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RESEARCH ARTICLE

STUDIES ON FACTORS RESPONSIBLE FOR SMART AGRONOMY OF DWARF FIELD PEA

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ABSTRACT

An experiment was conducted during winter season of two years to study the efficacy of three varieties HFP-4, KPMR-157 and KFPD-24 of dwarf field pea (*Pisum sativa* L.), three spacing (20, 25 and 30 cm) and two seed rate (100 & 125 kg/ha). Cultivar KPMR-157 proved better than other genotypes and gave highest seed yield of 34.63 q/ha. However, it was almost on a par with yield levels of KFPD-24 (31.43 q/ha) and HFP-4 (30.05 q/ha). The crop responded upto 30 cm spacing (32.78 q/ha) and at this spacing the grain yield was higher in comparison to 20 cm spacing (30.97 q/ha) and 25 cm (32.32 q/ha). The 100 kg seed/ha (32.10 q/ha) gave higher seed yield than 125 kg seed/ha (31.95 q/ha). The growth and yield contributing characters were concordance to the grain yield of dwarf field pea.

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INTRODUCTION

Field pea (*Pisum sativum* L.) is self pollinated crop and belongs to the family *Papilionaceae*. The fruit which is eaten as a 'pod' botanically. The plant is a herbaceous annual with varying habit. Pea has been grown in India for several decades and is quite adopted to this part of world. There are a good number of local strains and exotic varieties available. Most of exotic varieties introduced in India and used as commercial varieties and hence significant efforts were made to bread varieties for various purposes. The dwarf cultivars of field pea play a significant role in increasing the grain production due to high yield potentiality. These varieties possess higher N_2 fixation and high harvest index, therefore, they gives better grain production under poor edaphic condition. Singh (1999) has conducted the field study under degraded edaphic condition, having sandy loam soil texture, moisture stress condition and low in fertility status at Regional Research Station, Mainpuri, C.S. Azad University of Agriculture and Technology, Kanpur and reported that dwarf varieties *Aprana*, *KPMR 157* and *Swanti* gave grain yield by 27.44 q/ha, 30.41 q/ha and 31.90 q/ha, respectively. Constraints under cultivars field are often found to be major limitation for the use of higher seed rate and closer spacing for increasing production of field pea.

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The crop is finally grown under degraded lands of Uttar Pradesh on 3.84 lakh ha with production of 5.27 lakh mt. tones and productivity 1377 kg/ha (Anonymous, 2017). The similar constraints have also been evaluated in SAT of Uttar Pradesh, where the crop is being grown without any consideration of seed rate and planting distance. With the view to findout the suitable variety, seed rate and spacing for maximum production in degraded land, the present experiment was planned and laid out under situation base study.

MATERIALS AND METHODS

The field trial was laidout during winter (*Rabi*) season of two years at Regional Research Station, Mainpuri, C.S. Azad University of Agriculture and Technology, Kanpur. The soil was sandy loam, having pH 8.7, organic carbon 0.37%, total nitrogen 0.03%, available phosphorus 10 kg/ha and available potassium 296 kg/ha, thus, the nutrients of experimental soil were analysed low in organic carbon, total nitrogen, available phosphorus and high in available potassium. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta, *et al.,* 1962). Total nitrogen was analysed by Kjeldahl's method as discussed by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen *et al.,* 1954) and Flame photometric method (Singh, 1971), respectively. The three genotypes of dwarf field pea i.e., *HFP-4, KPMR 157* and KFPD-24 were tested under three

spacing (20, 25 and 30 cm) and two seed rate (100 and 125 kg/ha). A dose of N_{25} + P_{50} + S_{15} + Ca_{30} kg/ha was given to crop at planting. The sulphur (S) and calcium (Ca) were supplied through gypsum @ 100 kg/ha. The crop was seeded in second fortnight of November and harvested after 135 days in the first fortnight of April during both experimental years. Four irrigations at branching, flowering, grain filling and pre-maturity stages were given to crop. Other recommended agronomical practices were followed as suggested by Singh (1999). Well sun dried crop was threshed after 15 days of harvesting. The experiment was conducted in three replicated split plot design. The experimental data of both and pooled years were statistically analysed as suggested by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

The two years pooled data of growth and yield contributing characters and individual year grain yield/ha results have been presented in Table 1 and Table 2, respectively, and discussed here under appropriate heads.

Effect of spacings: The different spacing of dwarf field pea did not influence to height/plant, branches/plant, pods/plant, pods weight/plant, seeds/pod, grain weight/plant and 100-seed weight, however, the increasing spacing up to 30 cm numerically increased the all growth and yield traits over the 20 cm and 25 cm spacing. Data given in Table 2 make it clear that increasing spacing linearly increased the grain yield upto highest test spacing of 30 cm, but this increased was insignificant. The three spacing i.e., 20 cm, 25 cm and 30 cm produced grain by 30.97 q/ha, 32.32 q/ha and 32.78 q/ha, respectively. The considerable improvement in growth and yield contributing parameters under sowing of 30 cm spacing was responsible for higher grain yield. Singh (1999), Singh *et al.* (2003), Singh (2005) and Singh *et al.* (2009) have also reported that dwarf field pea gave higher yield at 30 cm spacing.

