AA RESEARCH NEWS

Oct '91

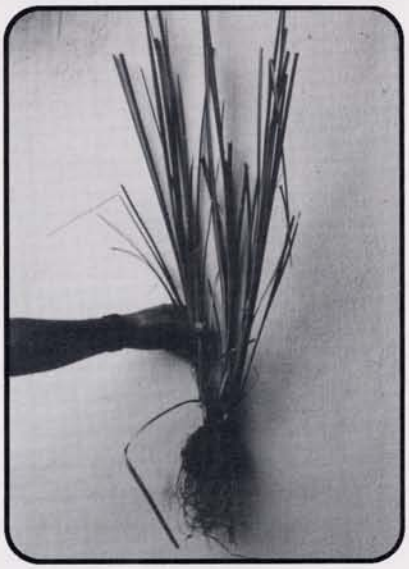
EDITORIAL

Our agronomists carry out detailed analysis of crop yields on individual estates in their routine advisory reports. This Newsletter carries yield survey and analysis reports of the three main plantation crops for 1990 on all the estates under AAR Agronomic Advisory Services. As indicated in the reports there are obvious differences in results from different regions and also various reasons why yields were low. Yield analysis of this nature is therefore limited in value without full detailed analysis of all the important factors, an impossible task at AAR currently. Until fully computerised crop databases can be set up, these reports may therefore serve mainly as general guides to annual yield achievement and trends, highlighting obvious gross yield limiting or favourable factors. Nevertheless this regular review exercise is useful to AAR's agronomists to obtain the 'whole' picture. Hopefully, it will similarly interest our readers who can also compare these average results with that on their estates and the agronomists' comments on their yield achievements.

Many readers will have heard of Vetiver, 'the miracle grass' by now but have not got the full details on it. AAR carried out a detailed review of this grass and its potential benefits in 1990 and a condensed account from the report is presented in this issue. Experience of this grass in Malaysia with very much more favourable growing conditions than the main research areas so far is still very limited and those interested to experiment with it are advised to do so cautiously and after necessary permission has been secured.

Chew,P.S.

Vetiver, 'the miracle grass'



2 1/2 months in a polybag. Note the large clump of roots.

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Yield Analysis for 1990 of AAR Oil Palm Advisory Estates

INTRODUCTION

After achieving very high yields in 1989, the slightly lower yields in 1990 gave a somewhat dismal feeling to many estate managers.

However, looking back over the previous five years (Table 1), the overall result for 1990 was not as depressing as it appeared to be. The yield for AAR advisory estates in 1990 was still signifi cantly higher than the preceeding years except in 1989.

Possible causes for the lower yield are discussed below:-

a) Palm age and yield trend

Oil palm yields in the 3-7 years category generally rise strongly upward and peak at 8-10 years. They should stabilise between 11-18

Continue Pg 2.

Continue from Pg. 1

OIL PALM

Table 1 : Yield profile of AAR Advisor Estates for the last 5 year

	Peninsular Malaysia		Sabah		Total	
Year	Ha	t/ha	Ha	t/ha	Ha	t/ha
1986	60996	18.5	12634	19.4	73630	18.7
1987	62685	18.4	14279	17.8	76964	18.3
1988	66240	19.2	15804	18.7	82044	19.1
1989	69811	21.0	16973	21.9	86748	21.2
1990	74051	20.1	23209	20.7	97260	20.3

Table 2 : Yield age profile and hectarage distribution of AAR Advisory Estates (1990)

Palm age (yrs0	<20(t/ha)		20-24(t/ha)		>24(t/ha)		Oveall weighted mean (t/ha)	Total ha.	% Total
	Ha	Yield	Ha	Yield	Ha	Yield			
3-6	17820	13.2					13.2	17820	18.3
7-12	5878	18.7	19245	22.5	1808	24.8	21.8	26926	27.7
13-18	0	0	13438	22.0	1472	24.5	23.3	28167	29.0
					9				
>18	19190	13.5	4076	22.3	1081	25.4	15.5	24347	25.0
Total ha	4289		36859		1761		20.3	97260	
					3				
% Total	44.1		37.8		18.1				100.0

years. After 18 years, yields are usually seen to decline markedly, probably due to decrease in efficiency in harvesting tall palms. Table 2 shows the age profile of AAR advisory estates, yield and their hectarage distribution. Palms at 13-18 years age gave the highest yield with 23.3 t/ha followed by 7-12 years age group with an average of 21.8 t/ha. The other two age groups' averages lagged disappointingly far behind. Eighty percent of the 18 years and above, and all the 3-6 years age category yielded below the 20 t/ha mark with only 13.5 t/ha and 13.2 t/ha respectively..

