AA RESEARCH NEWS

October, 88



## EDITORIAL

### SPIN-OFFS FROM R&D

Sometimes in research pursuits with clearly defined and narrow objectives, certain unexpected events or phenomena occur which can be contrary or irrelevant to a scientist' original thinking. Instead of dismissing them as rogue results or negative results and closing the experiment, some scientists have made great discoveries from these events and exploited them.

The most famous example is Alexander Fleming's discovery of penicillin which gave birth to the field of antibiotics. Apparently, he unknowingly dropped a piece of breadcrumb onto his bacterial cultures when he was examining their growth while having lunch. The next day, he found that the breadcrumb had turned mouldy and substances from the mould prevented the bacterial culture from growing.

Similarly, Monsanto discovered an effective compound for controlling cockroaches when they were in fact developing the compound for a completely different objective. The laser is another example which was an offshoot from space research. This phenomenon is called serendipity; and some postgraduate schools have deemed it important enough to offer it as a course or subject.

In our plantation R&D, while such striking serendipitous discoveries are not common, there are and have been occasions where offshoots from the main line of R&D have been put to good use. A case in point is the development of AAR's foliar fertilizers (featured in this issue), which came about from the search for a suitable foliar fertilizer for cocoa. In many cocoa fields, there are often diseased (due to vascular streak dieback or VSD) and weak trees which need rehabilitation. Soil application of fertilizers will not be effective as these plants have poor root development. Foliar fertilizers seem to be more appropriate especially since routine sprayings against pest and diseases are being done, incorporation of fertilizers into the spray will not result in additional labour requirement.

As commercial foliar fertilizer formulations available were found to be unsuitable or not cost-effective, AAR decided to formulate its own. Among the first formulations was "Calplus", high in Ca and P for rehabilitation of poor cocoa trees. It is only logical that further formulations for growth (high N), for fruiting (high K), for prevention of micronutrient deficiency and for other crops were subsequently included. Development has reached the stage of commercialisation and ICI will be marketing these formulations under its "GROFAS" label.

This "off-shoot" development will benefit our estates in at least three ways; an effective foliar fertilizer, lower cost and higher profits which can be channelled into further research for the estates' betterment.

AAR's tissue-culture laboratory's primary objective is to develop oil palm clones. As the commercialisation stage is likely to be delayed in the light of recent developments; an "off-shoot" small facility for commercial micropropagation of orchids has been established. The income derived goes to help reduce the cost of research for oil palm; the experience obtained will help towards the scaling-up process when the clonal propagation of oil palm becomes commercialised and also sets the stage for possible venture into micropropagation of ornamentals which is a separate viable industry.

Another development now commercialised is the "Atlaskote" rainguard for rubber, which is an offshoot of AAR research efforts to find a suitable rainguard to prevent loss of latex from rain wash during wet weather. This was a cooperative project between Atlas Industries and AAR.

It is not often appreciated that many plantation R&D department or companies ventured into the commercial seed production business with the original objective of providing superior planting materials to their own plantations. Because of the subsequent great demand for seeds, production levels were increased and commercial sales made. This led to a lower cost of seed to the company and the additional profits made were channelled back not only to support a comprehensive and longer term breeding programme for further improved planting materials but also much of the other research activities. This is indeed good but should not be used as a precedence to judge the performance or contribution of a R&D unit, when in fact the contribution of an R&D unit should be judged from the increased yields and profits of the plantations. The R&D profits should be viewed as bohuses which can be reinvested into more R&D to increase profits for the plantations. There is also a possible danger that in the pursuance of profit, the R&D unit may overemphasise its off-shoot business at the expense of its main role, which is to service the plantations. Most R&D managers are aware of this and are unlikely to do so. Any much-involved non-main line business is likely to be contracted out in some form to a separate company.

In this modern world, there is an explosion of technical and technological developments, many of which can have opportunities and applications which cut across very wide fields. With the pool of talent available in the R&D unit; it is possible for them to spot potential spin-offs in the peripheral and off-peripheral areas from developments and findings in their main course of work. It would be a shame if pursuit of some of the more feasible and less distracting potential spin-offs be discouraged. The experience gained from a new line of business will always be useful and the research minds will be kept active and motivated; and who knows what form and shape a plantation R&D unit in the next century may take with the rapid developments that are taking place today?

**Soh, A.C.**

## HIGHLIGHTS

# FEATURE ARTICLE

## THE CHOICE OF A FOLIAR FERTILIZER

### Introduction

There are many brands and formulations of foliar fertilizers available in Malaysia which are either manufactured locally or imported. The imported brands tend to be more popular compared to the local products which are generally poorly presented copies of the imported materials lacking the quality assurance, research and advisory back-up services. Basically all of them can be classified into liquids, solids and suspensions.

