Sept 1997

The Planter, Kuala Lumpur, 73 (857): 403-418 (1997)

Technical Reviewed

Performance of Clone PB260 in a Large Plantation Group in Peninsular Malaysia

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PB260 was the most extensively planted clone in a large plantation group in Peninsular Malaysia. This clone occupied 8 620 ha or 27.9 per cent of the total rubber area in 1996.

The clone generally sports dense foliage in most districts due to its above average resistance against the major leaf diseases. The clone has also performed well in terms of growth and latex yield when compared with both the traditional and newer clones. Its straight trunk with light self shedding branches yields twice as much timber as clone RRIM600.

Growth of the clone during immaturity was better (exceeding 50 cm in 60 months) in Selangor, Perak and Pahang than in the other states. Wintering depression was also generally less severe and tree dryness reported to be lower in these states. All these parameters probably account for the higher yields obtained on panels BO1 and BO2 in the three states. The clone also yielded well on when tapped high level virgin bark. Yields obtained on panel B11 was however low, due mainly to poor condition of the bark. The lifespan of trees may be reduced to 26 years from the normal 30 years if tapping is confined to virgin panels only.

On the basis of its attractive attributes and comparable performance against newer clones and under the current scenario of scarcity of skilled tappers and high demand for heveawood, PB260 may still be considered a good choice of clone for replanting. Trees could be exploited on a reduced lifespan of 26 years whereby virgin panels are tapped for their high yields and trees subsequently felled for their valuable timber.

Keywords: *Good foliage, good growth vigour, high yield precocity, high timber volume, still good choice of clone for replanting*

PB260, a Class I clone (RRIM, 1992), is currently the most extensively planted clone in a large plantation group in Peninsular Malaysia. The clone occupied 8 620 ha or 27.9 per cent of the area in 1996. The earliest planting of the clone was in 1975. The clone has continued to be planted annually since then. The popularity of PB260 stems from its good vigour during immaturity and high yield precocity at maturity (Chan, 1989).

In view of limited availability of proven high yielding materials, it was considered worthwhile to study performance of the clone in the group estates located in the various states of Peninsular Malaysia to check justification of replanting further areas with this clone.

METHODOLOGY

Data were mainly extracted from estate records and also obtained from published

information.

Growth during immaturity

Girth of trees was measured at 150 cm from the ground at six-monthly intervals.

Yield

Yield of plantings of various ages and thus panels were recorded. These include:

Panel BO1. Fields were opened at either 45 cm or 50 cm girth at various periods depending on policy, at a height of 150 cm from the ground and tapped 1/2Sd3.

Panel BO2. Fields were opened either at the normal height of 150 cm from the ground and tapped 1/2Sd3 or at 250 cm and tapped 1/2Sd4 on a reduced task size of about 420 trees followed three to four years later on 1/2Sd3 on normal task size.

Panel B11. Fields were tapped 1/2S3 but with four to eight rounds of stimulation with 2.5 per cent ethephon.

Panel HO1. Fields were tapped ↑1/4Sd3 or ↑1/4Sd4 with four to eight rounds of stimulation with 2.5 per cent ethephon.

Other observations

A number of other observations was made. These include:

- *Foliage and diseases*. These were assessed visually during the annual agronomic visit by agronomists to the estates.
- *Tree dryness*. Status of the dryness in the group has already been reported by Chan (1996).
- *Wintering depression**. Four fields planted in the 1980s were randomly selected in each state to study this phenomenon.

RESULTS

Distribution of PB260

Distribution according to state. Perak had the largest area of PB260, followed by Kelantan and Pahang, ranging from 1 462 ha to 1 976 ha. Selangor and Malacca had the lowest at 625 ha and 191 ha respectively (*Table 1*). Kelantan however, had the highest percentage of PB260 at 39.7 per cent of the total rubber area in the state, followed by Perak and Pahang. Six of the eight states had more than 20 per cent planted with the clone.

Distribution according to period of replanting. The earliest plantings were carried out in the mid-1970s (*Table 2*). The percentage of PB260 planted rose sharply thereafter, reaching a peak of 55 per cent during the period 1981-86 before declining gradually to 40.7 per cent in the period 1991-96. Overall PB260 constituted 27.9 per cent of the group's total rubber area.