The ability to fruit does not decline with age because 20 percent of the palms over 18 years yielded 22.9 t/ha in the same year! It was common to note extensive areas with excessive and dried fronds in these tall old palm areas, signs of inefficient harvesting suspected to be the primary cause of the exceedingly low yields obtained. For the 3-6 years category, yields above 20 t/ha were not recorded due to weighting of mean yields per estate. Individual plantings exceeding 25 t/ha were recorded. Nevertheless overall mean yield at only 13.2 t/ha was low compared to potential yields (Chew, 1989).

b) Effect of weather

The weather, particularly the rainfall pattern has a profound effect on the growth and development of the oil palm. We will only focus on the effect of the bunch development as a consequence of water availability. The process of sex differentiation and floral abortion is usually determined at 22-30 months and 8-11 months respectively before harvesting (Hartley, 1988). For example, if the palm experienced water stress at the sex differentiation stage male flowers tend to form while at rapid development stage of the female inflorescences abortion may occur.

To indicate possible effects of rainfall, moisture deficit and yield summaries were arranged according to 10 rainfall regions (Kee, 1989) as in Table 3. Sabah areas had insufficient soil and rainfall data to be classified in the same manner. Palms in 13-18 years age group were selected. Moisture deficit was calculated by taking one of the most representative soil types within the respective estates and a weighted(by hectarage) mean was taken for each region.

The data are inadequate to confirm the hypothesis of effects of soil moisture stress on yield due to gross averaging effects and other factors eg. high water-tables, management practices within the regions, but it is interesting to note nevertheless that average yields for the past three years are lowest in the east coast regions of Kuantan, Kuala Krai and Kemaman and in the north near Kulim and Sg. Petani, known usually to have regular long dry periods and more management problems than on the west coast.

Table 3 shows that Region 5 or Johore estates yielded the highest for 1990. Approximately 30% of our estates are located in this region (Table 4). This region has a favourable rainfall pattern and generally the palms are located on the relatively good Rengam series soil. The highest yield for this region and also for the whole of Peninsular Malaysia was 36 t/ha with a field size of 44 ha.

The biggest decline or drop in yield for 1990 occurred in Region 4. This is because the three estates that made up quite a significant contribution in terms of total area to the whole region experienced at least 5 t/ha decrease. The most likely explanation to the yield drop could be due to same high moisture deficit of approximately 300

Table 3 : Yield profile and estimated moisture deficit (m.d) of AAR Advisory Estates (1988-90) for the 13-18 years age category

Rainfall region	No.of estates	Ha	1988		1989		1990		Mean yield for last 3 years t/ha
			Yield t/ha	m.d. mm/yr	Yield t/ha	m.d. mm/yr	Yield t/ha	m.d. mm/yr	
1	7	1280	20.5	101	22.0	173	22.5	236	21.7
2	11	1944	24.1	5	24.8	43	22.9	37	23.9
3	3	73	17.3	105	23.8	56	23.9	66	21.7
4	8	1472	24.1	14	26.7	118	22.3	309	24.4
5	18	11288	23.5	12	25.3	40	24.5	118	24.4
6	3	2449	18.5	0	20.7	0	20.3	86	19.8
7	7	2282	18.4	28	21.9	128	20.5	61	20.3
9	9	1665	22.1	21	26.1	43	23.4	61	23.9
10	3	2273	18.2	53	25.1	146	22.8	163	22.0
SABAH	5	3150	23.5	-	25.3	-	24.4	-	24.4

Table 4 : Total area in each region

Regions	Total	Major towns located within regions
1	6861	Alor Star, Sg.Petani Kangar
2	5184	Parit Buntar, Kuala Kangsar
3	879	Teluk Intan, Batu Gajah, Sabak Bernam
4	6683	Seremban, Malacca, Segamat, Temerloh
5	28371	Klung, Johor Baru, Kota Tinggi
6	6157	Kuantan, Chukai
7	5932	Kota Baru, Kuala Krai, Dungun, Gua Musang
9	7183	Kual Lipis, Tg. Malim
Sabah	23210	

mm/yr deficit in the same year.

