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AAR NEWS

E D I T O R I A L

Rhinoceros beetle damage and labour shortage related problems are some of the contributing factors to the slow yield progress in young oil palm plantings and stagnating yields in older plantings.

The current industry standard of bi-monthly preventive spraying with synthetic pyrethroids for rhinoceros beetle control is expensive and labour intensive. Therefore practices that will prevent/reduce the breeding of the beetles in the palm residues at replanting is an attractive option.

The labour shortage scenario facing the oil palm industry is one that is expected to worsen with time. Mechanization is therefore inevitable if this industry is to stay competitive with other oil crop producers. Rachel Stringfellow in her paper on "The competitiveness of the palm oil industry now and in the future" in the recent International Planters Conference 2000, illustrated the significance of mechanization constraint facing palm oil producers. She noted that the labour requirements for harvesting of 1 t of oil is 0.07 person day for soy bean oil and two person days for palm oil, meaning that the labour requirement for the latter is nearly 30 times that of the former. We therefore feel that it is timely for us now to reproduce here a paper by Mr. Chow, K. C., the Planting Director of Boustead Estates Agency and our Mr. Ooi, L. H. that will offer some solutions to the above issues.

Because the issue of slow initial yield and stagnating yields in the older oil palm plantings is an alarming one, we reproduce here abstracts of papers presented by Dr. Soh A. C. *et al.* and Goh, K. J. *et al.* reviewing the roles that plant breeding and precision agriculture can play in reversing these trends, respectively. Both papers emphasized the importance of correct agro-management practices. Goh *et al.*, highlighted the need for managing variability across fields and the negative impacts of "large fields" as management units.

This issue of the newsletter marks the handing over of editorial duties for this newsletter from Mr. Ooi, L.H. to Ang, B.N. We

An Improved Field Practice and Mechanisation of FFB Evacuation and Manuring in Oil Palm Plantations

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SUMMARY

Pulverisation of palm trunk chips with Howard Mulcher could help destroy the breeding sites of *Oryctes rhinoceros* beetle and rat nesting sites. It also improved field access and hence facilitated field upkeep work and supervision. An added advantage was that the legumes and palms benefited from the well-distributed pulverised palm trunk mulch.

Total cost for two runs of the palm chip mulcher was RM286 and RM347 per hectare for HM60 and HM50 Mulcher respectively. The cost for 60 rounds of prophylactic spraying of cypermethrin with conventional knapsack sprayer required to control the rhinoceros beetle was RM1,275 per hectare. The manpower requirement for pulverizing the palm chips was less than 2 man-days per hectare whereas spraying of synthetic pyrethroids required over 25 man-days per hectare.

The productivity and cost of an integrated system of harvesting and fresh fruit bunch (ffb) evacuation using mini-tractors fitted with mechanical grabber and high-lift trailer or the MTG system and tractor-mounted mechanical fertilizer spreader aided by a mini-crane to handle the fertilizer packed in half-tonne bags for fertilizer application in two oil palm estates were reported.

In Estate B, the MTG worked 191 days and evacuated about 3159 t of ffb per year on average. The mean output of the MTG was 15.8 t per day and the operating cost of the MTG was RM2.69 t^{-1} ffb evacuated. The productivity of MTG in Estate C was 12.10 t per day and the cost was RM4.31 t^{-1} ffb.

For fertilizer application rate of 200 kg ha^{-1}, the cost of mechanical manuring was RM4.45 per round in Estate B and RM5.94 in Estate C. This was nearly 50% cheaper than the manual method. The worker productivity of the mechanized method was nearly eight times more than the manual method.

keyword: Pulverization, palm trunk, rhinoceros beetle, mechanisation, ffb evacuation, manuring.

INTRODUCTION

The ban on open burning and the advent of zero burning technique of replanting have created pest and disease problems for the plantation industry. The continuous palm-to-palm replanting on an estate could result in rapid build up of rhinoceros beetles, causing serious damage to the palms and hence loss in yield. Liau *et al.* (1991) reported that at 50% damage incidence, up to 40% of the ffb crop in the first year of harvesting could be lost. Chung *et al.* (1999) found that severe beetle damage (16.4 fronds out of 23.9 fronds) on a 21-month old planting resulted in 92% loss of the first 12 months crop and moderate damage (14.3 out of 29.2 fronds) caused 16% crop loss.

