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Effect of sowing dates and varieties on yield and quality of garden pea seed

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Abstract A trial on effect of sowing dates and varieties on seed yield and quality of garden pea was conducted at IIVR, Varanasi during rabi 2006-2007. Pea seeds of four varieties viz., Arkel, Kashi Nandini, Kashi Udai and Kashi Mukti were sown at 10 days interval from 20 October to 9 December. Early sowing dates resulted in poor seed yield and delayed sowing dates resulted in poor seed yield and quality. Significantly higher seed yield [13.53 q ha^{-1}] was found in 30th October sowing date followed by 9th November sowing date. Among the varieties, Kashi Udai produced significantly higher seed yield followed by Kashi Nandini. Interaction effect was found significant and maximum seed yield [15.8 q ha^{-1}]was noted on 30th October sowing of Kashi Udai.

Keywords: Pea yield, quality and sowing date

Introduction

Garden pea (*Pisum sativum* L.), an important vegetable crop, has acquired a place of prominence not only in sumptuous banquets but in diets of all sections of the society. It is being recognized as an important protein supplement. The pea varieties are of three seed types viz. round, dimpled and wrinkled. Early cultivation of pea was for pulse purposes and mostly round seeded varieties were grown mainly as a rainfed crop. The vegetable/garden pea varieties are sweet in taste and hence are mostly wrinkled or dimpled because of high sugar content. Kashi Nandini, Kashi Udai and Kashi Mukti are newly released early varieties of vegetable pea from IIVR, Varanasi and suitable for pea-wheat cropping system whereas Arkel is a very well known early variety of vegetable peas released from IARI. Peas are sown in rabi season from beginning of October to the end of November in northern plains as the cool climate of about four months is ideal for pea growing. The areas where there is slow transition from cool to warm weather, are ideal for pea growing. The optimum temperature for seed germination is about 22^{o}C however, it can germinate upto 5^{o}C but at slow rate. Peas grow best at mean temperature of 13-18^{o}C. It is tolerant to frost at early stage of growth. At later stage, the flowers and pods are affected. The wrinkled seeded cultivars are more sensitive to high temperature and a temperature of 30^{o}C and above even for a day affects the quality of pods. Since the seed crop of garden pea remains in the field for a longer duration, it is very much affected by the sowing time. The present study was thus conducted to underline the optimum sowing time for northern plains for newly developed early vegetable pea varieties.

Materials and Methods

The experiment was conducted during 2006-07 rabi season. The trial was laid out in a factorial randomized block design with six sowing dates at 10 days interval starting from 20 October to 9 December (20 Oct, 30 Oct, 9 Nov, 19 Nov, 29 Nov and 9 Dec) and four varieties (Arkel, Kashi Nandini, Kashi Udai and Kashi Mukti). Each treatment was replicated thrice.

The pea seed crop is normally sown with the help of a seed drill. Hence, the rows of experiment were made 23

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cm apart with the help of a seed drill. The seeds in each row were placed manually at 6-7 cm apart in the moisture zone of 4-6 cm below the soil surface and recommended cultural practices were followed. Each plot measured 3.45m^2 (3x1.15m). For harvesting of seeds for seed yield, all the plants from each plot were uprooted at fully mature (brown) stage and the seeds were extracted by threshing manually. 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 per plant, pods per plant and seeds per pod were counted at harvesting stage. The 100 seeds were counted with the help of a seed counter (Tripette & Renaud, France) and the100 seed weight (g) was measured with the help of an electronic balance (Mettler-Toledo, Switzerland). 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 germination towels and placed in a seed germinator (Calton, India) at 25^{0}C. The germination counts were performed at 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 [3].

Results and Discussion

Result indicated that maximum plant height (58.35cm), number of branches (2.69) and pods per plant (8.11) were observed under 9th November sowing date (table-1). It may be due to relatively cool temperature and sufficient time available for the growth and development to these seeds before low temperatures creep in, which could have promoted the growth of the plants. At higher temperature the germination is rapid but plant stand is affected due to decay and because of this the yield in earliest sowing date is low though the 100 seed weight was high. Similar results were reported by Singh *et al.* (1996) and Nagarajan *et al*. (2002).

Significantly higher number of seeds per pod (7.28), germination 94.18% and seed yield (13.53q ha^{-1}), were recorded from second sowing date i.e. 30th October. Maximum 100 seed weight (25.03 g) was obtained in 20th Oct. sowing date which was at par with 30 October sowing date (25.02 g). Similar results were reported by Sharma (2002), Varshney (1995) and Knott & Belcher (1998). The minimum value for all measured parameters was recorded under the last sowing date i.e. 9th December. Late sown crop was affected by powdery mildew disease and high temperature at the later stage of the crop which reduced the seed size as evident by weight of 100seeds. Similar result was reported by Sangar and Singh (1994).

