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Evaluate the performance of genotypes of pea in terms of growth, yield and quality attributes

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Abstract

An experiment was conducted on Genetic variability, heritability and genetic gain in the thirty genotypes in Pea during 2017-18 at the Departmental Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad. The observations were recorded on various yield and yield contributing characters. The results from the present investigation revealed that Pea Genotype Jawahar Pea-54 recorded maximum pod yield per plant (90.47g) and maximum number of pods per plant (15.87). Swarna mukti recorded maximum plant height (97.51 cm) and highest number of branches per plant (3.13). Maximum protein content (34.50%), plant spread (37.43 cm) and pod length (10.53 cm) was recorded in genotype Arka Karthik. Azad pea-5 recorded highest average pod weight (8.49 g) and moisture content in pod (84.31%). Pusa pragati recorded best in days to first flowering (34.73). Rachna recorded maximum fibre content (13.52%). Analysis of variance showed significant difference for all the characters under study, indicates that there was ample scope for selection of promising genotypes.

Keywords: Pea, genotypes, jawahar pea-54, pod yield

Introduction

The common pea (also known as the garden pea), botanically known as *Pisum sativum* var. *Hortense* L. ($2n=2x=14$) is one of the world's oldest domesticated crops (Ambrose, 1995; Zohary and Hopf, 2000). It is an annual herbaceous crop of the family *Fabaceae* or *Leguminosae* (Genus: *Pisum*, subfamily: *Faboideae* tribe: *Fabeae*), originated in the region comprising Central Asia, Mediterranean countries and Ethiopia.

The term "pea" can refer to small spherical seed or to the pod. Peas are consumed as fresh vegetables or dry seeds in most of the countries. Peas are starchy but, high in fiber, protein, vitamins (vitamin A, C, K and B complex vitamins such as folic acid, pantothenic acid, niacin, thiamine and pyridoxine), minerals (iron, magnesium, phosphorus and zinc) and lutein (a yellow carotenoid pigment that benefits vision). The dry pea seeds are rich source of proteins (about 19-27%) and are free of anti-nutritional substances (Pettersson *et al.*, 1997). Dry weight is about one-quarter protein and one-quarter carbohydrates, mostly sugars.

In India, peas are grown as winter vegetable in plains and as summer vegetable in the hills. In India major pea producing states are Uttar Pradesh, Bihar, Haryana, Punjab, Himachal Pradesh, Orissa and Karnataka. In India, the total area and production of peas in 2015-16 was 497,000 ha and 4,814,000 metric tonnes respectively, which was the 2.4% of total vegetable production. The productivity of peas is about 9.4 MT/ha which has shown to decrease in last three to four years (Indian Horticulture Database, 2016). India is ranking second next to China both in terms of area and production (FAO, 2015).

Materials and method

The present research work entitled, "Study on Genetic Variability, Heritability, Character Association and Genetic Divergence In Pea (*Pisum sativum* var. *hortense* L.)" was undertaken to study the variability, heritability, genetic advance, and correlation and their effect on yield and yield contributing traits. Study of performance of genotypes of pea in terms of growth, yield and quality attributes were also done on 30 genotypes of Pea collected from different institutes, research stations and private seed companies.

Experimental site

The study was conducted in the Experimental Research Field, Department of Horticulture, Naini Agriculture Institute, SHUATS, Allahabad, located between 25. 87° North latitude 81.15° East latitude. The altitude is 78 meters above the mean sea level.

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Soil type

The soil type of experimental field was sandy loam with average fertility level and pH in the range of 7.0 to 8.0.

Climate

Department of Horticulture, Naini Agricultural Institute, SHUATS, Allahabad, falls under the humid subtropical zone. Maximum rainfall received during the period between July to the end of September. However, occasional showers are also very common in the month of June, December and January. The winter month will usually cool and dry. The summer is hot and dry western hot winds start from April and end at onset of monsoon.

Result and Discussion

The mean replicated data collected on twenty-five hybrid varieties of Pea were subjected to the appropriate statistical analysis for drawing valid conclusions. The maximum plant height was observed in genotype Swarna Mukti (97.51 cm) followed by S-10 (87.26 cm). The maximum branches per plant were recorded in genotype Swarna Mukti (3.13) followed by BL-2 (3.12). The maximum plant spread was found in genotype Arka Karthik (37.93 cm) followed by Jawahar Pea-54 (37.51 cm). The minimum days to first flowering were recorded in genotype Pusa Pragati (34.73 days), whereas the maximum days to first flowering were recorded in genotype Rachna (61.20 days). The minimum days to 50% flowering were recorded in genotype Hara Bona (40.00 days), whereas the maximum days to 50% flowering were recorded in genotype Rachna (67.33 days). The maximum days to pod setting were recorded in genotype