### Liquid, Solid and Suspension Foliar Fertilizer

Liquid fertilizers are soluble salts dissolved in water. As there is a limit to the amount of salt that can be dissolved (saturation point), liquid formulations tend to contain lower nutrient analysis compared with solids e.g. total nutrient contents in Nitrophoska Liquid or Complesal are 20%—25% compared to 55%—70% in solid formulations. Hence they cost much more than solids on unit nutrient basis. Their main advantages are their quick and complete solubility in water and uniformity in composition.

Solid foliar fertilizers comprise formulations derived from soluble salts or spray dried wettable powders. Although one manufacturer of spray dried wettable powders has claimed that such products are safer and provide slow release of nutrients, trials at AAR have shown that wettable powders are inferior to soluble salts in terms of growth in cocoa and oil palm seedlings. Chemical analysis also reveal that some of the nutrients are insoluble in water and hence cannot be absorbed quickly enough by the leaves during foliar application.

*Table I*

| Parameter | Nutraphos N | | Nutraphos Super K | |
|---|---|---|---|---|
| | Declared | Tested in Water | Declared | Tested in Water |
| Total (%N) | 16.0 | 14.8 (92.5%) | 7.0 | 7.7 (110%) |
| Phosphorous (%P205) | 12.0 | 0.02 (0.17%) | 13.0 | 0.56 (4.3%) |
| Potassium (%K20) | - | - | 34.0 | 27.7 (81.5%) |
| Magnesium (%Mg) | 1.5 | 0.31 (20.7%) | - | - |
| Calcium (%Ca) | 4.0 | 0.31 (7.8%) | - | - |
| Boron (%B) | 1.0 | 1.08 (108%) | - | - |
| Zinc (%Zn) | 2.0 | 0.002 (0.1%) | 12.5 | 0.015 (0.12%) |

*Note* : Figures in brackets are expressed as % of declared figure

From the above results it would appear to be not far off the mark to use urea and borate to replace Nutraphos N and potassium nitrate to replace Nutraphos Super K.

The disadvantages of solid foliar fertilizers appear to be the slower solubility and higher variability compared to liquids which are homogenous. Formulations containing very hygroscopic or deliquescent salts can absorb moisture rapidly in humid climate and turn to liquid unless they are kept in airtight containers e.g. Gaviota.

*Table II*

| Parameter | Wuxal Calcium Suspension | | Wuxal NPK Suspension | |
|---|---|---|---|---|
| | Declared wt:wt | Tested in Water | Declared wt:wt | Tested in Water |
| Total (%N) | 10.0 | 11.2 (112) | 15.0 | 13.8 (92) |
| Phosphorous (%P205) | - | - | 15.0 | 13.5 (90) |
| Potassium (%K20) | - | - | 10.0 | 7.83 (78.3) |
| Magnesium (%Mg) | 2.0 | 1.9 (95) | - | |
| Calcium (%Ca) | 15.0 | 16.1 (107) | - | |

*Note* : Figures in brackets are expressed as % of declared figure

In between liquids and solids are the suspension fertilizers. They are basically solid formulations in which water and a suspending agent have been added. As a result of this dilution, % nutrients are lowered on weight basis. On the other hand, the addition of water causes the volume to shrink so that density is increased e.g. density of Wuxal suspension is 1.5 g/ml. When expressed on wt: vol basis, the formulation is 23:23:15 but when expressed on wt: wt basis, the formulation is down by 35% at only 15:15:10. The principle behind a suspension is to reduce the variability of the solid fertilizers by keeping them in a homogenous suspension through agitation. Suspensions may be stored for months by using periodic agitation but the general tendency is to limit storage since the crystals may grow to such a size as to cause problems such as physical separation and poorer dissolution. Table II shows results of chemical analysis of two types of Wuxal foliar fertilizers.

These results show that the variation in a suspension can be higher than 10% which is the limit set by SIRIM for solid compound fertilizers. Thus there does not appear to be any advantage in suspensions compared with well homogenised solid formulations in terms of variability in nutrient composition. In fact, there is an additional burden of water.

### Trace Elements

Trace elements can be chelated or non-chelated. The common chelating agent is EDTA. For foliar application of copper, zinc, manganese and magnesium, there is no advantage in the chelates and the U.S. Co-operative Extension Service in several states recommend the application of the soluble salts (Dariusz Swietlik, 1984). For liming or bicarbonate-induced chlorosis, EDTA-iron sprays were inconsistent and soil application of EDDHA-iron was recommended as the best way by the author. It should be noted that chelated materials are useful if they are to be applied to the soil as they can prevent the metal from being "fixed" by the soil and made unavailable to the plant. With foliar application, this problem does not arise. In fact, it has been suggested that the use of chelates which are large organic molecules may impede uptake of the nutrients because of their size and once taken up, they may cause exchange

reactions in the plant that could lead to nutrient disorders (C.S. Liew, 1984).

