AA RESEARCH NEWS

E D I T O R I A L

In the wake of diminishing availability of favourable land for cultivation of oil palm, plantation companies have ventured into less suitable territories to capitalize on the fairly consistent high returns from oil palms. Oil palms have already expanded into ex-rubber areas on shallow soils, steep terrain and with low rainfall regimes, previously considered harsh for the crop.

The rapid development of oil palm mainly on mineral soil areas has generally driven up prices of agricultural land. Consequently many companies have gradually been moving into peat areas where land prices are cheaper. The gradual and mainly recent expansion into oil palm cultivation on peat is not without valid reasons. Peat has several limitations to oil palm cultivation which if not well understood and ameliorated, can result in investment failure.

AAR`s Principals have ventured into peat in Sarawak and Indonesia to the tune of around 34,000 ha. AAR has also been building up research findings on peat. It is hoped that the articles on peat covered in this issue of the newsletter will provide pointers to managers working on peat.

This issue also brings to light much grief to AAR as it reports the passing away of our beloved colleague and friend, Quah Yin Thye. AAR expresses deepest condolence to Peggy, Quah`s wife and Sarah, his only daughter and also to his immediate family members.

Chan, W.H.

Inside this issue:

CHARACTERISTICS OF PEAT AND ITS NUTRITIONAL REQUIREMENTS FOR OIL PALM CULTIVATION

BY ARIF SUGANDI

Introduction

Expansion of oil palm cultivation into peat particularly in Malaysia and Indonesia has been very rapid in recent years. Some of the factors contributing to this are the increasing scarcity of suitable soils, advancement in peat research and generally cheaper prices of such land. Lack of knowledge on peat soils can result in less economically viable returns and may even lead to failure in investment in the long term. Characteristics of peat soils should therefore be fully understood and development of peat should only proceed if one is confident that all agro management requirements can be fully met.

This paper provides a review on characteristics of peat soils in Malaysia and Indonesia and nutrient management in relation to oil palm cultivation. Some reported long-term yield trend of oil palm from trials as well as commercial plantings is also reviewed. This paper is based on past and recent published papers on peat soils as well as our observations on commercial oil palm plantings on peat in our clientele estates in Malaysia and Indonesia.

Main characteristics of peat

Peat exceeding 1.5 m in depth is classified as deep peat. On drainage, peat subsides by 40-60 cm in the first 2 years. Thereafter subsidence is around 3-6 cm a year if water level is maintained optimally at 50-75 cm.

Peat has unique physical and chemical properties.
The main physical properties of peat are:

a. very woody texture often with presence of stumps and logs still intact,
b. low bulk density
c. high moisture content and water holding capacity
d. irreversible drying if over drained. and subsidence upon drainage.

Chemically, peat

a. is very acidic (pH< 4.0)
b. has high organic matter
c. has high C/N ratio
d. has high CEC
e. has low base saturation
f. is deficient in K, P, Cu, Zn and B.

Limitations of deep peat for oil palm cultivation

Although oil palm is a highly tolerant crop and can grow well in a wide range of soils, the above characteristics of peat impose severe constraints on the growth and yield of oil palm. Thus oil palm development on peat has generally been restricted compared with development on mineral soil areas.

The main physical and chemical properties of peat and their limitations to oil palms are summarized in tables 1 and 2.

In general, tropical peat has low pH (3.09 – 4.36), high organic carbon and cation exchange capacity (68.6 – 145.0 me/100g) but low base saturation (6.26 – 8.20%) (Table 2). C/N ratio of peat in Peninsular Malaysia has been determined to be lower than in Indonesia. This implies that the peat in Indonesia is less decomposed probably due to its more recent development for oil palm. The peat in Indonesia also has substantially lower total and available P and therefore, may require higher P application.

