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CORRELATION COEFFICIENT IN PEA (PISUM SATIVUM L.)

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Abstract

Correlation coefficient for 11 characters in 32 strain / varieties of pea (Pisum sativum L.) were studied.. Studies indicated that the genotypic correlation coefficient were higher than the phenotypic correlation coefficient for almost of all the attributes alongwith the consideration of correlation of grain yield/plant and with its contributing characters. Highly significant relationship of grain yield/plant were found to be associated with number of pods/plant, number of primary branches, plant height, pod length and number of seeds/pod . Hence these characters may be taken into consideration during the selection breeding programme.

Keywords: *Pisum sativum (L.), path- analysis, direct and indirect effects, Correlation*

Introduction

Pulse crops had received little attention at the hands of agricultural scientists in the past. This was probably because as late as in the Third Five Year Plan, the per-capita availability of pulses was 60 g/day which could be considered as adequate. Subsequently, with a sharp increase in the population and continued stagnation in the pulse production, the pre-capita availability of pulses has come down to less than 40 g/day at present. Pea is grown all over the world and occupies an area of about 7 million hectares, producing more than 10 million tones annually. It is grown particularly in Asia, Europe and USA. In China and USSR the grain is mostly fed to livestock, while in our country it is used for human consumption as a protein source and occupies a position of considerable value because of its importance in the agriculture economy of the country. India stands next to china and USSR in production. In India the area under pea is 544 thousand hectares with in annual production of 595 thousand tones and average productivity is 10.39 quintals per hectare .Uttar Pradesh is the largest producers in the country contributing about 345 thousand hectares in the area and 481 thousand tones in production and average productivity is 13.94 quintal/hectare. Other important pea growing states are Madhya Pradesh, Bihar, Haryana, Maharashtra and Rajasthan. Yield is a complex character, Influenced by several genetic factors interacting

with environment. The relationship between various characters can be determined with the help of correlation studies. Simple correlation provides information on mutual association only.

Material and Methods

In the present investigation 32 pea *(Pisum sativum*L.) genotypes were planted in a Randomized Complete Block Design with three replications. The each experimental plot consists of 6 rows of 4 m length with 30 cm distance from row to row and 10 cm from plant to plant. The observations were recorded on 10 randomly selected plants per plot for eleven characters. Correlation coefficient measure the degree of mutual association between two variables without employing any cause and effect relationship. This was calculated by means of genotypic and phenotypic correlation coefficients. The genotypic and phenotypic correlations coefficients were calculated on the basis of variance and co-variance.

Result and Discussion

Success of any breeding programme depends on the efficiency of selection. Selection can not be applied on the basis of a single character because most of the characters are polygenic in nature. So it is necessary to study the nature of association of the character with other relevant traits. All possible phenotypic and genotypic correlations were worked out for all the characters under study.

Study of correlation to help the breeders for deciding the yield components in quantitative characters, its provide useful information about selection for the characters. The selection for one character in variably effects the other characters (Searle,1965) and the pattern of variation will also be changed (Wellington and Robertson,1966). Therefore, a knowledge of genetic correlation existing between yield and its components is essential.

All possible phenotypic and genotypic correlations are presented in Table1. Thoug , the significance of genotypic correlations could not be tested as on suitable statistical test is available (Nair et al.,(1973). But their magnitude is considered in relation to the corresponding phenotypic estimates. In the present study in general, the genotypic correlation coefficient were greater than their corresponding phenotypic ones. Its reveals that significant phenotypic association between characters seams primarily due to genetic cause, which is due to pleotropic effects rather than linkage. Gritton (1975) reported similar findings in pea.

High yield potential is the basic criteria with which a breeder is generally concern. The grain yield is artifact of combined effects of various factors complementary or counteracting which

reflect for the sum total of grain yield. Out of eleven, five characters were studied, namely plant height, number of primary branches, number of pods/plant, number of seeds/pod and pod length were found to be strongly and significantly associated with grain yield/plant. Positive and significant correlation were reported by several workers viz., Srivastava(1972), Malik and Haffes(1977), Singh et al. (1985),Gupta et al. (1986), Irfan A khan(1988) and Gupta et al.(1989).

It is a matter of great importance that number of pods /plant and number of seeds/pod, both characters observed to be beneficial to seed yield. These characters indicated that the translocation of food material was adequate to the number of pods which ultimately increased the number of seeds/pod and such good amount of carbohydrates was supplied to developing seeds to increase the yield.

The grain yield showed negative and non significant correlation with days to flowering and days to maturity while grain yield showed positive and non significant correlation with number of secondary branches, 100-grain weight and harvest index. The grain yield is not indicated negative and significant correlation with any characters. Association of grain yield with maturity period and days to flowering, clearly pointed out that the increase in grain yield /plant was not dependent on extending the period of ripening of material under study. It is established fact that the long maturity period contributes good yield in most of the crop plants but in the case of pea the duration of maturity is very important as farmers need. Short duration varieties under present intensive cropping pattern have greater importance, therefore, there is need to develop varieties / strains of pea to ripen in short duration with higher yield.