Bonneville (67.73 days) followed by Rachna (64.53 days). The minimum days to first pod picking were recorded in genotype Ajad Pea-3 (54.33 days), whereas the maximum days to first pod picking were recorded in genotype Arka Karthik (90.67 days). The maximum pods per cluster were observed in genotype Rachna (2.00) followed by Hara Bona (1.99). The maximum pods per plant were recorded in genotype Jawahar Pea-54 (15.87) followed by Ajad Pea -3(15.67). The maximum pod length (cm) was observed in genotype Arka Karthik (10.53cm) followed by BL-1 (10.18 cm). The maximum pod width (cm) was recorded in genotype JM-1 (2.23cm) followed by Azad Pea-5 (1.91cm). The maximum average pod weight (g) was recorded in variety Azad Pea-5 (8.49 g) followed by JM-1 (7.79 g). The maximum pod yield per plant were observed in genotype Jawahar Pea-54 (90.47g) followed by variety Azad Pea-5 (88.94g). The maximum pod yield per plot were observed in genotype Jawahar Pea-54 (1085.68g) followed by variety Azad Pea-5 (1067.23g). The maximum seeds per pod were recorded in genotype VRT-12-1(8.64) followed by VRP-22 (7.94). The maximum seed yield per plant (g) was recorded in variety JM-1 (13.63 g) followed by Azad Pea-5 (13.30 g). The maximum shelling per cent were recorded in genotype VRPMR-10 (54.00%) followed by JM-1 (53.33%). The maximum moisture content in pods was recorded in genotype Azad Pea-5(84.33%) followed by Jawahar Pea-54 (83.50%). The maximum fibre content were recorded in genotype Rachna (13.52%) followed by VRPMR-10 (12.93%). The maximum protein content was recorded in genotype Arka Karthik (34.50%) followed by VRPMR-11 (33.57%).

Table 4.2a: Mean performance of garden pea genotypes for yield and other characters

Name of Genotypes	Plant height (cm)	Num-ber of pri-mary branches per plant	Plant spread (cm)	Days to first flowering	Days to 50% flowering	Days to pod sett-ing	Days to first pod picking	No. of pods per clus-ter	No. of pods per plant	Pod length (cm)
VRP-22	53.77	2.20	33.53	37.40	41.33	41.20	62.00	1.73	8.27	8.55
VRPMR-11	69.38	3.08	34.73	51.00	58.60	63.20	86.87	1.73	14.80	7.27
VRT-12-1	48.93	2.80	32.47	45.27	52.33	48.73	69.73	1.67	10.07	8.77
PC-531	61.68	2.67	35.93	41.73	45.00	50.07	71.87	1.67	11.87	8.27
JawaharPea-54	83.99	2.60	37.51	40.87	64.67	44.13	65.53	1.73	15.87	8.54
J.Pea-71	53.39	2.13	37.33	58.47	62.67	63.47	83.60	1.67	8.87	8.28
Arkel	47.71	2.60	36.53	38.73	43.67	42.00	61.00	1.73	14.00	8.16
Arka Karthik	52.24	3.00	37.93	39.80	44.00	42.73	90.67	1.67	14.13	10.53
NSM-6	53.84	2.73	35.87	45.47	64.00	48.67	68.67	1.73	11.73	8.12
Azad Pea-5	66.11	2.40	35.20	52.62	60.40	63.40	82.67	1.93	10.47	8.23
VRP-7	65.84	2.40	35.40	45.36	50.35	49.60	72.13	1.73	13.00	6.97
Pusa Pragati	61.12	2.33	33.93	34.73	53.67	38.00	59.93	1.93	11.80	10.18
VRPMR-10	52.51	2.67	32.93	58.32	63.67	63.00	74.40	1.67	13.60	8.21
Arka Pramod	67.29	2.67	32.20	59.58	64.33	63.60	73.67	1.67	9.67	8.03
Bonneville	60.78	2.87	33.40	60.21	65.00	67.73	74.33	1.80	12.20	9.56
Swarna Mukti	97.51	3.13	33.13	44.80	49.00	47.73	68.40	1.73	9.47	8.14
Rachna	69.02	2.47	32.78	61.20	67.33	64.53	72.33	2.00	14.87	6.43
Hara Bona	64.62	2.87	33.80	35.13	40.00	39.12	79.67	2.00	15.07	7.89
Ajad Pea -3	73.06	2.27	32.00	41.53	46.33	44.73	54.33	1.47	15.67	8.57
Arka priya	60.38	2.40	33.20	47.33	51.33	50.40	71.13	1.47	7.80	8.23
BL-1(Bidar Local-1)	63.17	2.73	33.60	41.67	45.67	44.80	70.87	1.47	9.53	10.18
Hissar Harit	58.24	3.07	34.07	37.00	43.33	40.07	57.67	1.67	13.87	7.55
S-10	87.26	2.13	31.73	40.80	45.00	43.87	69.00	1.33	10.80	8.19
Azad Pea-1	86.49	2.60	30.33	43.93	47.00	46.93	65.33	1.47	9.20	8.11
JM-1	63.90	2.73	30.73	43.80	47.67	46.73	66.33	1.93	13.33	8.88
BL-2	58.60	3.13	31.47	61.20	66.00	64.00	88.60	1.60	8.73	6.17
Over all means	64.65	2.64	33.91	47.66	53.17	50.86	71.57	1.70	11.87	8.31
C.D. (5%)	1.81	N/A	1.652	1.703	2.446	1.609	5.011	0.16	1.415	0.581
SE(m)	0.635	0.274	0.58	0.598	0.859	0.565	1.759	0.056	0.497	0.204
SE(d)	0.898	0.388	0.82	0.846	1.214	0.799	2.488	0.08	0.703	0.289
C.V.	1.702	17.982	2.962	2.173	2.86	1.909	4.247	5.739	7.244	4.254

