Journal of Plantation Crops 20 (Supplement) : 175-178

COMMERCIAL POTENTIAL OF NURSERY GRAFTING FOR HIGHER YIELD AND IMPROVED QUALITY OF TEA

P., HARIDAS, C.K. UNNIKRISHNAN NAIR and R.D. LAI

R & D Department, Tata Tea Limited, Munnar 685 612, Kerala.

ABSTRACT

A trial with nursery grafted clones differing in vigour and quality was carried out. The vigour of grafted plants, stock and scion was assessed in terms of weight of centered branches, area of plucking surface and yield. The root stock influenced the leaf yielding capacity of the scion but it did not affect the quality of made tea. The magnitude of the difference in vigour between the grafted plants and the scion was found to be a satisfactory indication of commercial potential of the clonal combination used in the trial for higher yield and improved quality of tea.

INTRODUCTION

Studies carried out by Hajime Sannal *et al* (1962) showed that planting of grafted tea plants resulted in vigorous growth. The bud grafting (patch budding) technique has been used successfully for over thirty years at Tocklai for early production of seeds on clonal crosses (Barua, 1968). In budding and grafting methods followed in tea earlier, the root stock was either established in the field or a grown up seedling in the nursery used. The modified form of the conventional method known as fresh root stock graft developed in South India offers promise of producing composite, vigorous, hardy plants with high yield potential (UPASI, 1972; Haridas, 1979; Satyanarayana, 1980). The technique of grafting fresh, single node clonal cuttings was developed primarily to overcome the drought susceptibility in certain high yielding clones (Sharma *et al.* 1981). It has been found that grafting of fresh cuttings enhances the vegetative vigour of the resultant composite plants, leading to an increase in the latter's yield by 10 to 70 per cent over the ungrafted clonal plants used as scions in the initial years; an increase of about thirty per cent in yield due to chip budding of fresh cuttings has been reported from the Tea Research Foundation of Central Africa, Malawi (Sharma and Ranganathan, 1986).

Barua (1973) reported that the yielding capacity of weaker clones was enhanced by field grafting. The yield of scions increased with the increase in vigour of the stock without affecting the liquor quality. This paper deals with the investigations carried out based on this principle to find out whether the yield of a quality clone with low or average yield could be increased by grafting the same on a hardy high yielding clonal stock.

MATERIALS AND METHODS

The experiments were conducted in nursery and fields attached to R & D Department, Madupatty Estate, Munnar, Kerala. The clones selected for scion and stock were Craigmore-6017 and B/6/61 (UPASI-9) respectively. While Craigmores-6017 is acknowledged as a quality clone B/6/61 is known for its high yield and drought tolerance. The method of cleft grafting described earlier (Haridas, 1979) was followed.

The composite plants (15 months old) were planted in the field in June 1988 at a spacing of 120 cm x 75 cm. For comparison purposes plants of scion, stock and standard clone (TRI 2025) of same age were planted making the number of treatments (clones) four. Each treatment consisted of 21 plants and eight replications. The plants were established in the field as per normal cultural practices. Centering of plants was carried out 11 months after planting (i.e. May 1988) at a height of 23 cm from ground level. Data on weight of pruned branches of plants in each of the replications were recorded when centering was carried out (Table I). Plucking of trial plots was commenced in July 1989 maintaining the height

ACKNOWLEDGEMENTS

The authors are grateful to Dr. MR. Sethuraj, Director, Rubber Research Institute of India for encouragements given in carrying out the study and also for permitting to present the paper in this forum. Our sincere thanks to the supporting staff of Botany Division for the wholehearted assistance rendered in conducting the study is also recorded. Thanks are also due to Mr. G. Subbarayalu, Statistician, for analysing the data in time. We also acknowledge the co-operation extended by the Plantation Corporation of Kerala Limited for conducting this trial in their estate.

REFERENCES

ANG, B.B. and SHEPHERD, R. 1979. Promising new Prang Besar rubber clones. *Proc. RRIM Plrs. Conf.* pp. 219-229.

