Websites:
http://www.sciencepub.net
http://www.sciencepub.net/rural

Emails:
editor@sciencepub.net
sciencepub@gmail.com

World Rural Observations

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Food Potential In Dry Pea (*Pisum Sativum* L.) Crop To Handle Food Security Menace

Ch. Muhammad Rafiq, Muhammad Amin, Amer Hussain and Sadia Kaukab

Pulses Department, Ayub Agricultural Research Institute Faisalabad Pakistan.
Corresponding author: Muhammad Amin Email: aminpbg@yahoo.com

Abstract: The experiment was conducted on twelve (12) dry peas advanced lines during 2017-2019. The results of analysis of variance show significant differences among all the advanced lines for all parameters. The phenotypic coefficients of variation (PCV) were more as compare to their corresponding genotypic coefficients variation (GCV). Phenotypic coefficient of variation increased owing to environment contribution. High heritability observed except total seed yield per plant and pod per plant. This range of inheritance has key role in selection. The path coefficient vitalizes that seed per pod, 100–grain weight and pod length had maximum direct effects on dependent variable, grain yield per plant.

[Ch. Muhammad Rafiq, Muhammad Amin, Amer Hussainand Sadia Kaukab. **Food Potential In Dry Pea (*Pisum Sativum* L.) Crop To Handle Food Security Menace.** *World Rural Observ* 2020;12(2):75-78]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). http://www.sciencepub.net/rural. 7. doi:10.7537/marswro120220.07.

Keyword: correlation; dry peas; genotypes; heritability; path analysis; *Pisum sativum*; yield.

Introduction

Dry Pea (*Pisum sativum* L.) is cheap source of protein also called poor people meat. It has 21-25 % essential amino acids. It has high value of protein so being used in animal feed as well as in human food. It has atmospheric nitrogen fixation mechanism called ecological restorer. The area of field pea in Pakistan is about 45.30 thousand hectares and average production of 658 kg ha-1 (1).

For any breeding programme to develop new varieties/hybrids, provision of heritability is prerequisite to researcher for development process. The varieties/hybrids having high yield potential are the need of hour (1).

The present trial was conducted to know the relationship among different parameters and their effects to grain yield of dry pea crop.

Material And Method:

The current trial was carried out at the research area of Pulses Research Institute Faisalabad during the Rabi season 2017–2019. The trial includes of twelve advanced lines including two check varieties (DP-01-15, DP-02-15, DP-03-15, DP-04-15, DP-05-15, DP-10-15, DP-11-15, DP-12-15, DP-13-15, DP-14-15, NO.267 and Climax). The trial was conducted by using randomized complete block design in three repeats. The trial plot size was 4 meter × 1.2 meter with plant to plant and row to row distances of 30 centimeter and 15 centimeter, respectively. Five random plants were selected from each replication. Following data were recorded seeds per pod, pod width (cm), days to 50 % flowering, branches per plant, pods per plant, pod length (cm), 100 seed weight (g), seed yield per plant (g) and plant height (cm).

Statistical Analysis:

Analysis of variance recorded by using the protocol of Steel and collab (Steel *et al*. 1997).

Genotypic and phenotypic correlation coefficient was found by using the protocol of Kown and Torrie (Kown and Torrie, 1964). Phenotypic and genotypic coefficients of variation were known. The protocol for path coefficient analysis was adopted as given by Dewey and Lu (Dewey and Lu, 1959). In path coefficient analysis genotypic correlation is known by using seed yield as resultant factor. In path coefficient analysis solution of equation, using genotypic correlations in which seed yield was as resultant factor and yield contributing characters as dependent factor.

Results And Discussion

The analysis of variance depicted the significant differences among advanced lines including check. The mean performances of twelve pea advanced lines describes that DP-10-15 was excellent in seed yield per plant and number of pods per plant, DP-03-15 in 100–seed weight, pod length and seed per pod, DP-04-15, and pod width, DP-01-15 was excellent in plant height, climax check in days to 50% flowering, DP-13-15 in pod weight per plant, branches per plant, DP-11-15 in 100–seed weight and check climax perform better in pod weight per plant.

Correlation studies (Table 1 and Table 2) showed that pod width, branches per plant, pod length, and plant height were positive and highly significant correlation at genotypic level but positive and non significant correlation at phenotypic level except pod width which is significant. The pods per plant was positively non significant correlated with seed yield per plant at genotypic level and significantly but positively correlated at phenotypic level. The days to 50 % flowering, seeds per pod, pod weight per plant were negatively correlated with grain yield per plant at genotypic and non significant at phenotypic levels. Similar findings have been reported by other authors (Singh and Singh 2005, Sardana, 2007, Nisar *et al*., 2008, Esposito *et al.,* 2009, Ghobary, 2010, Singh *et al*. 2011, Fikresilassie, 2012, Kosev and Mikić, 2012, Govardhan *et al.*, 2013, Tiwari and Lavanya 2012, Bashir *et al.*, 2017).

