SECOND SELECTIONS FROM THE 1954 HAND POLLINATION PROGRAMME

Tree improvement in *Hevea* through hybridization and selection began at the Rubber Research Institute of India in 1954. In the 1954 hand pollination programme 439 new clones belonging to 14 families were established and a small scale trial was laid out at the Rubber Research Institute of India Experiment Station in 1956 (Bhaskaran Nair, 1963; Bhaskaran Nair & George, 1969). Reports on selections and their secondary characters have been published (Bhaskaran Nair & George, 1969 and Bhaskaran Nair *et al.*, 1975). Based on yield during the first four years and other secondary characters, 22 clones belonging to seven families were preliminarily selected (first selections) and given accession as RRII 100 series. Of these, RRII 105 has gained large scale commercial acceptance. In the present communication, the performance of certain promising late yielding clones from the 1954 hand pollination programme over a period of twenty years is presented.

The clones evolved were planted in 1956 in a small scale trial, with five trees of each clone, and the control clone Tjir 1 (Bhaskaran Nair, 1963). The trees were opened for tapping in 1964. The tapping system followed was half spiral alternate daily ($\frac{1}{2}$S d/2 6d/7). Yield recording was done by cup coagulation technique for twenty years of tapping. The number of trees available in each clone for yield recording ranged from one to four. Tree girth was measured at a height of 150 cm from bud union and the mean annual girth increment calculated. Prophylactic spraying against abnormal leaf fall was given upto 1979 and afterwards the trees were left unsprayed. Anatomical characters like bark thickness and number of latex vessel rings were recorded on virgin and renewed bark.

Over the years, five clones showed a rising trend in yield over RRII 105 and these selections were designated as 'second selections'. In Table 1 the yield of the above clones for various periods and the mean over twenty years, along with girth data are given. It may be noted that during the first five years, RRII 105 was the highest yielder (60.61 g) followed by HP 372 (50.98 g). RRII 105 is a precocious yielder and the clones in the second selection showed high yielding trend only from the sixth year onwards (George *et al.*, 1980). From the 6 to 20 year period, HP 185 out yielded all other clones and RRII 105 recorded a lower yield than the second selections. During 6 to 10 years HP 223 was the second best yielder (119.62 g) and during the 11 to 15 year and 16 to 20 year periods HP 372 was the second highest yielder (129.06 g and 139.49 g respectively). Considering the mean yield over 20 years, HP 185 (104.00g) was on par with HP 372 with 104.01 g. This was followed by HP 223 (97.94 g). Among these clones observed, RRII 105 was the lowest yielder with 81.38 g. When percentage yield increase over RRII 105 for 20 years is considered, HP 185 and HP 372 showed the same trend. HP 187 recorded only 10.46 per cent increase which is the lowest among the second selections. The highest mean annual girth increment was recorded by HP 372 (4.15 cm) and the lowest by RRII 105 (2.09 cm).

Table 1. **Mean yield (g tree^{-1}) and girth (cm) of second selection clones from the 1954 HP series**

Clone	Parentage	1–5 years	6–10 years	11–15 years	16–20 years	Mean over 20 years	Percent yield increase over RRII 105 for 20 years	Mean annual girth increment (cm)
HP 185	Tjir 1 x Mil 3/2	49.67	129.80	133.73	142.83	104.00	27.79	3.52
HP 187	Tjir 1 x Mil 3/2	48.22	95.58	120.45	109.91	89.90	10.46	3.30
HP 204	Tjir 1 x Mil 3/2	42.73	102.10	110.61	123.94	94.47	12.29	3.55
HP 223	Tjir 1 x HC 28	48.90	119.62	120.86	94.33	97.94	20.34	2.77
HP 372	Mil 3/2 x Hil 28	50.98	96.55	129.06	139.49	104.01	27.80	4.15
RRII 105 (control)	Tjir 1 x G1 1	60.61	89.29	81.16	76.25	81.38	—	2.09

