Indian J. Nat. Rubb. Res. 1 (1): 18-21, 1988.

ASSOCIATION OF CHARACTERS IN HAND POLLINATED PROGENIES OF *HEVEA BRASILIENSIS* (WILLD. EX ADR. DE JUSS) MUELL. ARG.

J. Licy and D. Premakumari

Licy, J. and Premakumari, D. (1988). Association of characters in hand pollinated progenies of *Hevea brasiliensis* (Willd. Ex Adr. de Juss) Muell. Arg. Indian J. Nat. Rubb. Res. 1 (1): 18-21.

Nursery evaluation of sixty three genotypes of *Hevea*, obtained from 1982 hand pollinations was carried out for yield and related characters like plant height, girth, number of latex vessel rows and bark thickness. Simple, partial and multiple correlations of the variates were estimated. Yield on test tapping was positively correlated with all other characters. Plant height showed significant correlation with girth. Girth and number of latex vessel rows showed significant positive correlation with bark thickness. Studies on partial correlation revealed that number of latex vessel rows is the most important character influencing the nursery yield. The characters studied could explain 43 per cent of yield variability in the nursery stage.

Key words – *Hevea brasiliensis*, Progeny analysis.

J. Licy (corresponding author) and D. Premakumari, Rubber Research Institute of India, Kottayam – 686 009, India.

INTRODUCTION

Yield is a complex polygenic character and is dependent on a number of components. A knowledge of the association of quantitative characters, especially of yield and its attributes, will be of immense practical value in crop breeding programmes. Selection pressure can be profitably exerted on any of these easily descernible characters having close association with yield (Kamalam et al, 1978). Thus how selection pressure on one character brings about changes in other traits is worth studying. Correlation studies between various yield components at nursery stage have established the influence of vigour, bark thickness and number of latex vessel rows on the yield of *Hevea* clones (Narayanan and Ho, 1973; Ho et al, 1973). In the present paper correlations of four characters with nursery yield in 63 hand pollinated progenies of *Hevea brasiliensis* are reported.

EXPERIMENTAL

The materials comprised of sixty three genotypes resultant of 1982 hand pollinations in five cross combinations maintained in the nursery at RRII (Table 1). The five parental

Table 1. **Genotypes and their parentage**

Genotypes	Gross combinations	Total No.
82/1 — 82/29	RRII 105 x RRIC 100	29
82/30 — 82/32	RRII 105 x PR 107	3
82/33 — 82/35	RRII 105 x PB 5/51	3
82/36 — 82/52	GT 1 x RRIC 100	17
82/53 — 82/63	GT 1 x RRII 105	11
		63

clones selected were RRII 105, RRIC 100, GT 1, PB 5/51 and PR 107. Characters of the parental clones are listed below.

RRII 105: This is a promising clone evolved by the Rubber Research Institute of India. Initial yield and yield during subsequent years were high. It is a partially wintering clone. The clone has a fair degree of tolerance to abnormal leaf fall disease as well as to drought. Virgin bark and renewed bark are of above average thickness. Bark contains a high number of latex vessel rings.

RRIC 100: This is a high yielding clone developed by the Rubber Research Institute of Sri Lanka. The clone has fairly high vigour. Slightly tolerant to abnormal leaf fall and powdery mildew. Agro-climatically suitable for planting in wet zone.

GT 1: This is a high yielding primary clone developed at the Gondang Tapen estate in Indonesia. This clone shows a rising yield trend with average initial yield and high subsequent yield. Summer yield is high. Shows good tolerance to pink disease and brown bast, average to above average tolerance to powdery mildew and wind damage and average to below average tolerance to *Phytophthora* disease. This clone withstands high intensity tapping. Thickness of virgin bark is average.

PB 5/51: This is an average yielder with high summer yield. Tolerance to *Phytophthora* disease and pink disease is average and that to brown bast below average. Highly resistant to wind damage owing to its peculiar branching habit. Virgin bark thickness is average.

PR 107: This is a fairly high yielding primary clone developed in Indonesia. Vigour at opening is average. Both virgin bark and renewed bark have good thickness. Summer yield is high. Tolerance to pink and powdery mildew is average and highly resistant to wind damage and brown bast.