Table 1. Summary of main physical and chemical properties of peat and their limitations to growth and yield of oil palm

a) Physical properties

Properties	**Limitation to oil palm**
Woodiness	• less effective rooting volume • prone to termite infestation • difficult to dig drains • prone to fire hazard • poor in-field accessibility especially if zero burning is practiced and no compaction and proper stacking done
High moisture content and water holding capacity (15 to 30 times its dry weight)	• high buoyancy and high pore volume leading to low bulk density and low bearing capacity
Irreversible drying when over-drained	• moisture stress especially for young palms
Low bulk density (<0.1 g/cm3)	• less nutrient per volume basis and not readily available • less root anchorage, causing leaning/lodging • poor light utilization if leaning occurs • poor access for heavy machinery during reclaiming process
Surface subsidence	• cause leaning/lodging palms • may delay work schedule as some of the work programme should wait until peat is constantly subsided • shallow drainage and need regular and costly maintenance of drains

b) Chemical properties

Properties	**Limitation to oil palm**
very acid (pH < 4.0)	• presence of heavy metals such as Al/Fe • major nutrients may not be readily available • may need liming to raise pH • inhibit the activity of nitrifying micro-organism
high CEC due to presence of organic acids in the complex and low base saturation	• major nutrients are not readily available • high fertilizer regime required • in some cases, high exchangeable Ca/Mg which may cause nutrient imbalances and no buffer for the other nutrients especially K resulting in white stripe symptoms due to N/K imbalance.
high organic matter	• cause fixation of some water-soluble nutrients • fire hazard when dry
high C/N ratio	• low mineralisation • needs high N fertilizers initially
deficient in macronutrients as well as micronutrients especially P, K, Cu, Zn and B	• additional costs for application of micronutrients

Table 2. A compilation of main chemical characteristics of peat (0-100 cm) from various sites

Properties	P.Malaysia	Sarawak	Sumatra	Kalimantan
pH (H_20)	3.09	3.78	4.29	3.92
OC (%)	32.39	41.82	42.50	46.13
Total N (%)	1.28	1.21	1.55	1.05
C/N	25.14	40.56	28.10	49.16
Exch. Mg(cmol/100g)	2.58	2.75	2.05	4.17
Exch. K (cmol/100g)	0.69	0.42	0.65	0.83
CEC (cmol/100g)	145.00	68.60	99.69	121.52
Available P (ppm)	52.67	31.13	27.20	51.90
Total P (ppm)	505.00	275.00	72.78	39.67
Tot. K (ppm)	255.00	213.00	-	16.38
BS (%)	8.20	-	5.95	9.14

Although peat has higher concentrations of nutrients, on per volume basis N, P, K and Mg contents are lower than in mineral soils (Table 3).

Table 3. Comparison of soil analysis and nutrient reserves corrected for differences in bulk density in typical mineral and peat soils

Soil Types	Bulk density (kg/m^3)	Total N (%)	Available P (mg/kg)	Exch. K (cmol/kg)	Exch. Mg (cmol/kg)
Mineral	1500	0.5	10	0.2	0.3
Peat	100	1.28	40.7	0.65	2.92
		Nutrient reserves (0-20 cm, kg/ha)			
	Kg soil/ha (20 cm)	N	P	K	Mg
Mineral	3,000,000	15,000	30	234	168
Peat	200,000	2,500	8.14	50.7	70.1

Nutritional requirements of oil palm on peat

Oil palm requires high amount of nutrients for growth and yield. As peat has inherently poor nutrient contents, nutrient supply will largely come from nutrient inputs from fertilizers.

Requirement for macronutrients

Nitrogen

Peat has large amounts of nitrogen. However, N is largely tied up in organic matter. The availability of N increases with mineralisation of the peat. Thus rate of N for oil palm will depend on the degree of mineralisation of the peat. On peat where has been properly drained and compacted, the indigenous N supply is expected to be high.

A yield response of 8 – 15% to N in the early years has been reported.

About 1.25 to 1.50 kg urea/palm/year is suggested on deep peat areas during immaturity. However, on very raw coarse woody peat and newly opened peat from jungle, higher N rate is initially required. About 0.5 – 1.5 kg urea/palm/year is recommended for mature palms on highly decomposed peat but up to 2.2 kg urea/palm/year for raw peat in Sarawak. N rate can be reduced further in later years as the peat decomposes.

Phosphate

Total content of P in peat is very variable (Table 2). P content also depends on the degree of mineralisation the of peat. Total P is low in raw and woody peat areas and the availability increases as peat mineralizes. Total P ranging from 400 – 600 ppm was reported in highly mineralized peat in Peninsular Malaysia.

