Genetic Variability in Asiatic Radish

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Radish (*Raphanus sativus* L.) is an important root vegetable grown for its enlarged fleshy roots and tender foliage. Due to high yielding and early maturing nature, it can be easily fit in different cropping systems to get higher returns/unit area. A wide range of variability is available for root and shoot growth characters in radish, which may be utilized for its genetic improvement. Genetic improvement of crop is largely depending on the magnitude of genetic variability and the extent to which desirable traits are heritable. Broad base genetic diversity in the materials has more chances to obtain desired gene, which is great importance to the plant breeders. Earlier workers Lal and Shrivastava (1975) reported high phenotypic and genotypic variability, heritability and genetic advance by utilizing few lines. The success of phenotypic selection depends upon the nature of genetic diversity present in the population. Further partitioning of this variability into heritable and non-heritable component enables to know the effectiveness of selection. Therefore, an attempt was made in the present investigation to estimate the extent of variability, heritability and genetic advance by utilizing fifty-five divergent lines of tropical radish.

The experiment was carried out at the experimental farm, IIVR, Varanasi during *kharif* and *rabi* season, 1998-99. Fifty-five divergent genotypes (lines) were grown in randomized block design with three replication in *kharif* and *rabi* season. All the cultural practices and fertilizers were given as per recommendation for proper growth and stand of the crop as and when required. The observations were recorded on five randomly selected plants on different characters *viz.*- plant height (cm), number of leaves/plant, leaf weight/plant (g), leaf length (cm), root length (cm), root diameter (cm), root weight (g) and root: leaf weight ratio. Data were statistically analyzed as suggested by Panse and Sukhatme (1967).

Statistical analysis revealed highly significant differences among the lines for all the characters in both seasons. EC 339790 and local land races were found promising during *kharif* and NIC-7215 and IIVR-1 during *rabi* season for most of the leaf and root growth parameters (Table 1). Root length was found highest in C-2 (22.67cm) followed by IIVR-1 (22.07cm) during *kharif* season and Mooli Early (32.27 cm) followed by IIVR-1 (32.53cm) during *rabi* season. Root: leaf weight ratio was noticed maximum in RH-7 (2.61) followed by NKD-19 (2.14) during *kharif* season and in Sungro Chetki (2.96) followed by Pusa Chetki (152) during *rabi* season. Genotypic and phenotypic coefficient of variation were maximum in leaf weight (36.67 and 45.58g) followed by root weight (34.67 and 38.38g) and root: leaf weight ratio (30.50 and 38.21) during *kharif* season, whereas, root: leaf weight ratio was found to be maximum (30.71 and 40.07) followed by leaf weight (28.82 and 34.30g) and root weight (26.58 and 32.47g) during *rabi* season, respectively. Some of the

Table 1. Promising accessions identified in Asiatic radish

Characters	Promising accessions	
	Kharif	*Rabi*
Plant height (cm)	EC-339790, IIVR-1, C-2	NIC-7215, Ambala Local, IIVR-1
No. of leaves/plant	RH-16, RH-17, Khari Local	NKD-19, IIVR-3, NIC-72
Leaf weight/plant (g)	EC-339790, R.L. Local, Local-6	NIC-7215, Local Collection-4, NKD-19
Leaf length (cm)	EC-339790, Local-2, Local Collection-5	NIC-7215, Jaunpuri Local, IIVR-1
Root length (cm)	C-2, IIVR-1, EC-11705	Mooli Early, IIVR-1, SN-737
Root diameter (cm)	Chinese Pink, EC-339790, Local-6	Local Collection-4, Local Collection-3, Ambala Local-2
Root weight (g)	Local-6, R.L. Local, EC-339790	Punjab Safed, NIC-7215, NKD-19
Root: leaf weight ratio	RH-7, NKD-119, Mooli Lal Bombay	Sungro Chetki, SN-327, Pusa Chetki

Table 2. Mean performance and genetic parameters for quantitative characters

Characters	Season	Statistical parameter							
		Mean	Max.	Min.	± SE	Genetic advance (%)	Heritability (broad sense)	Coefficient of variation	
								Genotypic	Phenotypic
Plant height (cm)	*Kharif*	49.77	68.80	32.67	2.68	16.75	87.50	17.47	18.68
	Rabi	71.19	82.27	54.93	2.53	11.05	79.10	8.47	9.53
Number of leaves/plant	*Kharif*	13.22	20.80	10.47	1.86	2.04	34.90	12.65	21.41
	Rabi	13.08	16.20	9.73	1.23	1.22	32.30	8.00	14.00
Leaf weight/plant (g)	*Kharif*	105.53	223.33	32.67	14.95	71.89	81.60	36.67	40.58
	Rabi	205.21	328.33	93.33	31.17	102.32	70.60	28.82	34.30
Leaf length (cm)	*Kharif*	34.17	50.07	20.00	3.16	10.03	69.80	17.05	20.42
	Rabi	49.29	53.27	28.13	2.46	9.80	76.50	12.56	14.36
Root length (cm)	*Kharif*	15.54	22.67	9.93	2.07	4.13	53.20	17.60	24.01
	Rabi	22.84	34.27	21.80	2.40	2.53	33.90	7.58	13.02
Root diameter (cm)	*Kharif*	2.98	4.32	2.31	0.33	0.55	47.20	12.93	18.81
	Rabi	3.81	4.61	3.05	0.33	0.41	38.40	8.42	13.58
Root weight (g)	*Kharif*	109.09	223.67	50.33	14.75	70.30	81.40	34.67	38.38
	Rabi	232.64	370.00	128.00	35.69	103.50	66.50	26.48	32.47
Root: leaf weight ratio	*Kharif*	1.12	2.61	0.61	0.21	0.56	63.80	30.50	38.21
	Rabi	1.21	2.96	0.75	0.25	0.59	58.70	30.71	40.07

characters namely, number of leaves, root length, and root diameter were found to be more influenced by environmental factors. The characters such as leaf weight, root weight and root: leaf weight ratio has shown wider range of variability and high co-variance, therefore, indicating an ample scope for effective improvement in these characters. Other characters with low coefficient of variation are indication of less scope of selection. Similar results were reported by Pandey *et al.*, (1981). The estimate of heritability (broad sense) expected genetic advance as percent of mean have been presented in Table 2. The high heritability was recorded for plant height (87.50 and 79.10 cm) followed by leaf weight (81.60 and 70.60 g), root weight (81.40 and 66.50 g) and root: leaf weight ratio (63.80 and 58.70) and lowest for number of leaves (34.90 and 32.30) in both the season. The character which exhibited high heritability suggested that the selection will be more effective, whereas the character showing low heritability, indicated that the selection will be difficult as the expression of genotypes will be affected by the environmental factors (Arumugam and Muth Krishnan, 1975). High heritability estimates in conjunction with high genetic advance is more useful than heritability alone in predicting the results and for selecting the best individual. Leaf weight and root weight exhibited high genetic advance as percent of mean (>70%) alongwith high heritability. This situation might have occurred due to additive gene action. The remaining characters suggested that it might not be possible to bring about a considerable improvement in such character through selection. These results are in agreement with the findings of Sirohi and Kutty (2000).

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