## Criteria for Choice of Foliar Fertilizer

1. The needs of the plant are the most important factors when formulating a foliar fertilizer. As these vary at different stages of growth e.g. nursery, normal growth, flowering/fruiting; a simple approach whereby all utilisable nutrients are added should be avoided as this may cause imbalances. Therefore foliar fertilizers should be formulated to suit individual situations and crop requirements.

2. Water is the medium by which the leaves absorb nutrients. Therefore a good foliar fertilizer should be easily and completely soluble in water to ensure that the nutrients are taken up immediately after the spray is applied. For good coverage of the foliage and adherence of the spray to the surface of the waxy leaf, a good wetting agent should be present in the foliar fertilizer.

3. For cost effectiveness, it should contain high macro-nutrient contents and generally high micro-nutrient contents as well.

4. To qualify as a quality product, it should be of a guaranteed formulation. Under SIRIM standards, the variation of each nutrient in compound fertilizers should not exceed +10% of the declared formula. Although no standards exist for foliar fertilizers, product homogeneity should be generally as good as compounds and coefficient of variation should preferably not exceed 5%.

5. For economic considerations, foliar fertilizer is normally incorporated into pesticide spraying to reduce application rounds. Thus compatibility with commonly used insecticides and fungicides is necessary.

6. In case of a solid foliar fertilizer, the product should not contain excessive moisture as this will make it soggy and unpleasant looking. Good packaging in strong air-tight bags or containers is especially important in preventing absorption of water by hygroscopic materials in tropical countries where the humidity is high.

7. The foliar fertilizer should be safe for all crops e.g. certain crops such as tobacco, coffee and others are sensitive to chloride and suffer setback if chloride containing fertilizers are used. Thus it is important to use chloride-free or low chloride fertilizers in foliar fertilizer formulations to prevent problems from arising in their usage.

8. The foliar fertilizer should be buffered against excessive pH changes caused by the use of poor quality water.

## Qualities of AAR Foliar Fertilizers

The AAR range of foliar fertilizers are formulated on the advice of experienced crop agronomists taking into account of the nutrient requirements and commonly encountered nutrient deficiencies and adverse soil problems in horticultural and plantation crops in tropical soil conditions and also the factors required for effective foliar fertilization.

AAR foliar fertilizers possess the following desirable properties required for effective application:-

1. Specially formulated for crops grown under tropical soil conditions and containing a wide range of formulations to suit varying crop requirements and situations.

2. Easy, complete solubility in water and containing a safe and effective wetting agent for good spray coverage and adherence on the foliage.

3. High macro-nutrient formulations and generally high micro-nutrient contents (except Blue and Green which contain the full range of micro-nutrients at lower level).

4. Guaranteed formulation with low variation in nutrient composition.

5. Compatible with common insecticides and fungicides tested.

6. Generally contain low moisture levels (1%—3%).

7. Suitable for chloride-sensitive plants because of low chloride level (less than 1%).

8. Buffered against pH changes.

9. Trace elements unchelated for quick effective absorption through aerial plant parts.

The foliar fertilizers are produced by a dry process of mechanical blending, curing and homogenisation. Stringent quality control measures and tests are carried out daily to ensure uniform products up to specifications in the manufacture of AAR foliar fertilizers. Results of tests on daily samples are tabulated below and show that variations of nutrient composition of AAR foliar fertilizers are generally within 5% C.V.

*Nutrient Composition and Variation of AAR Foliar Fertilizers*

| | | | N | | P205 | | K20 | | Ca0 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Formulation (codename) | No. of Samples | Average Moisture | Mean | CV% | Mean | CV% | Mean | CV% | Mean | CV% |
| 22:22:10:1 (Yellow) | 58 | 2.94 | 22.0 | 5.2 | 21.6 | 4.6 | 10.4 | 7.5 | | |
| 21:21:21 (Blue) | 54 | 3.23 | 19.5 | 3.0 | 20.9 | 2.7 | 20.5 | 4.5 | | |
| 18:33:18 (Green) | 65 | 1.82 | 18.0 | 3.4 | 32.6 | 1.9 | 17.5 | 3.9 | | |
| 12:26:26 (Red) | 26 | 1.15 | 13.1 | 3.5 | 25.7 | 3.3 | 25.6 | 2.9 | | |
| 15:15+20 Ca0 (Calplus) | 41 | 10.60 | 14.8 | 2.9 | 15.0 | 4.7 | | | 19.5 | 2.6 |
| Mean CV% | | | | 3.6 | | 3.4 | | 4.7 | | 2.6 |

*Note* : Results based on 100g samples taken from 25kg bags at the rate of 8 bags per ton (20% sampling intensity)

## Conclusion

Foliar fertilization is gaining popularity in Malaysia as evidenced by the numerous brands and formulations available commercially. As users become more sophisticated, quality and cost effectiveness will be the prime considerations in their choice of a foliar fertilizer. This means that stringent quality controls must be taken in their manufacture and packaging to ensure that high standards are maintained. Research inputs must be added to gain a better understanding of foliar fertilization to improve and optimise its usage. These improvements may be through better penetrants, improvement of formulations or applications techniques. On the ground, advisory services supported by research findings are crucial to ensure that the best results are obtained by the end-user so that greater confidence in the foliar fertilizer is achieved.

