossing plan. It appears that the Nigerian T x AAR D crosses yielded better than the Nigerian D x AAR T/P crosses and the latter better than Nigerian T x AAR T/P and Nigerian D x AAR D crosses. If this proves to be so with later data, then perhaps we should introgress the Nigerian T's (or at least these selected T's) into the pisifera breeding populations rather than the dura breeding populations; although the Nigerian D's, 951/971 and 0151/1662, could perhaps be incorporated into the dura breeding population.

#### Bunch analysis results

The bunch analysis results of both BP5-90 and BOQ1-90 are very encouraging with many progenies having O/B values approaching and some exceeding those of the DxP control indicating the feasibility of further improving this trait in the introgressed population. The crosses tended to have proportionately higher shell and kernel contents and smaller fruits.

### **Oil quality results**

Despite the higher probability of sampling and analytical errors with the few number of fatty acid determinations made, the Nigerian x AAR crosses gave consistently higher IV, oleic acid and linoleic values than that of the DxP control and in-between the DxP control and the Nigerian parental values. The good heritabilities of these traits were further confirmed by the results from the selfed progenies of a number of palms selected for high IV

### **Conclusion**

Despite the very early data, the trends revealed the prospects and utility of the selections of the Nigerian prospected materials in an introgression programme to upgrade current breeding populations. We await anxiously for further confirmatory results to proceed further with the programme.

### **The need for soil information to optimise**

Goh Kah Joo and Chew Poh Soon  
Published in Selangor Planters' Association  
1993 Annual Report

### **RECOMMENDATIONS**

The past success of the oil palm industry was brought about by the implementation and management of sciences of soil, plant, climate and people. The irony now is the lack of interest in soils at a time when we need to optimise oil palm yield to remain competitive inside and outside the industry. Soil information is an added and needed tool to achieve the intended results. Therefore, we strongly advocate the continued study and understanding of our soils to maximise soil resource utilisation and integrate it with agromanagement research to enhance the resilience, sustainability and profitability of the oil palm industry in Malaysia.

### **Primary Production of Cocoa**

Ooi Ling Hoak  
Paper presented at the MCB WORKSHOP ON THE 7<sup>TH</sup>  
MALAYSIAN PLAN FOR COCOA, 7 & 8th July '94  
Kundasang Sabah.

### **CONCLUSIONS**

The prolonged poor prices of cocoa beans have resulted in the majority of the producers to incur heavy losses in the last few years. This has shattered the confidence of many growers. Large hectares of cocoa have already been felled and more are expected to go in the near future unless the price improves substantially soon.

However, there have been some positive developments as growers adjusted themselves to the more competitive environment and became generally more efficient. This augurs well for the future of the industry.

Cocoa has a potential useful role as the third alternative plantation crop after oil palm and rubber. Producers should

not lose faith and be too hasty in writing off the crop during the current crisis. They should instead take a longer term view of the crop and adopt the strategy of managing a smaller hectareage well and exploit the full potential of the crop. One could perhaps consider planting a certain percentage of the estate to cocoa and have a mixed-crop estate to reduce the risks and problems associated with a single-crop cocoa estate.

The price of cocoa beans has probably reached its bottom in the current price cycle and there is only one way to go i.e. upwards as indicated by the recent trend. Producers should therefore take advantage of the excellent expertise available in the field of plantation management and research to improve their competitiveness rather than withdrawing from the crop. There is further considerable scope for yield improvement and cost reduction and hence profits to be made in many situations.

Chew P.S., Kee K.K., Goh K.J., Quah Y.T. and Tey S.H.

### **An integrated fertiliser management system for oil palm**

Presented at the IFA-FADINAP Regional Conference  
for Asia and the Pacific 12-15 December 1994  
Kuala Lumpur, Malaysia

### **SUMMARY**

An integrated multidisciplinary site-specific fertiliser management system for oil palm in Malaysia for high productivity and sustainable yields is described. The system includes models to predict site yield potentials and expected target yields based on existing site conditions involving soil, climatic and palm factors and estimates fertiliser requirements from nutrient balance computations based on the target yields, site conditions, fertilisers used and expected efficiencies from agronomic practices. Profitabilities of fertiliser application may also be computed. The development of a good agronomic assessment system and computerised database are necessary for the system to be feasible in commercial practice. Examples of the results of the system now being evaluated are included.