ANONYMOUS. 1983. RRIM planting recommendations, 1983-85. *Plrs. Bull.* No. **175**: 37-55.

ANONYMOUS. 1986. RRIM planting recommendations, 1986-88. *Plrs. Bull.* **186** : 4-22.

ANONYMOUS. 1989. RRIM planting recommendations, 1989-91. *Plrs. Bull.* **198** : 3-23.

BHASKARAN NAIR, V.K. and GEORGE, P.J. 1968. Indian clones RRII 100 series. *Rubb. Bd. Bull.* **10** : 115-140.

BHASKARAN NAIR, V.K. and JOSEPH G. M. 1975. Report on the performance of RRIM clones in India (500 & 600 series). *Rubb. Bd. Bull.* **12** : 41-49.

BHASKARAN NAIR, V.K. and JOSEPH G. M. 1981. Performance of some RRII clones in India. *Proc. PLACROSYM* **4** : 262-269.

JOSEPH G. M., U. 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** (Supplement) : 377-381.

JOSEPH G. M., SARASWATHY AMMA, C.K. and GEORGE, P.J. 1980. Crop improvement of *Hevea* through ortet selection in India. *Int. Rubb. Conf., India, 1980.*

NAZEER, M.A., GEORGE, P.J., PREMAKUMARI, D. and JOSEPH, G. M. 1988. Evaluation of certain primary and secondary *Hevea* clones in large-scale trial. J. Plantn. Crops **18** (Suppl.) : 11-16.

PAARDEKOOPER, E.C. 1965. R.R.I.M. Planting Manual No. **11**. *Rubb. Res. Inst. Malaya,* 135 p.

SARASWATHY AMMA, C.K., JOSEPH, G. M. and PANIKKAR, A.O.N. 1988. Rubber Planting Materials: A Review. 1. Classification and choice of planting materials. *Rubber Reporter* **12** : 149-151.

