Journal of Plantation Crops, 20 (Supplement) : 207-211

EVALUATION OF TWELVE CLONES OF *HEVEA BRASILIENSIS* (WILLD. EX. ADR. DE JUSS.) MUELL. ARG. OF EXOTIC AND INDIGENOUS ORIGIN IN AN ESTATE TRIAL

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ABSTRACT

Indigenous and exotic selections of *Hevea brasiliensis* clones, resultant of conventional breeding methods viz., hybridization and ortet selection, are tested in farmers' plots in different agroclimatic regions of the country. Five primary, six secondary and two tertiary clones are included in a block trial at Central Kerala. Growth during immaturity as well as growth, yield and secondary characters for the first five years after tapping were recorded.

Higher yield was recorded in RRC 36 among the Sri Lankan clones, RRIM 703 among the *Malaysian clones and RRII 105 among the Indian clones. Among the 12 clones, RRII 105 was* the highest yielder followed by RRIM 703, RRIC 36 and PRIC 102. RRIC 52, the most vigorous clone, however, recorded the lowest yield among the clones. Yield potential of different clones as well as their major secondary characters are presented.

INTRODUCTION

In *Hevea brasiliensis*, experimental evaluation of clones involves three consecutive stages viz. small scale trial, large scale trial and block trial. The preliminary selections, based on the performance in small scale trials, from hybridization programmes and ortet selection as well as exotic clones are subjected to the second stage of evaluation. Promising selections are finally tested in estate trials or block trials in farmers plots before being recommended for commercial cultivation. A total of 144 clones are under experimental evaluation in 153 blocks in 25 different block trials at different locations of varying agroclimatic conditions. The present paper deals with the performance of 12 clones in an estate trial located at central Kerala.

MATERIALS AND METHODS

Twelve clones of *Hevea brasiliensis* (Willd. ex. Adr. de Juss.) Muell., three of Malaysian origin, six from Sri Lanka, one Indonesian clone and two Indian clones of RRII 100 series (Table I) planted in 1978 in central Kerala were included in the study. Of these, four are primary clones resultant of ortet selection and six secondary clones and two tertiary clones developed by hybridization and selection. The six Sri Lanka clones were introduced during 1972 in exchange for RRII clones (Marattukalam and Premakumari, 1987).

Table I. Clones evaluated

Clone	Parentage	Country of origin
RRIM	44/553 x RRIM 501	Malaysia
RRIM 707	RRIM 632 x RRIM 501	Malaysia
Ch 153	Tjir 1 x Ch 5	Malaysia
Nab 17	Primary	Sri Lanka
Wagga 6278	Primary	Sri Lanka
RRIC 36	PB 86 x PR 107	Sri Lanka
RRIC 45	RRIC 8 x Tjir 1	Sri Lanka
RRIC 52	Primary	Sri Lanka
RRIC 102	RRIC 52 x RRIC 7	Sri Lanka
GT 1	Primary	Indonesia
RRII 105	Tjir 1 x G1 1	India
RRII 118	*Mil 3/2 c Hil 28*	*India*

The trees were opened for tapping at an age of seven years except for the clone RRII 118 in which case tapping commenced during sixth year. The exploitation system adopted was alternate daily half spiral, and the block yield recorded monthly. Mean yield over first five years of exploitation as well as percentage yield depression during summer (based on yield data for the period February to May) were computed. Vigour

in terms of girth was recorded at a height of 150cm from the bud union, every year. Thickness of virgin bark and renewed bark was measured using a Schleipers guage. Incidence of brown bast and pink disease was recorded every year. Incidence of powdery mildew and abnormal leaf fall disease was recorded visually during the respective seasons.