Kee K.K., Goh K.J. and Chew P.S.

Published in the Fertiliser Research Kluwer Academic

### **Investigation into Manganese deficiency in mature oil palms (*E. guineensis*) in Malaysia**

Publishers:1-6, 1994

### **ABSTRACT**

Manganese deficiency was confirmed on prominently chlorotic palms with small canopies grown on very sandy colluvium. An experiment to assess the effects of the Mn deficiency on palm growth and yield was carried out.

The effectiveness of the application of  $MnSO_4$  at various rates to correct the deficiency was tested. Manganese concentration

< 25.µg Mn g<sup>-1</sup> in Frond 17 was found to be indicative of deficiency. Soil application of MnSO<sub>4</sub> at 150 g palm<sup>-1</sup> plus 60 g palm<sup>-1</sup> as foliar spray was most effective for short term correction. Higher rates (300 g MnSO<sub>4</sub> palm<sup>-1</sup>) were required for soil application only. Cumulative yield over 42 months after treatment showed significantly higher number of harvested fresh fruit bunches. Full recovery of canopy size, colour and vigour took up to two years.

Chan Khoon San

Paper presented at the Seminar on Advances in Soil,



**Palm showing severe manganese deficiency symptoms. Canopy is small, with pronounced interveinal chlorosis. Necrosis occurs on the pinnae tips and margins.**



**Interveinal chlorosis and necrosis become unmistakable and are evident even on young unopened pinnae of emerging new fronds (spears).**

### Fertilizer analysis cross-checks in Malaysia 1992-93

Plant and Fertilizer Analysis. 15-17 June 1994, Penang.

#### SUMMARY

Results of 6 fertilizer cross-checks carried out among 25 Malaysian laboratories in 1992-93 are presented in this paper. Compared to the previous exercises in 1990-91, the reproducibility has remained constant within 5% for the parameters N, P2O<sub>5</sub>, K<sub>2</sub>O and MgO but the frequency of rogue and off-specification results have decreased resulting in a rise of the number of reliable laboratories, a good sign of

the progress made by the laboratories concerned. The laboratory precision or co-efficient of variation within laboratory is generally less than 10% and appears to be strongly correlated to the frequency of off-specification results. This is expected because poor precision means higher variation within the laboratory thereby contributing to more off-specification results. Laboratories which are still plagued by high % rogue and off-specs are urged to strive harder to reduce their incidence.

The following four categories of awards were accorded to

## SOCIAL

workers in conjunction with AAR Sports Club Dinner held on 10-12-94.

### A. AAR Awards for Innovations 1994

- 1) T. Supramaniam & Lokman Ismail - innovation on improved technique for removing inflorescence for Tissue Culture.
- 2) Nadisin A. & Tan Lei Hong - innovation on improved germination technique for hydroponic vegetable project.
- 3) Chong Siew Peng - innovation on recycling of used alcohol in oil palm tissue culture laboratory.

### B. AAR Awards for best assessment 1994

- |                       |                               |
|-----------------------|-------------------------------|
| 1) Chin Tong Lai      | The award were given for the  |
| 2) Mazlan Mamat       | best three assessment results |
| 3) Abdul Rashid Yacob | conducted by AAR.             |

### C. AAR Awards for contributions to AAR Sports Club were given to:-

- 1) A. Periasamy, Tan Ching Mooi and Julie Yee

### D. AAR Awards for 100% attendance at work were given to the following:

- |                      |                         |
|----------------------|-------------------------|
| 1) Tan Lei Hong      | 11) ZawahirYacoob       |
| 2) Mohd Kamal        | 12) Alatipah            |
| 3) Abdul Razak Rahim | 13) Kogilvani Duraisamy |
| 4) Mahizan Mohd      | 14) Jariah Kasmat       |
| 5) Tan Ching Mooi    | 15) Sahara Mat Husin    |
| 6) Mazlan Mamat      | 16) Dzulkefie Ismail    |
| 7) Chong Siew Peng   | 17) Noorasma Che Seman  |
| 8) Junainah Ismail   | 18) Sabariah Alias      |
| 9) V. Subramaniam    | 19) Sareday Kunjukanno  |
| 10) K. Kumar         |                         |