Currently, the most effective control for rhinoceros beetles is the prophylactic spraying of synthetic pyrethroids such as cypermethrin at bi-monthly rounds. In high pest pressure areas, repeated prophylactic sprayings of up to 60 rounds were required for adequate control of the pest. This practice is costly and requires high labour inputs. The shortage of labour and skilled sprayers has prompted the search for alternative methods of rhinoceros beetle control in the Boustead Group of estates. Investigations into the use of the Howard Mulcher to pulverise the palm trunk chips to destroy the breeding sites of the rhinoceros beetle commenced in 1998.

Pulverisation of the palm trunk chips promoted rapid breakdown of palm biomass, thus destroying beetle-breeding sites. It also killed some of the beetle grubs in the process. At the same time, it improved field access and hence speeded up field upkeep work and facilitated supervision. An added advantage was that the legumes and palms benefited from the well-distributed pulverised palm trunk mulch.

Mechanisation of fresh fruit bunch (ffb) evacuation in oil palm plantations to improve the productivity of labour has been a subject of great interest and research since the 1960s (Benny *et al*., 1967 and Cunningham, 1969). The research was intensified in the 1990s when labour shortage and upward wage pressure became more acute and much progress have been made (Teo *et. al*., 1991; Law *et al*., 1992; Kamarudzaman *et al*.; 1994; Ahmad *et. al*., 1995; Mohd Ali, 1995; and Chew *et al*., 1996). More recently, Ooi and Sim (1997) reported that with the integrated system of harvesting and ffb evacuation using mini-tractors fitted with mechanical grabber and high-lift trailer (the MTG system), labour requirement for harvesting and ffb evacuation could be reduced by 54%. This was accompanied by a 22% reduction in cost. Ismail and Abu Hassan (1998) reported 34% reduction in labour requirement with the introduction of the MTG system.

The advantages of using tractor mounted fertilizer spreader have been reported by Ramani *et al.* (1992) and Mohd Ali (1995). Ooi and Sim (1997) reported that a tractor mounted fertilizer spreader assisted by a mini crane to handle the fertilizers packed in half tonne bags resulted in a ten-fold improvement in labour productivity and 52% reduction in cost over the conventional manual system of manuring.

This paper reports the results of an improved field practice during replanting in Estate A and the cost and productivity of mechanized in-field ffb evacuation and manuring in Estates B and C.

A) An improved field practice using Howard Mulcher HM60 and HM50 to pulverize palm trunk chips in oil palm-to-oil palm replanting in Estate A.

METHODS

The equipment used for pulverizing the palm trunk chips consisted of a John Deere 4-wheel drive tractor model 6400 (105hp) fitted with creeper gear and a 60-inch Howard Mulcher (HM60) purchased in October 1998 and a smaller 50-inch Howard Mulcher (HM50) which was purchased in June 1999 and was attached to a John Deere 4-wheel drive tractor model 2450 (75hp).

The felling, chipping and pulverization of the palm trunks at replanting were carried out in the following manner:

1. The excavators felled the palms, chipped the trunks to a thickness of not more than 4 inches and spread them evenly along the existing palm row.
2. The boles of the palms were duged out and chipped into small pieces so that they do not obstruct the smooth running of the mulcher.
3. Palm fronds were chopped into 5-foot length pieces to prevent them from choking the spindle of the mulcher.
4. Initially, pulverisation of palm trunk chips could only commence 5 to 6 months after felling. With strict enforcement on the thickness of the chips to about 3 to 4 inches and proper balancing of the Howard Mulcher, the lag time was reduced to 80-90 days.
5. Two passes of the mulcher were necessary to break up the palm chips into smaller pieces and to scatter them over a wider area.

RESULTS

Initial results obtained in 1998 indicated that the HM60 Mulcher has the potential of chipping up to 340 palms or 2.5 hectares per day. However, due to high machine downtime and wear and tear of the chipping blades, actual output was much lower.

Pulverisation of the palm trunk chips was completed in two replants i.e. PR1999 and PR2000. Details of the results obtained are tabulated in Tables 1.1 and 1.2.

