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Correlation and Path Coefficient analysis among Different characters in genotypes of Vegetable Pea

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ABSTRACT
Correlation and path analysis studies conducted during Rabi in Randomized complete block design thirty six genotypes of vegetable pea with the objective to know association among the characters viz.,node at which first flower appears, days to 50 % flowering, number of nodes per plant, intermodal length (cm), primary branches per plant, plant height (cm), length of green pod (cm), width of pod, (cm), number of green pods per plant, number of green pods per cluster, number of seeds per pod, shelling per cent, green pod weight (g), T.S.S of edible seed, green pod yield per plant(g).Present study revealed that number of green pods, T.S.S of edible seeds number of node per plant, length of pod (cm), plant height (cm),significantly and positively associated with green pod yield per plant (g) both at phenotypic as well as genotypic levels while negatively correlated with width of pod (cm).It may be concluded that improvement of characters like number of green pods per plant, pod weight, number of green pod per cluster, length of pod, number of nodes per plant and plant height would help in improving pod yield in vegetable pea and should be considered as selection criteria for yield improvement. Path coefficient analysis revealed that green pod yield followed by number of green pods per plant, pod weight exerted high positive direct effect at phenotypic level. Therefore, these characters appear to be the most important traits for vegetable pea improvement programme.
Keywords: *Pisum Sativum L.var. hortense, correlation , path analysis*

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INTRODUCTION

Vegetable pea (*Pisum sativum*L. *var. hortense*) belongs to family Leguminoceae sub family Fabaceae. Pea is an important legume vegetable, extensively cultivated in the temperate regions and restricted to cooler altitudes in the tropics and winter season in the sub tropics. It is a self pollinated crop having diploid chromosome number 2n=2x=14. It is highly nutritious and capable of using atmospheric nitrogen. India ranks third in area after China and USSR under pea cultivation. . India ranks third in area after China and USSR for pea cultivation. The total area covered by peas is 498000 hectare with the production of 4811000 metric tons with productivity of 10 tons per hectare [1].

The major growing states of vegetable pea in India are Uttar Pradesh, Madhya Pradesh and Maharashtra. Uttar Pradesh is the leading producer of vegetable pea having alone about 50% of its area and production. It is also grown as summer season crop in the hilly states of India. The major area under vegetable pea cultivation is under mid season because of its suitability in various agro-climatic zones. Large proportion of vegetable pea are processed (canned, frozen and dehydrated and pickle) for consumption. It is mostly consumed as green fresh grains for vegetable purpose. Phenotypic variability changes under different environmental conditions while genetic variability remains unchanged and more useful to a plant breeder for exploitation in selection or hybridization, consequently estimates of heritability and genetic advance are useful for selection [2]. Yield is very complex characteristics controlled by several yield contributing components and significantly influenced by environmental factors. Estimation of correlation co-efficient among the yield contributing characters is necessary to understand the direction of selection and maximize yield in the shortest period. Path co-efficient provides an effective means of entangling direct and indirect causes of association of characters and measures the relative importance of each causal factor.

MATERIALS AND METHODS

The experimental material comprised of 36 genotypes of vegetable peawhich are being maintained at Department of Vegetable Science, N.D. University of Agriculture & Technology, Kumarganj, Faizabad (U.P.).The experiment was conducted in Randomized Complete Block Design with three replications during *Rabi* season in 2013 to assess the performance of 36 vegetable genotypes including 3 Check verities. Each entry was grown in the plot size of 3 m x 1.5 m and sowing was done with the spacing of 30 cm and 10 cm from seed to seed.All the recommended agronomic package of practices and plant protection measures were followed to raise a healthy crop. Observations were recorded on five randomly selected plants from each treatment in each replication for(i) nodes at which first flower appears, (ii) days to 50% flowering, (iii) number of node per plant (iv) internodal length (cm), (v)primary branches per plant, (vi) plant height(cm), (vii) length of pod(cm), (viii) width of pod(cm), (ix) number of green pods per plant, (x) number of green pods per cluster, (xi)number of seeds per pod (xii) shelling percent (xiii) pod weight(g) (xiv) TSS of edible seeds(Brix) (xv) pod yield per plant. The correlations between different characters at genotypic (g) and phenotypic (p) levels were worked out between characters as suggested by Kumar *et al* [4]. Path-coefficient analysis was carried out according to Ghobary [3] and Singh *et al* [9].

RESULTS AND DISCUSSION

In general, the magnitude of genotypic correlation coefficients were higher than the corresponding values of the phenotypic correlation coefficients. This indicated a strong genetic association between the traits and the phenotypic expression which was suppressed due to environmental influence. The present study also suggested that both genotypic and phenotypic correlation were similar in direction. Similar findings had also been reported by Kumar et *al*. [4]. A perusal of data revealed that most important traits of green pods yield per plant had highly significant and positive association with number of green pods per plant, T.S.S of edible seed, pod weight, length of pod, and plant height at both phenotypic and genotypic levels. Thus, these characters emerged as most important associates of green pods yield per plant. The available literature has also indicated positive correlation between green pod yield per plant and character mentioned above in vegetable pea.

