Performance of some introduced and indigenous clones of Para rubber (*Hevea brasiliensis*)

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Introduction

Crop improvement in *Hevea brasiliensis* is mainly achieved through hybridization, ortet selection or polycross breeding. Initially, all breeding materials passed through evaluation at various stages viz. nursery evaluation, small scale trial, large scale trial and on-farm trial. These processes took almost 30 years before a clone was recommended for unrestricted commercial planting. In an attempt to reduce the breeding cycle, the small scale trial has been substituted with clonal nursery evaluation and the large scale trial is simultaneously carried out along with on-farm field evaluation through a participatory plant breeding approach namely, participatory clone evaluation. Thus, it is now possible to release a clone in about 22 years and efforts are underway to further reduce the breeding cycle (Mydin and Saraswathyamma, 2005).

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In an effort to increase commercial yield of rubber clones and also supply good clones to rubber growers of the country, the genetic base of the tree was continuously enriched through introduction of promising clones from other countries. I

this process more than one hundred clones were imported from other countries mainly Malaysia, China, Indonesia and Thailand (Saraswathyamma *et al.*, 1998). These clones were subsequently tested in block trials mainly in large estates in order to assess their adaptability to local agro-climatic conditions and such clones were subsequently approved for planting by Rubber Board, India under different categories. Currently, forty six clones are approved for planting under different categories (Rubber Board India, 2012).

In 1992, four imported clones and two indigenously developed clones were planted in block trial in Edamon Division of Shaliackary Estate (Punalur, Kollam Dt.,Kerala, India). Details of the clones are given in Table 1. This paper discusses the yield performance and secondary traits of these clones under on-farm trial condition in estate sector.

Block trial

The block trial was laid out using 300 plants of each clone. The trees were opened for tapping in 2000. Latex was separately collected from each block of the clones and fresh weight was recorded. Dry rubber content (DRC) of latex samples was also estimated. Yield of the clones was computed following standard procedures (Mydin and

Table 1 Details of clones in the on-farm trial at Shaliackary Estate (Punalur, Kerala)

Clone	Parentage	Country of origin	Year of introduction	Yield in experimental trial (g/t/t; over 10 yr)
PR 255	Tjir 1 x PR 107	Indonesia	1995	58.04 (LST*)
PR 261	Tjir 1 x PR 107	Indonesia	1995	51.34 (LST)
PB 260	PB 5/51 x PB 49	Malaysia	1979	63.00 (LST)
PB 280	Primary clone	Malaysia	1985	70.60 (LST)
RRII 5	Primary clone	India	Indigenous	89.06 (SST**)

*large scale trial; **small scale trial

(Source: Rubber Board India, 2012, Mydin and Saraswathyamma, 2005)

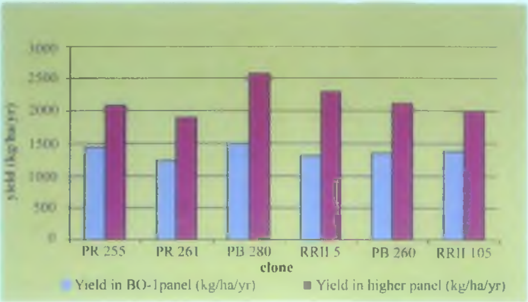

Fig 1. Yield performance in BO-1 panel (regular tapping) and higher panel (CUT)

Saraswathyamma, 2005). Block-wise latex was collected from each clone and monthly yield of dry rubber was calculated based on equation [1]

Monthly yield (kg/block/day)

$$= \frac{\text{latex wet weight x D.R.C}}{100} + \frac{\text{field coagulam weight x 50}}{100} \quad [1]$$

(where D.R.C. is the dry rubber content)

Using monthly yield, annual mean yield (AMY) was calculated by equation [2]

Annual mean yield (kg/block/day)

$$= \frac{\text{Total of monthly yield}}{\text{No. of months tapped}} \quad [2]$$

Finally, yield per hectare was calculated using equation [3]

Yield per hectare (kg/ha/year)

$$= \frac{\text{(AMY) x (no. of trees/ha) x (no. of tapping days)}}{\text{Actual no. of trees per block of each clone}} \quad [3]$$

(where AMY is the annual mean yield as per equation [2])

The tapping was initiated in 1998 (tapping system: S/2(RG) d3 6d/7. ET2.5% Pa 1/y) with yearly stimulation, which continued until 11th year. Subsequently, CUT (controlled upward tapping) system was introduced. From 14th year of tapping, there were six months of tapping in lower panel followed by six months CUT in the higher panel (tapping system: S/2(RG) d3 6d/7 6m (April-September)/12. ET2.5% 1/6m : S/3U d3 6d/7 6m (October - March)/12. ET5% 3/6m). Data on tapping panel dryness was collected during 12th year of tapping and girth in the 14th year of tapping.