TABLE 1.1. PULVERISATION OF PR1999 FROM FEBRUARY TO AUGUST 1999

	Total	Ha	Cost RM ha^{-1}	Man-day ha^{-1}
HM60 + J/DEERE 6400 for 1st run				
J/Deere 6400 - running hrs	1168			
1st run man-days	146			
Machine output ha day^{-1}		0.63		
Operating expenses for tractor	14,314.10	92	155.59	
Operating expenses for HM60 Mulcher	3,626.81	92	39.42	
Total cost per hectare for 1st run			195.01	1.59
HM50 + J/DEERE 2450 for 1st run				
J/Deere 2450 - running hrs	608			
1st run man-days	76			
Machine output ha day^{-1}		0.50		
Operating expenses for tractor	7,773.76	38	204.57	
Operating expenses for HM50 Mulcher	919.36	38	24.19	
Total cost per hectare for 1st run			228.77	2.00

For the first run, HM60 Mulcher was able to pulverize 0.63 hectares per day in PR1999 replant and 0.93 hectares per day in PR 2000 replant. The HM50 Mulcher was less productive with output of 0.50 and 0.85 hectares per day for the two replants respectively. The higher output in PR2000 was the result of improvement in the method of pulverization i.e. strict enforcement on the thickness of the chips to about 3 to 4 inches, proper

TABLE 1.2. PULVERISATION OF PR2000 FROM MARCH TO JUNE 2000

	Total	Ha	Cost RM ha^{-1}	Man-day ha^{-1}
HM60 + J/Deere 6400 for 1st run				
J/Deere 6400 - running hrs	344			
1st run man-days	43			
Machine output ha day^{-1}		0.93		
Operating expenses for tractor	4,292.98	40	107.30	
Operating expenses for HM60 Mulcher	1,618.80	40	40.47	
Total cost per hectare for 1st run	5,911.78		147.77	
HM60 + J/Deere for 2nd run				
J/Deere 6400- running hrs	196			
2nd run man-days	25			
Machine output ha day^{-1}		1.60		
Operating expenses for tractor	3,452.84	40	86.32	
Operating expenses for HM60 Mulcher	2,060.52	40	51.51	
Total cost per hectare for 2nd run	5,513.36		137.83	
Total for two runs (HM60)			285.60	1.70
HM50 + J/Deere 2450 for 1st run				
J/Deere 2450 - running hrs	432			
1st run man-days	54			
Machine output ha day^{-1}		0.85		
Operating expenses for tractor	5,757.79	45.8	125.72	
Operating expenses for HM50 Mulcher	2,237.23	45.8	48.85	
Total cost per hectare for 1st run	7,995.02		174.56	
HM50 + J/Deere for 2nd run				
J/Deere 2450 - running hrs	280			
2nd run man-days	35			
Machine output ha day^{-1}		1.31		
Operating expenses for tractror	4,998.75	45.8	109.14	
Operating expenses for HM50	2,920.40	45.8	63.76	
Total cost per hectare for 2nd run	7,919.15		172.90	
Total for two runs (HM50)			347.46	1.94

TABLE 1.3. QUALITY OF PULVERISED MULCH OBTAINED IN PR2000

	Fine %	Coarse %	Not pulverized chips %
1st run	10	60	30
2nd run	60	30	10

balancing of the mulcher and the use of more wear-resistant blades.

The improved method implemented in the PR2000 replant increased machine output for the HM60 to 0.93 hectare for the first run and 1.60 hectares for the second run. Cost for two runs with the HM60 Mulcher was RM285.60 per hectare and manpower requirement was 1.70 man-days per hectare. Machine output for the HM50 Mulcher was lower at 0.85 hectare for the first run and 1.31 hectares for the second run. Cost for two runs with the HM50 Mulcher was higher at RM347.46 per hectare and manpower requirement was 1.94 man-days per hectare.

For satisfactory results, it was necessary to complete two runs over the palm chips. Pulverisation quality improved in the second run with the coarse chip percentage reduced from 60% in the first run to 30% in the second run. The respective figures for the missed out chips that were not pulverised were 30% and 10% (Table 1.3). The second run also improved fine mulch percentage and helped distribute the pulverised mulch over a wider area and reduced the thickness of the mulch.

