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Genotypic Correlation Co-efficients among Growth and Root Parameters in Radish Genotypes (*Raphanus sativus* L.)

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A B S T R A C T

In the present investigation, root yield per hectare had significant and positive correlations with leaf area, root diameter, root length, root to leaf ratio and root weight both at genotypic and phenotypic level. The trait root diameter was significantly and positively correlated with root length, root to leaf ratio, root weight and root yield per hectare whereas, root length had positive and significant correlation with root to leaf ratio, root weight and root yield per hectare at both genotypic and phenotypic level. Positive and significant correlation was observed for root to leaf ratio with root weight and root yield per hectare at both genotypic and phenotypic level.

Introduction

Radish (*Raphanus sativus* L.) is ancient and popular root vegetable crop commonly known as mooli in hindi and moolangi in kannada and it belongs to the family cruciferae which is eaten as raw or in cooked form. It is grown for fleshy roots and leaves in both tropical and temperate climate. The edible portion of radish is swollen root that develops from primary root and hypocotyl. It is a rich source of Vit-C (ascorbic acid), calcium and minerals.

In India, it was cultivated maximum in states of West Bengal, Bihar, Uttar Pradesh, Punjab, Haryana, Gujarath, Himachal Pradesh, Karnataka (Anon. 2017). Its consumption prevents constipation, increases appetite and useful for curing jaundice, liver disorders and also useful in urinary complaints and piles (Dhananjaya, 2007). In homeopathy, it is used for curing chronic diarrhea, headache and sleeplessness.

As most of the traits of economic importance are complex involving several related traits, the knowledge of correlation between these traits is important (Robinson *et al.*, 1951). The association between two variables which can be directly observed is termed as phenotypic correlation. Phenotypic correlation fails to

give the true picture of relationship between two characters because along with genetic value it is also influenced by the environment.

Therefore, genotypic correlation is essential for studying the real genetic variation in different characters and the manner in which environmental variation affects the expression of such variation. The genetic improvement in dependent trait can be achieved by applying strong selection to a character which is genetically correlated with the dependent character. Therefore, keeping this point of view, the present study entitled Genotypic Correlation Co-efficients among Growth and Root parameters in radish genotypes (*Raphanus sativus* L.) was attempted.

Materials and Methods

The experiment was conducted at Kittur Rani Channamma College of Horticulture, Arabhavi during *kharif* season of 2017-2018 with thirty genotypes of radish which are presented in Table 1. The experiment was laid out in a Randomized Block Design with two replications.

The seeds were sown at a distance of 30 cm between row to row and 15 cm between plants. All the recommended cultural operations were followed and observations were recorded in five randomly selected plants per replication for each genotype for all the characters.

The data was analyzed using INDOSTAT software programme. For the analysis of the data the following statistical methods were exercised, namely analysis of variance, genetic parameters viz., genotypic and environmental variance, environmental co-efficient of variation (Burton and De Vane, 1953) and classified (high/medium/low) as described by Sivasubramanian and Mennon (1973).

Results and Discussion

Correlation studies are used to find out the degree and direction of relationship between two or more variables. Knowledge on degree of association of yield with its components is of great importance, because yield is not an independent character, but it is the resultant of the interactions of a number of component characters in which the plant grow.

Further, each character is likely to be modified by action of genes present in the genotypes of plant and also by the environment and it becomes difficult to evaluate this complex character directly. Therefore, correlation study of yield with its component traits has been executed, to find out the yield contributing traits. In the present study both genotypic and phenotypic correlations were worked out for root yield per hectare and its contributing traits.

In the present experiment, root yield per hectare was significantly and positively correlated with leaf area, root diameter, root length, root to leaf ratio and root weight at both genotypic and phenotypic level (Table 2). Similar trend of results are were observed by Mapari *et al.,* (2009) for number of leaves, root length and days required to harvest; Kumar *et al.,* (2009) for number of leaves, root length, root diameter and root to leaf ratio; Jatoi *et al.,* (2011) for root weight and root diameter; Sivathanu *et al.,* (2014) for root length and root diameter; Mallikarjunrao *et al.,* (2015) for number of leaves, root length, root diameter, root weight; Nagar *et al.,* (2016) for number of leaves and root weight; Naseeruddin *et al.,* (2017) for number of leaves, root diameter and root length.

Since, these yield attributing traits are in appropriate direction, selection for such traits would be more worthwhile in improving the root yield per hectare.

Leaf area was significantly and positively correlated with root diameter, root length, root weight and root yield per hectare. This indicates leaf area is an important trait as it increases the root yield per hectare.

