Variability And Character Associations In Wild *Hevea Germplasm*

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The extremely narrow genetic base of cultivated rubber (*Hevea brasiliensis*) in the Asian countries is limiting further genetic advance in the crop. In this context, collection, conservation and evaluation of wild genetic resources of *Hevea* from its centre of origin in the Amazon rainforests has become vital in order to broaden the genetic base and introduce new genes for incorporation into cultivated clones. Hence, an exploration was organised by the International Rubber Research and Development Board (IRRDB) and the Agricultural Research Agency (EMBRAPA) of Brazil in 1981, in the Brazilian states of Acre (AC), Mato Grosso (MT) and Rondonia (RO). A huge quantity of wild germplasm was collected. In India, a total of 4967 accessions have been established in conservation nurseries in the traditional and non-traditional regions. These are being conserved, characterized and evaluated with the final objective of broadening the genetic base and identifying sources of desirable genes.

Yield in *Hevea* is a complex character and is influenced by various agromorphological, physiological and anatomical traits. Therefore, a knowledge of the variability and correlation between yield and other related traits and also their direct and indirect effects on yield will help early identification of the genotypes with desirable attributes. Hence, a study was carried out in a sample of wild *Hevea* germplasm.

The germplasm materials introduced into India were multiplied and planted in nurseries at a spacing of 1 x 1 m. A total of seventy five genotypes, with five plants per genotype, were selected for the study at the age of 4 years. RRII 105, the popular high yielding clone developed in India, was used for comparison. The characters studied include plant height, crotch height, girth of the plant, single leaf area, bark thickness, number of laticifer rows (NLR) and test tap yield.

The data collected were subjected to statistical analysis. Simple correlations and path co-efficient analyses were done. A wide range of variation in mean values was noted for most of the traits studied (Table 1). Most of the wild genotypes gave very low test tap yield, as expected, though one accession came very close to the yield of the control. Maximum variability was observed for test tap yield. The wild germplasm, in general, had much larger leaves and higher crotch height, though the mean plant height was on par with the control. The average performance for other traits was below that of the control. Accessions with potential superiority over control for individual traits have been located for further confirmation and incorporation in breeding programmes.

Correlation and path analyses were carried out in order to identify the pattern of associations in wild germplasm, for identifying traits that could be used in selection. The simple correlation matrix (Table 2) revealed that the test tap yield was positively correlated with bark thickness, girth, and NLR. Girth, in turn, was positively correlated with bark thickness, while bark thickness was negatively correlated with

Table 1. Mean and coefficient of variation in wild *Hevea* germplasm.

Character	Wild genotypes		General mean	Coefficient of variation	Control (RRII 105) mean
	Minimum	Maximum			
Plant height (m)	3.50 (RO 2890)	7.60 (AC 3013)	5.85	14.86	5.86
Crotch height (m)	0.72 (RO 2629)	6.50 (MT 2529)	2.07	82.58	0.86
Leaf area (cm^2)	46.37 (RO 2729)	152.48 (AC 2686)	88.22	33.26	65.51
Girth (cm)	14.34 (RO 2906)	27.70 (MT 2217)	19.26	13.90	21.54
Bark thickness (mm)	2.06 (RO 3032)	4.80 (RO 2629)	3.25	12.90	4.10
Laticifer rows	3.20 (RO 3032)	7.60 (MT 2217)	4.55	13.98	6.00
Test tap yield ($g\ t^{-1}\ t^{-1}$)	0.05 (RO 2856)	1.57 (RO 2629)	0.17	151.36	1.70

Table 2. Correlation matrix for seven characters in wild *Hevea* germplasm

Character	Plant height	Girth	Crotch height	Leaf area	Bark thickness	Laticifer rows
Girth	0.520**					
Crotch height	0.287*	0.021				
Leaf area	-0.095	-0.056	0.052			
Bark thickness	0.068	0.471**	-0.258*	-0.117		
Laticifer rows	0.134	0.172	-0.037	0.049	0.155	
Test tap yield	0.113	0.345**	-0.143	-0.128	0.372**	0.310**

*, ** Significant at 5% and 1% levels, respectively

Table 3. Direct and indirect effects of six traits on yield

Character	Plant height	Girth	Crotch height	Leaf area	Bark thickness	Laticifer rows	Total correlation with yeild
Plant height	-0.023	0.113	-0.022	-0.001	0.015	0.032	0.113
Girth	-0.012	0.217	-0.002	-0.001	0.101	0.041	0.345
Crotch height	-0.007	0.005	-0.078	0.001	-0.055	-0.009	-0.143
Leaf area	0.002	-0.012	-0.004	0.016	-0.003	-0.012	-0.128
Bark thickness	-0.002	0.102	0.020	0.000	0.214	0.037	0.372
Laticifer rows	-0.003	0.037	0.003	-0.001	0.033	0.240	0.310

Residual factor = 0.873

crotch height. The highest correlation was obtained between plant height and girth. Plant height was also positively correlated with crotch height. No significant correlation, however, could be detected between single leaf area and any other traits.

Number of latex vessel rows was found to have the highest direct effect on yield followed by girth and bark thickness (Table 3). The total effect of NLR on yield was mainly through its direct effect. Similarly, the direct effects of girth and bark thickness on yield were fairly large. The positive correlation between these traits and yield was mainly through their direct effects. The correlation between bark thickness and yield was also boosted by the indirect positive effect of bark thickness through girth.

The results indicate that among the parameters studied number of latex vessel rows, girth and bark thickness were the most important traits contributing to juvenile yield. The present investigation has revealed that the expedition has been successful in introducing the much needed variability in this crop.