Journal of Plantation Crops 23 (2): 84-88, December, 1995

LONG TERM PERFORMANCE OF A FEW RRII CLONES IN LARGE SCALE TRIAL

V. C. MERCYKUTTY, P. J. GEORGE, M. A. NAZEER,
D. PREMAKUMARI and JOSEPH G. MARATTUKALAM
Rubber Research Institute of India, Kottayam-686 009, Kerala, India.

ABSTRACT

Performance of nine clones of *Hevea brasiliensis* (Willd. ex Adr. de Juss) Muell Arg. evolved at the Rubber Research Institute of India, over a period of 24 years (8 years before tapping and 16 years of tapping) was evaluated in a large scale trial in the central part of Kerala State. Among these nine clones, four were hybrid clones (RRII 108, RRII 112, RRII 115, RRII 119) and the rest ortet clones. (RRII 1, RRII 2, RRII 19, RRII 20, RRII 21). An old popular clone Tjir 1, of Indonesian origin, was used as the control. The trial was laid out in randomised block design with three replications. Yield performance over a period of 16 years, summer yield depression, mean girth at 24th year, girth increment before tapping and on tapping, bark thickness, number of latex vessel rows in eight year renewed bark, percentage incidence of tapping panel dryness, wind damage and diseases like powdery mildew and abnormal leaf fall have been observed. The data showed that all the clones were on par with the control clone Tjir 1 for yield. The clone RRII 108 recorded highest yield (55.38 g tree^{-1} tap^{-1}) over 16 years of tapping which was followed by RRII 119 (54.28 g tree^{-1} tap^{-1}), whereas the control clone Tjir 1 recorded 48.59g tree^{-1} tap^{-1}. There were significant differences between clones for summer yield depression. RRII 1 showed the lowest yield depression during summer over other clones tried.

INTRODUCTION

In *Hevea*, selective hybridization between superior clones as well as ortet selection (plus tree selection) followed by vegetative multiplication and evaluation, could produce many promising clones. Improved clones evolved by adopting these two techniques are used as planting materials since 1954 in India (Nair and Panikkar, 1966; Nair and George, 1968; Nair and Jacob, 1968; Nair *et al.*, 1975; Saraswathy Amma *et al.*, 1980; Joseph *et al.*, 1986 and Nazeer *et al.*, 1986). The experimental evaluation of clones is very elaborate involving three stages of which large scale trial is the second. In the present paper, performance of nine RRII clones (five ortets and four hybrids) along with Tjir 1 an old popular clone as control, in a statistically laid out large scale trial, over a period of 24 years, is presented for the first time. Yield performance of the clones in this trial over a period of 10 years had already been reported. (Nazeer *et al.*, 1991)

MATERIALS AND METHODS

The trial was laid out at the Central Experiment Station of RRII during 1968 with 10 clones, nine evolved by the Rubber Research Institute of India and one developed by Indonesia. Among the nine Indian clones, five viz., RRII 1, RRII 2, RRII 19, RRII 20 and RRII 21 were ortet clones and four viz., RRII 108, RRII 112, RRII 115 and RRII 119 were hybrid clones, resultant of 1954 hand pollination programme (Anonymous, 1980). The Indonesian clone Tjir 1 was used as control. The trees were opened for tapping at the eighth year in 1976. The tapping system followed was half spiral alternate daily system. Since 1979, no annual tapping rest was given and the trees were rain guarded during rainy months. Important characters recorded were dry rubber yield tree^{-1} tap^{-1} in grams over 16 years, summer yield depression as percentage of mean yield (Table I), girth of the trees 24 years after planting, girth increment before and on tapping,

thickness as well as latex vessel rows of eight year renewed bark (Table II), per cent incidence of wind damage, tapping panel dryness and major diseases under normal prophylactic conditions (Table III). Yield recording was done by cup coagulation method on two normal tapping days per month i.e., by coagulating the latex from

Table I. *Yield and summer yield depression of various rubber clones*

Clones	Mean yield g tree^{-1} tap^{-1}				
	Ist to 5th year	6th to10th year	11th to 16th year	1st to 16th year	Summer yield depression as percentage of mean yield
RRII 1	41.05	42.53	44.92	42.35	8.30
RRII 2	36.28	41.21	41.45	40.80	27.44
RRII 19	39.19	55.76	54.29	49.84	23.48
RRII 20	43.81	43.92	45.97	44.68	23.99
RRII 21	40.78	48.62	55.81	48.31	18.54
RRII 108	40.78	56.80	69.63	55.38	29.55
RRII 112	44.20	52.97	53.69	51.49	22.76
RRII 115	35.37	51.61	50.53	45.76	24.08
RRII 119	39.61	56.97	65.86	54.28	19.95
Tjir 1	37.78	49.50	36.99	48.59	32.03
General mean	38.89	49.99	51.91	48.15	23.01
S.E.	3.84	4.32	7.92	3.88	1.96
C.D.	N.S.	N.S.	N.S.	N.S	5.82
C.V.	15.86	14.33	26.42	13.97	14.72