About 0.6 kg CIRP/palm/year is sufficient for immature palm. At planting, P fertilizer is applied in and around planting hole. Subsequently, annual dressings of 1.0 – 1.8 kg CIRP/palm/year is recommended during the mature period. A yield response, up to 23%, has been obtained.

Potassium
Potassium is the most deficient nutrient in peat. and good responses to K of up to 56 % has been reported from a fertilizer trial.

About 3 – 6 kg MOP per palm/year is recommended for mature palm while 1 kg to 3.5 kg for immature palms may be sufficient depending on the decomposition rate of the peat. If the peat has not been properly compacted, splitting the K fertilizer in 3 – 4 applications is recommended.

Bunch ash is a preferred source of K for oil palm if available. This is due to its high content of K_2O (about 30 – 40%) and up to 4% of P2O5 and trace elements as well as its high pH (pH of 11 – 12). The latter is important in neutralizing acidity and improving mineralisation of peat. Application of 6 kg bunch ash per palm per year will meet the palm demand for K. However, response has still been obtained at up 9.6 kg/palm of bunch ash.

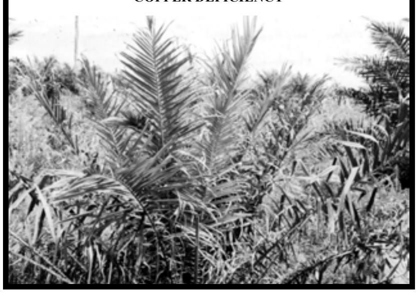
Symptoms of white stripe occurs when K uptake is inadequate due to a high N/K ratio.

Magnesium
Peat generally has adequate to high Mg contents and generally no response is obtained to Mg application. Mg needs to be monitored on shallow peat however and also where high K is applied due to nutrient imbalance. Application of GML is preferably for peat, as it will also increase pH of the peat. However, for quick correction, kieserite should be used.

Micronutrients
Copper, Zinc and Boron are the most important trace elements on peat.

Copper
Copper is usually deficient in peat and early application of CuSO4 in the planting hole prevents copper deficiency in later years.

COPPER DEFICIENCY



The symptoms of copper deficiency are chlorosis or necrosis of the fronds, leading to die-back of the frond tip especially on younger fronds. Symptoms start to occur from the middle of the crown onwards, thus the term `mid crown chlorosis` associated with copper deficiency. In severe cases, shortening of fronds also occur, often accompanied by chlorosis and necrosis of the leaf margins. New fronds become acutely stunted with eventual dieback of the spear.

There are two ways of correcting copper deficiency namely, foliar and soil applications. Foliar application (at 200 ppm of $CuSO_4$) is more effective and gives quicker recovery in young immature palms. Soil application at 200-300 g/palm however sustains the leaf copper level in the long term.

In order to prevent copper deficiency, early copper application at 15 g palm/CuSO4 in the planting hole and further soil application (of 100 – 200 g/palm/year) in the first and second year should be carried out. Subsequently, monitoring through foliar analysis to maintain leaf copper level at 5 – 8 ppm is recommended.

Cu application can increase FFB yield by 15 – 22%.

Zinc
Zinc deficiency in palm is characterized by yellowish-orange discolouration of the lower fronds. In more severe cases, younger fronds also become pale and chlorotic, while the older fronds progressively dry out. This symptom is called *Peat Yellows.*

In order to prevent *Peat Yellows*, application of 15 g Zinc sulphate/palm to the planting hole and further soil application (of 100 – 200 g/palm/year) in the first and second year should be carried out.

For quick correction of severe Zinc deficiency, foliar spraying of Zinc sulphate at 100 – 200 ppm gives good recovery within three to six months.

Zinc application improves vegetative growth and increases FFB yield significantly. Zinc has also a synergistic effect on uptake of potassium and also improves N, P and Cu status in the palm.

Leaf Zinc levels should be maintained at between 15 - 20 ppm.

Boron
Boron requirement on peat is more or less similar to that of palms on mineral soils. In the first three years an application of 100 – 150 g/palm/year is recommended and subsequently the amount applied should be adjusted according to the results of leaf analysis. No yield response to this element has been obtained.

