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YIELD PERFORMANCE AND TAPPING PANEL DRYNESS (TPD) IN RRII 105 UNDER DIFFERENT INTENSITIES OF EXPLOITATION

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ABSTRACT

The yield of rubber (*Hevea brasiliensis*) depends on the duration of flow at tapping and on the regeneration of latex between two tappings. Tapping panel dryness (TPD), a physiological disorder increases with tapping intensity and frequency. However, this incidence might be reduced by changing tapping system without much reduction in net profit. The common tapping system used for budded rubber tree is half spiral alternate daily tapping ($^1/_2$S d/2 6d/7). In this study half spiral third daily tapping and quarter spiral change over system was evaluated in comparisonto conventional $^1/_2$ S d/2 system for a period of six years. The yield was maximum under $^1/_2$ S d/2 followed by $^1/_2$S d/3 and 2 x $^1/_4$ d/2 change over system. The yield difference between $^1/_2$ S d/2 and $^1/_2$S d/3 systems narrowed down in fifth year and by sixth year $^1/_2$ S d/3 out yielded $^1/_2$ S d/2. Incidence of TPD was much low under d/3 tapping system. The discounted farm business income is more for $^1/_2$ S d/2 6d/7 over a period of six years, even though the return is more for d/3 in the fifth and sixth year. Thus, half spiral third daily tapping system with weekly one day rest can be employed for RRII 105 with *a view to reduce tapping panel dryness.*

INTRODUCTION

The yield of *Hevea* depends on the duration of flow at tapping and on the regeneration of latex between two tappings. If the interval between two tappings is too long, little biochemical energy is available and flow becomes a limiting factor for production. But the interval between two tappings should be long enough to allow intralaticiferous regeneration not to be a limiting factor. So technique of optimising production by suitable exploitation method is very important as there is clonal variation to the effects of different tapping methods. Usually longer cut and a more frequent tapping increase yield in the initial periods, but may cause subsequent reduction because of the increase in the incidence of brownbast as well as decrease in girth increment. Usually high yielding clones are more prone to these factors. The frequency of tapping is said to have a greater effect than the length of the cut on induction of brownbast (Chua 1966). A suitable tapping system is the one which gives the highest yield at the satisfactory growth rate and lowest tapping cost. Tapping panel dryness is an important factor in determining the tapping intensity to a particular clone (Paranjothy *et al.* 1975). There are many reports that tapping intensity is related to brownbast (Rands 1921, Sharrples and Lambourne 1924, Sanderson and Sutcliffe 1921, Bealing and Chua 1972, Sulochanamma *et al.* 1988). It is probable that the incidence of brownbast might be reduced by changing the tapping system without much reduction in the net profit. This paper deals with these aspects.

MATERIALS AND METHODS

The present study was initiated in the Central Experiment Station of RRII in 1985 on clone RRII 105 - a high yielding Indian clone. The experiment was laid out on a completely randomised block design with eight plots in each treatment. The plants taken for the study were of BO panel stage. The treatments imposed were:-

1) Half-spiral alternate daily tapping with weekly one day rest ($^1/_2$S d/2 6d/7)
2) Half-spiral third daily tapping with weekly one day rest ($^1/_2$S d/3 6d/7
3) Two quarter spiral cuts with alternate daily change over tapping system with weekly one day rest (2x$^1/_4$S↑↓d/2 6d/7 (t, t).

The gross income was computed taking into account 80% as of sheet rubber and 20% as

of scrape rubber. The price corresponding to RMA-5 of the year 1990-91 was used for estimation. The wages for tapping was taken as Rs. 40.15 per day. The farm business income was computed by deducting tapping wages alone from the gross income. Other variables as well as fixed costs were not taken into account. Since the returns are spread over a period of 6 years discounted cash flow analysis is used for comparison. The farm business income was discounted at 13% for the different tapping systems.

RESULTS AND DISCUSSION

Yield, dry rubber content, plugging index, girth and tapping panel dryness were presented in Tables I to III. Maximum yield of dry rubber is obtained from the trees under $^1/_2$ S d/2 6d/7 system of tapping for the initial four years. But the yield difference between $^1/_2$ S d/2 6d/7 and $^1/_2$ S d/3 6d/7 is reduced gradually and in the fifth year the total yield from both the treatments are comparable. However, in 2 x $^1/_4$ S↑↓d/2 6d/7 (t, t) method of exploitation, the yield difference when compared to other systems was continued even in the fifth year also. The third daily tapping system had higher yield in the sixth year than that of the alternate daily tapping system. This is in agreement with the findings of P' Ng and Lee (1970) in PB 5/633. Here in RRII 105 the same trend in yi ' ' is continuing even in the sixth year (1944.09 and 2009.48 kg respectively for d/2 and d/3). The yield per tap per tapper was high for $^1/_2$ S d/3 6d/7 throughout the experiment, as also reported by Gan Lian Tiong, *et al.* (1985). The low yield for double cut change over system is due to the low drainage area because of the shorter cut length. There is no significant reduction in yield between the two cuts in the initial years (Table IV), but a reduction in yield is noticed in the fifth year (1990-'91) for upward tapping. This is because of the height of the upper cut and also of the spillage. Spillage is more when the cut progresses upwards.