Table II. *Vigour Characters of the rubber clones*

Clones	Mean girth at 24th year (cm)	Mean girth increment before tapping (cm/yr)	Mean girth increment on tapping (cm/yr)	Thickness of 8th year renewed bark (mm)	Latex vessel rows of 8th year renewed bark
RRII 1	104.75	7.85	3.10	5.37	28.39
RRII 2	94.89	5.77	3.40	5.07	25.84
RRII 19	100.87	7.57	2.99	6.33	23.00
RRII 20	97.19	6.89	3.05	6.00	33.06
RRII 21	97.35	6.39	3.29	7.20	33.34
RRII 108	97.03	7.15	2.93	5.33	33.80
RRII 112	108.65	7.50	3.50	5.60	22.86
RRII 115	100.51	7.17	3.14	5.20	29.95
RRII 119	94.61	6.82	2.95	6.80	30.72
Tjir 1	103.18	6.62	3.55	6.27	22.56
General Mean	99.9	6.97	3.19	5.92	28.35
C.D.	N.S.	N.S.	N.S.	N.S.	N.S.
C.V.	9.41	10.02	18.38	14.25	25.71

Table III. *Important secondary characters of the rubber clones*

Clones	Wind damage (%)	Tapping panel dryness (%)	Abnormal leaf fall incidence	Powdery mildew incidence
RRII 1	9.34	16.82	Moderate	Moderate
RRII 2	4.67	17.48	Severe	Severe
RRII 19	18.18	21.29	Moderate	Moderate
RRII 20	5.61	15.61	Severe	Moderate
RRII 21	14.15	19.43	Severe	Severe
RRII 108	20.24	19.52	Severe	Severe
RRII 112	12.83	15.66	Moderate	Severe
RRII 115	5.61	19.67	Moderate	Very light
RRII 119	4.81	12.54	Severe	Moderate
Tjir 1	12.38	14.57	Severe	Severe

individual trees in collecting cups, drying the coagule in a smoke house and recording the weight of dry rubbers. Summer depression in yield was estimated by considering the mean yield during the period February to May as the percentage of the mean annual yield. Girth was recorded at a height of 150 cm above the bud union with a tailors' tape. Thickness of the bark was measured with a Schleiper's guage. For recording the number of latex vessel rows, bark samples were sectioned in the radial plane, stained with Sudan III and number of latex vessel rows were counted using a light microscope. Incidence of diseases was assessed by visual observation. Data on yield, yield depression, girth, bark thickness and latex vessel rows were statistically analysed.

RESULTS AND DISCUSSION

Mean yield in g tree^{-1}tap^{-1} for the first 5 years, 6th to 10th year, 10th to 16th years and 1st to 16th years are given in Table 1. The yield potential of these clones over first 10 years have already been reported by Nazeer *et al.* in 1991. Yield figures for the next 6 year period (11th to 16th year) indicated all the clones were numerically superior to control and RRII 108 showed the highest yield of 69.63g tree^{-1} tap^{-1}. The next highest yielders were RRII 119 and RRII 21 with 65.86g and 55.81g respectively. The control clone Tjir 1 yielded on an average 36.99g. During the period of 6th to 10th year of tapping also RRII 119 and RRII 108 gave high yield. (Nazeer *et al.*, 1991)

The mean yield over 16 years of exploitation had shown that though the yield differences were statistically non-significant, RRII 108 and RRII 119 out yielded all other clones recording 55.38g and 54.28g. respectively. The yield of the control clone Tjir 1 was only 48.59g. Four clones viz., RRII 108, RRII 119, RRII 112 and RRII 19 were superior to control in this aspect. Nazeer *et al.* (1991) also reported that RRII 108, RRII 112, RRII 119 and RRII 19 were the top yielders over the period of first 10 years. In the present study the lowest yielder was RRII 2 (40.80g).

Analysis of summer yield depression has indicated, that most of the clones are significantly superior to the control regarding summer yield. RRII 1 showed remarkably low yield depression during the summer months (8.30%). Summer yield of RRII 1 for the first 10 years, has already been reported to be high over other clones tried by Nazeer *et al.* (1991).

Table 2 contains data on girth at 24th year, mean girth increment before and on tapping, and mean thickness and number of latex vessel rows of 8 years renewed bark. The better yielding clone RRII 112 recorded the highest girth (108.65 cm) at 24th year,

while that of the control clone, Tjir, was only 103.18 cm. The lowest girth was noticed in another high yielding clone, RRII 119 (94.61 cm). This is in agreement with the report that high yield need not necessarily be associated with high girth increment (Nazeer *et al.* 1986).