## References:


1. Dariusz Swietlik (1984). Foliar nutrition of fruit Crops. Horticultural Reviews, Vol. 6, 1984.
2. Liew, C.S. (1984). Foliar feeding. Far Eastern Agriculture. January/February, 1984.


**Chan K.S.**

# CONFERENCE NEWS

### HIGHLIGHTS OF THE NATIONAL OIL PALM CONFERENCE (11TH-15TH OCTOBER 1988) ORGANISED BY PORIM

**SESSION I :**
**NURSERY AND FIELD MAINTENANCE**

***Paper 1** : Nursery irrigation system and fresh approaches to new planting development*

The practices highlighted in a paper by En. Ramli of Austral Entreprises on nursery irrigation system and fresh approaches to new planting developments were not new. The cost advantages of using Sumisansui nursery irrigation system was confirmed.

***Paper 2** : Mechanized mist blowers for treatment of oil palm leaf pests*

The centrifugal fan (air-blast) sprayer which has been popularly used for oil palm pest treatment was found to be less effective due to poor coverage of spray droplets on the plant canopy. These findings concurred with AAR's advice on the need to check the droplet coverage in any spraying work.

***Paper 3** : Spraying and trunk injection of oil palm for pest control*

Good droplet coverage by Turbo Mist Sprayer and the need to spray along every oil palm row with centrifugal (air-blast) sprayer was confirmed.

Trunk injection for control of leaf-eating caterpillars on oil palm was confirmed to be effective.

A few insecticides tested showed good promise for control of leaf-eating caterpillars on oil palm but require further evaluation before general recommendations can be made.
The need for monitoring of the pests and good timing of treatment for good control was emphasized.

***Paper 4** : Water management of oil palms on coastal soils*

Nothing of special interest.

**SESSION II :**
**HARVESTING AND IN-FIELD COLLECTION**

***Paper 5** : Development of harvesting machine for oil palm*

The machines tested by PORIM including a rough terrain forklift and a self-propelled machine integrated with a platform were not suitable.

***Paper 6** : Preliminary evaluation of mechanical infield FFB collection using Serbatrek / Mini tractor / Mechanical Buffalo*

Mini-tractor and Mechanical Buffalo were both suitable for infield FFB collection on level to undulating terrain but not Serbatrek. Overall Mechanical Buffalo was more cost effective and was about 1/3 the price of mini-tractor. However, in high yielding areas, mini-tractor was superior in vehicle output.

***Paper 7** : FFB grab loading*

The mechanical grabber designed by Austral Entreprises Bhd. which costs $4000/- was about 20% more efficient than manual loading but no comparison was made with the crane/net loading system.

***Paper 8** : Harvesting and mechanized infield collection of FFB*

Out of the three harvesting and mechanised infield FFB collection systems tested, the Harvester-Driver system was more cost efficient than the Harvester-Driver-Loader system and Harvester-Driver-Loose Fruit Collector system. All the three systems reduced the labour requirement by 20-30%.

***Paper 9** : An improved FFB harvesting pole*

After a series of trials on the design, size, weight, connection, flexibility/stiffness and durability of aluminium harvesting poles, PORIM found that the telescopic type was most suitable. The design has been patented and is now marketed by Aluminium Company of Malaysia Bhd. (Alcom) under the tradename of Zirafah.

***Paper 9a** : The economics of using Guthrie light weight harvesting pole*

Apart from the more common 12 m telescopic aluminium alloy harvesting pole, Guthrie reported that further extension of the poles to 16 m can be suitably used to harvest taller palms. The productivity of the harvesters in tall palm areas can increase by 20-30% and replanting can be delayed for about 4 years. The cost of the pole is high ($660/- per set) and should be offset by the higher recoverable yield assuming that the pole's durability is one year.

**SESSION III :**
**AERIAL APPLICATION AND FERTILIZER PLACEMENT**

***Paper 10** : The use of helicopter in plantations — Guthrie experience*

The first paper in Session III by Nasir Ma Lee *et al* of Guthrie highlighted the use of the helicopter as a management tool in addition to the more conventional role as a passenger carrier. Of relevance to the plantation sector is the use of the helicopter for fertilizer and pesticide applications. However

running costs at ~ $1350/hr appear prohibitive and would probably only justifiable under special circumstances such as acute labour shortage, difficult terrain (tea plantation) or rapid control of large scale pest outbreaks.