Although the second selections showed some promising secondary characters under unsprayed conditions (unpublished data), further observations are necessary, as the number of trees was limited. Details of bark anatomical characters are given in Table 2. HP 185 and HP 204 had the thickest virgin bark (15.00 mm). RRII 105 showed only average thickness (12.50 mm). The mean number of latex vessel rings was the highest in RRII 105 (44.50) which was followed by HP 185 (42.89). In the case of renewed bark, thickness was higher for RRII 105, HP 187 and HP 204 and a higher number of latex vessel rings was observed in RRII 105 and HP 372 (Table 2).

From the foregoing account, it is evident that all the five second selections were slow starters and gradually picked up yield from the sixth year onwards, later out-yielding RRII 105 in the small scale trial. HP 185 continued to be the highest yielder from the sixth to twentieth year. After the first

Table 2. **Bark anatomical characters of the second selection HP clones**

Clone	Mean bark thickness (mm)		Mean no. of latex vessel rings	
	Virgin	Renewed	Virgin	Renewed
HP 185	15.00	7.33	42.89	29.22
HP 187	11.00	8.00	38.67	31.00
HP 204	15.00	8.50	29.83	24.50
HP 223	11.00	5.00	29.00	13.50
HP 372	13.50	6.50	41.34	33.67
RRII 105	12.50	8.00	44.50	33.14

five years of tapping, RRII 105 did not show substantial increase in yield which might be due to the comparatively low girth increment on tapping (Table 1). Since the number of trees available for the study in the small scale trial is very limited, it would be worth evaluating the second selections in the next stage of large scale trial so as to get a more accurate data on their performance. Conventional breeding programme in *H. brasiliensis* takes 30 to 32 years from nursery stage of progenies to final recommendation and any attempt to shorten the breeding cycle will be of advantage (Markose & Panikkar 1984). Selection of the best ten per cent seedlings from hand pollination programme, based on nursery test tapping yield, and field evaluation in promotion plot trials could shorten the breeding cycle by ten years (Subramanian, 1980). However, the present report shows that conventional evaluation up to 20 years of exploitation is essential to identify late yielders like the second selection HP clones. Similar findings also emerge from the studies of Tan (1987).

ACKNOWLEDGEMENT

The authors are thankful to Dr. M. R. Sethuraj, Director, Rubber Research Institute of India for encouragements.

REFERENCES

Bhaskaran Nair, V. K. (1963). Short history and guide to the experiment station of the Rubber Research Institute of India. Rubber Board, pp. 5.

Bhaskaran Nair, V. K. & George, P. J. (1969). The Indian clones: RRII 100 series. *Rubber Board Bulletin*, **10**: 115–140.

Bhaskaran Nair, V. K., George, P. J. & Saraswathy Amma, C. K. (1975). Breeding improved *Hevea* clones in India. *Proceedings of the International Rubber Conference*, Kuala Lumpur, **2**: 45–54.

George, P. J., Bhaskaran Nair, V. K. & Panikkar, A.O.N. (1980). Yield and secondary characters of the clone RRII 105 in trial plantings. *Paper presented in the International Rubber Conference*, 1980, India.

Markose, V. C. & Panikkar, A. O. N. (1984). Breeding strategies for *Hevea* improvement. Compte-Rendu du Colloque Exploitation. Physiologie et Amelioration de l'Hevea, 367–373.

Subramanian, S. (1980). Development in *Hevea* breeding research. *Paper presented in the National Rubber Symposium*, Brazil, pp. 1–12.

Tan, H. (1987). Strategies in rubber tree breeding In: *Improving Vegetatively Propagated Crops* (Ed. A. J. Abbott and R. K. Atkin). Academic Press, New York. 27–62.

M. A. NAZEER

P. J. GEORGE

D. PREMAKUMARI

A. O. N. PANIKKAR

Rubber Research Institute of India
Kottayam–686 009, India.