The similar results are observed by Panwar *et al.,* (2003) for root length, root diameter and root weight.

Root diameter had significant and positive correlation with root length, root to leaf ratio, root weight and root yield per hectare at both genotypic and phenotypic level. It indicates if more the root diameter it increases the root yield per hectare. The quite similar results are observed by Sivathanu *et al.,* (2014) for root yield/ha; Mallikarjunrao *et al.,* (2015) for root weight and root to leaf ratio.

Table.1 List of radish genotypes used in the experiment

Sl. No.	Genotype	Source
1	HRESB-6	HRES, Hidkal Dam
2	HRESB-7	HRES, Hidkal Dam
3	HRESB-8	HRES, Hidkal Dam
4	HRESB-9	HRES, Hidkal Dam
5	HRESB-10	HRES, Hidkal Dam
6	HRESB-11	HRES, Hidkal Dam
7	HRESB-15	HRES, Hidkal Dam
8	HRESB-16	HRES, Hidkal Dam
9	HRESB-17	HRES, Hidkal Dam
10	HRESB-18	HRES, Hidkal Dam
11	HRESB-19	HRES, Hidkal Dam
12	HRESB-22	HRES, Hidkal Dam
13	HRESB-24	HRES, Hidkal Dam
14	HRESB-29	HRES, Hidkal Dam
15	HRESB-30	HRES, Hidkal Dam
16	HRESB-32	HRES, Hidkal Dam
17	HUB-1	L C from Karnataka (Kolar)
18	HUB-2	L C from Karnataka (Koppal)
19	White Icicle	YSPHF, Solan (Himachal Pradesh)
20	VRRAD-26	IIVR, Varanasi
21	VRRAD-30	IIVR, Varanasi
22	VRRAD-150	IIVR, Varanasi
23	VRRAD-202	IIVR, Varanasi
24	VRRAD-205	IIVR, Varanasi
25	HUB-3	LC from Punjab(Ludhiana)
26	Japanese White	YSPHF, Solan (Himachal Pradesh)
27	DPR-1	IIVR, Varanasi
28	Palam Hriday	IIVR, Varanasi
29	Pusa Himani	YSPHF, Solan (Himachal Pradesh)
30	Arka Nishant	IIHR, Banglore

Table.2 Genotypic correlation coefficients among growth and root parameters in radish

	1	2	3	4	5	6	7	8
1	**1.00**	-0.2214	0.0142	0.0320	0.1605	0.2189	-0.0127	0.219
2		**1.00**	0.3907**	0.4904**	0.1047	0.4616**	0.1624	0.4616**
3			**1.00**	0.4281**	0.7759**	0.8323**	0.0367	0.8323**
4				**1.00**	0.4015**	0.5959**	0.1932	0.5959**
5					**1.00**	0.8262**	0.2006	0.8262**
6						**1.00**	0.0283	1.00**
7							**1.00**	0.0283
8								**1.00**

Critical r_g value (5%) = 0.254 Critical r_g value (1%) = 0.330 * and ** indicate significant at 5 and 1 per cent probability level, respectively.

1. Number of leaves
2. Leaf area (cm^2)
3. Root diameter
4. Root length (cm)
5. Root to leaf ratio
6. Root weight
7. Days to harvest
8. Root yield/h

Root length was significantly and positively correlated with root to leaf ratio, root weight and root yield per hectare both at genotypic and phenotypic level. The similar kind of results are opined by Mallikarjunrao *et al.*, (2015) for root weight, root to leaf ratio and root yield per hectare; Kaur *et al.*, (2017) with root weight, root to leaf ratio and root yield per hectare.

Root to leaf ratio was significantly and positively correlated with root weight and root yield per hectare at both genotypic and phenotypic level. This indicates that while, selecting for high yielding genotypes in radish, varieties with high root to leaf ratio is considerable. The results are in agreement with the results of Kaur *et al.*, (2017) for root weight and root yield per hectare.

Root weight was significantly and positively correlated with root yield per hectare a both genotypic and phenotypic level. This indicates root weight was an important trait while selecting for high yielding genotypes in radish. The results are in line with the results of Mallikarjunrao *et al.*, (2015), Nagar *et al.*, (2016), Kaur *et al.*, (2017).

From the above preceding discussion, it is reasonable that a great deal of success can be achieved in improvement of root yield per hectare by applying selection pressure on leaf area, root diameter, root length, rot to leaf ratio and root weight as these traits had significant and positive correlation with root yield per hectare.

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