

Response of Pea Varieties on Growth, Yield Attributes and Quality under Valley Conditions

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ABSTRACT

An investigation was conducted with fifteen pea genotypes and three replications. The maximum number of seeds per pod, maximum pods per hectare and maximum pod yield per plant were observed under the treatment P-89. From the data presented, it may be concluded that the genotype of variety P-89 was found suitable for valley hills on the basis of yield parameters, followed by variety Priya and PB-89. The yield and quality of crop (pea) are very complex characteristics depending on certain biological alignments between environment and heredity. The characteristic of a cultivar as well as combination of trials differ according to climatic conditions of the localities (valley conditions) Statistical analysis for all the characters studied by method Randomized block design (RBD) and for the statistical analysis of data the C.D. (Critical difference) at 5 % level of significance for each character was worked out.

Highlights

- ① The genetic hereditary and favorable climatic conditions affect the flowering.
- ② Low temperature required for good sugar content in pea.

Keywords: Pea, yield attributes, genotype, heritability

Pea is an important vegetable crop grown throughout the world. It belong to family Fabaceae, having chromosome number $2n = 14$. Vavilov listed different centres of origin for pea. Area comprising Central Asia, the near East, Abyssinia and the Mediterranean is the centre of origin based on diversity. It is very rich in protein, carbohydrate, vitamin A and C, calcium and phosphorous and the nutritive value of fresh green peas. In India, pea is grown as a winter vegetable crop in plains of northern regions and low hills. It is also grown as an offseason vegetable in summer in the hilly areas. As it is mostly grown in Uttar Pradesh, Madhy Pradesh, Bihar, Assam and Orrisa which together account for

about 95 % of the total area and production of pea in India. Pea cultivar performs differently under agro-climatic conditions and various cultivars of same species grown even in same environment have yield differences. Because yield and quality of crop are very complex characteristics depending on certain biological alignments between environment and heredity. The characteristic of a cultivar as well as combination of trials differ according to climatic conditions of the localities. The crop has promising future and attempt should be made to know about best performing and adaptable varieties of garden pea under subtropical agro-climatic condition of Garhwal hills of Himalayan region.

MATERIALS AND METHODS

Perusal was carried out for comparable study of fifteen varieties *viz.* PB-89, AP-5, CHP-2, AP-4, P-89, VL-7, AP-1, AP-2, Bonneville, Arkel, Azad-1, PS-04, GS-10, Priya and Azad-3 with three replications having planting geometry 45 cm × 10 cm in the plot size allocated 3 m × 2 m. The investigation was carried out at Horticultural Research Center, Department of Horticulture, H.N.B. Grahwal University, Srinagar Garhwal, Uttarakhand during 2013-14. The average 4.50 mm rainfall was received during the months of experiment. The average maximum temperature was 24.6 °C, while the average minimum temperature was 10.0 °C. The average maximum and minimum relative humidity was 67.98 and 27.34 per cent, respectively.

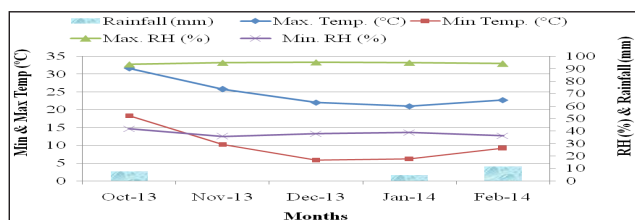


Fig. 1: Meteorological data recorded during experiment, 2013-2014

Recommended dose of fertilizers was applied 20 kg, 40 kg and 50 kg N, P and K respectively per hectare. Statistical analysis for all the characters studied was done by method of Randomized block design (RBD) and for the statistical analysis of data the C.D. (Critical difference) at 5 % level of significance for each character was worked out.

RESULTS AND DISCUSSION

In the investigation variety AP-4 produces maximum number of primary branches, whereas the minimum number of the primary branches was observed under the treatment AP-1. Variety AP-2 recorded the maximum plant height whereas variety GS-10 recorded the minimum plant height. The increase in number of branches might be due to the enhanced cell division which increased the number of vegetative buds on the main stem. The temperature and moisture conditions also favored the vegetative development of the crop. The variation in plant height can be partly attributed to variations of soils and climatic factors. The maximum length of internodes was recorded under AP-2, whereas the minimum length of internodes was recorded under

Bonneville and it may be due to congenial climatic conditions like temperature, relative humidity and rainfall. Different varieties had taken significant influence on days taken to first flowering. Variety 'Arkel', took minimum days for first flowering, whereas 'AP-2' required to maximum days for first flowering and it may be due to the genetic hereditary and favorable climatic conditions like temperature, rainfall, high relative humidity and dry sunshine also confirmed that favorable environment must be required for flowering in pea.

