Growth performance of root trainer plants

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Abstract

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Hevea brasiliensis is grown for commercial production of latex. Early maturing and high precocious yield from trees are very important when the return on the investment in developing a plantation is considered. Planting materials with high trunk growth rate and yield is in high demand. The present study examines (i) clonal performance and early tappability of RRII 400 series clones (RRII 414, RRII 417, RRII 422, RRII 429, RRII 430 and RRII 105- control); (ii) comparative advantage in juvenile growth of root trainer over poly bag plants of clones RRII 414, RRII 417, RRII 422 from a small holding in the traditional rubber belt of Central Travancore. Results of growth studies indicate that all the clones except RRII 105 (47.6 cm) maintained superiority in vigour. RRII 414 (55.2 cm), RRII 430 (54.8 cm) and RRII 417 (54.3 cm) registered noticeable high girthing followed by RRII 422 (53.2 cm) and RRII 429 (51.4 cm), over six years.

Tappability of clones ranged from 39.3 – 96 % in the sixth year while RRII 105 tended to grow slower (39.3%). RRII 422 registered highest tappability of 96% followed by RRII 417 (91%) and RRII 430 (90.3%). The growth pattern of clone RRII 414 raised in root trainers and poly bags was almost equal but plants raised in root trainer attained higher tappability (93%) when compared to poly bag plants(81%). The same trend in tappability percentage was found in the case of RRII 417 (PB: 88%; RT: 93%) and RRII 422 (PB: 88%; RT: 90%). Adoption of new clones and root trainer technology could help the growers in minimizing the unproductive age and ensure early returns from the holdings.

Introduction

Hevea brasiliensis (Willd. ex. A. L. Juss.) Muell. Arg. is a tree grown for commercial production of latex. Early starting of tapping and high precocious yield from trees is important when discounted cash flow and return on the investment is considered (Wycherley, 1969). Cultivars with high trunk growth rate and yield are in high demand. Exploitation of heterotic vigour in breeding and improvement in clonal propagation techniques would be the possible solutions for early return. Recently, five hybrid clones of RRII 400 series (Licy *et al.* 2003; Mydin *et al.*, 2011) and root trainer technology (Soman *et al.*, 2002) have been recommended for

adoption. However, documented feedback on the role of these recommendations in reducing the immaturity period from small growers' holdings is meagre. In the present investigation, effect of five hybrid clones and root trainer technology in reducing juvenile phase was investigated and the results were discussed.

Materials and methods

The study was performed at a small holding situated in Kanjirappally (Latitude 9º 33'N, Longitude 76º 47' E; altitude 160 m) in the Kottayam District of Kerala. The planting materials consisted of five genotypes (RRII 414, RRII 417, RRII 422, RRII 429 and RRII 430) selected from the hybrid population of cross RRII 105 x RRIC 100.

These five clones along with control (RRII 105) were brown budded onto rootstocks. After successful bud grafting, stumps were planted in polythene bags (55 cm x 25 cm when laid flat) filled with top soil and raised in a nursery. Plants of RRII 414, RRII 417 and RRII 422 (30-75 numbers of each clone) were also raised in root trainers cups with 30 cm length and 7.5 cm diameter with 800 cc capacity (Soman *et al*., 2002). The root trainer (RT) and poly bag (PB) plants were field planted at 2-3 whorls stage in separate unreplicated blocks adopting uniform spacing of 4.9 m x 4.9 m.

Recommended crop management practices were performed throughout the experiment. Trunk girth (at a height of 125 cm) was measured every year. Mean girth and tappability percentage of trees were computed from each group of clones planted using root trainer and polybag method. Incidence of diseases (Abnormal leaf fall, Shoot rot, Powdery mildew and Pink disease) was also noted throughout the study.

Result and conclusions

Five clones of RRII 400 series along with the control (RRII 105) were field planted in separate plots to study the performance of growth and

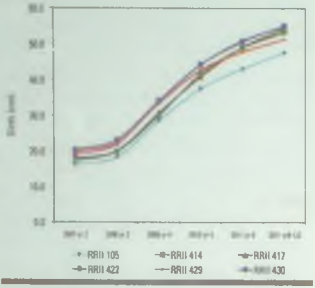

Fig.2. Growth curves of clones

RRII 105 registered only 47.6 cm. In general, these clones exhibited tolerance towards shoot rot and abnormal leaf fall except RRII 105. No severe attack of pink disease and powdery mildew

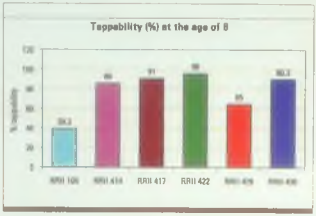

Fig.3. Percentage of trees in the population(n=30 -75) attained girth of 50cm at the trunk height of 125cm from the bud union of trees, in the 6th year after planting

tappability. Monitored the girth and growth curve was plotted (Fig. 2). During the lag (one to three years), and log phase (four to six years) of growth, all the clones except RRII 105 kept its superiority in vigour. RRII 414 (55.2 cm), RRII 430 (54.8 cm) and RRII 417 (54.3 cm) registered noticeable high girthing followed by RRII 422 (53.2 cm) and RRII 429 (51.4 cm) over six years, whereas was noticed during the immaturity period. Data appears to be useful for reconfirming the earliness of these clones and disease tolerance when compared to the control (RRII 105). The high

