

Studies on Variability in Asiatic Carrot (*Daucus carota* L)

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A wide variation in height and weight of top growth and number of leaves per plant was observed in Asiatic carrot. The variations in the height and weight of top are additive in nature with high heritability and genetic advance indicating the relative importance of these two traits in selection programme for improvement of Asiatic carrot.

Carrot (*Daucus carota* L) is one of the major root vegetables meeting the Vitamin-A requirement of people. However, the selection indices for production breeding of this crop are not yet perfected and the available information is meagre and inadequate. Hence attempts were made to assess the extent and nature of variability in this root crop and also to study the environmental influence on the genotypes to aid the selection programme.

MATERIALS AND METHODS

Seventeen varieties of Asiatic carrot collected from different regions of India were set out in the field in a randomised block design with three replications at Horticultural Research Station, Kodaikanal. The seeds were sown during March, 1977 along the ridges formed at 30 cm apart and the seedlings were thinned giving 10 cm spacing between plants. The roots were harvested in July-August, 1977. The cultural practices and plant protection measures were uniform for all the varieties. Observations were taken

at the time of harvest on number of leaves, height of top growth, length and girth of root and weight of top and root. The girth of root was taken at the point of maximum width while the length of root was measured from the point of attachment of leaves to the top of root. The data were statistically analysed. The phenotypic and genotypic variances and coefficient of variation were calculated according to the formula of Burton (1952). Heritability in the broad sense and the genetic advance as percentage of the mean to visualise the relative utility of genetic gain were worked out as suggested by Johnson *et al.*, (1955).

RESULTS AND DISCUSSION

The analysis of variance presented in Table I showed that number of leaves/plant, height and weight of top growth are significantly differed. The other three characters viz., length, girth, and weight of roots did not exhibit significant variation. The range and coefficient of variation was the highest

TABLE I. Analysis of variance for six parameters of yield in carrot

Characters	Mean	Range	C. V.	F.	SE _D	CD (P=0.05)
1. Number of leaves/plant	6.72	4.8 to 9.8	19.35	41.2**	0.608	1.277
2. Height of top	26.71	18.7 to 52.4	36.83	112.83**	1.319	2.771
3. Length of root (cm)	10.30	7.5 to 13.5	16.76	1.62 NS	—	—
4. Girth of root (cm)	6.35	4.2 to 9.6	15.51	2.00 NS	—	—
5. Weight of top (g)	14.21	6.8 to 33.0	53.72	5.76**	1.323	2.790
6. Weight of root (g)	36.06	16.0 to 40.0	45.37	0.81 NS	—	—

for the weight of top followed by weight of root and height of top. The length of root, girth of root and number of leaves per plant exhibited low coefficient of variation. Arumugam and Muthukrishnan (1976) observed high coefficient of variation for top weight and root weight in radish.

The variability of the characters presented in Table II showed that the phenotypic as well as genotypic variance were very high for height of

top growth followed by weight of top growth with meagre environmental variance. Though the phenotypic variance was high in the weight of root, the genotypic variance was considerably low indicating the high environmental influence. The variance was very low for all the other characters. Phenotypic as well as genotypic coefficient of variation were higher for weight of top growth followed by height of top growth.

TABLE II. Variance, coefficient of variation, heritability and genetic advance for six characters in carrot

Characters	Variance		Coefficient of variation		Heritability %	Genetic advance	Genetic advance as per cent of mean
	Pheno- typic	Geno- typic	Pheno- typic	Geno- typic			
1. Number of leaves Per plant	0.76	0.58	12.97	11.33	76.00	1.36	20.24
2. Height of top	98.17	97.30	37.10	36.93	99.00	20.21	75.66
3. Length of root	0.87	0.33	9.06	5.58	38.00	0.72	6.99
4. Girth of root	0.26	0.13	8.03	5.68	50.00	0.52	8.19
5. Weight of top	50.71	49.83	50.11	49.68	98.00	14.38	101.20
6. Weight of root	33.96	8.19	16.16	7.94	24.00	2.88	7.99

In addition to that the heritability estimate showed (Table II) that the heritable portion of variation was very high for the two characters viz., height and weight of top growth. Johnson *et. al.* (1955) and Lerner (1958) were of the view that the heritability estimates when used in conjunction with the genetic advance would provide a better information than the heritability estimates alone. In the present investigation height and weight of top growth accounted for high heritability coupled with high genetic advance thus, offering great scope for selection. These two traits are governed by additive gene effects with little environmental influence. Bhagchandani and Choudhury (1972) also recorded that the height of plants was governed by additive genes. Burton (1952) suggested that the amount of advance to be expected from selection could be obtained by the study of genetic coefficient of variation along with the heritability estimates. This is evident in the present investigation as the height and weight of top accounted for wider variation and high heritability along with high genetic advance with low environmental influence. There will be a substantial genetic improvement if selection is practised based on these two characters.

Bhagchandani and Choudhury (1972) observed that the top length was controlled by additive genes while the root length and root weight were governed by both additive and dominant genes the effect of dominant genes being more pronounced. This further lends support to the additive nature of top height. Hence, in the selection for improvement of carrot, the top weight and top height are the two important indices for genetic improvement of asiatic carrot.

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