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NURSERY EVALUATION OF CLONAL SEEDLINGS OF *HEVEA BRASILIENSIS* MUELL. ARG.

By

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ABSTRACT

Open pollinated clonal seeds from five modern clones of Hevea brasiliensis *were collected, germinated and the seedlings raised in the nursery in a randomized block design. The growth characteristics were studied in the nursery stage. The seedlings were budgrafted with a common scion donor and the budtake on these seedlings was observed. The results revealed that there is significant variation with regard to diameter of seedlings of different clones at the buddable stage. The heritability for this trait was 62 per cent. The budding success also showed clonal variation. The success was low for stocks genetically related to the scion, indicating that there is a certain level of genetic influence on successful budtake.*

INTRODUCTION

During the initial stages of rubber cultivation the rubber tree, *Hevea brasiliensis* Muell. Arg., was propagated exclusively by seeds. After the perfection of the budgrafting technique, by Van Helten in 1917, the vegetative method of propagation became popular. Seedlings, however, are indispensable as stock plants for budgrafting. In India root stocks are usually raised from assorted seeds collected from commercial fields. As the budgrafting method became the accepted method of propagation, the relationship between stock and scion assumes importance. Stock-scion interaction had been established in fruit crops like apple and pear (Hartmann and Kester, 1968). Some attempts have been made to identify *Hevea* clones whose seedlings are comparatively better stocks for certain scions. There is a good range of modern cultivars comprising of secondary and tertiary clones. It may be expected that the seedlings from different clones may show variation in growth. Hence, evaluation of the seedling population from various clones is of importance. Work on this aspect has already been initiated in Sri Lanka, Indonesia and Malaysia (Fernando and De Silva, 1971 ; Bahtiar and Syafar, 1981 ; Ng Al Peng, 1983). The present study was taken up with a view to study the early performance of the seedlings of a few clones as stock plants.

MATERIALS AND METHODS

Open pollinated seeds of five *Hevea* clones, RRII 105, RRII 118, RRII 203, RRIM 600 and GT 1 were included in the study. The origin of these clones is given in Table 1. The seeds were germinated in the normal manner. 120 germinated seeds from each clone were planted in the nursery in a randomized block design with three replications of 40 seedlings per plot. The planting was done in four rows of ten points each and the data were collected from the sixteen inner plants. Measurements of height were taken at the 3rd, 6th and 10th month of planting. At 10 months age, the diameter just above the collar region and number of leaves of the seedlings were also recorded. These seedlings were budded with RRII 105 as the scion and the budding success was ascertained.

Table 1. *Materials*

Clone	Parentage	Origin
RRII 105	Tjir 1 × Gl 1	India
RRII 118	Mil 3/2 × Hil 28	India
RRII 203	PB 86 × Mil 3/2	India
RRIM 600	Tjir 1 × PB 86	Malaysia
GT 1	Primary clone	Indonesia

RESULTS AND DISCUSSION

The mean diameter, height and number of leaves of the seedlings belonging to different clones showed variation at 10 months of age (Table 2). Seedlings of RRII 203 recorded the maximum height followed by those of RRII 118 and GT 1. With regard to diameter, the seedlings of GT 1 showed highest vigour followed by those from RRII 118 and RRII 203. GT 1 seedlings also showed the highest number of leaves. The data were subjected to statistical analysis and significant variation between clones was recorded only in the case of diameter (Table 2). Seedlings of GT 1, RRII 118, and RRII 203 showed significant superiority in terms of diameter compared to the seedlings from the other clones. The components of variance for diameter are given in Table 3. Heritability for diameter was found to be high. High genotypic variance and high heritability indicate the involvement of additive genetic action for this character.

Table 2. *Mean height and diameter of seedlings at 10 months*

Clone	Height (cm)	Diameter (mm)	Total number of leaves
RRII 105	142·2	13·83	22·6
RRII 118	162·7	16·54	29·9
RRII 203	163·2	15·11	27·6
RRIM 600	142·0	13·52	28·8
GT 1	158·8	16·63	31·1
S. Em	6·94	0·61	2·31
C.D	N.S.	1·99	N. S.
CV %	7·82	6·94	14·29

Table 3. *Components of variance for diameter*

Phenotypic coefficient of variance	—	11·00
Genotypic coefficient of variance	—	9·914
Heritability (h^2)	—	0·6169
Genetic advance at 5% selection interval	—	2·14

The seedlings of clones RRII 118, GT 1 and RRII 203 showed high budding success (75 to 76%), while seedlings of RRII 105 and RRIM 600 gave only 49 and 56 percent, respectively. The percentage of budding success is depicted in Table 4. The low budding success obtained on seedlings of clones RRII 105 and RRIM 600 may be due to the genetic relationship of the scion. In this context it may also be recalled that Tjir 1 is a common parent for both the clones. The present observations thus indicate low budding success where the stock and scion are genetically related.

Table 4. *Percentage of budding success*

Clone	Total number budded	Success	Percentage
RRII 105	41	20	49
RRII 118	42	32	76
RRII 203	40	30	75
RRIM 600	32	18	56
GT 1	42	32	76

Significant difference in vigour has been already noticed in certain clonal seedling families (Bhaskaran Nair, 1966 ; Anonymous, 1966). Vigorous seedlings can make available a greater number of stock plants for budding. Variation of yield and girth within clones has been more often attributed to local environmental factors and also to different genotypes of the rootstock (Gordon Haskell, 1961). The rhythm of growth is genetically determined and is related to vigour. The diameter of the seedling can be used as a parameter for nursery selection (Jayasekera and Senanayake, 1971). Results of the experiments conducted in Malaysia have shown that there is rootstock effect on scion growth and yield (Ng Al Peng, 1983). As the early growth of the scion will depend on the vigour of the stock, it is always desirable to use more vigorous seedlings as stock plants. The study revealed that seedlings belonging to different clones show variation in growth vigour. In addition budtake also appeared to be influenced by genetic relations to some extent. Selection of seeds for raising stock seedlings is therefore important. The genetic influence of stock-scion interaction at different phases of growth also deserves detailed study.

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