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CORRELATION AND PATH COEFFICIENT STUDIES OVER ENVIRONMENTS IN RAMIE (*Boehmeria nivea* L. GAUD.)

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Forty ramie genotypes were raised in a randomized block design with three replications considering three dates of cuttings as three environments to study the correlation and path coefficients among nine morphological traits and yield attributes. The correlation studies revealed that every characters showed a highly significant positive correlation with fibre yield and among themselves both at phenotypic and genotypic levels. The path coefficient analysis at genotypic level revealed that number of effective canes had the maximum positive direct effects on fibre yield while the maximum negative direct effect was produced by fresh weight of plant.

Key words : Ramie, *Boehemeria nivea*, correlation, fibre yield, path coefficient

Ramie (*Bochemeria nivea* L. Gaud.) is a shrub belonging to the family *Urticaceae* which is considered as the strongest among all the natural fibres. In ramie, the fibre yield is influenced by a number of yield attributing traits. Therefore, information regarding the association between different yield attributes and also with fibre yield could be very useful for improvement of fibre yield. But the correlation between two characters alone cannot reveal the cause and effect relationship. Separating the correlation coefficients of yield components into direct and indirect effects can be used to understand the exact association. The present investigation was, therefore, undertaken to estimate the genotypic and phenotypic correlations and their direct and indirect effects on fibre yield.

MATERIALS AND METHODS

Forty indigenous and exotic ramie genotypes collected from Ramie Research Station (ICAR), Sorbhog, Assam and some ramie growing pockets of Assam were evaluated in a randomized block design with three replications maintaining a spacing of 45 cm × 60 cm during 1995-97 in the Experimental Farm of the Department of Plant Breeding and Genetics, Assam Agricultural University, Jorhat. At the time of land preparation, farm yard manure @ 7 tonnes per hectare was applied and when the crop was about two months old a fertilizer mixture of N, P_2O_5 and K_2O @ 20:10:10 kg/ha was applied. The canes were harvested periodically at three dates of cuttings (3 environments) for extraction of fibre. After each harvest, a fertilizer mixture of N, P_2O_5 and K_2O @ 30:15:15 kg/ha was applied for better growth of the plants. Data were recorded on nine morphological and yield attributing traits, viz., plant height (cm), number of effective canes, number of leaves, leaf area (cm^2), basal stem diameter (cm), fresh weight of plant (g), fresh weight of cane (g), fresh weight of fibre (g) and dry weight of fibre (g). Mean data for each genotype in each replication for individual traits were utilized to estimate the genotypic and

phenotypic correlation coefficients and their direct and indirect effects. Correlation and path analysis were worked out by as per model given by Panse and Sukhatme (1957) and Dewey and Lu (1959).

RESULTS AND DISCUSSION

The phenotypic and genotypic correlation coefficients among yield and yield components are presented in Table 1. All the characters showed a highly significant and positive correlation with fibre yield per plant and among themselves. Further, the genotypic associations were higher than the corresponding associations at phenotypic level. Gupta (1977) also reported significant positive association of fibre yield and other yield components both at genotypic and phenotypic levels in white jute. Genotypic correlation chiefly results from linkage, pleiotropic action of genes and effect of selection; they acted either individually or jointly. It is, therefore, necessary to have precise information to choose appropriate yield contributing characters in improvement programme.

The genotypic correlation were further partitioned into direct and indirect effects to establish the cause and effect relationship among yield and its component characters. The results of path analysis at genotypic level are presented in Table 2. The path coefficient analysis indicated that the number of effective canes (+ 0.75) had the maximum positive direct effect on fibre yield per plant followed by number of leaves (+ 0.43), fresh weight of plant (+ 0.20) and basal stem diameter (+ 0.19). Thus significant positive genetic correlation coefficients observed for these characters with fibre yield could be explained mostly due to their influence on fibre yield. These characters deserve topmost consideration in selection programme for improvement of fibre yield. Roy (1984) reported that number of leaves, fresh