The path coefficient (Table 3 and Table 4) shows significant genetic variability was found among advanced lines for parameters. The phenotypic coefficient found high value. The phenotypic has high range due to environment. The pod width had negative direct effects on grain yield. The pod length, 100–seed weight, seed per pod had maximum direct effect on grain yield per plant while days to 50% flowering, pod weight per plant, pod per plant, branches per plant, and plant height had low direct effects. Similar findings has been noticed by other authors (Nawab *et al*., 2008, Espósito *et al*., 2009, Ghobary, 2010, Kosev and Mikić, 2012, Tiwari and Lavanya, 2012, Kumar *et al*., 2013, Bashir *et al.*, 2017).

From the discussed findings, it revealed that attributing traits can be further used to develop high yielder cultivar/variety.

References

1. Anonymous. 2018. Agricultural statistics of Pakistan, Government of the Pakistan.
2. Bashir, I., I., Sumera F., Sajid and S., Muhammad. 2017. Association of yield attributing traits in pea (*pisum sativum* l.) germplasm. Banats J. Biotech. DOI: 10.7904/2068–4738–VIII (15)–43.
3. Dewey, D. R., and K. H., Lu. 1959. A correlation and path–coefficient analysis of components of crested wheatgrass seed production. *Agron. J.* 51(9), 515–518.
4. Espósito, M. A., E. A., Martin, V. P., Cravero, D., Liberatti, F. S., López Anido and E. L., Cointry. 2009. Relationships among agronomic traits and seed yield in pea. BAG. *J. basic and applied Genetics*. 20(1), 1–8.
5. Fikreselassie, M. 2012. Variability, heritability and association of some morpho agronomic traits in field pea (*Pisum sativum* L.) genotypes. *Pak. J. Biol. Sci*. 15(8), 358–366.
6. Ghobary, H. M. M. 2010. Study of relationship between yield and some yield components in garden pea (*Pisum sativum* L.) by using correlation and path analysis. J. Agric. Res. 36, 351–360.
7. Govardhan, G., G. M., Lal, R., Vinoth, and P. A., Reddy. 2013. Character association studies in M2 generation of field pea (*Pisum sativum var. arvense* L.). Int. J. Applied Biology and Pharmaceutical Technology. 4: 161–163.
8. Kosev, V., and A. Mikic. 2012. Short communication. Assessing relationships between seed yield components in spring–sown field pea (*Pisum sativum* L.) cultivars in Bulgaria by correlation and path analysis. *Spanish J. Agric. Res*. 10(4), 1075–1080.
9. Kumar, B., A. Kumar, A. K., Singh, and G. R. Lavanya. 2013. Selection strategy for seed yield and maturity in field pea (*Pisum sativum* L. *arvense*). *African J. Agric. Res*. 8(44), 5411–5415.
10. Kwon, S. H., and J. H., Torrie. 1964. Heritability and interrelationship of traits of two soya bean populations. *Crop Scie*. 4(2), 196–198.
11. Nawab, N. N., G. M., Subhani, K., Mahboob, Q., Shakil, and A. Saeed. 2008. Genetic variability, correlation and path analysis studies in garden pea. Pak. J. Agric. Res. 46(4), 333–340.
12. Nazir, S., E., Bashir and R. Bantel. 1994. Crop production. National Book Foundation, Islamabad. vol. 6, 317– 318.
13. Nisar, M., A., Ghafoor, H., Ahmad, M. R., Khan, A. S., Qureshi, H., Ali, and M. Islam. 2008. Evaluation of genetic diversity of pea germplasm through phenotypic trait analysis. Pak. J. Botany. 40(5), 2081–2086.
14. Singh, A., S., Singh, and J. D. P. Babu. 2011. Heritability, character association and path analysis studies in early segregating population of field pea (*Pisum sativum* L. var. arvense) Int. J. Pl. Breed. Genet. 5, 86– 92.
15. Singh, J. D., and I. P. Singh. 2005. Studies on correlation and path coefficient analysis in field pea (*Pisum sativum* L.) Nat. J. Pl. Improvement. 7(1), 59–60.
16. Steel, R. G. D., J. H., Torrie, and D. A. Dicky.1997. Principles and Procedures of Statistics.
17. Tiwari, G., and G. R. Lavanya. 2012. Genetic variability, character association and component analysis in F4 generation of field pea (*Pisum sativum var. arvense* L.) Karnataka J. Agric. Sci. 25(2), 173–175.