***Paper 12** : A commercial trial showing the promise and problems of aerial application of fertilizers to oil palms*

Loong Sing Guan *et al* from Sime Darby presented results of a commercial trial on aerial application of fertilizers. Results indicated that aerial applications of N & K at reduced rates (to offset the higher costs) gave comparable results to manual applications without any adverse effects on yields, leaf nutrient levels or growth. There was little scorching of the palms with aerial applications (@ 1.5 kg. AS and MOP/p/round).

***Paper 14** : Mechanical spreading of fertilizers in an island oil palm estate*

Another paper of interest is from Teo Leng *et al* of Eastern Plantations. The paper described the use of two units of tractor mounted VICON PS 802 (each with payload of 800 kg.) for fertilizer (AC, MOP, AS, Urea,, CIRP, Kieserite, GML) applications covering 1850 ha. of mature palms (1974-1982 plantings). The average cost of application was $3.23/ha representing a saving of 40-50%. This was a saving of ~ $35,000 for the estate over one year. There was also substantial reduction in labour requirement and supervision time with fringe benefits realisable. However mechanical application was only possible on gently undulating terrain. Prior levelling of tractor paths at a cost of $34.50/ha was necessary.

Another point of interest was that with modification of the outlet spout it was possible to spread the fertilizers wider with less fertilizers falling in the tractor path area and hence reduce possible scorching of inter-row covers.

**SESSION IV :**
**AGRONOMIC PRACTICES AND BY-PRODUCT MANAGEMENT**

***Paper 15** : Oil palm response to NPK fertilizers on lateritic soils*

A paper by PORIM showed that the main response was to N on lateritic soils. There was also some K response.

Without N yields were about 16 t/ha and with 6 kg AS yields were about 27 t/ha (13 to 15 years).

***Paper 16** : Fertilizer placement studies in mature oil palm using isotope techniques*

Results of isotope studies by UPM indicated that the roots of oil palm may be more widespread than expected. But this still needed to be confirmed. This emphasized the point that all fertilizers should be well spread out in whatever area they are to be placed.

***Paper 17** : Principles and guidelines on land application of POME for the oil palm industry*

This paper confirmed that proper application of POME is safe and economically viable. It contributed to saving of fertilizer importation and hence demand. It should be remembered that in areas where ground water quality may be affected it should be monitored to ensure that there is no contamination.

***Paper 18** : The economics of mechanized EFB application in estates*

This paper by Guthrie discussed the EFB utilisation project at Rantau Mill, N. Sembilan between 1985-1988. They compared the

a) Transport system using :
   i) contract lorries costing $135-161/ha at 37.5 t/ha.
   ii) returning FFB lorries costing $57/ha with one 16 x 10 t mill hopper required for overnight storage. Also 2 x 10 t field hopper.
   iii) combination of i) and ii) costing $99/ha with one 6 x 10 mill hopper and one 10 t field hopper.

b) Field loading :
   Cost was reduced by using tractor- mounted grabbers. This reduced cost to $1/t or $38/ha.

c) Infield Distribution:
   Use of mini tractors/ trailers reduced in-field distribution cost to about 60 cents/t or $23/ha. With modification and tipping on opposite sides of the harvesting paths in 1/2 t heaps, this was reduced to about 45 cents/t or $17/ha.

An economic analysis was carried out showing the economic viability of using EFB mulching.

**Teoh, K.C.**

# COMMODITY NEWS

## PALM OIL

### Malaysia

PORIM has opened an office in Washington following the setting up of a palm oil promotion committee, to wage its battle against the anti-palm oil campaign by the soyabean growers in the U.S.

The Malaysian production of palm oil and kernel oil should amount to 8.1 mill. tonnes and 991,000 tonnes respectively by year 2,000 doubling the 1986 production level and will still account for 60% of the world's production of the commodity according to researchers at PORIM.

They also pointed out that the versatility of palm oil has made the industry an economically significant one. Also much progress has been made on the downstream end eg. oleochemicals, which will provide much of the impetus for the development of new industries, in the next growth phase of the industry. World production of oleochemicals was expected to total 3.9 million tonnes/year by 1995 and Malaysia would provide at least 20% of the output.

The Institute remains optimistic of the general acceptance of palm oil in food uses by the world food industry because of its nutritional values.

### United States

SIMPLESSE –
another low-calorie cholesterol-free fat substitute will be expected to be marketed next year by Nutra Sweet, a Monsanto-owned company. The product is made through a process which changes the size and shape of milk egg-white proteins making it smooth, rich and creamy.