Table 1.4 shows the actual cost in one of our estate for prophylactic spraying using cypermethrin to control rhinoceros beetles using the conventional knapsack sprayer (CKS). It is expensive and labour intensive. For effective control, bi-monthly spraying of up to 60 rounds were needed where the pest population was very high after continuous palm-to-palm replanting. Total cost of up to RM1,275 per hectare was incurred and total manpower requirement for the spraying operation was 25.68 man-days per hectare.

DISCUSSION

Pulverisation of palm trunk chips with Howard Mulcher could help destroy rhinoceros beetle breeding sites. The Mulcher pulverised the palm chips to a fine mulch and hastened the decomposition of the palm biomass. In addition to beetle control, rat-nesting sites were also disturbed during the pulverisation operation. It is a viable solution to the increasing pest problems in palm-to-palm replanting.

Pulveristion of the palm chips also improved field access and hence speeded up field upkeep work such as lining and planting operations and facilitated supervision (Figure 1 & 2). In addition, the well-distributed mulch improved the growth of both the legumes and the palms.

TABLE 1.4. CYPERMETHRIN SPRAY (CKS) FOR RHINOCEROS BEETLE CONTROL

Palm Age	Total Rds	Cost (RM/Ha/Rd*)				Man-day/Ha/Rd	Cost (RM/Ha/Yr)	Man-day/Ha
		Labour	Material	Vehicle	Total			
1st Year	24	5.70	7.70	2.46	15.86	0.34	380.64	8.16
2nd Year	24	8.07	12.15	3.36	23.58	0.48	565.92	11.52
3rd Year	12	8.40	14.22	4.73	27.35	0.50	328.20	6.00
						TOTAL	1,274.76	25.68

* Rd = Round

Figure 1. Improved field access with the new clearing method where palm residues were pulverized with the Howard Mulcher.

Figure 2. Windrowed chippings that can hinder field access in the conventional clearing method where the palms were chipped and stacked.

Total cost for two runs of the palm chip mulcher at RM285.60 per ha for HM60 Mulcher and RM347.47 for HM50 Mulcher compares very favorably to the cost of 60 rounds of prophylactic spraying of cypermethrin with CKS at RM1,275 per hectare. The manpower requirement for pulverizing the palm chips was less than 2 man-days per hectare whereas spraying of synthetic pyrethroids required over 25 man-days per hectare.

It would not be possible at the moment to completely replace cypermethrin spraying with the use of the palm chip mulcher in a high pest population area, but considerable reduction in spraying rounds could be achieved. It is envisaged that the repeated use of the palm chip mulcher, in consecutive replantings, as a cultural practice will reduce pest population gradually to manageable levels. Prophylactic spraying could then be dispensed with and only selective spraying of isolated problem areas would be needed.

The palm chip mulcher is currently working on flat and undulating terrain where palms are planted under straight lining. A modified method will be required for the terraced area. Machine output can be further improved if palm chip thickness is reduced to below 3 inches. This will also enable pulverisation to be carried out earlier than 30-40 days after chipping. Improvement to the durability of the cutting blades can also improve productivity of the machine and reduce operating costs. The HM60 Mulcher was more productive and cost effective than HM50 Mulcher but required a tractor of more than 80hp.

B) An integrated system of harvesting and fresh fruit bunch (ffb) evacuation using mini-tractors fitted with mechanical grabber and high-lift trailer (MTG system) in Estates B and C.

METHODS

Land preparation

The success of implementing the MTG system in an estate depends to a large extent on the quality of land preparation prior to the introduction of MTG. The following land preparations were made in the estates reported in this paper.

Estate B was generally undulating with about 10% hilly areas that required terracing. It was not under any form of mechanization prior to the introduction of the MTG system and new 3m wide MTG paths had to be constructed. The cost was RM12 per chain for the terraced areas and RM3.60 per chain for the other areas. An average of 25 chains (about 500m) of MTG paths costing about RM111 was required per hectare (Table 2.1).