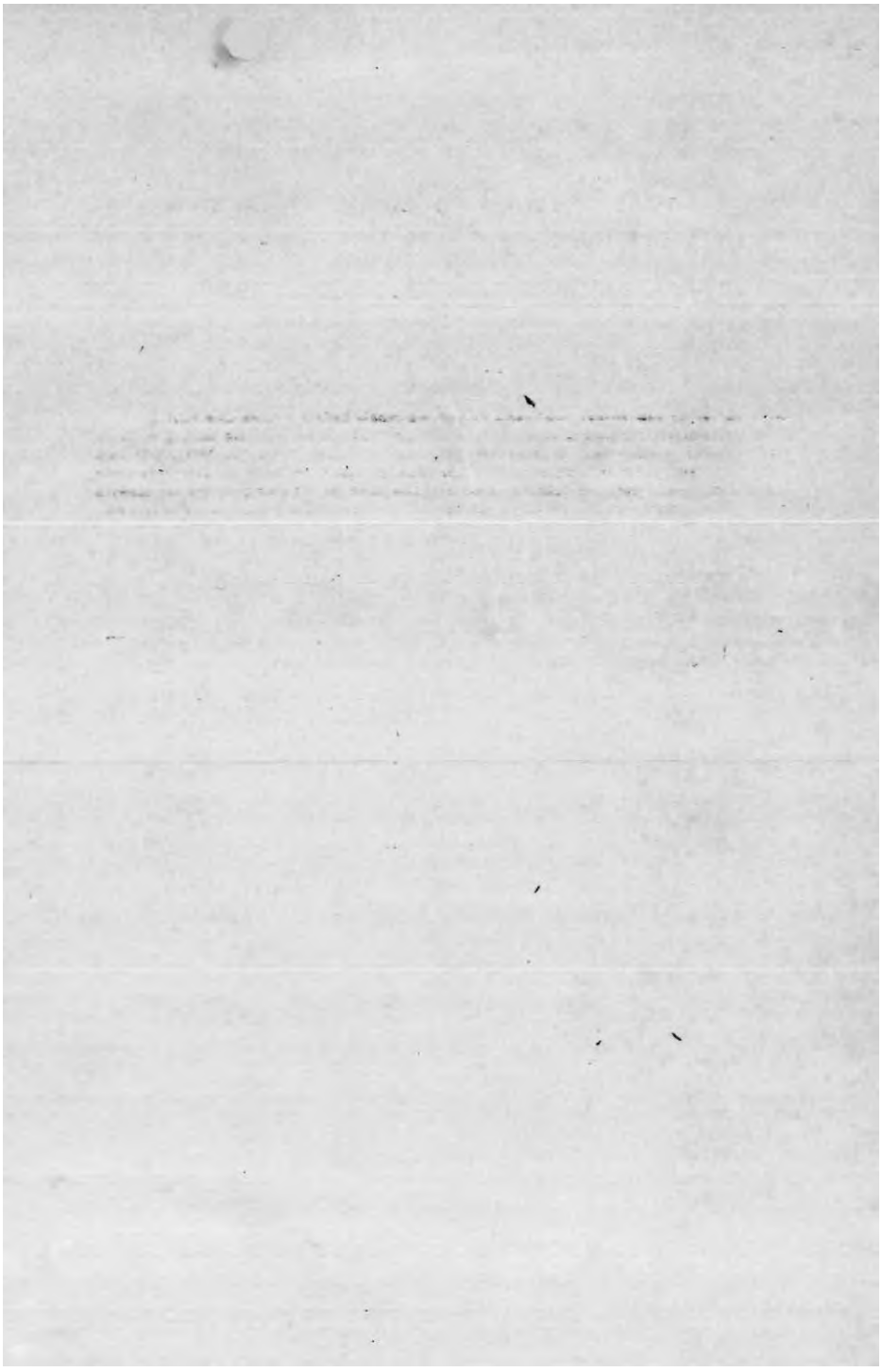

Table III. Susceptibility of the rubber clones to wind damage

Clone	Trees damaged by wind (%)			
	Uprooting	Branch snap	Trunk snap	Total
Tjir 1	Nil	9.1	27.2	36.3
RRII 5	7.1	Nil	3.6	10.7
RRII 104	Nil	3.8	Nil	3.8
RRII 116	Nil	Nil	4.5	4.5
RRIM 513	Nil	Nil	Nil	Nil
RRIM 519	Nil	Nil	4.2	4.2
RRIM 600	Nil	Nil	10.7	10.7
RRIM 628	Nil	3.3	10.0	13.3
PB 206	4.0	Nil	4.0	8.0
PB 213	3.2	Nil	6.5	9.7
PB 217	Nil	3.2	3.2	6.4
PB 5/76	Nil	Nil	Nil	Nil

Table IV. Susceptibility of the rubber clones to diseases

Clone	Incidence of diseases			
	Pink (%)	Brown bast (%)	Abnormal leaf fall (intensity)	Powdery mildew (intensity)
Tjir 1	Nil	9.1	Severe	Very severe
RRII 5	Nil	21.4	Severe	Severe
RRII 104	Nil	15.4	Severe	Severe
RRII 116	Nil	13.6	Moderate	Very severe
RRIM 513	Nil	11.7	Moderate	Severe
RRIM 519	Nil	29.2	Moderate	Severe
RRIM 600	10.7	25.0	Very severe to severe	Moderate
RRIM 628	16.7	23.0	Moderate	Moderate
PB 206	4.0	8.0	Severe	Very severe
PB 213	3.2	12.9	Moderate	Moderate
PB 217	3.2	3.2	Severe to moderate	Severe
PB 5/76	7.7	19.2	Severe	Severe

of the mean annual yield. Data on annual yield, summer yield, girth, girth increase and bark thickness were statistically analysed.