It can be used in ice-cream, margarine, yoghurt and processed cheese but not in frying or baking as compared to its rival product "Olestra" made by Procter and Gamble Co. A butter substitute made with Simplesse will only have 8 calories per spoon compared to 36 for butter or margarine.

An American businessman, Phil Sokoloff, as president of the American Heart Savers Association, has launched a one-man crusade by splashing an advertisement entitled, "The Poisoning of America" in major newspapers in the U.S. Sokoloff has injected close to US $2 million into his anti-cholesterol battle since his own heart attack in 1966. In response, Malaysia recently announced $10 million a year Palm Oil Promotion Fund to counter anti-palm oil drives in the U.S.

Many of AHSA advertisements contained factual inaccuracies. Nevertheless, legal charges of false advertising cannot be filed against the association because the First Amendment of the US Constitution guarantees freedom of speech, protects people and organisations who comment on public issues from legal challenge even if their views are wrong or their factual contentions are false unless the advertiser is in fact a business enterprise proposing a commercial transaction or promoting a product.

### Thailand

Phansrivat Co. of Thailand will develop an oil palm estate and an associated palm oil processing plant with the financial assistance of the Washington-based International Finance Corporation, an affiliate of the World Bank.

There are more than 70,000 ha. of land in the Central Region of Southern Thailand suitable for growing oil palms.

### Ghana

The Palm Research Centre of the Council for Scientific and Industrial Research announced the development of a tenera hybrid which can yield 3.7 t. oil per acre. They were also breeding for white palm fruits for the soap industry and to reduce palm height to lower harvesting cost.

### Costa Rica

Costa Rica started to export palm oil with an initial amount of 3700 t in early 1988. The export figure for 1988 is expected to be 12,000-12,500 t. The growth of palm oil output is exceeding domestic demand.

### Colombia

Palm oil production continued to increase in '87 to 148,300 t as compared to 141,000 t and 120,200 t for the two years.

### Pakistan

Islamic Development Bank (IDB) is in the process of finalising a US$20 million loan for Pakistan to import palm oil. This loan will be signed in Jeddah shortly.

### Burma

According to a officer from PORIM's Technical Advisory Service, since the beginning of 1987, palm oil products are enjoying near monopoly as far as oils and fats imports into Burma are concerned.

## RUBBER

### Price Retreats Due To Slacken Demand

Prices of all grades of rubber drifted steadily lower in the absence of buying support. At the time of writing (30/11/1988) RSS 1 price is down to $2.76 per kg, shedding off 80 sen/kg from the price of $3.62 per kg (2/7/88) stated in our previous rubber news. Premium of SMR CV/L has narrowed markedly to about 20 sen and 12 sen respectively over RSS 1.

It is believed that the delivery of rubber stocks from INRO stockpile to customers has slackened demand to contribute to the downslide in price. Market estimate of INRO's stock is less than 50,000 tonnes, down from 360,000 tonnes as at September, 1987.

Sentiment was also affected by the weakening of the US dollar against major currencies and the decline in oil prices.

Rubber traders felt that a reversal of the decline looks unlikely in the near future, given that the market is currently in the peak production period (October - December) and stocks are beginning to build up. The peak however may be smaller than expected due to the recent rainy season.

On the INRO front, the 17th council meeting was held recently to discuss developments on the buffer stock operations and to prepare for the implementation of the International Natural Agreement 1987 (Inra II). The meeting was being attended by INRO's 7 exporting and 24 importing members. A press communique issued at the end of the two- day meeting said that exporting members representing 71.7% of production (ie. Malaysia, Indonesia) and importing members representing 54.1 [illegible] consumption (ie. US, Japan, China) had already ratified Inra II. The new pact can operate only after ratification by importers accounting for 75% of consumption and exporters accounting for 75% of production. Thailand, a major producing nation and the EEC, a major importer, must ratify the pact before it can come into force. INRO Executive Director is confident of securing the required 75% for a new agreement to be enforced.

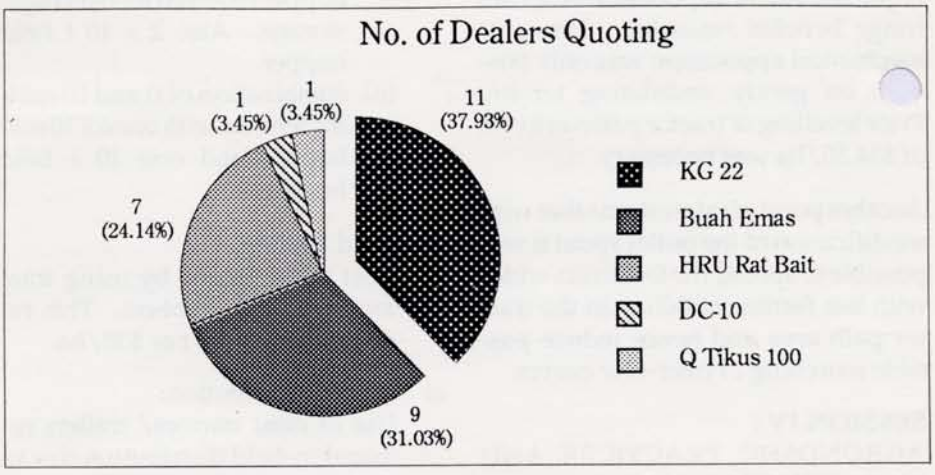
NST 29/9/88, 14/11/88, 19/11/88 21/11/88, 24/11/88,28/11/88

