INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES
Volume-5, Issue-4, Oct-Dec-2015 Coden: IJPAJX-CAS-USA, Copyrights@2015 ISSN-2231-4490
Received: 10th Aug-2015 *Revised: 27th Aug-2015* *Accepted: 27th Aug-2015*
Research article

CORRELATION AND PATH COEFFICIENT ANALYSIS IN SEVEN FIELD PEA (*PISUM SATIVUM* L.) GENOTYPES CREATED BY HALF DIALLEL ANALYSIS IN SULAIMANI REGION FOR F_2 GENERATION

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ABSTRACT: The present study was carried out in Qlyasan Agricultural Research Station, Faculty of Agricultural Sciences, University of Sulaimani (Lat 35° 34 307 □ □ ; N, Long 45° 21 992 □ □ ; E,765 masl) during the winter season (2012 – 2013). Twenty eight F_2 field pea plant population were grown in CRBD (Complete Randomize Block Design) 7x7 half Diallel cross system in this experiment, with three replications to determine the simple correlation Coefficient among characters and path analysis between weight of seeds / plant and other characters. It was observed that the character weight of seeds / plant correlated positively and highly significantly with the character No. of pods / plant , weight of pods / plant , biological weight / plant and harvest index recording (0.857, 0.839, 0.694 and 0.505) respectively .The character biological weight / plant and harvest index exhibited maximum positive direct effect in weight of seeds / plant recording (0.630 and 0.456) respectively , the character No. of pods / plant showed the highest positive indirect effect in weight of seeds/plant via harvest index recording (0.191)
Key words: Field pea (Pisum sativum L.), Correlation Analysis, Path Coefficient Analysis, Grain Yield.

INTRODUCTION

The legume crop pea (*Pisum sativum* L.) a grain legume and a member of the leguminoseae family is a native of central of Southeast Asia [1]. The pea is full of nutrition because its grain is rich in protein (27%), complex carbohydrates (42.65%), vitamins, minerals, dietary fibers and antioxidant compounds [2]. [3-10] emphasized the importance of No. of pods / plant in determining seed yield in field pea. Several workers including [4, 5, 8, 9, 10, 11] reported the inter association of plant height with seed yield / plant. [3, 8, 11, 12, 13, 14] reported similar finding that is 100 seed weight exhibited significant and positive association with grain yield / plant. No. of pods / plant exerted highest direct effect on seed yield, also reported by [3, 4, 5, 6, 7, 8, 9, 10, 11] in field pea. This indicates that No. of pods / plant is highly reliable component on yield. Another important character with high direct effect on seed yield is plant height showed positive direct effect on seed yield, which were earlier reported by [4, 5, 8, 9, 10]. Data analysis reveals that No. of pods / plant had the highest genotypic correlation coefficient and direct effect on seed yield and the corresponding indirect effect through plant height and 100 seed weight . Hence No. of pods / plant should be given prior attention in field pea improvement programmers because of its major influence on yield. The correlation coefficient between seed yield with plant height, No. of pods / plant and biological yield / plant was highly significant and positive , while it was significant and positive with No. seeds / pod , but it correlated highly significantly and negatively with seed protein content.

Sarawat et al, [15] reported that there is significant positively correlation between grain yield with, No. of pods / plant and 100 seed weight in pea. No. of pods / plant were also reported to be positive correlated in pea.

Correlation studies showed that the grain yield was significant positive correlated with plant height, No. of pods / plant and No. of seeds / pod, represented by [16].