Growth during immaturity

Mean girth. Chan (1984) reported that PB260 ranked second in growth after PB235, out of nine clones surveyed. In another survey of 15 clones in the group, PB260 ranked third after PB330 and PB235 in descending order (Chan, 1989). In an RRIM large scale clone trial in Padang Meiha estate in Kedah, PB260 ranked third in growth among more modern clones (*Table 3*). In the RRIM900 series clone trial in Merlimau estate in Malacca, PB260 ranked eighth in growth among 20 modern clones (*Table 4*).

Mean girth of PB260 in the group of estates located in the various states in

*Wintering depression (%) = [1 - (mean of lowest yields over 3 successive months)] x 100
mean yield over 12 months

TABLE 1
DISTRIBUTION OF PB260 ACCORDING TO STATE IN 1996

State	No of estates	Area (ha) PB260	Other clones	Total	% of PB260 over total area
Selangor	3	625	1 869	2 494	25.0
Perak	15	1 976	3 437	5 413	36.5
Pahang	6	1 462	4 047	5 509	26.5
Kedah	8	852	3 687	4 539	18.7
Kelantan	5	1 788	2 714	4 502	39.7
Malacca	2	191	817	1 008	18.9
N. Sembilan	5	984	2 796	3 780	26.0
Johor	4	742	2 874	3 616	20.5
Total	48	8 620	22 241	30 861	27.9

TABLE 2
DISTRIBUTION OF PB260 ACCORDING TO PERIOD OF PLANTING (HA)

Clone	Period 1972<	1972-76	1977-81	1981-86	1987-91	1991-96	1972-96
PB260	0	302	1 799	1 936	3 059	1 524	8 620
Other clones	6 495	6 492	2 428	1 583	3 025	2 218	22 241
Total	6 495	6 794	4 227	3 519	6 084	3 742	30 861
% PB260	0	4.4	42.5	55.0	50.2	40.7	27.9

Peninsular Malaysia is shown in *Table 5*. PB260 exceeded 50 cm girth at 60 months in Selangor, Perak and Pahang. Girth of trees was below 50 cm in the other states. Johor showed the lowest girth at 46.94 cm.

Foliage and disease. Foliage has mainly been dense and relatively disease free in most states because of above average resistance to the major leaf diseases. The clone however, is susceptible to Pink disease (*Corticium salmonicolor*) during the immature phase in the wetter districts of Tanjong Malim and Taiping in Perak, Telemong in Pahang and also during the monsoonal season in Kelantan. About 30 per cent of trees have been observed to be infected with the disease in the aforementioned districts. Pink disease however is readily controlled by brushing the infected areas with Calixin or spraying with Bordeaux Mixture.

Wind-damage. PB260 has above average wind resistance, being damaged significantly only in severe windstorms (Ang & Shepherd, 1979). Incidence of wind damage on PB260 in the group has been sporadic and only in severe windstorms where other clones were

TABLE 3
GIRTH OF TREES IN RRIM LARGE SCALE CLONE TRIAL AT PADANG MEIHA ESTATE KEDAH

Clone	*Girth (cm)*
PB355	41.12
PB235	40.61
PB260	39.95
PB350	37.95
PB366	36.90
RRIM938	36.90
RRIM936	36.67
PB347	36.00
PB359	35.61
RRIM937	35.58
RRIM600	37.44
Mean over all clones	37.53

Planted : May 1990
Girth measurement : March 1994

Source: RRIM (1994)

TABLE 4
GIRTH AT OPENING IN RRIM900 SERIES CLONE TRIAL IN MERLIMAU ESTATE

Clone	*Girth at opening of trial (cm)*
RRIM922	51.44
RRIM903	50.73
RRIM908	50.36
PB235	50.35
RRIM906	49.45
PC125	49.01
RRIM902	48.93
PB260	48.82
PC95	48.75
PB236	48.57
PB314	48.53
RRIM924	48.00
RRIM921	47.87
RRIM911	47.61
RRIM916	47.49
RRIM904	47.46
RRIM905	46.49
RRIM901	46.11
RRIM927	45.71
RRIM600	38.16
Mean over all clones	47.13

Source: RRIM (1995)

also damaged.

Wintering depression and precoagulation of latex. Wintering depression was most severe in Kelantan and Kedah, exceeding 50 per cent (*Table 6*). The yield depression may be partly attributed to precoagulation of latex on the tapping cut whereby latex flow is halted prematurely. Precoagulation of latex has been observed to be particularly severe in Kelantan where the phenomenon may persist for two to four months compared with one to two months for most of the other states. The use of mild stimulation to reduce the impact the phenomenon especially in Kedah and Kelantan is being evaluated.