The progenies were planted in the nursery as family blocks, at a spacing of 30 cm, during September 1982. The seedlings were test tapped consecutively for a period of four months beginning at the age of 18 months. Observations on yield (x_1) was recorded as gm/tree/10 tappings. Observations on plant height (x_2) and girth at 20 cm from the ground (x_3) were recorded. Bark samples were collected from a height of 15 cm from the ground level and radial longitudinal sections were prepared and observations on number of latex vessel rows (x_4) and bark thickness (x_5) were recorded. Simple, partial and multiple correlations were calculated following Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Simple correlation coefficients among test tapped yield and related characters are presented in Table 2. All the four characters i.e., plant height, girth, number of latex vessel rows and bark thickness had highly significant positive correlations with yield. This is in agreement with the findings of Tan and Subramaniam (1975) based on diallel population analysis in *Hevea*. However, plant height was not included in their study. The results are also in conformation with the findings of Narayanan *et al* (1974) who established positive correlations of yield with girth, bark thickness and number of latex vessel rings in clonal nursery studies. Plant height showed highly significant positive correlation with girth, but negative and non-significant correlation with the number of latex vessel rows and non-significant correlation with bark thickness. Girth showed negative association with the number of latex vessel rows, while it showed significant correlation with bark thickness. Number of

Table 2. **Simple correlation coefficients among nursery yield and related characters in** *Hevea*

	Plant height x_2	Girth x_3	No. of latex vessel rows x_4	Bark thickness x_5
Yield x_1	0.5179**	0.4880**	0.3577**	0.3835**
Plant height x_2		0.8431**	-0.0345	0.2313
Girth x_3			-0.009	0.2922**
No. of latex vessel rows x_4				0.3703**

** Significant at 1% level

Table 3. Partial correlation coefficients among nursery yield and related characters in *Hevea*

	Plant height x_2	Girth x_3	No. of latex vessel rows x_4	Bark thickness x_5
Yield x_1	0.2773*	0.0758	0.3647**	0.1603
Plant height x_2		0.7747**	-0.1387	-0.0545
Girth x_3			-0.0634	0.1709
No. of latex vessel rows x_4				0.2992*

* Significant at 5% level
** Significant at 1% level
Multiple correlation = 0.6566**

latex vessel rows exhibited highly significant correlation with bark thickness.

The partial correlation coefficients of the different characters with yield are shown in Table 3. Partial correlation coefficient of yield with number of latex vessel rows was found to be the highest ($r = 0.3647^{**}$; $P < 0.01$). Plant height also showed significant correlations with yield and girth when the other characters were kept constant. Partial correlation between bark thickness and number of latex vessel rows was also significant. The highly significant partial correlation coefficient for number of latex vessel rows in the present studies confirmed the importance of this character in selecting for yield. The importance of this trait as an yield component also had been reported earlier (Ho et al, 1973).

The multiple correlation of the characters was highly significant ($r = 0.6566$; $P < 0.01$) and revealed that 43 per cent of variation in nursery yield may be explained by the number of latex vessel rows, plant height, girth and bark thickness. From the multiple regression equation;

$$x_1 = -3.0302 + 0.7595\ x_2 + 0.0633\ x_3 + 0.1911\ x_4 + 0.3800\ x_5$$

it may be said that nursery yield is mainly

dependent on plant height, bark thickness, number of latex vessel rows and girth. Since these characters were reported to be governed by additive gene action (Tan and Subramaniam, 1975) selection based on these nursery characters may prove worthy.

ACKNOWLEDGEMENTS

We are grateful to Dr. A. O. N. Panikkar for his interest in this work and for critically reviewing the manuscript. We are also thankful to Dr. M. R. Sethuraj, Director of Research, RRII for providing necessary facilities for conducting the work and to Mr. G. Subbarayalu, for statistical analysis of the data.

REFERENCES

Ho, C. Y., Narayanan, R. & Chen, K. T. (1973). Clonal nursery studies in *Hevea*. I. Nursery yields and associated structural characters and their variation. *Journal of Rubber Research Institute of Malaysia*, **23**: 305–316.

Kamalam, P., Licy, J. & Hrishi, N. (1978). Association of characters in some selfed progenies of Cassava, *Manihot esculenta* (CRANTZ). *Journal of Root Crops*, **4**: 27–29.

Narayanan, R. & Ho. C. Y. (1973). Clonal nursery studies in *Hevea* II. Relationship between yield and girth. *Journal of Rubber Research Institute of Malaysia*, **23**: 332–338.

Narayanan, R., Ho, C. Y. & Chen, K. T. (1974). Clonal nursery studies in *Hevea*. III. Correlation between yield, structural characters, latex constituents and plugging index. *Journal of Rubber Research Institute of Malaysia*, **24**: 1–14.

Panse, V. G. & Sukhatme, P. V. (1967). *Statistical methods for agricultural workers*, ICAR, New Delhi.

Tan, H. & Subramaniam, S. (1975). A five parent diallel cross analysis for certain characters of young *Hevea* seedlings. *Proceedings of International Rubber Conference, Kuala Lumpur*. Vol. II, RRIM, Malaysia. : 13–26.