Significant observations were observed among different varieties of pea for the days taken to first pod setting and days to first green pod harvest. The minimum days taken to first pod setting was observed under the treatment 'Arkel', whereas the maximum days taken to first pod setting was observed under the treatment AP-4. VL-7 required minimum days for first green pod harvest, whereas the maximum days taken to first green pod harvest was recorded under the treatment AP-2. It might be due to the genetic characters of particular variety. But favorable climatic conditions and sometimes the change in the microclimate will affect the days required for pod setting and green pod harvesting.

Maximum width of pod and maximum length of pod were recorded under PB-89, whereas the minimum parameters were recorded under AP-2. The reason behind the variations of pod might be due to genetic makeup of variety. Performance of various treatments with respect to number of seeds per pod, number of pods per plant, number of pods per hectare was found to have significant variation. The maximum number of seeds per pod was observed under the treatment P-89, whereas the minimum number of seeds per pod was observed under the treatment AP-1. Variety Arkel recorded the maximum number of pods per plant, whereas the variety AP-2 recorded the minimum number of pods per plant. Maximum pods per hectare were recorded under the treatment P-89, whereas the minimum number of pods per hectare was observed under the treatment AP-2. This might be due to congenial climatic condition like cool relative humidity, low temperature and optimum photoperiod for luxuriant vegetative growth and flowering which favors better pods production. This may possibly due to its good plant growth and comparatively more number of primary branches

Table 1: Response of different pea cultivars on growth attributes, yield attributes and yields under valley conditions of Garhwal hills

Tr. No.	Treatment/ Cultivars	Plant height	No. of primary branches	Length of inter-nodes (cm)	Days taken to first flowering	Days taken to first pod setting	Pod set per cent	Length of pod (cm)	Width of pod (cm)	Days to first green pod harvest	No. of seeds per pod
V ₁	PB-89	106.00	2.67	5.70	50.33	53.67	39.00	11.03	1.71	53.67	8.93
V ₂	AP-5	117.00	3.33	4.90	52.00	56.00	40.33	7.63	1.43	56.00	7.33
V ₃	CHP-2	128.33	3.33	4.23	57.67	60.67	36.00	7.27	1.46	60.67	7.33
V ₄	AP-4	124.00	3.67	4.43	63.33	64.07	37.00	7.23	1.42	64.07	7.00
V ₅	P-89	129.33	3.40	4.47	51.33	54.67	38.00	10.60	1.56	54.67	9.67
V ₆	VL-7	113.67	3.45	4.27	46.33	49.21	42.33	7.80	1.49	49.21	7.00
V ₇	AP-1	103.33	2.16	4.30	52.33	55.67	38.00	6.50	1.57	55.67	6.33
V ₈	AP-2	170.00	3.21	7.67	69.67	72.33	36.67	5.30	1.32	72.33	6.67
V ₉	Bonneville	101.33	2.33	4.20	54.00	58.33	46.67	8.36	1.57	58.33	7.33
V ₁₀	Arkel	138.33	2.67	4.67	43.67	47.00	41.33	8.43	1.61	47.00	7.33
V ₁₁	Azad-1	115.67	2.33	6.77	48.33	51.67	41.67	7.40	1.67	51.67	7.33
V ₁₂	PS-04	90.33	2.30	6.20	51.67	54.67	39.00	7.83	1.63	54.67	6.67
V ₁₃	GS-10	88.00	2.67	5.23	60.00	63.00	37.67	7.60	1.65	63.00	7.33
V ₁₄	Priya	93.67	2.36	7.23	51.33	53.00	33.33	8.27	1.59	53.00	7.92
V ₁₅	Azad-3	106.67	2.63	4.77	60.00	63.00	35.67	7.20	1.51	63.00	7.67
SE \pm		1.44	0.29	0.47	1.10	1.16	0.65	0.11	0.06	1.16	0.36
CD at 5 %		4.18	0.86	0.14	3.20	3.35	1.89	0.31	0.02	3.35	1.05
Mean		115.04	2.83	5.27	54.13	57.13	38.84	7.90	1.55	57.13	7.46

Table 1: (Cont...)