# P & D NEWS

## SURVEY OF RAT BAIT PRICES

1. 20 managers of advisory estates (5 estates x 4 regions) were requested to check the estate-delivered prices of various brands of rat baits with their estate suppliers. The results are shown as follows:

a) Brands




b) Average Price (estate-delivered)

| | AA | KG 22 | Buah Emas | HRU | DC-10 | Q Tikus 100 |
|---|---|---|---|---|---|---|
| $/Box | 20.00 | 24.80 | 25.44 | 24.07 | 22.50 | 24.50 |
| $/kg bait | 2.00 | 2.20 | 2.28 | 2.21 | 2.81 | 3.06 |
| $/gm warfarin | 4.0 (100%) | 4.41 (110%) | 4.56 (115%) | 4.42 (111%) | 5.62 (141%) | 6.12 (153%) |

**AA Rat Bait is cheaper than any of the cheapest brands in all the regions.**

c) Lowest price quoted (estate-delivered)

| | Region / $ per gm warfarin | | | |
|---|---|---|---|---|
| Brand | Northern | Central | Southern | Central |
| AA | 4.00 (100%) | 4.00 (100%) | 4.00 (100%) | 4.00 (100%) |
| KG 22 | 4.58 (115%) | 4.49 (112%) | - | 4.40 (110%) |
| KG 22 / HRU | - | - | 4.32 (108%) | - |

2. The expected savings in rat bait cost by using AA Rat Bait instead of any other cheapest brands are as listed in the table on the right:-

Average cost of rat bait / ha baiting / annum

| | Region | | | |
|---|---|---|---|---|
| | Northern | Central | Southern | Central |
| AA Rat Bait | $19.49 | $19.49 | $19.49 | $19.49 |
| Cheapest brand | $21.95 | $21.51 | $20.63 | $21.07 |
| Expected savings ($ / ha / annum) | $2.46 | $2.02 | $1.14 | $1.58 |

3. Apart from big price advantage, AA Rat Bait also offers the advantage of bait freshness which improves the bait uptake by rats and efficacy.

4. To conform to the Pesticide Board regulations, each carton of AA Rat Bait now weighs 10 kg for 900 baits. Often estate managers make price comparison of the various brands of rat baits based on number of baits per carton without due considerations to warfarin content, and bait size. This is an unfair comparison and AA Rat Bait because of its slightly lower bait content stands at a disadvantage. The correct comparison should be based on the active ingredient (i.e. warfarin) content. Also bait size and freshness which together with the active ingredient determine the cost- effectiveness of the baits should be considered.

MMM

# AAR NEWS

## A. AAR SEMINAR/FIELD DAY AT KDC (SABAH)


AAR held a Seminar Field Day in collaboration with KDC (Kalumpang Development Corporation) at their estate grounds in Sabah on the 23rd and 24th August, 1988. A total of 45 participants representing all AAR advisory clients in Sabah attended, with some representatives from Peninsular Malaysia.

The purpose of the Seminar Field Day was to bring up relevant and peculiar aspects of the c and oil palm crop and management under Sabah conditions in particular.

The topics presented at the Seminar included soils and their management for oil palm and cocoa, management of budded cocoa nursery, rehabilitation of poor cocoa, seasonal cocoa yield patterns and their effects on management, principles of pest management and biological control of *Setora nitens*.

The Field Day included demonstrations and discussion on most of the topics presented earlier during the seminar. The participants were shown various soil profiles, proper cocoa pruning which stimulated active participant involvement, P&D control and equipments, rehabilitation of cocoa and oil palms and a visit to the cocoa factory. The topics generated a lot of discussion both in the seminar hall and in the field in spite of the overcast sky and intermittent rains. Proceedings of the Seminar/Field Day has been completed and a set will be sent out to all AAR advisory clients very soon.

## B. AAR / TAIKO GAMES

In early August, a contingent of about 50 AARSC members went up to Ipoh to participate in the inaugural series of AARSC-Kelko S.C. games carnival. Of the five games played, badminton, table-tennis, football, netball and volleyball, AARSC only won the table-tennis match. It was an enjoyable trip, made possible by the good hospitality of Kelko S.C.