RESULTS AND DISCUSSION

The clones under evaluation showed very wide variation in yield (Table I). However, only three clones viz. RRII 5, PB 213 and 217 showed any significant superiority over the control in this aspect. Yield of RRIM 600, generally considered a high yielder, was not very encouraging in this trial. Five clones exhibited rising yield trend whereas in two clones it was declining. Three clones showed rising yield trend in virgin bark with a fall in yield in renewed bark. In one clone (PB 206) the trend was declining

both in the virgin bark and in the renewed bark. High yield potential of RRII 5 has already been reported (Joseph *et al.* 1980). PB 217 is also considered a fairly good yielder (Anonymous, 1989). However, the performance of RRIM 600 was different from its reported performance (Anonymous, 1989). Among the clones under evaluation, RRIM 513 was found to be the poorest yielder and RRII 5 the highest.

Three clones viz. PB 217, RRII 116 and PB 206 were found to give significantly superior yield during summer compared to control (Table I). Summer yield of PB 217 has been reported to be good under Malaysian condition also (Anonymous, 1986). RRII 116 also is reported to give high yield during summer.

Analysis of the girth of the clones, recorded 23 years after planting, has indicated that no clone is significantly superior to the control (Table II). RRIM 628 was the least vigorous among all the clones.

PB 217, PB 5/76 and RRII 116 were found to exhibit better girth increment on tapping (Table II). RRIM 628 was found to be very poor in this character also when compared with other clones.

All clones were found to be on par with or inferior to the control in respect of girth increment before tapping (Table II). PB 213 was the poorest among all the clones in this aspect.

No clone except RRII 104 was found to possess significantly thicker renewed bark than that of control (Table II). Performance of RRIM 600, which generally shows good bark renewal (Anonymous, 1983), was not promising in this trial.

All forms of wind damage viz. uprooting, trunk snap and branch snap occurred in the trial (Table III). Two clones were completely resistant to this malady. Nine clones were affected by trunk snap and four clones damaged by branch snap while three clones succumbed to uprooting. Among the clones under evaluation, RRIM 600, which is reported to be comparatively resistant to this form of damage (Anonymous, 1989), exhibited more resistance against this form of damage compared to control.

Only six clones viz. RRIM 600, RRIM 628, PB 206, PB 213 PB 217 and PB 5/76 were infected by pink disease (Table IV). The disease was most severe in RRIM 628 (16.7%) and RRIM 600 (10.7%) whereas, in the other four clones incidence was less than 8 per cent. RRII clones were found to be completely free from this disease while all PB clones were found to be susceptible. High susceptibility of RRIM 600 and RRIM 628 to this disease has been reported from Malaysia also (Anonymous, 1983).

All clones were affected by brown blast. Percentage of affected trees was above 20 in RRIM 519, RRIM 600, RRIM 628 and RRII 5 (Table IV). PB 217 showed maximum resistance. RRIM clones were generally found to be more susceptible. Contrary to the general belief, even clones like RRIM 519 which are not very high yielding exhibited very high susceptibility to brown blast. RRIM 600 and PB 217 are reported to be resistant to this malady in Malaysia (Anonymous, 1989). Only PB 217 showed resistance whereas RRIM 600 was found to be highly susceptible.

All clones were found to be susceptible to abnormal leaf fall caused by *Phytophthora* spp. Intensity of leaf fall varied from moderate to very severe in different clones (Table IV). RRIM clones in general, except RRIM 600, exhibited moderate leaf fall. Intensity of the disease showed variation in different years in the case of RRIM 600 and PB 217. Even though PB 217 is reported to be highly susceptible to this disease in Malaysia (Anonymous, 1989), in this trial it was not very severely affected.

All clones were infected by powdery mildew, intensity of infection varying from moderate to very severe (Table IV). Both the highest yielding clones were found to be affected severely. Susceptibility of clones like PB 217 to *Oidium* is noted in Malaysia also (Anonymous, 1986). PRIM 600 considered to be somewhat resistant to this disease (Anonymous, 1989) showed the same trend in this trial also. In overall performance, RRII 5, RRII 116 and PB 217 were found to be better than the other clones.