Wintering depression was more severe in PB260 than in RRIM600.

Yield performance

A survey of 14 clones planted commercially in the group showed that PB260 was the highest yielding over 15 years from time of planting, exceeding RRIM600 by 25 per cent (Chan, 1989). Among more modern clones, PB260 also achieved the highest mean yield in the first five years (*Table 7*).

The mean yield profile of PB260 planted in the group compared with PB260 planted in RRIM large scale clone trials is shown in *Table 8*. Mean yield in the estates over the first 12 years was 1 784 kg per ha compared with 2 192 kg per ha obtained in the RRIM trials. However, tapping system in the group was 1/2Sd3 and 1/2Sd4 compared with

TABLE 5
MEAN GIRTH (CM) OF PB260 BY AGE AND LOCATION

	Age in months							
State	*18*	*24*	*30*	*36*	*42*	*48*	*54*	*60*
Selangor	15.5 (11)	20.6 (15)	26.1 (15)	32.5 (15)	38.1 (15)	43.7 (15)	48.4 (15)	51.6 (14)
SE±	1.6	2.2	2.5	2.7	2.4	2.0	2.0	1.3
Perak	14.4 (18)	19.7 (44)	25.9 (54)	31.9 (58)	37.6 (54)	42.9 (53)	47.2 (52)	50.5 (52)
SE±	1.4	2.1	2.8	3.0	3.1	3.1	3.0	2.4
Pahang	12.8 (11)	19.8 (28)	25.6 (30)	31.5 (32)	37.1 (32)	42.0 (32)	46.8 (32)	50.4 (32)
SE±	1.45	2.8	3.1	3.0	2.97	2.6	2.5	2.0
Kedah	13.1 (4)	18.4 (14)	25.3 (18)	31.7(19)	37.6 (19)	42.8 (18)	47.2 (15)	49.8 (13)
SE±	0.45	1.9	2.1	2.2	2.7	3.1	3.0	2.5
Kelantan	13.3 (1)	17.0 (13)	23.3 (25)	29.2 (26)	35.1 (27)	39.8 (26)	44.3 (25)	48.2 (25)
SE±	na	0.8	1.8	1.9	2.2	2.4	2.2	2.00
Malacca	11.4 (1)	15.3 (6)	21.4 (8)	27.8 (8)	33.7 (8)	39.1 (8)	44.3 (8)	48.8 (8)
SE±	na	1.7	1.7	1.3	1.8	2.2	3.1	3.3
N. Sembilan	12.6 (1)	16.7 (10)	23.1 (17)	28.3 (18)	33.9 (19)	39.1 (19)	44.0 (18)	48.2 (18)
SE±	na	1.3	1.7	2.0	2.0	1.8	2.0	1.7
Johor	13.3 (3)	16.8 (11)	21.8 (14)	27.1 (15)	32.6(15)	37.9 (15)	42.8 (15)	46.9 (15)
SE±	1.1	1.3	1.5	1.6	1.8	2.0	2.0	2.1

Figures in bracket indicate number of fields

TABLE 6
MEAN WINTERING YIELD DEPRESSION (%)

State	*PB260*				*RRIM600*			
	No. of fields	*1995**	*1996**	*Mean*	*No. of fields*	*1995**	*1996**	*Mean*
Selangor	4	41	31	36	0	na	na	na
Perak	4	35	49	42	4	33	35	34
Pahang	4	42	46	44	0	na	na	na
Kedah	4	52	52	52	4	38	44	41
Kelantan	4	66	56	61	0	na	na	na
Malacca	4	40	44	42	0	na	na	na
N. Sembilan	4	32	25	28	0	na	na	na
Johor	4	32	42	37	0	na	na	na

* Mean of 4 fields
na - not available

1/2Sd2 in the RRIM trials.

Yield on panel BO1. Yield on panel BO1 in the various states is shown in *Table 9.* PB260 was highest yielding in Pahang at 1 840 kg per ha followed by Selangor at 1 698 kg per ha and Perak at 1 659 kg per ha. Lowest yielding state was Malacca at 1 482 kg per ha.