MATERIALS AND METHODS

This experiment was conducted in Qlyasan Agricultural research station, Faculty of Agricultural Sciences, University of Sulaimani (Lat 35° 34 307 □ □ ; N, Long 45° 21 992 □ □ ; E, 765 masl), 2 km North West of Sulaimani city. Seven varieties of field pea (*Pisum sativum* L.) namely (Avolla , America , Jeza , Joneor, Pack land , Wild local arvena and Samara) were introduced from the Ministry of Agricultural , Sulaimani research station , Bakrajo , Sulaimani , Iraq . The Twenty eight F_2 s generation were sown in the field of experiment in a randomized complete block designed with (3) replications during (2012 – 2013) at Qlyasan location. This experiment was accomplished according to normal field practices. After maturity two rows of each plot were harvested. Data were collected by The following treatment (No. of pods / plant, weight of pods / plant (g), average pod weight (g) , pod length (cm) , No. of seeds / pod, weight of seeds / pod (g), 100 seed weight (g), weight of seeds / plant (g) , biological weight / plant (g) and harvest index). Correlation coefficients calculated to fixing the degree of association of characters pea yield and among themselves. This correlations were calculated by depending of using the formula given by (Singh and Chaudhary, 1985), and path coefficient analysis was carried out as suggested by [17, 18, 19, 20], Analysis of Moment Structures AMOS Ver. 18 Software).

RESULTS AND DISCUSSION:

Data in table 1 explain the simple Correlation Coefficient among the studied characters, and appendi x 1 confirm the significance of them. No. of pods / plant correlated positively and high significantly with weight of pods / plant, biological weight / plant and weight of seeds / plant recording by 0.691 , 0.646 and 0. 859 respectively, and correlated negatively and significantly with pod length recording -0.472, while it correlated positively and significantly with harvest index recording 0.419. Regards to the character weight of pods / plant it correlated positively and high significantly with biological weight / plant and weight of seeds / plant recording 0.613 and 0.839 respectively, while it correlated positively and significantly with harvest index recording 0.413. The character average pod weight gave positive and highly significant correlation with pod length , weight of seeds / pod and 100 seeds weight recording 0.818 , 0.868 and 0.735 respectively . There were positive and highly significant correlation between pod length with weight of seeds / pod and 100 seeds weight recording 0.800 and 0.588 respectively. Weight of seeds / pod gave positive and highly significant correlation with 100 seed weight reaching 0.643. Biological weight / plant correlated positively and high significantly with weight of seeds / plant reaching 0.694 and finally the character harvest index exhibited positive and highly significant correlation with weight of seeds / plant recording 0.505. [15] found significant positively correlation between grain yield weight of seeds in field pea. Grain yield is more strongly correlated with No. of seeds / plant [21]. These results shown for high grain yield , winter pea crosses should be moderately with No. of pods / plant and plant high.This means that in pea , grain yield is likely to be improved by selection for combined components of yield. Simple correlation coefficient were calculated among examined characteristics in pea genotypes. Positive significant relationships were found between seed yield and No. of pods / plant. biological yield and 100 seed weight. The relationship between No. of pods / plant and biological weight / plant and 100 seed weight was positive and significant, the relationship between No. of pods / plant and No. of seeds / pod was significantly negative. The relationship between 100 seed weight and No. of seeds / pod was significantly negative [22, 23].

Table-2 explains the path coefficient analysis, indicating to direct and indirect effect of studied characters in weight of seeds / plant. Maximum positive direct effect in weight of seeds / plant was 0.630 recorded by biological weight / plant and followed by harvest index recording 0.456. The character average pods weight recorded maximum negative direct effect in weight of seds / plant reaching -0.162. The character No. of pods / plant gave maximum positive indirect effect via harvest index recording 0. 191 and followed by 0.133 recorded by the character biological weight / plant via weight of pods / plant. Maximum negative indirect effect was -0.141 recorded by weight of seeds / pod via average pod weight and followed by -0.133 recorded by pod length via pod weight. The highest direct effect was exhibited by pod yield, indirect effects, especially through the pod number in the parents and hybrids [16]. Biological yield had the greatest direct effect on seed yield. This character was followed by No. of pods / plant and pod height respectively. Plant height showed high negative direct effect on seed yield. It is shown that , the No. of pods / plant had the highest moderate indirect positive effects on seed yield via biological yield, while 100 seed weight had the highest moderate indirect negative effects on seed yield via No. of seeds / pod [23, 24, 25].