CONCLUSIONS

Yield generally for 1990 was lower than 1989 but the decrease was not as drastic as thought to be looking at the last 5 years' records. The analysis of moisture deficit is too gross to pinpoint its role in the yield drop although in the region with the highest soil moisture deficit, a 5 t/ha decrease was seen.

The very low recorded yields in the palms > 18 years old contributed significantly to the yield drop from 1989. It is unlikely that agronomic factors are the sole cause of the very low yields. Management focus on improving crop recovery from these old areas will probably be very fruitful.

Overall results from the young areas of 3-7 years were also disappointing and in need of further checks and improvement.

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Samsudin A.

Rubber Yields In Estates Under AAR Advisory Service 1989/90

There were altogether 68 estates with mature rubber under AAR Advisory Service in 1990, similar to that of the previous year (Table 1). However, the mature hectarage has decreased by about 3500 hectares or 9% from 37182 ha in 1988/89 to 33696 ha in 1989/90.

The mean yield per hectare (YPH) achieved by all these estates in 1989/90 was 1563 kg/ha/yr, a drop of about 5% from 1988/89. Mean yield per tapper (YPT) remained at 21 kg.

When the estates are grouped under yield classes, there was a marked increase in percentage of low yielding estates (YPH < 1500 kg/ha/yr) from 31% in 1988/89 to 44% in 1989/90. The moderate yielding estates (YPH of 1500-1800 kg/ha/yr) remained about similar at 43% for both years while satisfactory to high (> 1800 kg/ha/yr) yielding estates dropped to 13% from 25%.

Overall performance in terms of yield per tapper did not differ over the last two years. There was still a high percentage of estates [40% with low YPT (<20 kg)]. Another 43% of estates produced moderate YPT (21-24 kg), whilst only 12% of estates achieved satisfactory to high YPT (> 29 kg). Yield per hectare of estates in the various states are shown in Table 2. It dropped in all the states except for Negeri Sembilan, which was the only state with yield increase. The average decline was 5.4%. Kelantan, Pahang, Kedah and Northern Johore continued to yield better than the other areas with YPH of above 1600 kg/ha/yr, whereas the other states i.e. Perak, Selangor, Negeri Sembilan, Malacca and Central/South Johore showed rather mediocre yields ranging from 1400-1500 kg/ha/yr.

The scenario regarding yield per tapper in the various states remained very much the same over the period under review (Table 3), with Pahang & Kedah continuing to reflect higher tapper productivity.

The main factors that possibly account for the differences in yield (YPH) performance between the states could be age composition of the yielding rubber (Table 4) and climatic difference i.e. rain interference and leaf diseases in wet areas against the absence of these in dry areas.

RUBBER

Table 1 : Mean rubber yield/hactare (YPH) and yield/tapper (YPT) of estates under AAR Advisory Service

Particular	Year	
	1988/89	1989/90
Mean YPH (kg)	1653	1563
Mean YPT (kg)	21	21
No. Of estates	68	68
Mature ha.	37182	33696

Pahang state had the highest percentage of prime 1970s' rubber at 56%, followed by Northern Johore with 42%, and Kelantan with 38%. These prime rubber could be a key factor for the relatively high yield per hectare from these states. As for Kedah, even though it had only 26% of this prime aged rubber, its yield was comparable to the above regions on account of more distinct dry period for better refoliation, lesser crop loss due to rain interference and mild or negligible secondary wintering yield depression.

Mediocre yields from Perak, Selangor, Negri Sembilan, Malacca and Central/South Johore was due to a combination of factors, mainly rain interference on tapping/collection, high leaf disease causing sparse foliage, moderate to pronounced secondary wintering, and in the case of Negri Sembilan & Central/South Johore, high percentage of 1960s' fields with declining yields.

Future yield improvement would have to hinge on aggressive replanting with high yielding clones, leaf disease control and possibly a system of tapping that could be free from rain interference.

Ong,T.S.