Table I. Dry rubber yield (kg ha^{-1} and kg tap^{-1} tapper^{-1} under different tapping systems in clone RRII 105

Period	$^1/_2$ S d/2 6d/7		$^1/_2$ S d/3 6d/7		2 x $^1/_4$ S↑↓ d/2 6d/7 (t,t)	
	(a)	(b)	(a)	(b)	(a)	(b)
1985-86	1027.25	13.17	840.50	13.13	704.00	11.00
1986-87	1491.00	12.02	1246.98	14.85	1201.03	10.54
1987-88	2030.50	14.82	1737.28	19.30	1374.82	10.66
1988-89	3328.79	22.96	2631.95	30.25	2169.39	14.96
1989-90	2206.57	15.32	2190.04	22.81	1389.15	11.20
1990-91	1944.09	13.23	2009.48	20.30	1217.32	9.15
Total	12028.20		10656.23		8055.00	

a - yield kg ha^{-1} b - yield kg tap^{-1} tapper^{-1}

Table II. Dry rubber content (%) and plugging index (representative)

Treatment	Dry season	Wet season	Winter season	P.I.
1/2 S d/2 6d/7	38.906	36.538	40.116	2.49
1/2 S d/3 6d/7	40.404	38.274	43.849	3.66
2 x 1/4 S↑↓ d/2 6d/7 (t, t)	43.860	39.064	42.846	3.46

Table III. Tapping panel dryness (TPD) (%) in RRII 105

Year	Tapping system		
	$^1/_2$ S d/2 6d/7	$^1/_2$ S d/3 6d/7	2 x $^1/_4$ S ↑↓d/2 6d/7 (t.t)
1985-86	10.8	3.3	6.7
1986-87	16.7	9.2	10.0
1987-88	15.0	8.3	10.8
1988-89	12.5	5.8	10.0
1989-90	22.5	10.8	10.5
1990-91	30.0	17.5	14.2

Table IV. Yield (kg) split up figure for 2 x 1/4 S↑↓ d/2 6d/7 (t,t)

Year	Lower cut	Upper cut
1987-88	445.61	340.00
1988-89	631.24	578.41
1989-90	315.60	478.24
1990-91	460.64	234.97

Plugging index (P. I) was worked out by the method adopted by Milford *et al* (1969). P. I is lower for $^1/_2$S d/2 6d/7 which is having more tapping intensity when compared to other systems. It is reported that plugging index increases with the shortening of the cut length (Paar de kooper *et al* 1975). But in this study plugging index is more related to the intensity of tapping as the shorter cut change over system shows no marked increase in plugging index. Dry rubber content is also less for more frequent tapping in all the seasons.

The incidence of brown bast (tapping panel dryness) under different tapping treatments shows that intensity of tapping has a role in the onset of tapping panel dryness only upto a particular low intensity, below which there is no corresponding decrease. There is no significant difference in brown bast between the upward and downward tapping. This is contrary to the findings of Sivakumar, *et al* (1985). The girth data (Table V) show no significant difference between treatments. The probable reason is that in all the treatments the length of the cut remained same for the tree and the minimum period of 48 hours was given in between two tappings for regenerating its lost material due to tapping. Lengthening the cut is more deleterious for girth than a higher frequency for a given tapping method (De Jonge, 1969, Ng *et al* 1969). Reducing the frequency of tapping at a constant length of cut does not result in any appreciable difference in girthing (Ng *et al* 1965).

Table V. Girth (cm) under different tapping systems

Treatment	1985	1991	Girth increment (%)
$^1/_2$ S d/2 6d/7	60.70	80.62	32.82
$^1/_2$ S d/3 6d/7	62.45	83.82	34.22
2 x $^1/_4$ S↑↓ d/2 6d/7 (t,t)	64.16	88.41	37.80

The discounted farm business income under various tapping system over a period of six years is more for $^1/_2$ S d/2 system. However, from fifth year of tapping it is more under $^1/_2$S d/3 (Table VI).

Table VI. Discounted farm business income, Rs./ha

Year of tapping	$^1/_2$ S d/2 6d/7	$^1/_2$S d/3 6d/7	2 X $^1/_4$ S↑↓ d/2 6d/7 (t,t)
1	13947	11404	9183
2	17571	15314	14574
3	22065	19636	13932
4	33957	27529	20887
5	18895	19777	11168
6	14328	15830	8182
Total	120763	109490	77926

Thus, half-spiral third daily tapping system with weekly one day tapping rest can be employed in RRII 105 with a view to reduce tapping panel dryness. Eventhough the discounted farm business income is still more for a period of six years for $^1/_2$ S d/2 6d/7 system, the discounted farm business income (Rs/ha) increases after four years of tapping on $^1/_2$S d/3 6d/7 system.

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DISCUSSION

JACOB MANI MANNOTHRA : What is your opinion about 4th daily tapping? Is any stimulation done in your 3rd daily tapping?

K.U. THOMAS : Evaluation of 4th, 5th & 6th daily system in comparison to 2/2 & d/3 is progressing. d/3 in this study is without stimulation.

JACOB MANI MANNOHTRA : With the increase in yields in the 3rd daily system will the TPO increase?

K.U. THOMAS : Naturally no, since sufficient time is available between two tappings for latex regeneration.

JJ SOLOMON : You have mentioned in the abstract of the paper that TPD is a physiological disorder. To my understanding the cause of the disorder is yet to be determined. In this context is it correct to describe it as a physiological disorder?

K.U. THOMAS : As per the present information it is a physiological disorder as other factors were ruled out. However, a reinvestigation from all angle is on, under an international programme.

P.J. JOSEPH : If the system of daily tapping is changed over to tapping over in three days will it not reduce the employment potential? Are you making comparitive study of different varieties on the problem of brown bark?

K.U. THOMAS : Yes. But as we are looking valuable foreign exchange on rubber import, we have to compromise on an ideal system. Comparative studies are already going on.