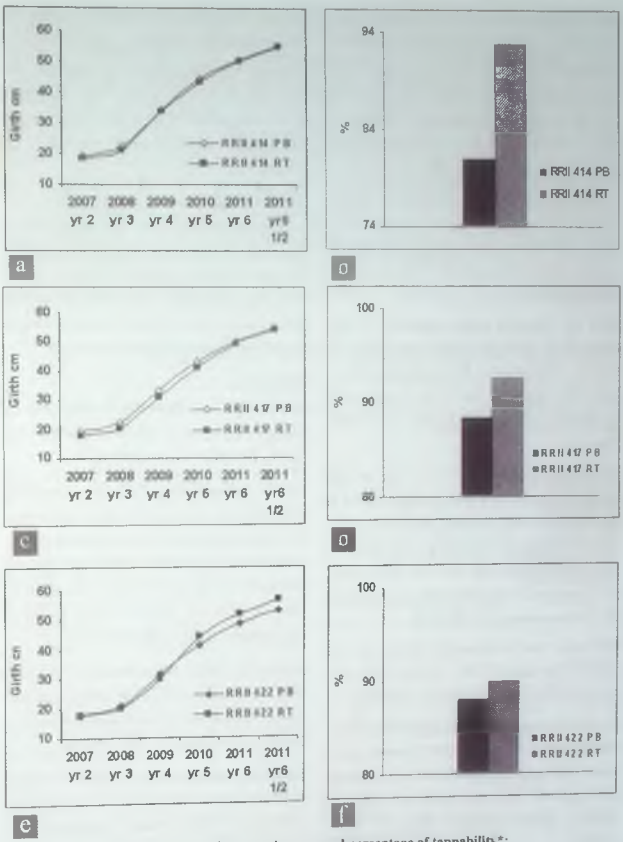

Fig.6. Comparative growth curve and percentage of tappability*: Poly bag vs. Root trainer propagation

PB: Poly bag planting; RT: Root trainer planting. Values are means. Tappability percentage (b, d, and f). Percentage of trees in the population (n=10-40) attained girth of 50cm at the trunk height of 125cm from the bud union of trees, in the 6th year after planting.

growth rate observed in these clones indicates the expression of heterotic vigour and fungal disease tolerance (Mydin, *et al*., 2011).

Early maturing clones will be preferred by the growers to reduce the unproductive period and cost of maintenance of the trees and thereby early return from the plantations.

Comparative tappability of clones is plotted (Fig.3). Of the six cultivars studied in the juvenile phase, tappability of clones ranged from 39.3–96 % in the 6th year whereas RRII 105 tended to grow slower (39.3%).

RRII 422 registered highest tappability of 96% followed by RRII 417 (91%) and RRII 430 (90.3%). Uniformity of trees indicates earliness and 70% tappability has been recommended for initiating commercial tapping in a rubber plantation.

Clone wise growth (Fig.4- a, c and e) and tappability (Fig.5- b, d and f) of trees raised in the PB and RT was compared and growth curve plotted. It could be seen that growth pattern of trees (RRII 414) in both cases was almost equal but trees raised in RT attained higher tappability (93%) when compared to PB (81%).

The same trend in tappability percentage was found in the case of RRII 417 (PB: 88%; RT: 93%) and RRII 422 (PB: 88%; RT: 90%) also.

Cost of poly bag planting is high by three fold than the RT method (Soman *et al*., 2002) mainly due to heavy potting media, space requirement, lack of maneuvrability in transportation etc. while root trainer is gaining popularity among the rubber growers.

Increased uniformity of trees across the genotype apparently indicates early and better establishment of plants in the soil as reported in other tree species (Khedkar and Subramanian, 1997).

From this case study, it can be concluded that the adoption of new clones and root trainer technology could help the growers in minimizing the unproductive age and early return from the holdings.

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References

Khedkar, M. H. and Subramanian, K. (1997). Trails on raising Teak (*Tectona grandis*) planting stock in root trainers. *The Indian Forester*, **123**(2):95-99.

Licy, J., Saraswathyamma, C. K., Premakumari, D., Meenakumari, T., Rajeswari Meenattoor, J. and Nazeer, M. A. (2003). Genetic parameters and heterosis in rubber (*Hevea brasiliensis*) Muell Arg. V. Hybrid vigour for yield and yield components among the RRII 400 series clones in small-scale evaluation. *Indian Journal of Natural Rubber Research*, **16**(1&2):75-80.

Mydin, K. K., Thomas, V. and Mecykutty, V. C. (2011). Yield and related attributes of certain new generation clones of *Hevea brasiliensis* under large scale evaluation. *Journal of Rubber Research*, **14**(3): 167-183.

Soman, T. A., Saraswathyamma, C. K. and Marattukalam, J. G. (2002). Root trainer planting technique for *Hevea*. *Proceedings of Rubber Planters' Conference*, India, 148-151pp.

Wycherley, P. R. (1969). Breeding of *Hevea*. *Journal of Rubber Research Institute of Malaya*, **21**: 38–55