TABLE 2.1. DETAILS OF MTG PATH CONSTRUCTION AND COST INCURRED IN ESTATE B

Particulars	
Total mature	2334 ha
Total area covered by MTG	2200 ha
% Terraced area	10%
% Undulating (not terraced)	90%
MTG path (chain/ha)	25
Cost	
Flat/undulating areas (RM/chain)	3.60
Terraced areas (RM/chain)	12.00
Averave cost (RM/ha)	111.00

The terrain in estate C was flat, consisting mainly of the sub-recent alluvium soil, Holyrood Series (Typic Kandiudults, fine loamy, siliceous, isohyperthermic, yellow). Prior to the introduction of MTG, the estate used Mechanical Buffalo and Wu's Cart for in-field ffb evacuation. The Mechanical Buffalo and Wu's Cart paths were upgraded into MTG paths with minimal expenditure. However, an average of 1.47 culverts per hectare had to be installed before the MTG system was introduced. Total cost of land preparation was RM125 ha^{-1}. Details of the land preparation requirements are summarized in Table 2.2 below.

TABLE 2.2. LAND PREPARATION IN ESTATE C

Mechanisation paths			Culverts			Total cost of land preparation(RM ha^{-1})
m ha^{-1}	RM m^{-1}	RM ha^{-1}	No ha^{-1}	RM $unit^{-1}$	RM ha^{-1}	
40	0.40	16.00	1.47	74.00	109.00	125.00

Equipment

The MTG system consisting of Yanmar US250D (25HP) or Yanmar F-28Ex (28HP) mini-tractors fitted with grabber and high-lift trailer was introduced in Estate B in 1995 and the following year in Estate C when encouraging results were obtained in the former. To-date, the system has been implemented in over 94% of Estate B (2200 out 2334 hectares) and in nearly all the mature palms older than seven years in Estate C (1200 hectares). Details on the deployment of MTG (Yanmar US250D mini-tractor fitted with grabber and high-lift trailer @ RM50,000 prior to 1998 and mainly Yanmar F-28Ex mini-tractor fitted with grabber and high-lift trailer @ RM55,000 thereafter) are tabulated in Table 2.3 below:

TABLE 2.3. DEPLOYMENT OF MTG IN ESTATES B AND C

Date of purchase	No. of MTG		Remark
	Estate B	Estate C	
1995	4	0	
1996	4	2	
1997	2	3	
1998	1	1	
1999	2	1	1 unit MTG condemned in Estate B
2000	3	1	2 units MTG used as stand-by in Estate B
Total	15	8	

Currently, there are effectively only 12 units of MTG equivalent to one MTG to about 180 ha operating in Estate B. In Estate C, due to frequent breakdowns, only 6 of the 8 MTG are working at any one time, that is one MTG per 150 ha.

Division of labour (DOL) and system of payment

The division of labour (DOL) system where each worker was given a specific task was adopted. The DOL and payment system for Estates B and C are summarized in Tables 2.4 and 2.5 respectively.

TABLE 2.4. DIVISION OF LABOUR AND PAYMENT IN ESTATE B

Category of worker	Payment Rate (% of MAPA Rate)
Harvester	50
Loose fruit Collector	20
Mini Tractor Operator	10
Machine Running Expenses	20
Total	100

TABLE 2.5. DIVISION OF LABOUR AND PAYMENT SYSTEM IN ESTATE C

Category of worker	Duty	Division of pay
Cutters	Cut subtending fronds and ffbs, trim bunch stalks and place ffbs on MTG paths	50 % of MAPA/NUPW Agreement plus an incentive payment of RM1 t^{-1} ffb harvested
MTG operators	Collect ffbs along MTG paths and load them into mainline transport vehicles parked along the field roads.	Basic general worker's wage (MAPA/ NUPW) for the first 6t; 6t to 12t at RM2.40 t^{-1}; 12t to 18t at RM2.70 t^{-1}; 18t to 24t at RM3.00 t^{-1} and RM3.30t^{-1} thereafter.
Loose fruit pickers	Collect loose fruit into used fertilizer bags and place them along the field roads.	RM0.80 per 25 kg bag.

It is not unusual for the estates to adopt different systems of job specialization and payment method as local conditions may differ. However, whichever system is adopted, it must be one that is accepted by the workers.

