Inter-relationships of Yield and Yield Components in Sunhemp (*Crotalaria* spp.)

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Improvement in production potential of sunhemp (*Crotalaria* spp.) would certainly go a long way in its use as a green manuring crop. Correlation studies in *Crotalaria* breeding material will help in developing a selection scheme which would help in enhancing the genetic potential of this crop. Such information in *Crotalaria* is not available. The present investigation was therefore designed to work out the component of yield and their direct and indirect effects on its determinants in *Crotalaria.*

The experimental material consisted of eight genotypes of *Crotalaria.* Three out of eight genotypes were received from NBPGR, New Delhi and rest of the five were collected from different places in Haryana. Thus, a total of eight genotypes were sown in a randomized block design with three replications at Plant Breeding Experimental Farm during *kharif,* 2000. Each genotype was sown in six rows of 3 m each placed 45 cm apart with plant to plant spacing of 15 cm in each replication. Data on five randomly selected plants from each genotype in each replication were recorded for days to flowering, plant height, leaves/plant, leaf length, pod length, pods/plant, seeds/pod and seed yield/plant. Correlations and path-coefficients were computed following the methodology of Dewey and Lu (1959).

The correlation coefficients between grain yield and other characters studied are presented in Table 1. In general, the genotypic correlations were of greater magnitude than their corresponding phenotypic correlations indicating that the environmental factors affected both the variables taken at a time at random and lack of association at environmental level. High genotypic correlations also suggested that there was inherent relationship between the characters studied. Seed yield had maximum value of positive correlation with number of pods/plant followed by pod length. This observation that pods/plant is significantly positive correlated with grain yield has also been reported in other legumes, such as chickpea (Pundir *et al.* 1988), lentil (Singh and Singh, 1991; Pandey *et al.* 1992) and in mungbean (Ramana and Singh, 1987). Days to flowering had negative insignificant correlation with grain yield as reported by Ramana and Singh (1987) in mungbean. Days to flowering and plant height are highly positive correlated with each other and both these characters were having significant negative correlation with pods/plant and seeds/pod. This may be because of the increase in vegetative phase due to increase in days to flowering resulting into increase in height of plants which reduces reproductive phase period and so reduces pods/plant and seed/pod. Leaf length showed high positive correlation with number of leaves/plant but had high negative correlation with seeds/pod. Path coefficient analysis using grain yield as dependent variable

Table 1. Genotypic (above diagonal) and phenotypic (below diagonal) correlation coefficients between yield and its components in *Crotalaria* spp.

Character	Days to flower	Plant height	No. of leaves/ plant	Leaf length	Pod length	Pods/ plant	Seeds/ pod	Seed yield/ plant
Days to flower		1.008**	0.129	0.585**	-0.223	-0.504*	-0.712**	-0.187
Plant height	0.920**		0.082	0.374	-0.114	-0.534**	-0.680**	-0.214
Number of leaves/plant	0.102	-0.040		1.070**	-0.096	0.261	-0.213	0.366
Leaf length	0.389	0.422*	0.437*		-0.156	-0.358	-0.607**	0.074
Pod length	-0.190	-0.051	-0.089	-0.168		0.193	-0.299	0.613**
Pods/plant	-0.482*	-0.476*	0.214	-0.231	0.157		0.344	0.779**
Seeds/pod	-0.507*	-0.531**	-0.102	-0.410	-0.184	0.320		-0.149
Seed yield/plant	-0.201	-0.159	0.242	-0.034	0.652**	0.640**	-0.072	

*, ** Significant at 1% and 5% level, respectively.

Table 2. Path coefficients of grain yield/plant vs other characters in *Crotalaria* spp.

Character	Days to flower	Plant height	No. of leaves/ plant	Leaf length	Pod length	Pods/ plant	Seeds/ pod	Seed yield/ plant
Days to flower	**-1.429**	1.018	0.072	-0.274	0.053	-0.340	0.712	-0.187
Plant height	-1.44	**1.009**	0.045	-0.175	0.027	-0.360	0.680	-0.214
Number of leaves/plant	-0.184	0.083	**0.558**	-0.503	0.023	0.176	0.213	0.366
Leaf length	-0.837	0.378	0.599	**-0.468**	0.037	-0.242	0.607	0.074
Pod length	0.318	-0.115	-0.053	0.073	**-0.239**	0.130	0.499	0.613**
Pods/plant	0.520	-0.539	-0.342	0.168	-0.046	**0.675**	0.347	0.779**
Seeds/pod	1.019	-0.687	-0.119	0.284	0.119	0.232	**-0.999**	-0.149

Residual effect = 0.2491 Diagonal values are direct effects

and other characters as independent variables is presented in Table 2. Plant height exhibited largest direct and positive effect on grain yield followed by number of pods/plant and leaves/plant. Plant height and leaves/plant had considerable positive direct effect through number of seeds/pod. The high correlation of grain yield with pod length and number of pods/plant was observed as a result of their indirect contribution through seeds/pod and days to flowering. Residual effect was of low magnitude, suggesting that most of the components contributing to yield have been included in the analysis.

In view of the results discussed above, it may be inferred that selection based on seeds/pod will increase pod length and number of pods/plant *vis-à-vis* the grain yield. The number of pods/plant which is an important yield contributing component is the only direct component through which yield potential of plants may be effectively increased. Singh (1997) also suggested number of pods/plant to be the most important yield component in pulse crops. It is further concluded that selection based on number of pods/plant will be more useful than any other yield component in *Crotalaria*.

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