RESULTS AND DISCUSSION

Data on mean annual growth rate during immaturity and mean girth on commencement of tapping and percentage of annual girth increment during five years of tapping is presented in Table II. RRIC 52 was the most vigorous clone during immaturity followed by RRII 118, in terms of growth rate during immaturity and mean girth on commencement of tapping, whereas Wagga 6278, RRIC 45 and RRIC 36 are the least vigorous clones. The very high vigour of RRIC 52 and low vigour of RRIC 45 and RRIC 36 are in agreement with earlier reports (Marattukalam and Premakumari, 1987; Fernando, 1971; Fernando and Wijesinghe 1970). Similarly, RRII 118 is also remarkable for growth vigour (Nair *et al.* 1976). Annual girth increment on tapping was the highest in RRII 118 followed by RRIC 52, RRIC36, Ch 153 and Wagga 6278. The clones Wagga 6278 and RRIC 36, though recorded comparatively poor growth during immaturity, showed good girth increment on tapping. On the contrary, in GT 1, RRIC 102 and Nab 17 with good vigour during immaturity, mean annual girth increment on tapping was comparatively poor. Thus it is evident that clones differ with respect to their response to tapping and a clone vigorous during the early growth phase need not show the same trend after tapping. Percentage girth increment was the highest in RRII 118, followed by RRIC 102, followed by GT 1 and Nab 17 (Table II).

Considering the performance of clones in terms of productivity (Table III), RRII 105 recorded the highest mean yield of 1812 kg/ha/year over the first five years of tapping. This clone, developed by the Rubber Research Institute of India, currently enjoying maximum popularity in the country has recorded very high yield in experimental plantings (Nair and Panikkar 1966; George *et al.* 1980; Nazeer *et al.* 1986). Similarly in commercial plantings, the clone recorded an average yield of 1653 kg/ha/year over the first seven years of tapping (Annamma *et al.* 1990). Among the RRIM clones, in RRIM 703, highest average yield of 1424 kg/ha/year was recorded. RRIC 36 is the highest yielder among the six RRIC clones followed by RRIC 102. These results are in agreement with the reports on high yield potential of RRIM 703 (Premakumari

Table II. Growth characteristics of clones

Clone	Annual growth rate during immaturity (cm)	Mean girth at commencement of tapping (cm)	Annual girth increment on tapping (cm) (5 years)	Percentage girth increment (cm) (5 years)
RRIM 703	6.85	47.95	2.37	24.73
RRIM 707	7.36	51.54	2.18	21.18
Ch 153	7.82	54.73	2.46	22.51
Nab 17	7.40	51.80	1.88	18.13
Wagga 6278	6.84	47.86	2.44	25.49
RRIC 36	6.96	48.69	2.49	25.59
RRIC 45	6.86	47.99	2.21	23.07
RRIC 52	8.81	61.64 (57.63)[1]	2.57	20.86
RRIC 102	7.41	51.89	1.45	13.95
GT 1	7.78	54.44	1.80	16.57
RRII 105	7.14	49.85	2.41	24.17
RRII 118	8.03	48.22[1] (56.24)[2]	3.59	37.18

1. Mean girth at sixth year 2. Mean girth at seventh year

Table III. Mean yield, percentage yield depression during summer and bark thickness of clones evaluated

Clone	Mean yield over first five years (kg ha-1 yr-1)	Percentage yield depression during summer	Mean bark thickness (mm)	
			Virgin bark (12th year)	Renewed bark (five years renewal)
RRIM 703	1424	53	9.15	7.53
RRIM 707	1131	53	8.48	7.28
Ch 153	1085	47	9.15	7.91
Nab 17	1129	34	7.76	6.48
Wagga 6278	893	47	8.15	6.00
RRIC 36	1306	34	8.63	7.58
RRIC 45	1069	46	7.81	6.24
RRIC 52	704	27	8.06	6.54
RRIC 102	1207	34	8.21	5.70
GT 1	1190	50	8.43	6.85
RRII 105	1812	43	9.75	8.16
RRII 118	1086	31	—	—