Green pod yield per plant had highly significant and positive association with number of green pods per plant, T.S.S of edible seed, pod weight, length of pod, and plant height were found significantly and positively correlated among themselves. Number of green pod per cluster is highly significant but negatively correlated with number of seeds per pod and width of podwhile positively and significantly correlated with number of seeds per pod. Primary branches per plant was significantly and positively correlated with T.S.S of edible seeds suggesting that, selection for green pod yield, pod weight, number of greenpod per plant, weight of pod and length of pod will be helpful for yield improvement. Many earlier research workers have also reported significant and positive association of total green pod yield per plant with number of green pods per plant [2, 6, 8], green pod yield [9-11], primary branches per plant [5] and length of pod [7].

The highest magnitude of positive direct effect on number of green pods per plant was exerted by pod weight followed by number of seeds per pod, at both phenotypic and genotypic levels (Table 3 and 4). This indicates that direct selection based on pod weight and number of green pod per plant would result in an appreciable improvement of number of green pod per plant. Pod weight was not only found to have maximum direct effect on total green pod yield per plant but it also contributed substantial positive indirect effect for intermodal length, followed by number of seeds per pod, and negative indirect effect for number of green pod per cluster and plant height. Therefore during selection these characters should also be taken into consideration. Similar results had also been reported by Singh and Mishra [9].

CONCLUSION

The highest magnitude of positive direct effect on number of green pods per plant was exerted by pod weight followed by number of seeds per pod, at both phenotypic and genotypic levels. This indicates opportunity that direct selection based on pod weight and number of green pod per plant would result in an appreciable improvement of number of green pod per plant.

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Table-1 Estimates of phenotypic correlation coefficients among fifteen characters in vegetable pea

Characters	Days to 50% flowering	No.of nods per plant	Internodal length (cm)	Primary branches per plant	Plant height (cm)	Length of pod (cm)	Width of pod (cm)	No. of pods per plant	No. of pods per cluster	No. of seeds per pod	Shelling (%)	Pod weight(g)	T.S.S. of edible seeds	Pod yield per plant (g)
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	0.730**	0.580**	0.264**	0.191*	0.573**	-0.446 **	-0.264 **	0.430 **	0.728 **	-0.570 **	0.295 **	-0.520 **	0.208 *	-0.002
2	1.000	0.833 **	0.370 **	0.179	0.768 **	-0.343 **	-0.215 *	0.540 **	0.689 **	-0.520 **	0.148	-0.501 **	0.336 **	0.153
3		1.000	0.313 **	0.316 **	0.677 **	-0.193 *	-0.327 **	0.709 **	0.750 **	-0.490 **	0.146	-0.524 **	0.314 **	0.325**
4			1.000	0.096	0.212 *	0.096	0.144	0.133	0.010	-0.063	0.173	0.181	-0.100	0.107
5				1.000	0.147	0.039	0.094	0.104	0.240 *	-0.087	0.109	-0.195 *	0.319 **	-0.071
6					1.000	-0.412 **	-0.253 **	0.639 **	0.688 **	-0.467 **	0.193 *	-0.564 **	0.126	0.209*
7						1.000	-0.006	0.002	-0.478 **	0.486 **	-0.104	0.265 **	0.199*	0.241*

-0.303**	0.637**	0.227*	0.186	0.061	0.293**	0.388**							14
-0.067	0.243 *	0.167	0.086	0.074	0.152	1.000							13
0.145	-0.534 **	-0.602 **	0.516**	-0.267 **	1.000								12
-0.036	0.299 **	0.288 **	-0.001	1.000									11
0.390 **	-0.271 **	-0.540**	1.000										10
-0.337 **	0.699 ***	1.000											9
-0.376 **	1.000												8
1.000													

*, ** Significant at 5% and 1% probability levels, respectively.

Table-2 Estimates of genotypic correlation coefficients amongfifteen characters in vegetable pea

Characters													
Days to 50% flowering	**2**	0.765**	1.000										
No. of no des per plant	**3**	0.627**	0.851**	1.000									
Internodal length (cm)	**4**	0.297**	0.395**	0.334**	1.000								
Primary branches per plant	**5**	0.250**	0.216*	0.358**	0.073								
Plant height (cm)	**6**	0.608**	0.784**	0.695**	0.143								
Length of pod (cm)	**7**	-0.539**	-0.406**	-0.287**	-0.010								
Width of pod (cm)	**8**	-0.508**	-0.449**	-0.688**	-0.194*								
No. of pods per plant	**9**	0.502**	0.573**	0.746**	0.179								
No. of pods per cluster	**10**	0.839**	0.756**	0.828**	0.192*								
No. of seeds per pod	**11**	-0.706**	-0.624**	-0.624**	-0.109								
Shelling%	**12**	0.322**	0.154	0.166	0.118								
Pod weight (g)	**13**	-0.559**	-0.528**	-0.549**	-0.241*								
T.S.S of edible seeds	**14**	0.243*	0.382**	0.383**	0.171								
Pod yield per plant (g)	**15**	0.036	0.172	0.363**	0.115								

