

Effect of Sowing Density on Seed Yield and Quality of Early Varieties of Vegetable Pea (*Pisum sativum*)

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The sowing density of varieties vary with the type of seed and growth habit of the plant. More number of round seeds are accommodated in a unit weight as compared to wrinkled ones. Further, if the size of the plant is small, more seeds are required per unit area and if the plants are vigorous in nature, less population per unit area is required. Kashi Nandini, Kashi Udai and Kashi Mukti are newly released early varieties of vegetable pea from IIVR, Varanasi, whereas Arkel is a very well-known early variety of vegetable pea. The sowing density of peas, mentioned in the literature, is 80-100 kg/ha.

During the course of vegetable pea seed production at IIVR, Varanasi, over the years, it was observed that sowing the early vegetable pea varieties as per the recommended sowing density of 80-100 kg/ha leaves many blank spaces in the field. Enhanced sowing density approximately by 20-40 per cent enhanced the seed yields and hence, an evaluation of optimum sowing density for early vegetable pea varieties merits investigation. The present study was thus conducted to find out the optimum sowing density for early vegetable pea varieties.

The experiment was conducted during 2007-08 in *rabi* season. The trial was laid out in a randomized block design with five sowing densities (120, 140, 160, 180 and 200 kg/ha) and four varieties (Arkel, Kashi Nandini, Kashi Udai and Kashi Mukti). Each treatment was replicated thrice. The experimental rows were 23 cm apart. The seeds in each row were placed manually at 4-8 cm apart, depending upon the chosen sowing

density. Recommended cultural practices were followed. Each plot measured 3.45 m² (3 m x 1.15 m).

For seed yield, all the plants from each plot were uprooted at full maturity (brown) stage. The seeds were extracted by manual threshing. All the observations, except seed yield, were recorded from five randomly selected plants in each plot. Plant height was measured with the help of a meter scale. The number of branches/plant, pods/plant and seeds/pod were counted at harvesting stage. The 100-seeds were counted with the help of a seed counter (Tripette & Renaud, France) and the seed weight (g) was also measured. The seed yield (q/ha) was calculated on the basis of plot yield. For germination test, four replications of 50 seeds each were put in rolled paper towels and placed in a seed germinator (Calton, India) at 25°C. The germination counts were performed on 5 and 8 days and the mean percentage of normal seedlings was calculated. The data recorded in the study were analyzed statistically as per Gomez and Gomez [1].

Results showed that the least sowing density (120 kg/ha) produced maximum plant height (56.73 cm), number of branches/plant (3.42), number of pods/plant (10.55), number of seeds/pod (7.94), 100-seed weight (21.2 g) and germination (92.99%), followed by second low seed density (140 kg/ha). The maximum seed yield (14.78 q/ha) was recorded with 180 kg/ha, followed by 160 kg/ha (Table 1). It is evident from the results that in least seed density (120

kg/ha), plants occupied maximum area for nutrition and light, therefore individual plant performance was better, whereas seed yield (q/ha) was minimum due to less number of plants/ha. Seed yield increased with increasing density up to 180 kg/ha and declined thereafter, due to over crowding and competition of plants for nutrition and light. The results of the present study were in agreement with those reported earlier [2-4]. It was also reported that total seed yield was higher in close spacing, *i.e.* with higher densities, and recorded about 33 per cent increased seed yield than wider spacing [5].

With regard to performance of varieties, significantly higher plant height (58.37 cm) was noted in Arkel, followed by Kashi Udai, whereas number of branches/plant (2.88), number of pods/plant (8.91) and number of seeds/pod (7.05) were higher in Kashi Mukti (Table 2). Maximum seed yield was obtained in Kashi Nandini,

followed by Kashi Udai, whereas maximum 100-seed weight and germination percentage were observed in Kashi Nandini and Arkel, respectively. Among varieties, variation were mainly due to their genetic performance. Kashi Nandini produced maximum seed yield (q/ha) because its 100-seed weight was significantly higher.

Data on interactive effect of sowing density and variety showed that significantly higher plant height (71.27 cm) was obtained in variety Arkel with least seed density [120 kg/ha], followed by next higher seed density [140 kg/ha]. Similar trend was observed with respect to maximum number of branches/plant (3.83 and 3.76, respectively) in variety Kashi Mukti. However, seed yield (16.53 q/ha) was maximum with sowing density of 180 kg/ha in Kashi Nandini, followed by Kashi Udai. The 100-seed weight (25.27 g) and germination per cent (95.30 %) were

Table 1. Effects of sowing density on seed yield and quality attributes

Sowing density (kg/ha)	Plant height (cm)	No. of branches/plant	No. of pods/plant	No. of seeds/pod	Seed yield (q/ha)	100-seed weight	Germination (%)
120	56.73	3.42	10.55	7.94	8.35	21.20	92.99
140	54.08	3.10	9.78	7.51	10.08	19.83	91.58
160	52.88	2.65	8.80	7.80	13.40	19.22	91.18
180	49.47	1.78	7.64	6.00	14.78	18.15	88.02
200	26.26	1.39	4.12	4.34	11.88	16.79	86.17
CD at 5%	3.02	0.32	0.67	0.60	1.08	0.17	1.13

Table 2. Effects of varieties on seed yield and quality attributes

Variety	Plant height (cm)	No. of branches/plant	No. of pods/plant	No. of seeds/pod	Seed yield (q/ha)	100-seed weight	Germination (%)
Arkel	58.37	2.35	7.54	6.69	10.72	18.00	90.42
Kashi Nandini	44.56	2.35	7.89	6.43	12.47	22.31	90.29
Kashi Uday	47.13	2.30	8.38	6.46	12.37	19.11	89.28
Kashi Mukti	41.47	2.88	8.91	7.05	11.55	16.90	89.45
CD at 5%	2.20	0.29	0.59	0.53	0.96	0.86	1.01

also maximum under least sowing density in Kashi Nandini. The maximum 100-seed weight and germination per cent obtained with least sowing density per ha may be due to availability of more nutritional area and exposure to sunlight. It is evident that performance of varieties was as per their genetic base (Table 2). The effect of plant density in different pea varieties was in agreement with Cruzat *et al.* [6].

It was hence, concluded that for early varieties of vegetable pea, sowing density of 140-180 kg/ha is optimum to obtain higher yield of quality seeds.

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