Table 2 : Yield per hectare (YPH) in various states

	YPH (kg)		
State	1988/89	1989/90	% difference
Kelantan	1768(8*)	1656(8)	-6.3%
Kedah	1781	1655(12)	-7.1%
Pahang	1808(7)	1644(7)	-9.1%
Johore-North*	1760(4)	1616(4)	-8.2%
Central&South	1591(4)	1496(4)	-6.0%
Wt. Mean	1710(8)	1582(8)	-7.5%
N.Sembilan	1428(8)	1504(7)	+5.3
Perak	1599(14)	1468(14)	-8.2
Selangor	1508(9)	1431(9)	-5.1
Malacca	1435(3)	1413(3)	-1.5

Table 3 : Yield per tapper (YPT) in various states

	YPH (kg)	
States	1988/89	1989/90
Pahang	24	24
Kedah	22	22
Kelantan	20	21
Perak	21	21
Negri Sembilan	20	21
Johore-North	21	21
Central & South	20	20
	20	20
Selangor	20	20
Malacca	21	21
Wt. Mean	21	21

Table 4 : Age distribution of in different states

states	Total ha	1950s'	1960s'	1970s'	1980-1984	1985-1990 (immature)
Kedah	8276	4%	51%	26%	4%	16%
Perak	5795	1%	23%	35%	9%	32%
Selangor	5453	-	25%	30%	17%	28%
N. Sembilan	5493	1%	49%	12%	8%	30%
Malacca	1417	-	36%	33%	20%	11%
Pahang	6305	-	14%	56%	8%	22%
Kelantan	5097	-	22%	38%	7%	33%
Johore-North	4125	-	23%	42%	15%	20%
Central & South	1701	-	66%	32%	2%	-
Mean	43962	1%	32%	34%	9%	24%

ANALYSIS OF 1990 COCOA YIELDS

" With improvement in productive stand and cultural practices, it is anticipated that yield of 1.5 t/ha can be achieved in most areas in the near future"

INTRODUCTION

In 1990, AAR provided advisory services to 33 cocoa estates with a total matured area of about 12540 hectares.

The estates were scattered throughout Malaysia. The main cocoa areas were in Tawau, Lahad Datu, and Sandakan (Table 1)

For the current study, the cocoa estates were grouped broadly into the four regions under three age groups:-

1) 5 years old and younger
2) 6 to 10 years old
3) more than 10 years old

RESULTS

The 1988 to 1990 yield trends for the three age groups in the four regions are tabulated in Table 2:-

5 years old and younger areas

Yield trends for these young mature cocoa areas are difficult to interpret because they were very variable. Also, different plantings were involved in different years. The mean yields for 1990 for the four regions were generally low and varied from 400 kg/ha to 739 kg/ha. However, the yield has improved greatly in comparison to 1989. The mean yield then was only 215 kg/ha to 670 kg/ha. It is encouraging to report that some estates were able to achieve yields of more than 1 t/ha in the first year of harvesting.

6 to 10 years old areas

The mean yields for Tawau and Pen.Malaysia in 1990 continued to improve and surpassed the 1 t /ha mark. The increasing trend is expected to be maintained and we hope that a yield of 1.5 t/ha will become a normal feature in the near future.

The mean yield for Sandakan estates improved by a big margin (25%) from 514 kg/ha to 643 kg/

ha. It was however, still far too low to be viable. Apart from the less favourable weather,the main problems encountered were low productive stand and high crop losses to pests and diseases (mainly cocoa pod borer, rodents and black pod). AAR initiated a yield improvement project in one of the estates in the region to check if it is possible to improve the yield to 1.5 t /ha in the short term (2-3 years) and to 2.0 t /ha eventually if all the controllable yield limiting factors were ameliorated or removed

The 1990 mean yield for Lahad Datu region at 693 kg/ha though slightly higher than in 1989 was not up to expectation.

11 years and older areas

The performance of cocoa under this age group in Sandakan was rather disappointing. This was mainly because many old areas had low stand of productive bushes. The poorer performance of the older cocoa should not be taken as the normal yield trend of cocoa. The yield of cocoa will decline with age only if they are not well looked after. In fact the highest yield recorded in Sabah were from well maintained cocoa which were more than ten years old!

Ooi,L.H.