RESULTS

The to-date mean yearly MTG productivity according to the age of the machine in Estate B is summarized in Table 2.6 below:

TABLE 2.6. MEAN YEARLY MTG PRODUCTIVITY IN ESTATE B

MTG age (yr)	ffb evacuated per yr (t)			No.of days worked per yr			ffb evacuated per day (t)		
	Lowest	Highest	Mean	Lowest	Highest	Mean	Lowest	Highest	Mean
1	86	4338	1437	14	268	91	6.12	22.83	12.44
2	1332	5391	3318	84	276	230	9.06	19.46	14.69
3	1735	5696	4071	120	262	237	12.73	23.83	17.14
4	1866	5652	3811	107	281	222	9.40	21.46	17.34
5	1633	5268	3156	98	278	176	15.05	19.36	17.38
Mean	1331	5269	3159	85	273	191	10.47	21.39	15.80

On average, a MTG worked about 191 days and evacuated about 3159 t of ffb per year. Excluding year 1, which is not representative because it usually did not cover the whole year as the MTG could be purchased any time in that year, the number of days worked varied from 84 to 281 days per year. The corresponding figures for the amount of ffb evacuated were 1332 to 5696 t. The very big variations were the result of a combination of reasons mainly the attitude of the MTG operator and his skill, machine breakdown and promptness in repairing it and field condition. The mean output of the MTG was 15.8 t per day and the range was 6.12 to 23.83 t.

The to-date mean yearly MTG cost according to the age of the

TABLE 2.7. MEAN YEARLY MTG COST IN ESTATE B

MTG age (yr)	MTG cost (RM t^{-1})			MTG cost (RM hr^{-1})		
	Lowest	Highest	Mean	Lowest	Highest	Mean
1	0.53	3.32	1.40	0.82	6.77	2.19
2	0.64	3.75	1.53	1.06	9.41	3.07
3	0.60	4.43	2.18	1.23	10.89	4.72
4	1.62	7.58	3.73	4.01	11.14	7.83
5	3.59	5.78	4.62	7.50	14.73	10.69
Mean	1.40	4.97	2.69	2.92	10.59	5.70

machine in Estate B is summarized in Table 2.7.

On average, the MTG cost was RM2.69 t^{-1} ffb evacuated and RM5.70 hr^{-1}. The cost per tonne ffb evacuated varied from RM0.53 to RM7.58. The corresponding figures for the cost per hour were RM0.82 to RM14.73.

Over the years, there was a declining trend in the number of days worked per year, indicating more breakdowns, as the machine gets older. This was accompanied by a sharp increase in the operating cost of MTG, which increased from RM2.19 hr^{-1} in year 1 to RM10.69 hr^{-1} in year 5. The corresponding increase in the cost of ffb evacuated was from RM1.40 t^{-1} to RM4.62 t^{-1}. Hence, it may not be economical to operate a MTG that is older than 5 years unless the driver is extremely careful and the machine is well maintained. Poor maintenance and abusive use of the machine could result in the machine being written off much earlier.

The mean MTG productivity and cost for Estate C is summarized in Table 2.8.

TABLE 2.8. MEAN MTG PRODUCTIVITY AND COST IN ESTATE C FROM JULY 1997 TO JUNE 2000

MTG	1	2	3	4	5	6	7	8	Mean
ffb evacuated	13.31	10.95	13.52	13.00	11.90	11.45	11.49	11.20	12.10
MTG cost	5.09	6.11	4.17	4.29	5.35	2.70	5.63	1.10	4.31

The MTG productivity of Estate C at 12.10 tonne ffb evacuated per day was lower than the 15.80 tonne achieved by Estate B. The lower productivity partly explained the much higher MTG cost at RM4.31 t^{-1} compared to the RM2.69 t^{-1} in Estate B.

DISCUSSION

The MTG system may not necessarily bring down the direct cost of harvesting and ffb evacuation. However, it has the potential of reducing the dependence on workers and indirect savings in the overall operation of the estates. Some of the potential benefits of the MTG system are listed below:

1. Reduced labour requirements and hence savings in fringe benefits and amenities.
2. Considerable savings could be achieved by loading the ffb directly from the high-lift trailer to the internal/external transport vehicles, as this would obviate the double-handling of ffb and loose fruits. Also ffb platform construction and maintenance would be a thing of the past.
3. Reduced road density. One of the major considerations in designing the estate road system in the “old days” was to cater for “manual carry” of ffb. As a result, road density of between 3 to 5 chains per hectare was the norm. With the MTG system, the “carry distance” is greatly increased. For example, on flat terrain, a one-tonne capacity MTG could easily cover 100 palms per trip. It is now possible to reduce the road requirement by as much as 50%.
4. Low turnover and good out-turn of workers because of higher wages and lighter work.
5. Improved crop recovery and quality. Nearly all fruits can be evacuated and sent to the mill on the day of harvest.
6. Able to maintain harvesting rounds.