Yield on panel BO2. On this panel, overall mean yield was highest in Selangor at 2 181 kg per ha followed by Pahang at 2 034 kg per ha and Perak at 1 960 kg per ha (*Table 10*). Opening trees at 250 cm from the ground gave a mean yield of 2 017 kg per ha or 8.5 per cent higher than opening at 150 cm. Highest mean yield at 250 cm opening was obtained in Selangor at 2 396 kg per ha followed by Pahang at 2 339 kg per ha and Johor at 2 010 kg per ha. Selangor yielded highest on 150 cm opening at 1 967 kg per ha followed by Perak at 1 931 kg per ha and Johor at 1 891 kg per ha.

Overall yield levels on panel BO2 may be considered high.

Yield on panel B1-1. Only a few fields have been tapped on this panel. Yields obtained ranged from 1 400 kg per ha to nearly 1 700 kg per ha (*Table 11*). These yield levels may be considered below average to low.

Yield on panel HO1. Yields obtained exceeded 2 200 kg per ha in the first two years but dropped to below 1 600 kg per ha in the next two years (*Table 11*). Only a few fields have been tapped on this panel.

Upward tapping on very short cut, 1/8Sd4 combined with jacket stimulation at 200 mg a.i. gave 8 per cent higher yield per hectare and 43 per cent higher yield per tapper than the control (Chan & Ong, 1995).

Tree dryness

Chan (1996) has already reported status of tree dryness of PB260 for the current group of estates. In Perak, Selangor and Pahang where moisture deficits are less severe, dryness incidence on panel BO-1 ranged from 5 to 10 per cent compared with 10 to 15 per cent in Kedah, Kelantan and Negeri Sembilan

TABLE 7
MEAN YIELD OF CLONES IN RRIM900 SERIES CLONE TRIAL IN MERLIMAU ESTATE, MALACCA

Clone	*Mean yield*
PB260	1 626
PB314	1 617
RRIM902	1 617
RRIM904	1 547
PB235	1 541
RRIM924	1 531
PC125	1 492
RRIM927	1 482
RRIM905	1 465
RRIM911	1 463
RRIM921	1 359
RRIM908	1 323
PC95	1 295
RRIM903	1 293
RRIM901	1 288
RRIM906	1 253
RRIM922	1 245
RRIM916	1 240
PB326	1 222
RRIM600	903

Source: RRIM (1995)

where the climate is characterised by a distinct and regular dry season lasting three to four months. Within these geographical groupings, deep soils showed lower incidence than shallow soils. Dryness incidence on panel BO2 was correspondingly higher by about 10 per cent for the various situations (*Table 12*). There was no clear trend of higher dryness incidence observed on panel BO2 opened at 250 cm from the ground compared with 150 cm. However, as dryness spreads both laterally and towards the cambium (Paranjothy & Yeang, 1977) a larger panel area on 250 cm opening was observed to be affected by dryness as compared with 150 cm.

Timber value

Heveawood is well recognised as an important raw material for furniture component production. In 1995, the export value of heveawood products amounted to RM1.4 billion (Najib *et al.*, 1997). The total wood volume of 26 year old PB260 has been estimated at 1.29 m^3 per tree and compares well with the wood volume of the newer vigorous clones. PB260 is one of the clones recommended for planting to obtain good latex and timber yield (Najib *et al.*, 1997).

Ang and Shepherd (1979) estimated log volume of PB260 to be twice that of RRIM600 because of its self shedding branches and straight trunk. On this premise and based on survey prices obtained for heveawood derived from common clones RRIM600, RRIM623, RRIM605, GT1, PBIG (Anon, 1995) estimated value of logs from the group's PB260 at replanting in the various states is shown in *Table 13*. Gross value is highest for Perak, followed by Pahang and Johor, all exceeding RM3 million. Values are lowest for Kelantan and Malacca due to lower projected price and small hectarage of PB260 respectively. Total value for the group is estimated at around RM20 million.

DISCUSSION

PB260 was the most extensively planted clone in the group, occupying 8 620 ha or 27.9 per cent of its total rubber area in Peninsular Malaysia at the end of 1996.

The main attributes of the clone are its good foliage, good growth vigour and high yield precocity.