FORECAST FOR 1991

The 1991 yield will most likely improve in all regions. The optimism is mainly based on the considerable amount of rehabilitation and supplying work put in during the last one to two years. With improvement in productive stand and cultural practices, it is anticipated that yield of 1.5 t /ha can be achieved in most areas in the near future.

Table 1 : Distribution of cocoa estates under AAR Advisory Service in 1990

Regions	No. of estates	Total matured hactares
Tawau	15	5537
Sandakan	5	2593
Lahad Datu	5	3196
Pen. Malaysia	8	1214
Total	33	12540

Table 2 : Cocoa yield trends for 1988, 1989, 1990

Region	Age group* (years)	1988		1989		1990	
		Ha.	kg/ha	Ha.	kg/ha	Ha.	kg/ha
Tawau	<5	335	246	364	520	499	739
	6-10	3448	1104	3490	1148	3686	1154
	>10	107	1094	105	1038	1043	1192
Sandakan	<5	710	422	980	215	364	400
	6-10	577	666	577	514	1267	643
	>10	176	610	176	560	256	486
Lahad Datu	<5	1742	642	1742	670	1011	587
	6-10	1392	636	1392	614	2190	616
Pen. Malaysia	<5	64	546	164	566	140	672
	6-10	942	852	946	989	830	1083
	>10	-	-	-	-	138	913

1992 WORKSHOPS

: Seminars/Conferences

1.	ISP Lahad Datu	:	Cocoa/Oil Palm Seminar (16-17/6/92)
2.	MSSS	: i)	Int. Conf. on fertiliser usage in the tropics (FERTROP 24-27/8/92)
		ii)	SS Conf. of M'sia at Primula , K. Terengganu (27-28/4/92)
3.	MAPPS	:	Conf. on Bio/Technologies for Trop. Plant Protection (12-13/8/92)
4.	PORIM	:	PAC workshops (16/4/92)
5.	RRIM	:	Vetiver workshops (13-16/4/92)

VETIVER: A VEGETATIVE SYSTEM FOR SOIL EROSION CONTROL

1. INTRODUCTION

Proper topsoil management is very important in the tropics. Without proper erosion control measures, torrential rains can wash away topsoil faster than the natural forces can replace it. It has been estimated in an undulating area under mature oil palm planting that soil loss due to erosion can amount to 15 t/ha/yr with an average of 6.9 t/ha/year (Kee, pers. comm.). This translates to mean losses of 116 kg of ammonium sulphate and 58 kg of muriate of potash per ha per year.

In AAR's advisory estates, most areas are on rolling to hilly terrains. Hence soil erosion and surface run-off losses of applied nutrients are expected to be higher than the above figures.

Recently, the World Bank highly recommended *Vetiver* as a vegetative system of soil and water conservation in preference over the physical conservation methods commonly practised in Malaysia. The "Contour Magazine" also advocated it as the ideal plant for soil and moisture conservation (Anon, 1990a).

The purpose of this article is to examine the main features of *Vetiver* and its probable uses in our plantations. A detailed report is available at AAR for interested readers.

2. SOIL AND WATER CONSERVATION

The World Bank based their recommendations on erosion studies done in India and experiments elsewhere. In a study comparing various methods of erosion control, it was shown that *Vetiver* plots had averages of 50 and 51 percent decreases in soil loss per storm compared to bunding and Leucaena plots respectively (Figure 1). This experiment was carried out by Dr. G.M.Bharad of PKV University, Maharashtra, India, on pearl millet and sorghum grown on Black Cotton soil (Vertisols) with 2% slope (Anon, 1990b).

The main effects of *Vetiver* hedge in controlling soil erosion were in reducing surface runoff (Figure 2) and trapping the fine earth.

Vetiver also helps to improve soil moisture. Studies showed that Vetiver plots had an average of 13.4% greater soil moisture with a maximum difference of 33% over the control plots (Anon, 1990a). On contour cultivation, *vetiver* plots were reported to have 15% higher total soil moisture than the control plots and 7.5% more, compared with Leucaena plots (Anon, 1990b).

The above workers attributed their results to better spread of run-off water, reduce run-off velocity and hence higher infiltration rate. These in turn improved soil water availability for crop growth and production.