In September, AAR also participated in TPSB Central Region Games Carnival and emerged volleyball champions in the team games.

# AAR TECHNICAL PAPERS
# (AUGUST — DECEMBER, 1988)

## 1. Paper Summaries

CLONAL PROPAGATION OF OIL PALM
Current experiences and Their Implications to Breeding and Cloning

Paper presented at the Moet Hennessy-Louis Vuitton Colloquium on Advanced Technology and Plant Breeding Strategy

by

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APPLIED AGRICULTURAL RESEARCH SDN. BHD.
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**Summary**

The development of the tissue-culture technique to vegetatively propagate oil palm is a technological advancement in the improvement of the crop. It allows for the clonal propagation of elite palms within the variable commercial mixed hybrid seedling populations. Projections of up to 30% improvement in oil yield have been made. This if achievable will be a great improvement compared to the advancement made by conventional breeding of about 12-18% per breeding cycle of minimum 8 years' duration.

Recent findings and experiences indicate that to achieve the expected advantages of clonal oil palms, certain challenges still have to be faced. From the breeding and selection angle, firstly, heritable variation for oil yield within current commercial material is rather low to be able to achieve the high yield improvement expected by cloning the superior palms. Secondly the consequence of low heritability will result in unreliable palm selection. Thirdly field evaluation of the clones is mandatory and by the time reliable yield results are obtained, the next generation of newly-bred commercial materials will be available, diminishing the yield advantage of clones.

Challenges on the clonal propagation end include:

i) Inefficiency in ability to clone palms
ii) Manifestation of variation in clones in terms of floral abnormalities and palm to palm yields.
iii) Long field testing cycle

The approaches in terms of breeding and cloning strategies to meet these challenges will be discussed.

## 2. Technical Papers List

| Date | Title | Author | Report No. |
|---|---|---|---|
| 14/8 | * Seasonal yield patterns and their effects of management of cocoa | OLH | * Papers presented at AAR Seminar/Field at KDC, Sabah 23-24th. August, 1988 |
| 14/8 | * Rehabilitation and improvement of poor cocoa fields in Sabah | GKJ | |
| 14/8 | * Principles in the management of pests and diseases of oil palm and cocoa | MMM | |
| 14/8 | * Introduction to the soils of the Sandakan, Lahad Datu and Tawau districts, Sabah | KKK | |
| 14/8 | * Soil management requirements of oil palm and cocoa in Tawau, Lahad Datu and Sandakan areas | CSP & GKJ | |
| 20/8 | Preliminary observations of dryness incidence in hevea cloned PB235 and PB260 (published in Pahang Planting Association Year Book, 1987) | PK, CWH, OTS | Int. 1/88 |
| 7/9 | Clonal propagation of oil palm : current experiences and their implication to breeding and cloning (paper presented at the Meet Hennessy—Louis Vuitton on Advanced Technology and Plant Breeding Strategy) | SAC, TCC & GW | 22/88 |
| 9/9 | Suitable plot sizes and replications in Oil Palm Breeding Experiments | SAC Lee CH, Chin CW | 23/88 |
| 30/9 | FFB grading and bunch analysis exercise at Landak Estate | SAC & CPS | 24/88 |
| 5/10 | A short review of foliar fertilisation of some tropical crops and AAR evaluations of foliar fertilizers on cocoa and oil palm seedlings | GKJ & TKC | Int. 2/88 |
| 26/10 | Soil survey and oil palm suitability report on Kuala Muda Estate | PK | S. Survey |
| 24/11 | The choice of a foliar fertilizer | CKS | 25/88 |
| 28/11 | Detailed soil survey of Ladang Ban Heng<br>Report on semi-detailed soil survey of Merotai | PK<br>KKK | S. Survey<br>S. Survey |
| 29/11 | Detailed soil survey of Ladang Sg. Bekok<br>Soil survey and oil palm suitability report on SLDB's Gomantong Scheme, Sandakan District | PK<br>PK | S. Survey<br>S. Survey |
| 2/12 | Renjok soil survey and suitability | GKJ | S. Survey |
| 28/12 | Detailed soil survey of cocoa fields and future replant areas in Ladang Selborne | GKJ | S. Survey |
| 29/12 | Soil survey and crop suitability assessment report on Ladang Sigalong II | GKJ | S. Survey |

## 3. AAR Advisory Circulars

| Date | Title | Author | Report No. |
|---|---|---|---|
| 8/9 | Inventory of cocoa clones | OLH | Ad. 10/88 |
| 27/9 | Fertiliser application during present wet period | TKC | Ad. 11/88 |

**Specific Recommendations Contained Herein Should Only Be Implemented With Proper Authorisation**