Overall mean yield of the clones in the BO-1 panel was 1366 kg/ha/yr. Among the experimental clones, the Malaysian clone PB 280 with mean

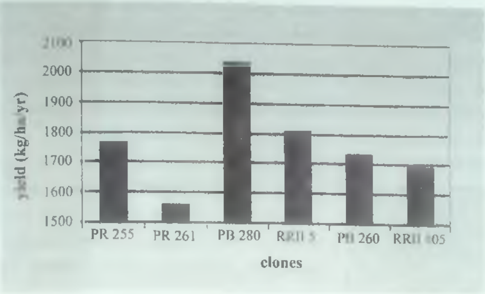

Fig 2. Overall yield performance of PB and PR clones (mean of six year data including three year tapping in BO-1 panel and three year CUT in higher panel)

yield of 1494 kg/ha/yr (Fig 1) followed by PR 255 with 1445 kg/ha/yr showed better yield compared to RRII 105 (1384 kg/ha/yr). Clones viz. PB 260 followed by RRII 5 (1307 kg/ha/yr) showed yield comparable to RRII 105. The Indonesian clone PR 261 showed minimum yield (1229 kg/ha/yr).

Under the combined system of the CUT with stimulation in the higher panel followed by normal tapping with stimulation in lower panel, there was considerable increase in the yield of all the clones (Fig 1). Overall mean yield of the clones in the higher panel was 2166 kg/ha/yr with 59% increase over the yield in lower panel under normal tapping system. The experimental clones maintained almost similar yield trend comparable to yield in the virgin panel. Clone RRII 5 followed by PB 280 and PR 255 showed better yield trend compared to RRII 105. Clone PR 261 maintained its minimum yield trend.

Based on combined mean yield over six years, clone PB 280 with more than 2000 kg/ha/yr showed maximum yield compared to remaining clones (Fig 2). Clone PR 261 with an overall mean yield of about 1560 kg/ha/yr showed minimum yield performance.

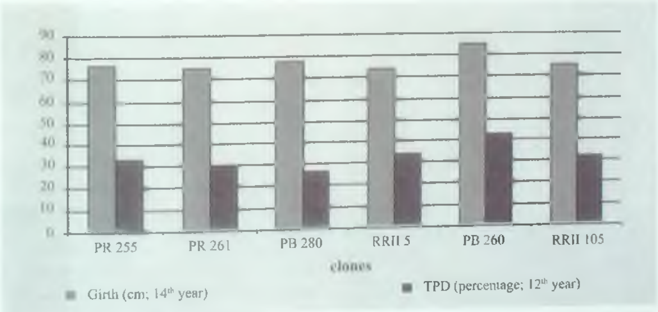

Fig 3. Girth and tapping panel dryness in different clones

Regarding growth performance, as indicated by mean girth of the clones in the 14th year of tapping (Fig 3), PB 260 (85 cm) followed by PB 280 (78 cm) showed maximum girth compared to RRII 105 (75 cm). Remaining clones showed almost similar mean girth. With regard to tapping panel dryness, which is a crucial factor influencing rubber productivity in *Hevea*, the experimental clones exhibited more than 30% overall mean TPD incidence (Fig 3). Among the clones, PB 260 was severely affected with maximum TPD incidence (43%). Remaining clones were affected by 27-34% TPD incidences.

Presently, the Malaysian clones, PB 260 and PB 280 are categorised under Category I and II respectively of Rubber Board India recommendation for large-scale planting (Rubber Board India, 2012). Clones PR 255 and PR 261 are classified under Category III of planting recommendation for the traditional areas. Clone PB 260 and RRII 5, however, are classified under Category III under recommendations for the Northeastern states or the non-traditional region. Clones PR 255 and PR 261 have not so far been recommended for planting in the non-traditional areas.

The above study showed better yield performance of imported clones especially PB 280 in the traditional region. The results from the above on-farm trial corroborated earlier findings related to high incidence of TPD in clone PB 260. Clones RRII 5, PB 280, PB 260 and PR 261 showed good response to CUT with yield increase ranging from 54 to 76% compared to normal tapping in BO-1 panel.

References

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