Genotypic correlation of grain yield were normally higher with the association of all the characters, than the phenotypic correlation in the present material. Similar magnitude of genetic correlation has been found among the characters themselves. High amount of genetic association point out that for the increase of grain yield in this study the environmental factor did intervene and that's why the environmental correlation of yield with its contributing characters were not significant.

The major component of yield in pea is number of pods/plant and plant height. Such finding were reported by Singh et al.(1985), Gupta et al. (1986) and Irfan A Khan(1988).It may be mentioned that there would be much scope for increasing grain yield in case the plant height, number of primary branches/plant, number of pods/plant, number of seeds/pod and

pod length may be considered for the purpose of selection in this study. Days to flowering was positively associated with plant height, days to maturity, number of seeds/pod and 100-grain weight at genotypic level suggested that with the increase in days to flowering would lead corresponding for the increase of these characters. Number of primary branches, number of secondary branches, number of pods/plant, pod length and harvest index showed negative and non-significant association with days to flowering at genotypic level.

Plant height has positive and non-significant association with number of primary branches, number of seeds/pod, 100-grain weight at genotypic level suggested that with the increase in plant height would lead corresponding for the increase of these characters. Positive and significant association of plant height with number of secondary branches, grain yield/plant and harvest index at genotypic level indicated that the plant height will be much affected with an enhancement in these characters. Therefore, these characters would have more scope for selection in the present investigation. Days to maturity and pod length were negatively correlated with plant height.

Number of primary branches showed positive and significant association with number of secondary branches, days to maturity, number of pods/plant, number of seeds/pod, pod length and 100-grain weight at genotypic level in all the cases and number of secondary branches and number of pods/plant showed significant association at genotypic and phenotypic level both. Significant association of these attributes to primary branches is indicated that the number of primary branches will group with enhancement of these characters. The number of primary branches/plant have positive and significant association with number of pods/plant, which indicates that primary branches/plant ultimately contributed more pods/plant (Narsinghani, (1979), Singh (1985) and Gupta et al. (1986).

Number of secondary branches showed positive and significant association with number of pods/plant and pod length indicate that the secondary branches/plant resulting the more number of pods/plant. The positive and non-significant association were obtained among number of secondary branches with days to maturity, number of seeds/pod, 100-grain weight and harvest index.

Days to maturity showed positive and significant association with number of seeds/pod and 100-grain weight at genotypic level, the more number of seeds/pod having more grain yield could get with the help of selection for maturity period in the present material. Number of pods/plant was a single character which showed negative correlation

with days to maturity. It is quite obvious that the number of pods/plant will be reduce proportionately if this character was too increased.

Number of pods/plant showed positive and significant association with pod length at genotypic level. Such association clearly indicates that the number of pods/plant would be higher with the proportional increase in this character. Number of seeds /pod showed positive and significant association with pod length. Such association clearly indicates that the pod length is increase with per unit increase to 100-grain weight.

Table 1: Genotypic and phenotypic correlation coefficient for 11 quantitative characters in pea

Characters		1	2	3	4	5	6	7	8	9	10	11
1 .Days to flowering	rg=	0.098	-0.206	-0.167	0.691**	-0.127	0.369*	-0.078	-0.051	0.239	-0.002	
	rp=	0.132	0.008	-0.126	0.590**	-0.117	0.335	0.005	-0.065	0.153	-0.059	
2. Plant height	rg=		0,245	0.381*	-0.247	0.484**	0.119	-0.054	0.470**	0.133	0.425*	
	rp=		0.050	0.046	0.094	0.225	0.045	-0.031	0.230	0.036	0.123	
3. No. of pri. branches	rg=			0.944**	0.514**	0.749**	0.512**	1.000**	0.651**	0.440**	0.256	
	rp=			0.473	0.173	0.347*	0.216	0.268	0.183	0,112	0.014	
4. No. of sec. branches	rg=				0.274	0.487*	0.199	0.525*	0.312	0.240	0.108	
	rp=				0.138	0.385*	0.151	0.163	0.205	0.140	0.046	
5. Days to maturity	rg=					-0.108	0.426*	0.323	-0.114	0.551**	-0.122	
	rp=					-0.064	0.284	0.093	-0.095	0.334	-0.092	
6. No. of pods/plant	rg=						0.282	0.425*	0.951**	-0.010	0.273	
	rp=						0.246	0.209	0.784**	0.002	0.223	
7. No, of seeds/pod	rg=							0.989**	0.383*	0.092	-0.219	
	rp=							0.571**	0.384	0.076	-0.167	
8. Pod length	rg=								0.454**	-0.014	-0.362	
	rp-=								0.292	0.010	-0.158	
9. Yield/plant	rg=									0.123	0.264	
	rp=									0.112	0.221	
10. 100- grain weight	rg=										0.080	
	rp=										0.063	

rg= Genotypic correlation coefficient

rp= Phenotypic correlation coefficient

*= Denote significant at 5% level (0.3494)

**= Denote significant at 1% level (0.4487)

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