Among the varieties, Arkel showed maximum plant height (48.14 cm) followed by Kashi Mukti (table-2). Variety Kashi Mukti produced maximum number of branches (2.86), pods per plant (7.67) and number of seeds per pod (6.59) whereas Kashi Nandini produced boldest seed as evident by its 100 seed weight (24.74 g), which was significantly higher than the 100 seed

Table 1. Effect of sowing dates

Sowing Dates	Plant height (cm)	No. of branches per plant	No. of pods per plant	No. of seed per pod	100seed weight(g)	Germination (%)	Seed yield (q/ha)
D1(20 Oct)	36.12	1.29	4.70	4.61	25.03	92.25	7.80
D2(30 Oct)	51.04	2.45	6.58	7.28	25.02	94.18	13.53
D3(9 Nov)	58.35	2.69	8.11	6.78	23.87	92.73	12.51
D4(19 Nov)	50.49	2.30	7.58	7.02	22.55	88.24	10.71
D5(29 Nov)	39.12	2.01	4.98	5.02	20.80	83.28	6.75
D6(9 Dec)	31.42	1.52	3.26	4.78	20.40	76.30	4.45
CD at 5%	3.19	0.18	0.74	0.72	1.32	2.89	1.24

Table 2. Effect of varieties

Varieties	Plant height (cm)	No. of branches per plant	No. of pods per plant	No. of seed per pod	100seed weight(g)	Germination (%)	Seed yield (q/ha)
V1(Arkel)	48.14	1.98	4.87	4.82	22.76	87.94	8.06
V2(Kashi Nandini)	39.79	1.48	5.53	5.98	24.74	87.26	7.89
V3(Kashi Udai)	44.78	1.95	5.41	6.26	22.46	88.58	10.06
V4(Kashi Mukti)	44.98	2.86	7.67	6.59	21.57	87.56	9.17
CD at 5%	2.60	0.15	0.61	0.59	1.07	2.36	1.01

Table 3. Interaction effects of sowing dates & varieties

Sowing dates x Varieties	Plant height (cm)	No. of branches per plant	No. of pods per plant	No. of seed per pod	100seed weight(g)	Germination (%)	Seed yield (q/ha)
D1V1	29.98	1.37	3.97	4.60	24.3	93.64	6.87
D1V2	36.27	1.17	4.27	4.20	26.27	93.17	8.73
D1V3	34.63	1.17	4.37	5.03	25.00	91.37	8.13
D1V4	43.60	1.47	6.20	4.60	24.10	90.83	7.47
D2V1	58.47	2.23	5.50	6.23	25.70	92.87	10.57
D2V2	44.03	1.70	5.73	6.90	27.53	92.97	14.30
D2V3	51.87	1.93	7.20	8.23	24.20	95.30	15.83
D2V4	49.80	3.93	7.90	7.73	22.63	95.60	13.43
D3V1	68.47	2.63	6.37	6.33	24.00	90.73	11.63
D3V2	48.13	2.00	8.12	7.17	26.37	93.10	12.63
D3V3	55.70	2.33	8.10	5.60	22.97	94.67	14.00
D3V4	61.10	3.80	9.80	8.00	22.13	92.43	11.77
D4V1	60.63	2.17	6.47	5.43	22.53	88.20	9.23
D4V2	46.80	1.50	8.60	8.13	24.67	87.07	12.57
D4V3	51.70	2.40	7.30	7.90	22.73	89.47	10.77
D4V4	42.83	3.13	7.93	6.60	20.27	88.23	10.27
D5V1	42.97	1.73	4.20	3.27	20.93	84.17	5.97
D5V2	36.73	1.30	4.10	5.23	22.50	83.50	7.00
D5V3	41.37	2.37	3.57	5.20	20.53	83.30	7.50
D5V4	35.40	2.63	8.07	6.37	19.23	82.17	6.53
D6V1	28.37	1.23	2.70	3.03	18.63	78.00	4.10
D6V2	26.77	1.20	2.30	4.27	21.13	73.73	4.10
D6V3	33.40	1.50	1.93	5.56	19.33	77.37	4.10
D6V4	37.13	2.17	6.10	6.27	21.07	76.10	5.53
CD at 5%	6.37	0.36	1.49	.44	2.63	5.79	2.47

weight of other varieties. Maximum germination (88.58%) and seed yield (10.6 q/ha) was noted in variety Kashi Udai. The performance of varieties is governed by interaction of genetic base and environment.

The interaction effect of sowing dates and varieties showed maximum plant height (68.47 cm) in 9th November sowing of Arkel followed by 9th November sowing of Kashi Mukti. Maximum number of branches (3.93) and germination (95.6%) was observed under 30th Oct. sowing in variety Kashi Mukti. Significantly higher number of pods (9.80) per plant was noted in 9th November sowing of variety Kashi Mukti. Maximum number of seeds per pod (8.23) and seed yield (15.83 q/ha) were found under 30th Oct sowing of Kashi Udai. Boldest seeds (27.53g) were produced by variety Kashi Nandini when sown on 30 Oct.. Maximum values for all the parameters were exhibited between 30thOct. to 9thNov. sowing. It was probably due to availability of optimum temperature to the crop for the growth and development stage by sowing during this period. With delay in sowing, as the temperatures slide down, the growth gets slowed down and the number of days to flowering increase. The sowing at a date later than 15th November reduced the seed yield (Nagarajan *et al*., 2002).

सारांश

बुवाई की तिथियों तथा किस्मों का सब्जी मटर की बीज उपज तथा गुणवत्ता पर प्रभाव देखने के लिए भारतीय सब्जी अनुसंधान संस्थान वाराणसी में 2006–07 के दौरान परीक्षण किया गया। सब्जी मटर की चार किस्मों अर्केल, काशी नन्दिनी, काशी उदय तथा काशी मुक्ति की बुवाई 10 दिन के अन्तराल पर 20 अक्टूबर से 9 दिसम्बर तक की गई। पहले बुवाई तथा बाद की बुवाई तिथियों में बीज उपज अच्छी नहीं रही। सार्थक रूप से अधिक बीज उपज (13.53 कु./है.) 30 अक्टूबर की बुवाई तिथि को प्राप्त हुई। काशी उदय किस्म से सार्थक रूप से अधिक बीज उपज प्राप्त हुई। अधिकतम बीज उपज 30 अक्टूबर को काशी उदय किस्म की बुवाई से प्राप्त हुई।

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