Boron applied at high rates on peat can be phytotoxic and can also adversely affect the uptake of Copper.

Liming
Studies on liming application have given inconsistent responses. A few long-term trials on liming have showed no significant yield different between no lime and prolonged lime application.

Application of lime increases pH and therefore accelerates decomposition of peat, enhances microbial activity and also improves the availability and solubility of nutrients. However, liming reduces the acidity only temporarily.

For newly opened peat areas, liming at 2 – 3 kg of lime/palm is advised in the first 2-3 years to correct acidity and promote rooting of the young palms. Subsequently, lime application should not exceed 2 kg/palm/year of limestone dust. Excessive application of lime could cause reduction in yield and foliar contents of P and Mg.

FFB yield on peat
With proper management and agronomic inputs, it has been reported that high yields comparable to or higher than mineral soils (25 – 30 ton/ha) can be achieved on highly decomposed and compacted peat. However, very low initial FFB yield can also be expected on newly opened areas

where the peat is raw and woody.

Long-term yield profiles of oil palm on deep peat from various sites is shown in Figure 1.

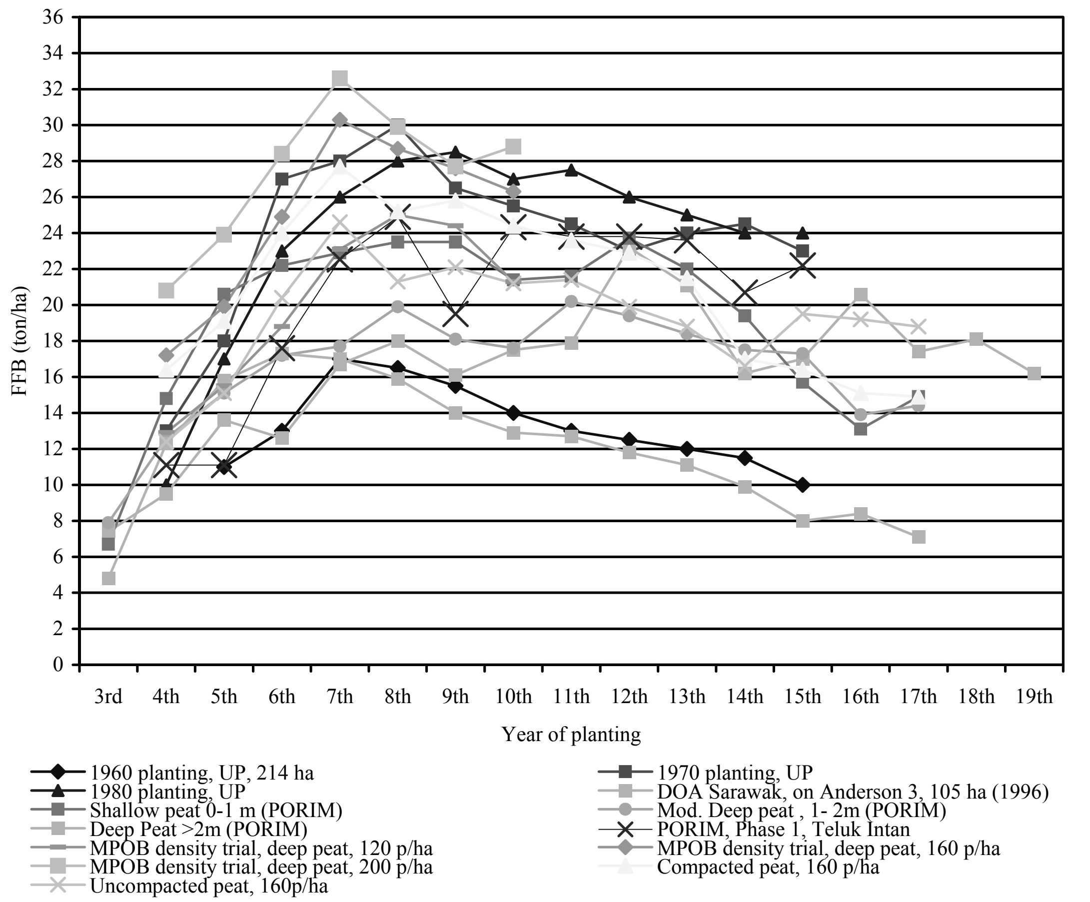


Figure 1. Yield trend of various commercial plantings and trials.

