



Research Article

CORRELATION COEFFICIENT ANALYSIS IN CARROT

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Abstract: A significant and negative association of number of leaves per plant at 90 DAS was observed with root yield per plant (-0.261). The correlation of fresh root weight was highly significant and positive associated with root length at 90 DAS (0.399), flesh: pith ratio (0.325) and root yield per plant (-0.267) was recorded significant and negative correlation for the same trait. Root length at 90 DAS showed positive and significant effect on root diameter at 90 DAS (0.271), pith diameter (0.269) and root yield per plant (0.258). Root diameter at 90 DAS exhibited a positive and highly significant association with core diameter (0.335), root yield per plant (0.616), flesh thickness of root at 90 DAS (0.257), leaf: root ratio (0.303) and pith diameter (0.271).

Keywords: Carrot, Correlation, Association

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Introduction

Next to Potato, Carrot is the most popular vegetable in the world. China is the leading producer of Carrot, it accounts about 31% of the world production. There are two main types of cultivated carrot i.e. Asiatic and European. Asiatic carrot called anthocyanin carrot because of their purple and red colour with pubescent leaves, are annual type. The greatest diversity of Asiatic is found in Afghanistan, Russia, Iran and India. Afghanistan is considered as its native place [2]. European carrots have orange, red or white colours with strongly dissected bright leaves. These carrots may have originated in Turkey. Carrot (*Daucus carota* L.) is a popular root vegetable crop suitable for tropical and temperate climate, which is grown throughout the world. Carrot is a major single source of pro-vitamin A, providing 14% to 17% of total vitamin consumption [7]. It contains 495 mg of β -carotene, vitamins, and minerals, which is a good source of calcium, potassium and magnesium. Carrots are good for eyes, skin, bones and muscles. In India it occupies an area of 68 thousand hectares with a production of 10.93 lakh tonnes per hectare (NHB 2014-15) whereas Madhya Pradesh covering an area of 1.90 thousand hectare with production of 32 thousand tonnes per hectare (NHB 2014-15). The knowledge of traits relationship in carrot is very important to exploit the potentiality to develop new variety. There is a need to generate more information on correlation of one trait with others. Hence, present investigation was carried out to estimate the correlation coefficient between yield and its component in carrot at phenotypic and genotypic level.

Material and Methods:

The experiment was conducted at Horticulture complex, Department of Horticulture, J.N.K.V.V., Jabalpur, M.P. in Rabi season during the year 2016-17. Jabalpur is situated in "Kymore plateau and Satpura Hills" agro-climatic region of Madhya Pradesh. It falls on 23.9° North latitude and 79.58° East longitudes with an altitude of 411.8 meters above mean sea level. Jabalpur is situated in the semi-arid region having sub-tropical climate with cool winter and hot dry summer.

The experimental material includes 20 genotypes of carrot were collected from IIVR, Varanasi and local collection.

SN	Genotypes	SN	Genotypes
1	2016/CAR-1	11	2016/CAR-11
2	2016/CAR-2	12	2016/CAR-12
3	2016/CAR-3	13	2016/CAR-13
4	2016/CAR-4	14	C-34(Raj.)
5	2016/CAR-5	15	JC15-1
6	2016/CAR-6	16	JC15- 2
7	2016/CAR-7	17	JC15- 3
8	2016/CAR-8	18	JC15- 4
9	2016/CAR-9	19	JC15- 5
10	2016/CAR-10	20	Pusa Kesar (C)

Result and Discussion

Correlation coefficient analysis

Correlation coefficient was worked out at phenotypic, genotypic and environmental levels for all possible combination of thirteen yield and its attributing characters [Table-1]. A wide range of variation in quantitative characters provides the basis for selection in plant breeding programme. The knowledge of association among the characters is useful to the breeder for improving the efficiency of selection. Correlation coefficient analysis measures the mutual relationship between plant characters and determines the component character on which selection can be made for genetic improvement of yield. Investigation regarding the presence of component and nature of association among themselves is essential and prerequisite for improvement in yield. Correlation coefficient provides a clear picture of the extent of association between a pair of traits and indicates whether simultaneous improvement of the correlated traits may be possible or not. The knowledge of genetic association between yield and its component characters help in improving the efficiency of selection for yield by making proper choice and balancing one component with another.