The MTG system is not without problems. Most of the problems encountered were related to the machinery itself, field access and the related changes required in the harvesting and ffb evacuation system and payment structure. There is a need to reduce the frequency of machine breakdowns and cost of repair. Good supporting services from the machinery vendors and an efficient estate workshop are also essential for the successful implementation of mechanisation. The other major constraints are the steep terrain and soft ground conditions and rutting of MTG paths.

C) Tractor-mounted mechanical fertilizer spreader (Emdek Turbo Spin) and mini-crane (Emdek E-Z Lift) to handle fertilizer packed in half-tonne bags in Estates B and C.

METHODS

Currently, mechanical application of fertilizer is the most promising method as it is relatively cheap and easy to implement especially when the fields have been prepared for mechanised ffb evacuation. The tractor mounted mechanical fertilizer spreader (Emdek Turbo Spin 600L) fitted with a mini-crane (Emdek E-Z Lift) to handle fertilizer packed in half-tonne bags was implemented in the two estates in 1997.

RESULTS

The cost of fertilizer application in Estates B and C are tabulated in Tables 3.1 and 3.2. For application rate of 200 kg ha^{-1}, the cost of the Emdek spreader was RM4.45 per round in Estate B and RM5.94 in Estate C. The cost of manual manuring in the latter was RM10.60 per round or about 78% more expensive than the mechanized method.

TABLE 3.1. COST OF FERTILIZER APPLICATION IN ESTATE B

Cost item	Cost of fertilizer applied (RM/t)	Cost of fertilizer applied[(1)] (RM/ha/round)
Vehicle running (tractor, spreader and crane)	8.48	1.30
Labour (driver and attendant)	6.65	1.65
Transport/distribution (store to field)	7.68	1.50
Total	22.81	4.45

Note: (1) At application rate of 200 kg ha^{-1}

TABLE 3.2. AVERAGE COST OF FERTILIZER APPLICATION IN ESTATE C FROM NOVEMBER 1997 TO JUNE 2000

Cost item	Cost of fertilizer applied[(1)] (RM/ha/round)	
	Emdek spreader	Manual
Vehicle	3.42	3.80
Labour	2.52	6.80
Total	5.94	10.60

Note: (1) At application rate of 200 kg ha^{-1}

Both estates were able to apply about eleven tonnes of fertilizer per day with the mechanical method with a driver and an attendant. With the manual method, each could usually apply 0.7 t per man-day. Hence, the worker productivity of the mechanized method was nearly eight times more than the manual method.

DISCUSSION

Fertilizers are an important input that must be applied correctly in terms of dosage, placement and timing to achieve the best results. They are traditionally applied manually. Due to serious labour shortage, rain disruptions and late fertilizer delivery, estates are finding it increasingly difficult to implement the manuring schedules on time.

Much progress have been achieved in mechanising the application of fertilizers. Estates should take advantage and make full use of the available technologies to improve the productivity of the workers and to improve the efficiency of fertilizer application to get the maximum benefits out of this expensive and important input.

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Expected Genetic Improvements In Oil Palm Planting Materials

Soh, A. C., Wong, G., Hor, T. Y. & Tan, C. C.

Abstract of paper presented at the Oils and Fats International Congress 2000

The oil palm is the highest yielding oil crop, the oils from which have very versatile uses.