From figure 1, several important points on oil palm yield on peat can be summarized below:

(1) Overall, long-term yield trend decreased for all sites. Early declining of yield is noted at about 9 –10 years after planting. The decreasing long term yield probably due to ganoderma indicates that oil palm cultivation on peat may be less profitable in the later years when yield can decline quite significantly.

(2) Yield was very low (at average 12-13 ton FFB/ha) in the 1960s and deep peat plantings when knowledge on peat was scanty.

(3) However higher yields were obtained in the 1970/1980 plantings (25-26 ton FFB/ha and peak at 30 ton FFB/ha in 8th year after planting) probably due to advancement in peat research and management resulting in improved field practices.

CONTROL OF TERMITE INFESTATION IN OIL PALMS ON PEAT

AAR Advisory Article

Introduction

Drained peat, essentially woody material, is an ideal habitat for various species of termites. Most termite species found in peat carry out a beneficial ecological function of breaking down dead woody materials, converting them into organic matter and releasing nutrients to the soil. One species, Coptotermes curvignathus, which feeds on living plant tissues, is gaining in importance as a serious pest of oil palms planted on peat. If infected palms are not treated in the early stages they will eventually die.

Cross Identification of Coptotermes curvignathus

Coptotermes may be differentiated from the other termites via the following features:

a. soldier caste has a pear shaped head armed with long sabre-shaped mandibles.
b. soldiers are distinctly white in colour and secrete a sticky milky fluid in defence.

Termite biology

Termites are social insects and have a highly developed caste system. The reproductive caste i.e. the kings and queens are produced in large numbers seasonally, leave the colony in swarms generally at the onset of the wet season, mate and individual pairs can start new colonies. The males are often smaller in size than the queens. Queens can become very large and may live for several years. The primary function of queens is to produce eggs for the colony.

Worker caste consists of nymphs and sterile adults. They are pale in colour , wingless with small mandibles and usually lacking in compound eyes. Their function is to collect food to feed the queen, soldiers and newly hatched nymphs. They also build and maintain the nest.

Soldier caste consists of sterile adults with greatly enlarged heads and mandibles. Soldiers are slightly larger in size than workers. Their primary function is to defend the nest.

Some termites live in mostly subterranean habitats while others live in dry habitats above ground. C. curvignathus is a subterranean termite. When foraging above ground they often build earthen tubes to travel in. The foraging area of termite colonies has been estimated to be around 17 m from the nest.

Predisposing factors

Infestation levels appear to be higher in fields with high water-table and with periodic flooding and thus infestation tends to increase during wet seasons. Dry and hot topsoil conditions appear to reduce termite activity above ground level. Infestation has been found to be more common in palms planted next to timber stacks.

Damage symptoms

In peat soils with existing termite colonies, termite attack on palms generally occurs at 7-8 months after planting but occurance as early as 3 months has been reported. The main entry point of termites into young palms is from the spear region downwards.

Symptoms of termite attack may be categorized as follows:

a. Initial stage

Presence of earthern tubes and fresh mudworks on frond bases, inflorescences, developing bunches and spear. Fronds 1 to 3 are still green.

TERMITE INFESTATION
Initial Stage

TERMITE INFESTATION
Intermediate Stage

b. Intermediate stage

Fronds 1 to 3 and the spear turn yellowish brown. This usually occurs 2-3 months after the initial stage.

TERMITE INFESTATION
Advanced Stage

c. Advanced stage

The spear and several young fronds around the spear region turn brownish and start to desiccate. The spear starts to rot and gradually collapses. The whole palm eventually dries up and collapses.

Chemical treatment

The preferred insecticide to use is Fipronil to be applied at a concentration of 0.005% a.i. In Malaysia, Fipronil is sold under the trade name Regent 50SC (5%a.i.) and in Indonesia, Regent 50EC. Both formulations should be mixed as 10 ml product/10L water.