In the group, growth of PB260 during the immaturity was better in Selangor, Perak

TABLE 8
COMPARISON OF YIELD PROFILES OF PB260 PLANTED IN THE GROUP ESTATES AND IN RRIM LARGE SCALE TRIALS (KG/HA)

Year	*Group estates*	*RRIM large scale clone trials**
1	1 140 (148)	1 180
2	1 522 (138)	1 820
3	1 791 (123)	2 220
4	1 868 (102)	2 220
5	1 837 (85)	1 960
6	1 701 (72)	2 370
7	2 327 (60)	2 760
8	2 044 (51)	2 530
9	1 939 (43)	2 390
10	1 814 (35)	2 230
11	1 773 (27)	2 140
12	1 658 (23)	2 480
13	1 685 (12)	na
14	1 626 (9)	na
15	1 668 (7)	na
16	1 482 (4)	na
Mean (1-12 yrs)	1 784	2 192

( ) - number of fields
na - not available
after Planting Recommendations Committee, RRIM (1992)

and Pahang with mean girth exceeding 50 cm in 60 months than in the other states due probably to more favourable rainfall distribution. Using young buddings and an integrated package of agronomic practices, Ong *et al* (1997) achieved the best result of 45 cm girth in 45 months for PB260 in Selangor. This may be extrapolated to 50 cm girth in about 52 months which may be considered to be very vigorous indeed. In these states, only a short dry season occurs or may even be absent whereas a distinct and regular dry season, sometimes lasting three to four months may occur in the other states (Kee, 1995).

Mean yields were also higher in these states, ranging from 1 659 to 1 840 kg per ha on panel BO1 and 1 960 to 2 121 kg per ha on panel BO2 compared with corresponding yields of 1 482 to 1 563 kg per ha and 1 876 to 1 950 kg per ha in the other states. The better growth during immaturity, lower tree dryness (Chan, 1996) less severe wintering depression resulting from the more favourable climate could have accounted for the higher yields in these states. On panel BO2 mean yields were higher by 8.5 per cent when opened at a height of 250

TABLE 9
YIELD PROFILE OF PB260 ON PANEL BO1 (KG/HA)

State	*Year of tapping*						*Mean*
	1	*2*	*3*	*4*	*5*	*6*	
Selangor	1 181 (13)	1 495 (12)	1 824 (10)	1 882 (8)	2 006 (5)	1 801 (5)	1 698
SE±	54	58	67	60	167	147	
Perak	1 170 (51)	1 593 (50)	1 892 (41)	1 880 (35)	1 785 (29)	1 665 (24)	1 664
SE±	26	34	43	56	63	69	
Pahang	1 242 (21)	1 615 (19)	1 885 (18)	2 072 (15)	2 110 (13)	2 052 (10)	1 829
SE±	43	65	74	55	52	54	
Kedah	1 178 (16)	1 460 (16)	1 683 (14)	1 741 (9)	1 821 (9)	1 580 (8)	1 577
SE±	50	53	56	81	68	90	
Kelantan	1 077 (23)	1 491 (19)	1 653 (17)	1 763 (16)	1 700 (11)	1 535 (8)	1 536
SE±	75	91	94	86	151	133	
Malacca	874 (4)	1 126 (5)	1 552 (6)	1 763 (6)	1 730 (6)	1 705 (6)	1 458
SE±	58	25	116	127	134	119	
N. Sembilan	1 176 (11)	1 472 (8)	1 759 (8)	1 693 (4)	1 624 (3)	1 547 (3)	1 524
SE±	51	49	66	46	271	222	
Johor	968 (9)	1 469 (9)	1 841 (9)	1 822 (9)	1 848 (8)	1 630 (8)	1 596
SE±	106	113	109	81	90	76	

( ) - number of fields

TABLE 10
YIELD PROFILE OF PB260 ON PANEL BO2 (KG/HA)