Mean girth increment per year before tapping ranged from a minimum of 5.77 cm (RRII 2) to a maximum of 7.85 cm (RRII 1). Nazeer *et al.* (1991) reported the highest girth at opening for RRII 1. The control clone Tjir 1 recorded mean girth increment of 6.62 cm before tapping.

The rate of girth increment during the tapping period over 16 years also varied among the clones tested. The control clone Tjir 1 and RRII 112 showed the highest girth increment of 3.55 cm and 3.50 cm/year respectively, followed by RRII 2 (3.40 cm). RRII 108 (2.93 cm) and RRII 119 (2.95 cm) were found to be very poor in this regard when compared to other clones.

In the case of bark thickness of 8 year renewed bark also all the clones were found to be on par with the control. RRII 21 (7.20 mm) recorded the highest bark thickness while RRII 2 (5.07 mm) recorded the lowest. Regarding the latex vessel rows in the renewed bark, all the clones were superior to the control and was found ranging from 33.80 (RRII 108) to 22.86 (RRII 112). In the control the number was 22.56.

The incidence of wind damage occurring in different forms trunk snap, branch snap and uprooting, upto 16th year of tapping was recorded and is given in Table 3. All the clones were affected by wind and the incidence varied from 4.67 (RRII 2) to 20.24 (RRII 108). The control clone Tjir 1 recorded 12.38% wind damage.

Incidence of tapping panel dryness was noticed in all the clones evaluated. RRII19 was the most susceptible clone, which recorded 21.29% incidence followed by RRII 108 (19.52%) and RRII 21 (19.43%). Nazeer *et al.* (1991) also reported the high incidence of brownbast in RRII 19.

Observations on disease incidence under normal field conditions were made and is given in Table 3. All clones were found to be more or less susceptible to abnormal leaf fall disease caused by *Phytophthora* sp. where four clones viz. RRII I, RRII 19, RRII 112 and RRII 115 showed comparatively low incidence under normal prophylactic conditions. Other clones were severely affected by this malady. Powdery mildew caused by *Oidium* sp. also affected all the clones, intensity varying from very light to severe. Based on the present study, 3 hybrid clones viz., RRII 108, RRII 112 and RRII 119 were found to be superior with respect to yield over 16 years. RRII 1 was found to give significantly higher yield during summer.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. M.R. Sethuraj, Director, Dr. A.O.N. Panikkar, Joint Director and Dr. C.K. Saraswathy Amma, Deputy Director of the Rubber Research Institute of India for encouragement and critical suggestions. Thanks are also due to Shri G. Subbarayalu (Statistician) for the analysis of data.

REFERENCES

ANONYMOUS, 1980. Rubber Research Institute of India. Guide to the Central Experiment Station, pp. 9.

JOSEPH, G. M., PANIKKAR, A. O. N. and SARASWATHY AMMA, C. K. 1986. Early performance of a few *Hevea* clones in large scale trial. J. Plantn. Crops 16 (Suppl.) : 377-381.

NAIR, V. K. B. and PANIKKAR, A. O. N. 1966. Progress of investigation on the improvement of rubber (*Hevea brasiliensis* Muell. Arg.) in India. Rubber Board Bulletin 8: 201-210.

NAIR, V. K. B. and GEORGE, P. J. 1968. The Indian clone, RRII 100 series. Rubber Board Bulletin 10: 115-140.

NAIR, V. K. B. and JACOB, K. T. 1968. Certain aspects of *Hevea* breeding. Rubber Board Bulletin 10: 23-28

NAIR, V. K. B., GEORGE, P. J. and SARASWATHY AMMA, C. K. 1975. Breeding improved *Hevea* clones in India pp. 45-54. Proceedings in International Rubber Conference, Vol. II, Kuala Lumpur, Malaysia.

NAZEER, M. A., MARKOSE, V.C., GEORGE, P.J. and PANIKKAR, A. O. N. 1986. Performance of a few *Hevea* clones from RRII 100 series in large scale trial. J. Plantn Crops. 14: 99-104

NAZEER, M. A., GEORGE, P.J., PREMA-KUMARI, D. and JOSEPH G. MARATTUKALAM, 1991. Evaluation of certain primary and secondary *Hevea* clones in large scale trial. J. Plantn. Crops. 18 (suppl):11-16

SARASWATHY AMMA, C. K., GEORGE, P. J., NAIR, V. K. B. and PANIKKAR, A.O.N. 1980. RRII clones. 200 series. International Rubber Conference, India Abs.