TERMITE INFESTATION
Dead Palm

Rate of solution/palm

Palms< 12 months old

Volume = 3 l/palm

Spray the spear region with half the solution and the balance in a 10 cm band around the palm base to create a barrier against reinfestation.

Palms >12 months old.

Volume = 5 l/palm

Spray the spear region with half the solution and the balance in a 10 cm band around the palm base.

Replacement of dead palms

Remove the dead palm and spray the ex-bole area with 5 l within a radius of 0.6 m to kill all existing termites. Check to ensure all termites are killed before supplying the vacancy.

If Fipronil is unavailable, Chlorpyrifos may be sprayed at 0.16% a.i. using the method described for Fipronil. Chlopyrifos is available under various tradenames e.g. Lentrek 400 EC. (39%a.i.) and Dursban 30EC(30%a.i.) Lentrek 400EC should be mixed as 41ml product/10L water and Dursban 30EC as 53ml product/10Lwater.

Treatment success

Early detection of infestation is important as good recovery from chemical treatment is obtained when the attack has not reached the advanced stage.

Recovery from chemical treatment.

Stage of infestation	Percentage recovery
Initial	100
Intermediate	92
Advanced	21

Control of spread of termite infestation

Inspection procedure

For palms up to 24 months old, inspect every 4 rows, observing the 2 palms to the left and 2 palms to the right of the inspection path for tell-tale symptoms of termite attack viz: yellowing around the spear region. Thereafter check the palm for mudwork around the bole region.
For palms> 24 months old, inspect every 2 rows, observing the palms left and right of the path.

If infection is confirmed, inspect all palms within 2 palm distance from the infected palm.

Mark out infected palms and effect treatment with Fipronil for infected palms only. Write down date of treatment on the frond base.

Intensity of inspection

TERMITE INFESTATION
Mudwork on Frond Base

Palms < 12 months old

Carry out inspection rounds from the 6th month after planting and subsequently at 3 monthly intervals.

Palms 12-60 months old

Carry out inspection at 3 monthly intervals.

Monitoring of treatment success

Roadside palms of rows where infested palms have been treated should be marked clearly for subsequent assessment of treatment success. Treated palms should be inspected at the subsequent inspection round and should be retreated if success is poor.

SPECIAL ADVISORY NOTE ON MANAGEMENT OF B DEFICIENCY IN MATURE OIL PALM

KEE KHAN KIANG

1. Occurrence:

Boron deficiency can occur:

1) In the nurseries (from about 3-4 months old)
2) In young immature and mature palms
3) Often associated with high yielding filds
4) In palms planted on B deficient soils (e.g. sandy soils, peat soils) or in soils with very low (<4.5) or very high (>7.5) soil pH.
5) Can be induced by heavy application of fertilizers especially N, P and Ca.

2. Deficiency symptoms:

i) Boron is a relatively immobile nutrient in the palm. Assessment of B status and deficiency symptoms should always be based on young and new emerging fronds.

ii) Early symptoms appear on the youngest fronds as a shortening of the pinnae in the terminal section of the frond resulting in a "rounded frond tip" appearance (Fig. 1).

Figure 1: Young frond showing "rounded frond tip" symptom.

iii) In nursery and field palms, typical symptoms appear as hook leaf, where the tips of individual leaflets (mostly the distil pinnae of the fronds) are bent backwards in a very characteristic "Z" shape (Fig. 2).

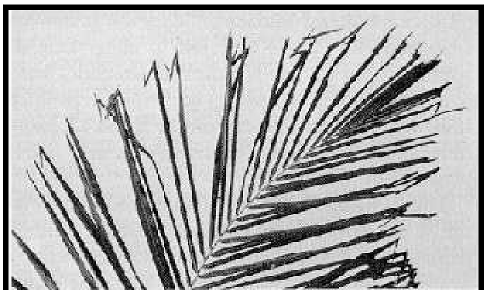


Figure 2: Characteristic hook leaf symptoms of B deficiency

iv) The deformation can also appear as "crinkle leaf" where corrugated folds occur at the tips of the affected leaflets (Fig. 3).