Tr. No.	Treatments / Cultivars	No. of pods per plant	No. of pods per ha ($\times 10^3$ pods)	Pod yield per plant (g)	Pod yield per ha (q ha^{-1})	Seed yield per plant (g)	Seed yield per ha (q ha^{-1})	Seed index	T.S.S. ($^{\circ}\text{Brix}$)	Shelling per cent
V ₁	PB-89	50.00	4000.00	221.67	106.35	63.62	50.87	18.59	15.50	42.00
V ₂	AP-5	31.67	2533.33	177.22	85.03	43.00	36.42	21.68	14.30	41.00
V ₃	CHP-2	32.33	2586.67	153.88	73.82	40.67	32.52	18.81	16.50	43.00
V ₄	AP-4	49.33	3946.67	209.45	100.49	54.33	42.43	15.38	14.00	42.00
V ₅	P-89	60.00	5122.22	271.67	130.30	67.00	53.57	17.59	13.00	46.00
V ₆	VL-7	43.00	3440.00	183.33	87.96	45.33	34.23	24.79	16.33	38.00
V ₇	AP-1	46.67	3733.33	183.33	88.69	46.00	34.76	18.68	17.00	38.67
V ₈	AP-2	24.67	1973.33	133.33	63.94	43.00	34.38	14.86	16.00	42.00
V ₉	Bonneville	46.67	3733.33	223.33	107.14	48.00	40.12	15.37	18.00	39.00
V ₁₀	Arkel	80.00	3840.00	213.88	102.62	54.33	44.43	25.25	18.50	41.33
V ₁₁	Azad-1	48.52	3880.00	218.33	104.71	47.67	39.52	21.33	16.00	36.00
V ₁₂	PS-04	46.67	3733.33	216.67	103.95	63.00	50.37	19.56	14.60	42.33
V ₁₃	GS-10	49.00	3920.00	223.88	107.42	51.33	40.34	17.02	16.23	37.00
V ₁₄	Priya	52.33	4185.00	230.00	110.32	63.67	50.91	16.73	15.33	41.00
V ₁₅	Azad-3	46.00	3680.00	216.67	103.92	58.23	46.56	18.75	14.70	44.00
SE \pm		1.61	147.05	3.17	1.52	2.24	2.26	0.09	0.11	0.68
CD at 5 %		4.68	426.00	9.22	4.42	6.50	6.57	0.26	0.33	1.97
Mean		47.12	3620.48	205.11	98.44	52.61	42.10	18.96	15.73	40.89



causing greater assimilation of the photosynthate which ultimately resulted into higher yield.

Yield characters *viz.*, pod yield per plant, pod yield per hectare were statistically significant. The maximum pod yield per plant was recorded under the treatment P-89, whereas the minimum pod yield per plant was recorded under the treatment AP-2. The maximum pod yield per hectare was recorded under the treatment P-89, whereas the minimum pod yield per hectare was recorded under the treatment AP-2. The increase in pod yield might be due to favorable climatic conditions like cool temperature, high relative humidity and optimum sunshine hours. Quality of pods produced is also low at high temperature due to conversion of sugars to hemicellulose and starch.

Variety P-89 produces the maximum seed yield per plant, whereas variety CHP-2 produces the minimum seed yield per plant. The maximum seed yield per plant was observed under the treatment CHP-2. Variety P-89 produces the maximum seed yield per hectare, whereas the minimum seed yield per hectare was observed under the treatment CHP-2 and it may be due to favourable environmental factors. Similar results were also confirmed by Acikgoz *et al.* (2009) and Orak and Nizam (2009).

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CONCLUSION

Finding of research work concluded that pea variety P-89 was suitable variety for valley region (Garwal hills) on the basis of growth, yield attributes and quality followed by variety Priya and PB-89. The yield attributes influenced by the genetic hereditary and favorable climatic conditions like temperature, rainfall, high relative humidity and dry sunshine. The favorable climatic conditions and sometimes the change in the microclimate will affect the yield attributes of pea.

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