Table 1: Correlation Coefficient among the studied characters

Characters	No. of pods / plant	Weight of pods / plant (g)	Average pod weight (g)	Pod length (cm)	No. of seeds / pod	Weight of seeds / pod (g)	100-seed weight (g)	Biological weight / plant (g)	Harvest Index	Weight of seeds / plant (g)
No. of pods / plant	1.000									
Weight of pods / plant (g)	0.691**	1.000								
Average pod weight (g)	-0.285	0.257	1.000							
Pod length (cm)	-0.472*	0.037	0.818**	1.000						
No. of seeds / pod	0.152	-0.061	0.053	0.239	1.000					
Weight of seeds / pod (g)	-0.313	0.209	0.868**	0.800**	0.253	1.000				
100-seed weight (g)	-0.344	0.228	0.735**	0.588**	-0.319	0.643**	1.000			
Biological weight / plant (g)	0.646**	0.613**	0.055	-0.063	0.035	-0.071	-0.132	1.000		
Harvest Index	0.419*	0.413*	-0.079	-0.244	0.170	0.061	0.028	-0.205	1.000	
Weight of seeds / plant (g)	0.857**	0.839**	-0.036	-0.237	0.134	-0.036	-0.051	0.694**	0.505**	1.000

Table 2: Path Coefficient Analysis among the studied characters

Characters	No. of pods / plant	Weight of pods / plant (g)	Average pod weight (g)	Pod length (cm)	No. of seeds / pod	Weight of seeds / pod(g)	100-seed weight (g)	Biological weight / plant(g)	Harvest Index
No. of pods / plant	0.080	0.055	-0.023	-0.038	0.012	-0.025	-0.028	0.052	0.034
Weight of pods / plant (g)	0.149	0.216	0.056	0.008	-0.013	0.045	0.049	0.133	0.089
Average pod weight (g)	0.046	-0.042	-0.162	-0.133	-0.009	-0.141	-0.119	-0.009	0.013
Pod length (cm)	0.032	-0.003	-0.056	-0.069	-0.016	-0.055	-0.040	0.004	0.017
No. of seeds / pod	0.019	-0.008	0.007	0.030	0.126	0.032	-0.040	0.004	0.021
Weight of seeds / pod (g)	0.001	-0.001	-0.003	-0.003	-0.001	-0.004	-0.003	0.000	0.000
100-seed weight (g)	-0.069	0.046	0.147	0.118	-0.064	0.129	0.201	-0.026	0.006
Biological weight / plant (g)	0.407	0.386	0.035	-0.040	0.022	-0.045	-0.083	0.630	-0.129
Harvest Index	0.191	0.188	-0.036	-0.111	0.077	0.028	0.013	-0.094	0.456
Weight of seeds / plant (g) Correlation	0.857	0.839	-0.036	-0.237	0.134	-0.036	-0.051	0.694	0.505

Appendix 1: Calculated (t) for the Correlation Coefficient

Characters	No. of pods / plant	Weight of pods / plant (g)	Average pod weight (g)	Pod length (cm)	No. of seeds / pod	Weight of seeds / pod (g)	100-seed weight (g)	Biological weight / plant (g)	Harvest Index
Weight of pods / plant (g)	4.872								
Average pod weight (g)	-1.515	1.357							
Pod length (cm)	-2.733	0.188	7.255						
No. of seeds / pod	0.785	-0.311	0.270	1.253					
Weight of seeds / pod (g)	-1.682	1.088	8.898	6.800	1.335				
100-seed weight (g)	-1.871	1.191	5.520	3.708	-1.719	4.285			
Biological weight / plant (g)	4.318	3.959	0.282	-0.321	0.177	-0.363	-0.679		
Harvest Index	2.353	2.314	-0.402	-1.282	0.877	0.313	0.140	-1.071	
Weight of seeds / plant (g)	8.497	7.871	-0.185	-1.245	0.688	-0.182	-0.259	4.917	2.986
t($p \leq 0.05$)	2.056								
t($p \leq 0.01$)	2.779								

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INTERNATIONAL JOURNAL OF
PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES

ISSN 2231-4490

International Journal of Plant, Animal and Environmental Sciences