-0.122	0.223*	0.252**	-0.797**	0.628**	0.212*	0.163	0.087	0.247**	0.458**
0.494**	0.136	0.321**	-0.189*	0.287**	0.220*	0.100	0.082	0.169	1.000
-0.274**	-0.602**	0.316**	0.350**	-0.587**	-0.708**	0.645**	-0.280**	1.000	
0.163	0.195*	-0.115	-0.066	0.334**	0.324**	0.005	1.000		
-0.166	-0.574**	0.574**	0.927**	-0.404**	-0.800**	1.000			
0.297**	0.758**	-0.604**	-0.865**	0.762**	1.000				
0.120	0.679**	-0.047	-0.917**	1.000					
0.232*	-0.509**	0.055	1.000						
-0.023	-0.512**	1.000							
0.203*	1.000								
1.000									
5	6	7	8	9	10	11	12	13	14

Table-3 Direct and indirect effect of fifteen characters on pod yield per plant (g) at phenotypic level in vegetable pea

Characters		1	2	3	4	5	6	7	8	9	10	11
Nodes at which first flower appears	**1**	**0.008**	-0.057	0.021	0.034	-0.003	0.025	0.023	0.010	0.482	-0.035	0.042
Days to 50% flowering	**2**	0.006	**-0.078**	0.031	0.048	-0.003	0.034	0.018	0.008	0.606	-0.033	-0.039
No. of no des per plant	**3**	0.005	-0.065	**0.037**	0.041	-0.006	0.030	0.010	0.012	0.795	-0.036	-0.036
Internodal length (cm)	**4**	0.002	-0.029	0.012	**0.129**	-0.002	0.006	-0.005	0.002	0.194	-0.009	-0.008
Primary branches per plant	**5**	0.005	-0.014	0.012	0.012	**-0.005**	0.007	-0.002	-0.004	0.116	-0.011	-0.007
Plant height (cm)	**6**	0.005	-0.060	0.025	0.017	-0.003	**0.044**	0.022	0.010	0.717	-0.033	-0.035
Length of pod (cm)	**7**	-0.005	0.027	-0.007	0.001	-0.001	-0.018	**-0.053**	0.002	0.002	0.023	0.036
Width of pod (cm)	**8**	-0.002	0.017	-0.012	-0.008	-0.002	-0.011	0.003	**-0.038**	-0.422	0.016	0.029
No. of pods per plant	**9**	0.005	-0.042	0.026	0.022	-0.002	0.028	-0.001	0.014	**0.922**	-0.033	-0.020
No. of pods per cluster	**10**	0.006	-0.054	0.027	0.023	-0004	0.031	0.025	0.013	0.784	**-0.048**	-0.040
No. of seeds per pod	**11**	-0.005	0.040	-0.018	-0.013	0.002	-0.025	-0.026	-0.015	-0.304	0.026	**0.074**
Shelling %	**12**	0.003	-0.012	0.005	0.014	-0.002	0.009	0.006	0.001	0.336	-0.014	-0.001
Pod weight (g)	**13**	-0.004	0.039	-0.019	-0.027	0.003	-0.025	-0.015	-0.006	-0.599	0.029	0.038
T.S.S of edible seeds	**14**	0.005	-0.026	0.015	0.019	-0.006	0.006	-0.011	0.003	0.273	-0.008	0.007
Genetic correlation coefficient with yield	**15**	-0.002	0.153	0.325	0.107	-0.071	0.209	0.241	-0.303	0.637	0.226	0.187