3. BIOLOGY

Vertiver is a densely tufted and glabrous perennial grass, native to India and Ceylon but now widely introduced throughout the tropics (Purseglove, 1978).

A total of 10 species of *Vetiver* belonging to the Gramineae(grass) family is known worldwide. Among them *Vetiver zizanioides* is the most common. In Malaysia, besides V. zizanioides another species called V. nemoralis is present but its roots are not fragrant (Gilliland, 1971). These were introduced as early as the 17th century (Burkill, 1966).

In the past, *Vetiver* was planted for its roots which have aromatic properties. Its leaves can be

Figure 1 : The effects of contour planted Vetiver on soil losses versus other treatments.

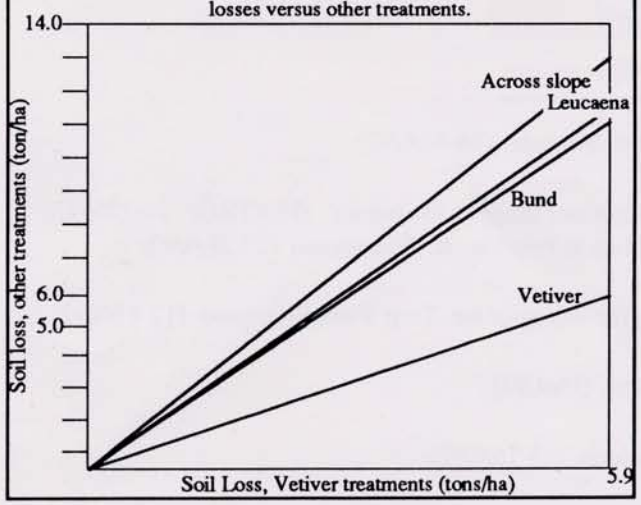
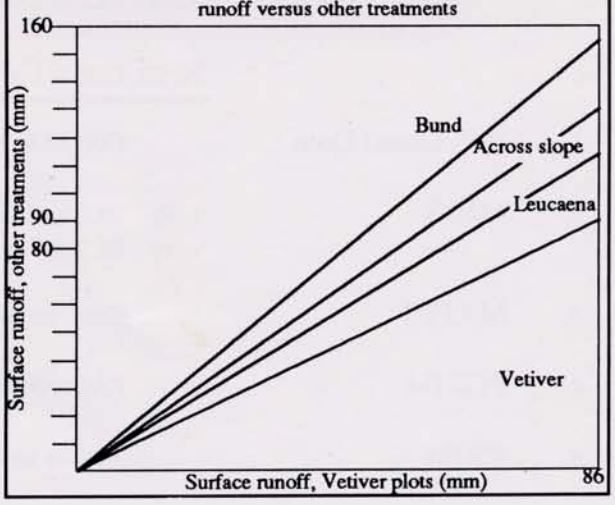


Figure 2 : Effects of contour planted Vetiver on surface runoff versus other treatments



The main characteristics of the plant are:-

1) Strong and fibrous root system that penetrates up to 3 metres depth and binds the soil; which can withstand the effects of tunneling and cracking.

2) It will grow on all types of soil including sand, shale, gravel and even soil with high aluminium content. It survives in a wide range of climate. It can grow in areas with an average annual rainfall between 200 and 6000 mm and in temperatures ranging from 9 to 50 °C (Greenfield, 1989)

3) Its leaves and roots are resistant to most pests and diseases.

4) It is unpalatable to livestock except for young leaves which, are palatable. On the other hand its crown is below the surface and this protects the plant from overgrazing and fire.

5) It is cheap and easy to maintain. Manuring is not required once it is established.

6) It is practically sterile; does not produce viable seeds and no stolons or rhizomes. Thus there is minimal chance of it becoming a weed. Furthermore, the plant vigour is diminished after flowering and seeding.

7) Its root grows straight down, so there is minimal nutrient competition with field crops.

8) The planting "slips" do not require irrigation for establishment and new planting has been observed to withstand 60 days without rain.

9) In semi-arid condition, it takes approximately 9 to 12 months to form a hedge. However, in the nursery with irrigation, it can produce 50 tillers in 6 months. In China it grows 4.5 cm per day to a height of 1.25 m.

10) Once established it can withstand drought, flood and long periods of waterlogging.

11) It can grow under heavy shade although less vigorously.