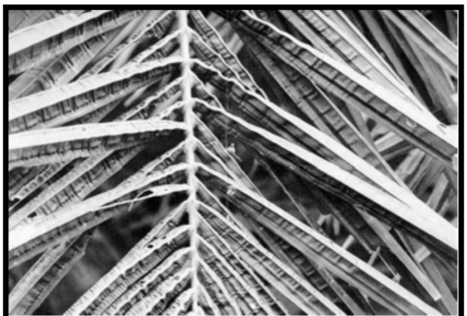


Figure 3: Crinkle leaf symptoms on mature palm fronds

v) Less common symptoms associated with B deficiency are "blind leaf" (Fig. 4), "hook leaf-little leaf" (Fig. 5) and "fish bone leaf" (Fig. 6).

Figure 4: Blind leaf symptoms.

Figure 5: "Hook leaf-little leaf" symptoms on a young palm.

vi) White stripe symptoms are often associated with B deficiency but this has not been positively established. On peat soils, white stripes are due to N/K imbalance rather than B deficiency.

3. Treatment:

i) Optimum foliar B concentration is 12-25 ppm in Frond 17 of mature palms. Transient deficiency symptoms are common and may be caused by dry weather.

ii) B application is advisable if the leaf B levels are < 10 ppm or/and when moderate to severe deficiency symptoms are visible extensively.

iii) For mature palms, 1 to 2 applications of high-grade fertilizer borate (HGFB) at 100-150 g/palm should suffice to correct the deficiency.

iv) Boron uptake is greatest during the first 2 months after application and symptoms on new fronds should disappear within 3-4 months.

4. References:

1. Fairhurst T (1998) Pocket Guide: Nutrient deficiency symptoms and disorders in oil palm. PPI, S'pore. 31pp.
2. Turner PD (1981) Oil palm diseases and disorders. Oxford University Press, K.L., 280 pp.

Figure 6: "Fish bone leaf" symptom.

CONGRATULATION!

PROMOTIONS:

	Name	Promoted to
1.	Noraini Bt. Mohd Said	Res. Clerk Gr.I
2.	Desiyarani Srinivasan	Res. Clerk Gr.II
3.	P. Selvam	Res.Asst. Gr.II
4.	Zainuddin Bin Husin	Res.Asst. Gr.III
5.	Muhammad Abdullah	Res.Asst. Gr.II
6.	M. Kanagasabai	Res.Asst. Gr.III
7.	Nor Aini Bt. Abdul Latif	Lab.Asst, SG
8.	Mahanum Bt. Ramli	Res. Clerk Gr.I
9.	Kathiresan Subramaniam	Res.Asst. Gr,IV
10.	Dzulkifli Ismail	Res.Asst. Gr,IV
11.	Abd. Razak Rais	Res.Asst. Gr,IV

MARRIAGE:

- ♥ En. Abd. Razak B. Musa to Cik Hasbi Bt. Mamat on 23-4-02.
- ♥ Cik Umi Kalsum Bt. Sabran to En. Musa B. Mu'minin on 21-5-02.
- ♥ Miss Gan Huang Huang to Mr. Lim Eng Hock on 4-11-02.
- ♥ En. Ahmad B. Ranjie to Cik Jalina Bt. Lampe on 7-12-02.
- ♥ En. Sarrudin B. Selamat to Cik Marjani Bt. Ab. Rahman on 17-12-02.

BIRTH:

- ⇒ Puan Mahizan- third child (son) Mohd Nur Izwan on 4-3-02.
- ⇒ Madam Petronella - first child (daughter) Annabelle Ju Zhen Yi on 27-3-02.
- ⇒ Puan Aspalila - first child (son) Azim Zakwan on 1-4-02.
- ⇒ Puan Hatina - third child (daughter) Hazirah Atikah on 23-11-02.

See,C.M.

Sports Club Events - 2002

In Aug 2002, a group of 160 members enjoyed a 3-day-2-night trip to Pulau Langkawi again. The islands were scenic but shopping was still the preferred choice.

All ready to go for their exciting Island Hopping Tour.

Some of the bravehearted visiting the menacing snake farm.

Another interesting event for the year was the Family day cum annual dinner held at Shah Alam Wet World on 26 Oct 2002. Approximately 350 members (the biggest crowded we have ever gathered), including their family members and guests turned up to enjoy the casual dinner and the unique performances presented by the talented staff of AAR in the wet out-door. It was a wonderful experience and memorable night. We hope other organizations can join us for a bigger gathering to make it even more memorable, some time in the future.