Table-1 Estimates of genotypic and phenotypic correlation coefficients among root yield and its attributing traits in carrot

Characters		Pla height (cm) at 90 DAS	No.leaves of plant ⁻¹ 90 at DAS	Fresh root weight (g)	Root length (cm) at 90 DAS	Root diameter (cm) at 90DAS	Flesh Thickness of root (cm) at 90DAS	Core diameter (cm)	Leaf: root ratio	Flesh: pith ratio	Pith diameter (cm)	Root yield plant ⁻¹ (g)
Days To germination	G	0.049	0.092	-0.07	-0.087	-0.404	-0.238	-0.053	-0.415	-0.66	0.154	-0.011
	P	0.001	0.08	-0.092	-0.145	-0.184	-0.164	-0.05	-0.289*	-0.359**	-0.006	-0.065
Plant height (cm) at 90 DAS	G		0.255	0.349	0.084	-0.137	0.256	-0.483	-0.008	0.426	-0.046	-0.189
	P		0.212	0.238	0.078	-0.101	0.233	-0.347**	0.066	0.212	-0.014	-0.164
No. of leaves plant ⁻¹ at 90 DAS	G			0.262	-0.044	0.035	0.154	-0.175	0.073	0.088	0.044	-0.284
	P			0.183	-0.055	-0.009	0.146	-0.099	0.053	-0.055	0.024	-0.261*
Fresh root Weight (g)	G				0.566	-0.22	0.118	-0.244	0.259	0.329	-0.29	-0.307
	P				0.399**	-0.153	0.074	-0.232	0.17	0.325*	-0.186	-0.267*
Root length (cm) at 90 DAS	G					0.482	0.017	-0.06	-0.014	0.099	0.265	0.259
	P					0.271*	0.075	-0.081	0.021	0.036	0.269*	0.258*
Root diameter (cm) at 90 DAS	G						0.38	0.572	0.434	0.25	0.41	0.724
	P						0.257*	0.335**	0.303*	0.135	0.271*	0.616**
Flesh thickness of root (cm) at 90 DAS	G							0.101	-0.071	0.697	-0.23	0.161
	P							0.066	-0.052	0.445**	-0.15	0.162
Core diameter (cm)	G								0.283	-0.432	0.57	0.401
	P								0.262*	-0.211	0.337**	0.336**
Leaf: root ratio	G									-0.16	0.259	0.137
	P									-0.206	0.173	0.131
Flesh: pith ratio	G										-0.581	-0.176
	P										-0.246	-0.141
Pith diameter (cm)	G											0.535
	P											0.462**

A positive correlation between desirable characters is helpful to the plant breeder because it helps in simultaneous improvement of both characters. A negative correlation on the other hand shall find the simultaneous expression of both the characters with high values. In such situation some economic compromises have to be made, for crop improvement. The magnitude of genotypic correlation was higher than the phenotypic correlation for all the traits that indicated inherent association between various characters.

Days to germination

Days to germination had a negative and highly significant association with flesh: pith ratio (-0.359) and significant negative association with leaf: root ratio (-0.289) [12].

Number of leaves per plant

A significant and negative association of number of leaves per plant at 90 DAS was observed with root yield per plant (-0.261) [4].

Fresh root weight (g)

The correlation of fresh root weight was highly significant and positive associated with root length at 90 DAS (0.399), flesh: pith ratio (0.325) and root yield per plant (-0.267) was recorded significant and negative correlation for the same trait [8, 13].

Root diameter (cm)

Root diameter at 90 DAS exhibited a positive and highly significant association with core diameter (0.335), root yield per plant (0.616), flesh thickness of root at 90 DAS (0.257), leaf: root ratio (0.303) and pith diameter (0.271), [5, 9, 14].

Conclusion

The correlation coefficient of root length at 90 DAS, root diameter at 90 DAS, core diameter and pith diameter was found significant and positive with root yield per plant.

Application of research: The results of phenotypic correlation coefficient have been discussed only as the mostly influenced by the environmental conditions hence phenotypic correlation will give the correct idea about the association

between two variables.

Research Category: Coefficient Analysis

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