Table1. COMBINED ANOVA

Traits	Replications	Genotypes
100–SW	0.15 ns	136.84**
DF	2.01 ns	163.66**
NBP	0.45 ns	80.00**
PL	1.90ns	2148.62**
NPP	1.21ns	2013.97**
SPP	0.34 ns	159.38**
PW	0.33ns	145.05**
PH	0.36ns	2605.93**
SYP	0.71ns	1.12ns

DF= Days to 50% flowering 100–SW= 100–seed weight
NPBP= Number of branches per plant
PL= Pod length NPP= Number of pods per plant
NSP = Number of seeds per pod PW = Pod width
PH = Plant height

Table 2 Estimation of Genetic Components of yield attributing traits

Traits	**GV**	**PV**	**EV**	**GCV %**	**PCV %**	**ECV %**	**H^2B_S%**	**GA%**
Days to 50% Flowering	115.8183	117.8593	2.1310	156.1904	156.5243	22.2704	97.1002	40.6585
100–Seed Weight	140.0783	143.4631	3.0580	171.3390	171.1931	23.2617	97.8716	41.8630
Seed Yield per Plant	0.1850	2.7064	2.6978	5.5035	26.4002	25.8439	3.6656	0.2289
Number of Branches per Plant	0.1242	0.1188	0.0045	21.6871	22.2151	3.3646	97.1199	24.3874
Pod Length	0.5533	0.4591	0.0008	22.0167	23.0245	0.9159	98.1458	15.5907
Number of Pods per Plant	6.3183	6.2386	0.0068	70.3316	71.3614	2.3703	99.8127	34.3711
Number of Seeds per Pod	0.5681	0.5784	0.0113	26.5113	27.7632	3.7406	99.2492	20.9396
Pod Width	0.0163	0.0167	0.0013	9.65243	8.7476	1.2657	97.0166	12.5556

Table3. Genotypic and Phenotypic Correlation of Various Quantitative yield contributing Traits

Traits	**R**	**100–SW**	**NBP**	**PL**	**NPP**	**NSP**	**PW**	**PH**	**SYP**
DF	G	-0.446**	0.0318	-0.5304**	0.3716*	-0.5174**	-0.6464**	0.5306**	-0.7243**
	P	-0.4441**	0.0372	-0.5237**	0.3672**	-0.5922**	-0.5437**	0.4432**	-0.1641
100-SW	G		0.4730**	0.7752**	0.3339*	0.4423**	0.4345**	-0.7371**	-0.0428
	P		0.3626**	0.7673**	0.3327**	0.4336**	0.4152**	-0.6113**	0.1362
NBP	G			-0.3064*	0.1445	-0.2346*	0.0265	-0.2149	-0.7117**
	P			-0.2016	0.1198	-0.2441*	0.0251	-0.1254	0.0134
PL	G				0.1551	0.0283	-0.3706*	0.4417**	0.2546**
	P				0.1634	0.0233	-0.3508*	0.4440**	0.0089
NPP	G					0.7597**	0.7652**	-0.4571**	0.7261**
	P					0.8525**	0.6700**	-0.4576**	0.1325
NSP	G						-0.0111	0.3018*	0.18730
	P						-0.0021	0.3106*	0.2154*
PW	G							-0.5687**	-0.4855**
	P							-0.5620**	-0.0670
PH	G								0.4075**
	P								0.0906

DF= Days to 50% flowering 100–SW= 100–seed weight
NPBP= Number of branches per plant
PL= Pod length NPP= Number of pods per plant
NSP = Number of seeds per pod PW = Pod width
PH = Plant height

Table 4 Direct and Indirect Effects

Traits	DF	100–SW	NPBP	PL	NPP	NSP	PW	PH
DF	**0.0251**	0.0189	0.0048	0.0119	0.1018	0.0049	0.1038	-0.0786
100–SW	0.1088	**0.2614**	0.01987	0.5611	-0.2118	-0.1081	0.0157	-0.1668
NPBP	-0.2729	0.0528	**0.0632**	-0.1727	-0.0412	0.0182	0.0556	-0.1087
PL	0.0131	0.1930	0.6572	**0.4352**	0.0836	-0.1024	-0.0336	-0.0351
NPP	-0.0226	0.0036	0.0052	-0.0056	**0.1637**	-0.1083	-0.0646	-0.0282
NSP	-0.3739	0.0963	-0.0758	0.0715	0.0184	**0.4160**	-0.6730	0.0703
PW	0.0063	0.0274	-0.0128	0.0096	0.0037	0.0021	**-0.0276**	0.0111
PH	0.0912	0.0753	0.0031	0.0126	0.0013	0.0012	-0.0119	**0.0026**

DF= Days to 50% flowering 100–SW= 100–seed weight NPBP= Number of branches per plant
PL= Pod length NPP= Number of pods per plant
NSP = Number of seeds per pod PW = Pod width
PH = Plant height

6/25/2020