Tey,S.H.

It was all smiles for Ooi as he received his 25 yrs service award.

Help! Help! We are drowning.

HAR & wife sharing a romantic light moment while taking a break.

WELCOME !

Miss Choo Chin Nee who joined us on 3 June 2002 as ARO.

Home town: Machang, Kelantan.
Education: Bachelor Science of Bioindustry, Universiti Putra Malaysia, 2002.

Cik Norazura Bt. Annuar who joined us on 3 June 2002 as ARO.
Home town: Penang
Education: Bachelor of Science (Botany), University Science Malaysia, 2002.

Miss Soon Siao Hwei who joined us on 1 December 2002 as ARO.
Home town: Paloh, Johor.
Education: Bachelor of Science in Computer Science and Computer Mathematics (Hons. Cum laude), Campbell University USA, 2002.

OBITUARY

We extend our condolence to the family of the late Mr. Quah Yin Thye who passed away on 8-12-2002.

Quah Yin Thye
(with his teak trees)
3 Feb. 1956 – 8 Dec. 2002

On 8 December, Quah Yin Thye passed away without regaining consciousness for 60 days after being assaulted and robbed in Kluang on 9 October. He was walking back alone to his hotel after having dinner with his colleagues when he was attacked.

Quah as we normally called him was born in Alor Star. He completed his primary and secondary education at Sultan Abdul Hamid Primary School and Sultan Abdul Hamid College respectively. He obtained his Bachelor of Forestry Science from the University of Canterbury, New Zealand in 1979 and a Diploma in Business Administration from the same university in 1980. Quah started his career in the oil palm industry as an agronomist with Lam Soon Management Services from 1981 to 1988. After a short break in New Zealand, he joined Applied Agricultural Research Sdn. Bhd. (AAR) in 1989 and was a Senior Research Officer with AAR at his untimely demise. In 1997 he was awarded a Master of Science from Universiti Pertanian Malaysia for a comprehensive work done on the growth and flowering of *Asystasia gangetica* subsp. *micrantha* culminating in positive control strategies for this noxious weed.

Another of Quah's major contributions to AAR and the Industry was his work on the use of plastic sheets for mulching immature oil palms (AA+ Mulch^{tm}). He was still working on refining and extending the use of AA+ Mulch^{tm} before he passed on. Quah was also in charge of the research program on plantation forestry, his original area of specialization. The numerous impressive blocks of teak, mahogany and sentang that he had planted all over Peninsular and East Malaysia will now be memorials of his effort and hard work in this field.

As a colleague, Quah was very conscientious and most pleasant but would accept no nonsense from anybody. As a friend, he was always cheerful and helpful but careful with the company he kept. As a father, his only child, Sarah meant the world to him and the song "Sara" by Starship was his anthem for her. As a husband he was very faithful and endearing to Peggy. Basically Quah was a family man and his family came above everything else.

For a man who was so fit and healthy and in the prime of his life, the manner of Quah's demise was not only very cruel and tragic, but also unnecessary. His very strong character, both physically and mentally was reflected in the way he fought for his life whilst in the hospital ICU. To Peggy who has shown great strength and courage throughout the agonizing two months that Quah was in a coma, please remain strong. We offer you, Sarah and Quah's brothers and families our most heartfelt sympathy. We share your great loss as we have also lost a very good field researcher, colleague and most of all a friend who will be missed very dearly. The numerous messages of condolences that we have been besieged with from Quah's friends in the Industry and before that the many phone calls that came in to enquire about his condition while in the ICU shows that we are not alone in facing this sad loss.

On a parting note, below is a poem from Chiu Sheng Bin in memory of Quah Yin Thye:

I am of the nature to decay, I have not gone beyond decay

I am of the nature to be diseased, I have not gone beyond disease

I am of the nature to die, I have not gone beyond death

All that is mine, both beloved and pleasing, will change and vanish

I am the owner of my actions, born and supported by my actions

Whatever I do, whether good or evil ... of that I shall be the heir

Tan,C.C.