Effect of seed rate: The use of 125 kg seed per hectare reduced the height/plant, branches/plant, pods/plant, pods weight/plant, seeds/pod, grain weight/plant and 100-seed weight in comparison to 100 kg seed/ha but these reduction were analysed insignificant.

Table 1. Growth, yield traits and grain yield of dwarf field pea under different varieties (pooled data of two years)

Varieties	Height /plant (cm)	branches/ plant	Pods /plant	Pods weight/ plant (g)	Seeds/ pod	Grain weight /plant (g)	100-seed weight (g)	Grain yield (q/ha)		
								1st year	2nd year	Pooled year
HFP-4	49.10	4.11	20.40	18.40	4.90	15.35	20.80	28.02	32.08	30.05
KPMR-257	49.55	4.20	21.50	18.80	5.38	16.20	18.30	31.02	38.24	34.63
KFPD-24	51.31	4.30	21.60	20.15	4.70	16.00	21.65	30.10	32.68	31.43
C.D. 5%	0.75	0.18	N.S.	N.S.	0.30	N.S.	1.09	0.91	N.S.	-

Table 2. Growth, yield traits and grain yield of dwarf field pea under various spacing (pooled data of two years)

Varieties	Height /plant (cm)	Branches / plant	Pods /plant	Pods weight/ plant (g)	Seeds/ pod	Grain Weight /plant (g)	100-seed weight (g)	Grain yield (q/ha)		
								1st year	2nd year	Pooled year
20 cm	48.08	4.05	20.36	18.40	4.68	19.10	19.45	29.19	32.75	30.97
25 cm	50.09	4.21	21.21	19.15	5.04	19.90	20.27	29.60	35.05	32.32
30 cm	51.09	4.33	21.84	19.53	5.14	20.30	20.65	30.35	35.21	32.78
C.D. 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-

Table 3. Growth, yield traits and grain yield of dwarf field pea under different seed rate (pooled data of two years)

Varieties	Height /plant (cm)	Branches/ plant	Pods /plant	Pods weight/ plant (g)	Seeds/ pod	Grain weight /plant (g)	100-seed weight (g)	Grain yield (q/ha)		
								1st year	2nd year	Pooled year
100 kg/ha	50.05	4.15	21.18	19.20	5.06	20.05	20.35	29.85	34.36	32.10
125 kg/ha	49.65	4.10	20.97	19.05	5.00	19.85	20.14	29.60	34.31	31.95
C.D. 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	-

Performance of varieties: Perusals of data make it clear that the variety *KFPD-24* produced significantly longest plant over *HFP-4* and *KPMR-157*. Varieties *HFP-4* and *KPMR-157* produced statistically at par plant highest. Varieties *HFP-4* significantly reduced branches/plant (4.11 branches/plant) over *KFPD-24* but it was produced statistically equal branches/plant with *KPMR-157*. Pods/plant and pod weight/plant did not influence by different varieties of dwarf field pea. The maximum 100-seed weight in *KFPD-24* (21.65 g) was due to, its genetic potentiality. *KPMR-157* gave higher seed yield by a margin of 3.20 q/ha or 10.18% and 4.58 q/ha or 15.24% over *KFPD-24* and *HFP-4*, respectively. The higher yield *KPMR-157* was owing to its better yield traits (seeds/plant and grain weight/plant), which took over benefit of suitable spacing and seed rate applied, resulted in, increased yield (Table 1). Singh and Yadav (1989), Singh (1992), Singh (1999), Singh *et al.* (2003), Singh (2005) and Singh *et al.* (2009) have also reported differences in yield attributes and seed yield in various genotypes.

The sowing of dwarf field pea with 100 kg seed/ha linearly increased the grain yield by 32.10 q/ha over 125 kg seed/ha (31.95 q/ha). however, both the seed rate displayed statistically at par grain yield of dwarf field pea. Therefore, sowing with 100 kg seed/ha saved 25 kg seed/ha. The considerable improvement in growth and yield contributing parameters under 100 kg seed/ha was responsible for the higher grain yield. These results are in agreement with those reported by Singh (1999), Singh *et al.* (2003), Singh (2005) and Singh *et al.* (2009).

Conclusion

The sowing of cvs. *HFP-4*, *KPMR-157* and *KFPD-24* gave better grain yield at 30 cm spacing with use of 100 kg seed/ha. therefore, the farm house holds residing in the field pea growing tract may be advocated to fallow this recommendation.

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