State	Opening height (cm)	Year of tapping 7	8	9	10	11	12	Mean	Grand mean
Selangor	250	2 609 (2)	2 720 (1)	2 740 (1)	2 060 (1)	2 223 (1)	2 026 (1)	2 396	2 181
	150	2 321 (4)	2 202 (4)	2 002 (3)	1 863 (3)	1 955 (2)	1 463 (1)	1 967	
Perak	250	2 354 (10)	2 035 (9)	1 908 (8)	1 909 (7)	1 769 (4)	1 965 (1)	1 990	1 960
	150	2 220 (11)	1 998 (9)	1 998 (8)	1 821 (5)	1 774 (5)	1 776 (6)	1 931	
Pahang	250	3 146 (3)	2 613 (2)	2 488 (1)	2 059 (1)	2 059 (1)	1 800 (1)	2 339	2 034
	150	2 165 (3)	1 863 (3)	1 751 (3)	1 583 (3)	1 543 (3)	1 480 (2)	1 730	
Kedah	250	2 604 (2)	1 907 (2)	1 989 (1)	1 860 (1)	1 914 (1)	1 633 (1)	1 984	1 879
	150	2 274 (4)	1 977 (2)	1 588 (1)	1 654 (1)	1 700 (1)	1 452 (1)	1 774	
Kelantan	250	2 274 (3)	2 047 (2)	2 121 (2)	1 928 (1)	1 802 (1)	1 481 (1)	1 942	1 876
	150	2 076 (2)	1 995 (2)	1 874 (2)	1 714 (2)	1 642 (1)	1 600 (1)	1 811	
Malacca	250	na	na	na	na	na	na	na	na
	150	2 002 (6)	1 716 (5)	1 720 (4)	1 617 (3)	1 636 (2)	1 556 (2)	1 707	
N. Sembilan	250	2 487 (3)	2 076 (3)	1 939 (3)	1 530 (1)	1 798 (1)	1 710 (1)	1 923	na
	150	na	na	na	na	na	na	na	
Johor	250	2 605 (3)	2 405 (3)	2 144 (2)	177 (2)	1 610 (2)	1 524 (2)	2 010	1 950
	150	2 222 (4)	1 934 (4)	1 753 (4)	1 927 (4)	1 823 (2)	1 689 (2)	1 891	
Wt Mean	250	2 512 (26)	2 164 (22)	2 046 (18)	1 873 (14)	1 826 (11)	1 682 (18)	2 017	1 937
	150	2 186 (34)	1 953 (29)	1 857 (25)	1 771 (21)	1 735 (16)	1 644 (15)	1 857	
Grand mean		2 327 (60)	2 044 (51)	1 939 (43)	1 814 (35)	1 773 (27)	1 658 (23)		

( ) - number of fields
na - not available

TABLE 11
YIELD PROFILE OF PB260 ON PANEL B11 AND HO1 (KG/HA)

	Panel B11 *Year of tapping*				*Panel HO1* *Year of tapping*			
State	*13*	*14*	*15*	*16*	*13*	*14*	*15*	*16*
Selangor	na	na	na	na	2 250(2)	2 293(2)	1 589(1)	1 530(1)
Perak	1 725(3)	1 454(2)	1 865(2)	1 254(2)	na	na	na	na
Pahang	1 504(3)	1 397(3)	1 628(2)	1 891(1)	na	na	na	na
Kedah	1 641(1)	na	na	na	na	na	na	na
Kelantan	na	na	na	na	na	na	na	na
Malacca	na	na	na	na	na	na	na	na
N. Sembilan	na	na	na	na	na	na	na	na
Johor	1 490(3)	1 379(2)	1 562(2)	na	na	na	na	na
Wt mean	1 572(10)	1 408(7)	1 682(6)	1 466(3)	2 250(2)	2 293(2)	1 589(1)	1 530(1)

( ) - number of fields
na - not available

TABLE 12
MEAN DRYNESS INCIDENCE OF PB260 IN RELATION TO SOIL DEPTH AND LOCATION

Panel	*Location (state)*	*Soil depth*	*Dryness incidence (%)*
BO1	Kedah, Kelantan, Negeri Sembilan	Shallow	15
		Deep	10-15
	Perak, Selangor, Pahang	Shallow	10
		Deep	5
BO2	Kedah, Kelantan, Negeri Sembilan	Shallow	>25
		Deep	20-25
	Perak, Selangor, Pahang	Shallow	15-20
		Deep	10-15

After Chan (1996)

cm from the ground than at the conventional height of 150 cm for all states.

Yield on panel HO1 by the conventional upward tapping exceeded 2 200 kg per ha, at least in the first two years of tapping. Yields were also satisfactory with upward tapping on very short cut combined with jacket stimulation (Chan & Ong, 1995).

Yields obtained on panel B11 were below average to low probably due to thin and often poor condition of the renewed bark as a result of sensitivity of the clone to wounding (Ang & Shepherd, 1979). Unevenness of renewed bark surfaces caused by poor quality tapping

TABLE 13
ESTIMATED VALUE (RM/HA) OF PB260 LOGS AT REPLANTING (ABOUT 30 YEARS) IN THE GROUP

State	*Total area(ha)*	*Average price (RM/ha) of *rubberwood (MRPC,1995)*	*Gross value of PB260 logs(RM)*
Kedah	852	1 500	2 556 000
Kelantan	1 788	430	1 072 800
Perak	1 976	1 000	3 958 000
Selangor	625	1 000	1 250 000
N. Sembilan	984	1 500	295 200
Malacca	191	1 100	420 200
Johor	742	2 500	3 710 000
Pahang	1 462	1 300	3 801 200
			19 720 200

* RRIM600, RRIM623, RRIM605, PB5/51, PBIG, GTI

has also been observed in several estates in the group. This is a major drawback as tapping lifespan of the clone would be shortened.