Table 4.2b: Mean performance of garden pea genotypes for yield and other characters

Name of Genotypes	Pod width (cm)	Ave-rage pod wt. (g)	Pod yield per plant (g/plant)	Pod yield per plot (g/plot)	No. of seeds per pod	Seed yield per plant (g/plant)	Shelling (%)	Mois-ture con-tent in pods	Fibre con-tent	Pro-teiin con-tent
VRP-22	1.54	5.42	72.25	867.04	7.94	10.47	48.00	73.43	8.60	27.00
VRPMR-11	1.55	5.33	78.52	942.24	7.17	10.75	50.00	74.80	10.93	33.57
VRT-12-1	1.52	4.83	48.67	583.98	8.64	10.27	46.00	73.64	10.23	30.43
PC-531	1.45	5.52	65.49	785.86	7.40	11.40	50.67	71.37	9.50	29.77
JawaharPea-54	1.53	5.71	90.47	1085.68	7.93	11.69	45.50	83.50	11.53	28.93
J.Pea-71	1.74	5.03	44.65	535.76	6.87	12.13	49.17	78.37	12.17	28.70
Arkel	1.43	4.98	69.72	836.62	6.38	10.67	51.67	73.00	10.63	25.80
Arka Karthik	1.40	4.98	66.85	802.23	6.07	11.93	52.33	75.83	9.07	34.50
NSM-6	1.32	6.47	75.85	910.26	7.62	11.77	47.33	75.87	12.93	27.03
Azad Pea-5	1.91	8.49	88.94	1067.23	7.47	13.30	53.00	84.33	11.53	25.43
VRP-7	1.45	4.77	61.97	743.60	6.70	11.10	50.67	82.43	11.83	26.20
Pusa Pragati	1.57	5.65	66.71	800.51	7.75	12.37	50.83	73.10	10.47	25.17
VRPMR-10	1.45	5.77	78.38	940.56	7.26	12.02	54.00	74.17	12.93	29.17
Arka Pramod	1.84	5.88	56.86	682.34	7.10	10.73	48.33	81.83	11.83	28.27
Bonneville	1.74	5.73	69.98	839.79	7.07	10.63	45.83	72.17	10.10	29.37
Swarna Mukti	1.82	4.01	45.93	551.16	5.44	10.37	42.17	74.27	11.47	29.07
Rachna	1.28	3.71	55.13	661.57	4.73	9.80	36.33	68.67	13.52	31.73
Hara Bona	1.45	4.81	72.48	869.78	5.96	11.56	42.87	80.77	10.27	29.37
Ajad Pea -3	1.84	4.73	73.99	887.92	7.10	11.85	52.00	81.13	9.73	31.67
Arka priya	1.51	5.18	40.40	484.85	7.40	9.50	49.67	75.33	11.50	27.67
BL-1(Bidar Local-1)	1.49	5.89	56.12	673.47	7.50	12.13	42.00	75.53	8.63	30.20
Hissar Harit	1.51	4.61	64.02	768.26	7.27	11.49	50.17	72.00	12.50	33.00
S-10	1.60	5.58	60.28	723.41	7.26	11.10	46.67	75.60	9.80	28.80
Azad Pea-1	1.61	5.15	47.41	568.93	7.80	10.47	52.67	77.30	9.87	25.83
JM-1	2.23	7.97	65.94	791.27	7.84	13.63	53.33	79.90	8.27	33.47
BL-2	1.31	3.70	43.33	520.00	5.23	9.73	39.00	69.00	13.12	29.73
Over all means	1.58	5.38	63.86	766.32	7.03	11.26	48.09	76.05	10.88	29.23
C.D. (5%)	0.12	0.23	7.80	93.55	0.35	1.19	2.87	2.89	0.96	3.54
SE(m)	0.04	0.08	2.74	32.83	0.12	0.42	1.01	1.01	0.34	1.24
SE(d)	0.06	0.11	3.87	46.44	0.17	0.59	1.42	1.43	0.48	1.76
C.V.	4.78	2.60	7.42	7.42	3.04	6.40	3.63	2.31	5.37	7.37

Conclusion

From the present experimental findings it is concluded that Jawahar Pea-54 is found to be best for yield parameters. Pusa Pragati, Azad pea-3, Azad pea-5 and Rachna also showed good performance for growth and quaity parameters and lowest readings was recorded in Arka Priya and BL-2.

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