12) It has a long life span of more than 50 years.

4. PROPAGATION

Vetiver is propagated by root division or slips (Grimshaw, 1990). Usually a clump of *Vetiver* grass is dug out with a spade or fork. Once the clump is removed it is further divided into smaller clumps of 5 tillers. The tillers are then pruned to 30 cm while the roots are cut to 20 cm length before planting.

5 RELEVANCE TO PLANT INDUSTRY

The possible uses of this plant in the plantation sectors are as follows:

1) It can be planted on the terrace back and lip as a soil binder to prevent erosion and intercept runoff. For similar purposes, it can be established across steep slopes without terraces and in areas with platforms.

2) It can be planted on soils with poor infiltration rate such as Durian series and Sabah soils and gravelly or lateritic soils to improve soil moisture regime.

3) It can be planted around the edges and inlets of water catchments or ponds to prevent siltations.

4) It can be established beside roadside drains to prevent gully formation.

5) When properly developed into a solid line *Vetiver* hedge may be a better alternative to other soil conservation methods be cause it is cheaper, permanent and more effective.

6) It is a perennial plant and requires minimal maintenance. The leaves can be cut and used as mulch.

7) Since the crown is below the surface, even when burned during replanting the plant will survive. Hence, it needs to be planted only once and may reduce erosion during the early stage of replanting.

8) It could act as a repellent barrier against rats as commonly used in paddy fields.

6. CONCLUSION

Vetiver has been shown to be an effective means of soil and water-conservation under various cropping systems. However, its growth habit in humid tropic conditions is not well-documented. Its use and possible benefits in our plantation crop needs to be investigated and confirmed.

For long-term use in our estates, we need to investigate its ability to tolerate shade and establish quickly. Being a grass, it might be competitive to our plantation crops especially under our soil and climatic conditions which should be ideal for *Vertiver*. On the other hand, its deep rooting might enable the plant to be used to recycle otherwise unavailable soil nutrients and return them as mulch to our plantation crops.

Apart from its soil and water conservation features, its ability to repel rats and insects might be beneficial to us. The leaves can also be used as a mulch especially on poorer soils.

Its main disadvantages of long time to establish in semi-arid situation and inviable seeds could probably be overcome through proper agronomic inputs or conditions and the

Apart from its soil and water conservation features, its ability to repel rats and insects might be beneficial to us. The leaves can also be used as a mulch esp. on poorer soils

use of tissue culture respectively.

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Samdudin A. & Goh K.J.

STAFF NEWS

TO THE NEWLY WEDS :

our Research Assist., En.Samsudin and his beautiful & charming bride (picture above), we wish both of them all the best .

Congratulations also to the lovely Pn. Mashita (from Plant Breeding section) and hubby.

FEEDBACK FROM A Cocoa Estate Manager

One of the major constraints in many cocoa estates is the poor productive stand. This may be in the form of vacancies or unproductive plants.

The recommended method to upgrade such plantings is to supply all the plantable vacancies and side-graft the healthy but unproductive plants with high yielding and VSD tolerant clones. It is advisable to replace the very poor and unproductive plants which are dificult to rehabilitate by side-grafting with well grown polybagged buddings. PBC123 is the preferred clone for such rehabilitation work in Sabah.

Mr. James Philip Ho, Manager of Tabung Tentera estate who is currently upgrading the problem plantings on the estate send us some slides recently for our Newsletter.

We have selected two slides on rehabilitation i.e. one on supplying (Slide 1) and the other on side-grafting (Slide 2) to convey a message to our readers.

Mr. Ho also sent us some slides of his more recent planting where "things were done right" right from the beginning. The result is an excellent planting with a full stand of productive plants (slide 3)

[Slide 1. A well established PBC 123 supply on Tabung Tentera Estate]

[Slide 2. PBC 123 successfully side-grafted onto an unproductive but healthy hybrid cocoa on Tabung Tentera Estate.]

[Slide 3. Dec. '89 planting on Tabung Tentera Estate.]

The planting was still considered immature when this slide was taken in October '91. It is encouraging to note they have already been scout-harvested.

We wish to take this opportunity to thank Mr. Ho for his contribution to our Newsletter and look forward to more contributions from the estates.

Ooi, L.H.