On the basis of the above yield profiles, satisfactory to high yields were mainly obtained on virgin panels. Assuming exploitation of the clone is to be confined to virgin panels for that purpose, tapping lifespan would comprise seven years on panel BO1 based on Chan's (1996) recommendation of tapping on 1/2Sd4 to minimise tree dryness, 10 years on panel BO2 opened at the height of 250 cm and tapped 1/2Sd5 to minimise tree dryness and four years of upward tapping on the remaining high virgin panel. Stand per hectare would have to be increased by about 10 per cent as proposed by Chan (1996) so as to maintain a satisfactory yield per hectare. Together with five years of immaturity, total lifespan of the clone would amount to 26 years. Any additional bark on renewed panel available for tapping subsequently particularly where quality of tapping has been outstanding, may be regarded as bonus.

The above cycle of exploitation could possibly be a better option for PB260 than the two options proposed by Najib *et al* (1997) wherein latex is extracted for 25 years or seven years prior to timber extraction. Najib *et al*'s (1997) 25 -year period of latex extraction would imply low yields on panel B11 while the seven year period would miss out on the high yields obtainable on panels BO2 and HO1.

Management-wise PB260 may be considered a 'manager friendly' clone in the light of the tight labour situation in most estates currently. Its dense foliage significantly reduces weeding as evident from the sparse to bare interrows in PB260 areas. Trees attain early maturity due to the inherent good vigour of the clone. Fields are 'classified' early due to its inherent high yield precocity. Tappers are also attracted to this clone because of higher yields obtained per tapping compared with say, RRIM600. Requirement for tappers is also lower as this clone may

be tapped on lower frequency than RRIM600 (*Table 14*).

In summary PB260 still appears to be a good choice of clone for planting/replanting in view of its aforementioned attractive attributes and comparable performance against newer clones. The oldest PB260 areas in the group would be due for felling in the next few years and could be replaced with the same clone so as to maintain or increase slightly the current percentage of PB260 in the group. PB260 could form the backbone in the group whilst evaluating newer clones in the pipeline. Under the current scenario of scarcity of skilled tappers and high demand for heveawood, the clone may be best exploited on a reduced lifespan of around 26 years whereby only virgin panels are tapped for their high yields and trees subsequently felled for their timber.

Whilst PB260 has unofficially replaced RRIM600 as the 'reference' clone currently, interest in investment in rubber continues to decline on account of constraints of the crop which include longer immaturity, higher labour requirement and lower profitability as compared with oil palm (Ariffin Mohd Nor *et al*, 1979). Research therefore needs to be intensified, particularly in breeding and selection to raise yields to even higher levels than PB260, coupled with good growth vigour to reduce immaturity further as well as increase timber yield in order to enhance profitability and maintain interest in the crop.

ACKNOWLEDGEMENT

The author wishes to thank Boustead Estates Agency and Taiko Plantations Sdn Bhd for permission to publish this paper. Special thanks are also due to the Head of Agricultural Research, Mr Chew Poh Soon for valuable comments, Ms Julie Yee for computerisation and analyses of data and Mdm Eleanor L

TABLE 14
COMPARATIVE YIELD OF PB260 AND RRIM600*

	PB260		*RRIM600*	
Year	*Kg/ha*	*Kg/tapper***	*Kg/ha*	*Kg/tapper***
1	1 140	17.0	615	9.1
2	1 522	22.6	1 007	10.0
3	1 791	26.6	1 291	12.8
4	1 868	27.7	1 586	15.7
5	1 837	27.3	1 869	18.5
6	1 701	25.2	1 927	19.1
7	2 512	38.0	2 247	22.2
8	2 164	32.7	2 311	22.9
9	2 046	31.2	2 032	20.1
10	1 873	27.8	2 085	20.6

* *Source*: Chan (1984)
** 1/2Sd2 system
*** 1/2Sd3 and 1/2Sd4 systems

Neri for typing.

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