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Association Analysis of Yield and Its Components in Carrot (*Daucus carota* L.)

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The association analysis of ten cultivars of carrot with diverse origin showed significant associations between yield and length and weight of top and length and diameter of root. The length of root had the highest positive correlation with yield followed by diameter of root. Path analysis revealed that the diameter of root had exerted the highest direct effect. Length and weight of top and length of root exhibited high indirect effects through diameter of root in improving the yield of roots. Thus, the characters like length and diameter of root and length and weight of top will serve as reliable indices in selection of genotypes for high yield in carrot.

Carrot is one of the root vegetables extensively cultivated in the hills and plains. The root yield in carrot, as in other field crops, is a complex character and is dependent on a number of yield components. In the breeding programme, it is necessary to know the importance and association of various yield attributes with yeild and among themselves. The study of association of characters with yield will enable the breeder to fix up characters which have decisive contributory role in influencing yield. The present study was undertaken to estimate the phenotypic and genotypic association of characters with yield and to determine the influence of component characters on yield in carrot.

METERIAL AND METHODS

The study was conducted at the Horticultural Research Station, Kodaikanal, during summer, 1977. The trial was laid out with ten cultivars of carrot having diverse origin in a randomised block design with four replications. The plot size was 3.0m×2.0m and the seeds were sown in rows with a spacing of 30 × 10cm and thinned out to one plant per hill. The cultural practices and plant protection measures were uniform for all the varieties tested. Ten plants were selected at random from each plot for recording yield and other biometric observations. Data collected on number of leaves, length and weight of top and length and diameter of root were subjected to statistical analysis. Phenotypic and genotypic correlation coefficient and path coefficients, were worked out following the procedure suggested by Goulden (1959).

RESULTS AND DISCUSSION

The phenotypic and genotypic correlations between pairs of characters showed that the root yield was positively correlated both phenotypically and

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genotypically with length and weight of top and length and diameter of root, but a negative association was noticed with number of leaves (Table I). The root yield had the highest positive correlation with length of root followed by diameter of root. Significant positive correlations between yield and length of root and yield and weight of foliage were reported by Thamburaj (1973) and Muthukrishnan and Arumugam (1977) in radish, a root crop. The length and weight of top and length and diameter of root also showed significant positive correlations. both at the phenotypic and genotypic levels with all the other characters studied, except the number of leaves. The number of leaves showed negative correlations with other characters, except weight of top, which, however did not attain the level of significance.

Path coefficient analysis showed that the diameter of root exerted the heighest direct influence on yield (Table II). Though the direct effect of weight of top was comparatively low, its indirect effect through diameter of root was considerably high. The direct effects of length of root and length of top were negative. However, high positive correlations were obtained with yield, due to compansatory effect of these characters through diameter of root. The residual effect was low (0.1808) indicating that about 82% of variation in yield was contributed by the five characters studied. Thus, selection of genotypes based on diameter and length of root and length and weight of top will be more effective in improving the yield of roots.

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TABLE I Bhenotypic (P) and Genetypic (G) Correlation coefficients between yield and other characters in carret.

Character		Number of leaves	Length of top	Weight of top	Length of root	Diameter of root
Yield	P	−0.3297*	0.7752**	0.5668**	0.9555**	0.9160**
	G	−0.4749**	0.7263**	0.5189**	0.8794**	0.7988**
Number of leaves	P		−0.2050	0.1623*	−0.3187*	−0.2288
	G		−0.2484	0.1074	−0.5148**	−0.4661**
Length of top	P			0.9204**	0.7677**	0.8826**
	G			0.9617**	0.8551**	0.9556**
Weight of top	P				0.5847**	0.7577**
	G				0.6315**	0.8090**
Length of root	P					0.8683**
	G					0.9862**

* Significant at 5% level

** Significant at 1% level

TABLE II Direct and indirect effects of yield components on yield in carrot.

Characters	Number of leaves	Length of top	Weight of top	Length of root	Diameter of root	Correlation with yield
Number of leaves	0.0638	0.5945	0,0644	0.2663	−1.4639	−0,4749
Length of top	−0.0158	−2.3934	0.5769	−0.4424	3,0010	0.7263
Weight of top	0.0068	−2,3018	0.5998	−0.3267	2.5408	0,5189
Length of root	−0.0328	−2,0466	0,3788	- 0.5173	3.0973	0.8794
Diameter of root	−0.0297	−2.2871	0.4853	−0.5102	3.1405	0.7988

Residual factor = 0.1808

Bold values refer to direct effects.