Table 1. Correlation co-efficients at genotypic (r_G) and phenotypic (r_p) levels among fibre yield and other yield attributes over three environments (three dates of cuttings)

Characters	Correlation Co-efficient	Characters							
		Number of effective	Number of leaves	Fresh weight of plant (g)	Fresh weight of cane (g)	Basal stem diameter (cm)	Fresh weight of fibre (g)	Leaf area (cm^2)	Dry weight of fibre (g)
Plant height (cm)	rG	0.84**	0.71**	0.82**	0.80**	0.79**	0.68**	0.85**	0.79**
	rp	0.75**	0.62**	0.77**	0.76**	0.64**	0.63**	0.82**	0.70**
Number of effective canes	rG		0.76**	0.84**	0.79**	0.90**	0.94**	0.80**	0.94**
	rp		0.64**	0.74**	0.72**	0.71**	0.78**	0.72**	0.80**
Number of leaves	rG			0.84**	0.85**	0.71**	0.81**	0.89**	0.81**
	rp			0.75**	0.77**	0.60**	0.62**	0.84**	0.69**
Fresh weight of plant (g)	rG				0.93**	0.86**	0.77**	0.78**	0.81**
	rp				0.90**	0.72**	0.70**	0.75**	0.74**
Fresh weight of cane (g)	rG					0.80**	0.70**	0.80**	0.74**
	rp					0.68**	0.62**	0.77**	0.68**
Basal stem diameter (cm)	rG						0.92**	0.73**	0.86**
	rp						0.74**	0.62**	0.69**
Fresh weight of fibre (g)	rG							0.70**	0.97**
	rp							0.63**	0.92**
Leaf area (cm^2)	rG								0.81**
	rp								0.73**

**Significant at P = 0.01

Table 2. Path analysis of the total correlation observed at genotypic level between fibre yield per plant and other related parameters over three environments (three dates of cuttings)

Characters	Plant height (cm)	Number of effective canes	Number of leaves	Fresh weight of plant (g)	Fresh weight of cane (g)	Basal stem diameter (cm)	Fresh weight of fibre (g)	Leaf area (cm^2)
Plant height (cm)	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Number of effective canes	0.630	***0.750***	0.570	0.630	0.600	0.670	0.700	0.600
Number of leaves	0.300	0.340	***0.430***	0.360	0.370	0.300	0.350	0.380
Fresh weight of plant (g)	0.160	0.160	0.170	***0.200***	0.180	0.170	0.150	0.150
Fresh weight of cane (g)	–0.420	–0.140	–0.440	–0.490	***–0.520***	–0.420	–0.350	–0.420
Basal stem diameter (cm)	0.150	0.170	0.130	0.160	0.150	***0.190***	0.170	0.140
Fresh weight of fibre (g)	–0.04	–0.060	–0.050	–0.050	–0.040	–0.060	***–0.060***	–0.040
Leaf area (cm^2)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	***0.003***
Genotypic correlation coefficient	0.790**	0.940**	0.810**	0.820**	0.740**	0.860**	0.970**	0.820**

Residual effect ± 0.25; **Significant at P = 0.01

weight of stem, basal stem diameter had high positive direct effect on fibre yield. Singh and Tuteja (1989) also reported that fresh weight of plant had high positive direct effect on fibre yield. Besides the high direct positive effect of number of effective canes on fibre yield, the remaining traits contributed high positive effect of number effective canes on fibre yield, the remaining traits contributed high positive indirect effects via this trait. The positive direct effect of number of leaves was high and the remaining traits also exerted high positive indirect effect on fibre yield via this trait. Therefore, it revealed from the study that number of effective canes, number of leaves, fresh weight of plant, basal stem diameter and fresh weight of cane are the most important traits to improve the fibre yield in ramie.

As regards the residual effect it was seen that apart from the variables under study there could be certain factors influencing the fibre yield as was evident from the estimates of residual effect of ± 0.25. In this context characters like top stem diameter, number of nodes, internode length, number of roots, root length etc. could be incorporated in future studies.

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