0.061	0.293	0.293	0.036	0.172	0.363	0.115	-0.122	0.229	0.252	-0.797	**15**	Genetic correlation coefficient with yield		
-0.004	0.132	**-0.014**	-0.021	0.033	-0.060	0.032	0.060	-0.016	-0.063	-0.008	**14**	T.S.S of edible seeds		
0.015	**0.869**	-0.002	0.047	-0.046	0.086	-0.046	-0.033	0.070	-0.062	0.014	**13**	Pod weight (g)		
-0.055	-0.232	-0.001	-0.027	0.013	-0.026	0.022	0.020	-0.023	0.025	-0.005	**12**	Shelling %		
0.001	0.448	-0.001	0.060	-0.054	0.098	-0.021	-0.020	0.066	-0.113	0.042	**11**	No. of seeds per pod		
-0.016	-0.523	-0.002	-0.071	0.066	-0.130	0.036	0.036	-0.088	0.119	-0.036	**10**	No. of pods per cluster		
-0.016	-0.464	-0.005	-0.045	0.050	-0.117	0.035	0.015	-0.078	0.009	-0.038	**9**	No. of pods per plant		
0.002	0.126	0.001	0.043	-0.039	0.108	-0.037	0.028	0.059	-0.010	**0.041**	**8**	Width of pod (cm)		
0.006	0.230	-0.005	0.0456	-0.0352	0.0450	-0.002	-0.003	0.0592	**-0.197**	0.002	**7**	Length of pods (cm)		
-0.011	-0.490	-0.005	-0.051	0.068	-0.109	0.027	0.025	**-0.116**	0.101	-0.021	**6**	Plant height (cm)		
-0.006	-0.170	-0.005	-0.021	0.019	-0.056	0.014	**0.121**	-0.023	0.005	0.010	**5**	Primary branches per plant		
-0.006	-0.184	-0.002	-0.025	0.034	-0.052	**0.189**	0.009	-0.017	0.010	-0.008	**4**	Internodal length (cm)		
-0.008	-0.455	-0.005	-0.053	0.074	**0.157**	0.063	0.043	-0.080	0.057	-0.028	**3**	No. of nodes per plant		
-0.008	-0.436	-0.005	-0.065	**0.086**	-0.133	0.075	0.026	-0.090	0.080	-0.019	**2**	Days to 50% flowering		
-0.016	0.452	-0.003	**-0.085**	0.066	-0.098	0.056	0.030	-0.070	0.106	-0.021	**1**	Nodes at which first flower appears		
12	13	14	1	2	3	4	5	6	7	8		Characters		

R^2 = 0.9342, Residual effect = 0.2565

Table-4 Direct and indirect effect of fifteen characters on pod yield per plant (g) at genotypic level in vegetable pea

0.628	0.212	0.163	0.087	0.247	0.458	0.628	0.212	0.163	0.087	0.247	0.458	0.628	0.212
0.461	-0.066	-0.015	-0.005	0.174	**-0.050**	0.461	-0.066	-0.015	-0.005	0.174	**-0.050**	0.461	-0.066
-0.941	0.216	-0.094	0.016	**0.933**	-0.008	-0.941	0.216	-0.094	0.016	**0.933**	-0.008	-0.941	0.216
0.536	-0.097	-0.002	**-0.058**	-0.290	-0.004	0.536	-0.097	-0.002	**-0.058**	-0.290	-0.004	0.536	-0.097
-0.648	0.239	**-0.146**	-0.000	0.666	-0.005	-0.648	0.239	**-0.146**	-0.000	0.666	-0.005	-0.648	0.239
0.922	**-0.299**	0.117	-0.019	-0.732	-0.011	0.922	**-0.299**	0.117	-0.019	-0.732	-0.011	0.922	**-0.299**
0.904	-0.228	0.059	-0.019	-0.606	-0.014	**0.904**	-0.228	0.059	-0.019	-0.606	-0.014	**0.904**	-0.228
-0.471	0.257	-0.150	0.005	0.361	0.009	-0.471	0.257	-0.150	0.005	0.361	0.009	-0.471	0.257
-0.076	0.180	-0.084	0.007	0.326	-0.016	-0.076	0.180	-0.084	0.007	0.326	-0.016	-0.076	0.180
0.989	-0.226	0.084	-0.011	-0.622	-0.007	0.989	-0.226	0.084	-0.011	-0.622	-0.007	0.989	-0.226
0.192	-0.089	0.024	-0.009	-0.283	-0.025	0.192	-0.089	0.024	-0.009	-0.283	-0.025	0.192	-0.089
0.287	-0.057	0.016	-0.007	-0.249	-0.0085	0.287	-0.057	0.016	-0.007	-0.249	-0.0085	0.287	-0.057
0.996	-0.247	0.091	-0.010	-0.568	-0.019	0.996	-0.247	0.091	-0.010	-0.568	-0.019	0.996	-0.247
0.919	-0.226	0.091	-0.009	-0.545	-0.019	0.919	-0.226	0.091	-0.009	-0.545	-0.019	0.919	-0.226
0.806	-0.250	0.103	-0.019	-0.578	-0.012	0.806	-0.250	0.103	-0.019	-0.578	-0.012	0.806	-0.250
9	10	11	12	13	14	9	10	11	12	13	14	9	10

R^2 = 0.9776, Residual effect = 0.1497

CITATION OF THIS ARTICLE

Zahra Shafie, A. Khosh Konesh. Explore the Relationship between body image and coping styles among employed and unemployed women. Bull. Env. Pharmacol. Life Sci., Vol 6 [11] October 2017: 123-130