et al. 1988) and RRIC 36 and RRIC 102 (Marattukalam and Premakumari, 1987). These two clones are reported to be high yielders in Sri Lanka also (Chandrasekara, 1972). GT 1, the Indonesian primary clone also recorded good yield (1190 kg/ha/year) and RRII 118, the vigorous Indian clone recorded medium yield (1086 kg/ha/year). RRIC 52, the most vigorous clone, however, recorded the lowest yield (704 kg/ha/year). This might be attributed to comparatively very low number of latex vessel rows in the bark (Marattukalam and Premakumari, 1987). Wagga 6278 also recorded low yield (893 kg/ha/year) over a period of five years. Data on the percentage yield depression during summer (Table 3) reveal highest summer yield in RRIC 52 followed by RRII 118, RRIC 36 and Nab 17. Summer yield was the lowest in RRIM 703 followed by RRIM 707.

Highest virgin bark thickness was recorded in RRII 105 (9.75 mm) followed by RRIM 703 and Ch 153 (9.15 mm). Rate o bark renewal as indicated by thickness of renewed bark (five years renewal) was also the highest in RRII 105 (Table 3).

Incidence of brown bast, pink, wind damage, *Oidium* and *Phytophthora* (Table IV) reveal varying degrees of resistance of clones. RRII 105 recorded the highest incidence of brown bast (11.25%) followed by RRIM 707 (9.36%) over the first five years period of exploitation, whereas RRIC 36, Wagga 6278 and Nab 17 recorded less than 1 per cent brown bast.

Incidence of pink disease caused by *Corticium salmonicolor* affecting the plants mainly during the immature phase was the highest in RRIC 45 (10.86%) followed by RRIM 703 (10.75%). RRIM 105 also had relatively high incidence of pink (7.17%) while it was the minimum in RRIC 36 (2.82%). The maximum wind damage was recorded in Wagga 6278 (7.93%) and the minimum in RRIC 102 (2%).

Incidence of powdery mildew disease caused by *Oidium heveae* ranged from very light, light, moc to severe (Table IV). In RRIC 36 and RRIC only very light incidence was recorded whereas it was severe in Nab 17 and GT 1, which is in accordance with the reports of Marattukalam and Premakumari (1987). Abnormal leaf fall disease caused by *Phytophthora* spp. was very severe in RRIC 36, severe in RRIM 703 and Nab 17 and very light in RRIC 102 and RRIM 707. In general, high levels of resistance to *Oidium* and *Phytophthora* was recorded in RRIC 102. The clone showed similar performance in Sri Lanka also. The clone is also reported to have satisfactory leaf retention at an elevation of 1800 ft. and also adaptability to drier conditions (Fernando, 1971). RRII 105 and GT 1 recorded moderate levels of resistance.

Table IV. Incidence of wind damage, pink, brown bast, powdery mildew and abnormal leaf fall disease

Clone	Percentage			Incidence of	
	Brown bast	Pink	Wind damage	Powdery mildew	Abnormal leaf fall disease
RRIM 103	4.98	10.75	7.76	light	Severe
RRIM 107	9.36	5.37	7.34	moderate	very light
Ch 153	1.5	7.16	2.86	light	light to severe
Nab 17	0.63	3.54	2.06	severe	severe
Wagga 6278	0.29	3.40	7.93	moderate	severe to very severe
RRIC 36	0.29	2.82	4.80	very light	very severe
RRIC 45	2.29	10.86	2.79	light	very severe to severe
RRIC 52	1.20	8.82	2.65	light	moderate
RRIC 102	1.21	4.32	2.02	very light	very light
GT 1	1.97	3.38	4.00	severe	severe to light
RRII 105	11.25	7.17	3.74	light	severe to light

Thus, it is evident that clones differ widely with respect to yield potential as well as other secondary characters contributing to yield and overall performance. By planting experimental clones in large estates, the performance of clones for yield and secondary characters identified for commercial planting and exploitation.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. M.R. Sethuraj, Director of Research for the encouragement and facilities provided for conducting the experiment. We extend our sincere thanks to the Management and staff of Malankara estate, Thodupuzha for their cooperation in carrying out the evaluation. Our thanks are also due to the supporting field staff of Botany Division for their sincere assistance in collection of data.

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