The prospect of further significant improvement in the already high yield potential of current oil palm planting materials in the near term is limited. Nevertheless, continuous genetic yield improvement is still possible but they are likely to arise through resistance to biotic and abiotic factors or adaptability to site factors and thus raises the site yield potentials closer to the genetic yield potential. These will come about with the increasing use of the more uniform near true F1 hybrids and clones which have more site specific requirements. The other objectives of the genetic improvement programmes e.g. improved harvestable crop, improved oil quality, novel traits, are unlikely to be achieved within the next 20 years to make significant impact except perhaps in reduced palm height for ease of harvesting. Most of these programmes have just started and breeding development time in the oil palm is in decade terms. Transgenic palms, marker assisted selection and other molecular technologies can help expedte this but their development in the oil palm would require much longer time than in annual crops.

Genetic improvements in oil palm planting materials within the next 20 years will still be confined to yield and palm height. Expected yield improvement for each breeding or cloning generation is 10-15% with clones enjoying a running advantage of 5-10% for 3-5 years. These genetic yield improvements, however, are not likely to be realized or fully exploited without the concurrent improvement in agro-management practices in the plantations.

***Keywords**: Oil palm, genetic improvement.*

Applicability of precision farming for oil palm plantations in Malaysia

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Abstract of paper presented on 16-10-2000 at the Seminar on Precision Farming organized by UPM & AIM

The management of oil palm plantations is based on extensive agricultural practices. Traditionally, a plantation is divided into smaller management zones or fields (about 40 ha) and each is uniformly managed which ignores its inherent spatial variability. This has been exacerbated by the increase in field size for supposedly ease of management. But results to date show stagnating fresh fruit bunch (FFB) yield per ha in Malaysia for over 20 years at a dismal level of 18.7 t/ha/yr.

Precision farming takes the opposite direction and thrives on managing variability across the field for efficient and high productivity and reducing environmental impact. It therefore appears to be appropriate for the oil palm plantations. Furthermore, recent work showed that the palm-to-palm coefficient of variation of FFB yield could exceed 35%. Spatial variation accounted for over 70% of the variation, which is manageable with differential inputs or precision farming. This paper therefore examines the applicability of precision farming for oil palm plantations in the light of maximising productivity, optimising inputs, identifying areas for replanting and planting, and monitoring and assessment of actions and results. These are the key issues, which will decide the long-term competitiveness of the oil palm industry.

SOCIAL AND PERSONAL

AARSB Sports Club field visit to Taman Bukit Tawau

In conjunction with the Tuan Yang Terutama's birthday, AARSB Sports Club of Sabah organized a field visit to Taman Bukit Tawau in Table Estate on 15th September 2000. A total of 26 participants comprising the staff and workers of AARSB from both the KDC and GSSB Complexes joined the trip.

Participants who were mostly teenagers enjoyed themselves and took part in games like the musical chair, who-can-hold-the-breathe-longest and strike-your-opponents. Hampers were given to the winners. Lunch was a BBQ affair, complemented by some catered food from Tawau.

Eugene Yee

AARSB Sports Club members at Taman Bukit Tawau

WELCOME TO:

Madam Petronella G Ah Tung @ Petronella Gerald joined us as a Research Chemist on 24/7/2000. She is from Sabah and has a Chemical and Process Degree, B.E.(Hons) from University of Canterbury, New Zealand. Prior to joining us she was a lecturer in Sabah.

CONGRATULATIONS TO :

MARRIAGE

- Cik Nora Annuar to En. Suhaimi Yasep on 10-6-2000.
- Cik Junainah Ismail to En. Md. Putera Hj. Hassan on 29-10-2000.
- Miss Petronella G Ah Tung to Mr. Ju Yew Soon Lee on 5-11-2000.
- En. Mohd Radzi Ariffin to Cik Marina Ismail on 9-11-2000.

BIRTH

- En. Isnine's wife gave birth to a baby girl (2nd child) Nurazrin on 5-8-2000.
- Madam Rosita Mohd Akhir gave birth to a baby girl (4th child) Nazira bt. Sarudin
- Madam Letchumy Poosari gave birth to a baby girl (3rd child) Sugashimi on 10-10-2000.

RETIREMENT

Mr. Chen Kok Chin who retired on 1-10-2000 has been with us for more than 35 years. He was our Admin. Officer.

OBITUARY

We extend our condolences to the families of the late :

⇒ Cik Lolaina Tinie who passed away on 11-8-2000.

⇒ Pn. Alatipah Husin, our canteen caterer who passed away on 28-11-2000.

SEE, C.M./SULIMAH