

Potential Productivity of Edible Podded Pea Cultivars in Mid-Hills of Himachal Pradesh, India

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Abstract

Five cultivars of edible podded peas with 4 replications were evaluated during rabi 2013-14 at Department of Seed Science and Technology, Dr Y S Parmar University of Horticulture and Forestry, Solan, HP, India for their potential productivity. The observations were recorded on pod weight, pod plant⁻¹, pod size, pod and seed yield, pod surface colour, stringiness, development of parchment layer and sweetness. Mithi Phali recorded the maximum pod yield of 13.17 t ha⁻¹ followed by variety Toledo Sugar yielded 12.60 t ha⁻¹. The days to 50% flowering was observed earliest in Mithi Phali *i.e.* 111.33 days after sowing whereas the Arka Sampurna took longest time (114 Days) to flower. The pods of Mithi Phali and Toledo Sugar were categorized as very sweet while all other varieties were comparatively less sweet. The maximum seed yield of 14.0 q ha⁻¹ has been recorded in Mithi Phali closely followed by Toledo Sugar (13.31 q ha⁻¹). The overall results obtained from this experimentation revealed that the variety Mithi Phali performed well with respect to majority of the parameters recorded under this study.

1. Introduction

The exotic vegetables are becoming popular in India. Most of them were introduced from the Europe and are cool season crops. Among these, the edible-podded peas (*viz.*, Snow Peas and Snap Peas) are labour intensive crops and are being exported to Europe and MEA from Asia and Africa. As of now, only corporate houses in India are entering into farming of these crops. Snow peas have both climbing and low-growing varieties and are eaten raw in salads. Edible podded peas prefer consistently cool growing conditions rather than hotter areas mainly moist, cool, growing period is desirable. (Slinkard et al., 1994). For the emergence, vegetative, and reproductive stages, the base, optimum, and maximum temperatures, are 3, 28, and 38°C respectively (Olivier and Annandale, 1998). Temperatures above 30°C reduce yields and cause rapid over-maturity of the pods and if temperature falls below 10°C, the growth was affected. Frosts are very damaging in the flowering and pod formation stages. Peas grow best on well drained loamy soils and respond greatly to well decomposed organic matter in soils. In Indian plains, the crop can only be grown in late autumn and end in early spring. However,

the climatic diversity of Himachal Pradesh offers a scope for round the year production of for the crop. Knowledge of the consequences of different sowing time for yield and frost risk can be used to define optimum sowing dates. Snow peas require a temperate climate, optimum temperature between flowering and harvesting is 20-25°C.

For the purpose, the varieties suited to the specific climatic conditions are needed. Therefore, these studies were undertaken to assess the potential productivity of different cultivars in the mid-hills of the state with respect to fresh as well as seed production.

2. Materials and Methods

Five cultivars of edible podded peas (Table 1) were sown in two separate sets of experiments on 08 November 2013 during Rabi 2013-14 in plots 5.4 m² at a spacing of 60×7.5 cm in the experimental farm Department of Seed Science and Technology, Dr Y S Parmar University of Horticulture and Forestry, Solan, HP, India. Both the experiments were laid out in Randomized Complete Block Design (RCBD) with four replications. The standard cultural practices recommended in



the Package of Practices for Vegetable Crops, were followed to ensure a healthy crop stand. Data pertaining to fresh crop was recorded from one set and the seed yield was recorded in the other.

The pod yield and quality parameters *i.e.* average pod weight, pod plant⁻¹, pod size, pod yield, pod surface colour, stringiness, development of parchment layer and sweetness were recorded at the marketable maturity of edible podded peas *i.e.* when the pod has attained full length but the bulging of seed inside has not initiated. The qualitative traits like colour, stringiness and parchment layer were observed visually or organoleptically and comparative scores have been given.

The statistical analysis was carried out for each observed character under the study using MS-Excel and SPSS 16.0 packages. The mean values of data were subjected to analysis of variance and ANOVA was set as per Gomez and Gomez (1983) for Randomized Block Design.

3. Results and Discussion

The data pertaining to various growth and yield parameters was subjected to statistical analysis using SPSS. The analysis of variance revealed that there were significant differences for all the parameters studied in this experiment.

The earliest flowering was observed in Mithi Phali *i.e.* 111.33 days after sowing which is significantly different from all others, whereas the Arka Sampoorna took longest time (114 Days) to flower. The number of pods plant⁻¹ ranged between 20.47 (Swarna Tripti) and 25.80 (Mithi Phali). Variety Snow Green (24.87) was however at par with Mithi Phali. The longest pods were recorded in Mithi Phali (8.39 cm) statistically at par with Snow Green (8.17 cm) and Toledo Sugar (8.06 cm). The smallest pods were observed in Swarna Tripti (7.07 cm). Whereas, the maximum pod width was observed in Swarn Tripti (1.92cm) statistically similar to Mithi Phali (1.87 cm). Variety Mithi Phali produced tallest plants with 83.83 cm statistically at par with Snow Green (78.97 cm) and Toledo Sugar (76.60 cm) while the smallest plants (71.47 cm) were observed in Swarna Tripti (Table 2). Islam et al. (2002)

conducted studied the growth and vegetable pod yield of edible podded pea as influenced by sowing time and spacing. The results revealed that November-23rd sown plants showed higher leaf area index, leaf, stem and pod dry matter, plant height and vegetable pod yield than those of November 8th and December 8th sowings. Closest spacing produced the highest LAI, leaf, stem and pod dry matter. Crop growth rate, plant height and vegetable pod yield. However, relative growth rate and net assimilation rate were the highest in widest spacing. Regardless of variation in sowing time and spacing, LAI, leaf and stem dry matter, CGR, RGR and NAR increased sharply upto 60 days after emergence (DAE) and then declined but pod dry matter increased thereafter. Moreover, plant height increased rapidly upto 60 DAE and then slowly. The highest vegetable pod yield of 10.26 t ha⁻¹ was recorded from the November 23rd sowing with 30×20 cm spacing.

The maximum pod weight at harvest maturity was attained by the Toledo Sugar (300.60 g 100 pods⁻¹), however it was statistically similar to Swarna Tripti (291.56 g 100 pods⁻¹) and Mithi Phali (286.67 g 100 pods⁻¹). Variety Mithi Phali recorded the maximum yield of 74.06 g plant⁻¹ *i.e.* 8.89 kg 5.4 m⁻² plot. Based on the data yield is projected to 13.17 t ha⁻¹ or 10.53 q bigha⁻¹. It was statistically at par with variety Toledo Sugar (70.86 g plant⁻¹, 8.50 kg 5.4 m⁻², 12.60 t ha⁻¹, 10.08 q bigha⁻¹) and Snow Green (62.71 g plant⁻¹, 7.52 kg 5.4 m⁻², 11.15 t ha⁻¹, 8.92 q bigha⁻¹) (Table 3). The published information related to these factors on the snap pea is not available in literature, however similar studies have been conducted on peas (Johnston et al., 2002; Kumar et al., 2009; Baird et al., 2009; Spies et al., 2010) and other leguminous crops (Adisarwanto and Knight, 1997; Ratan and Biswas, 2010). These studies in general revealed that the pea crop shows significant deviation in yield and quality with respect to the sowing time, plant population and other agro-techniques.

The observations were taken visually and pods were categorized as Light green, medium light green and green. The pods of Arka Sampoorna, Mithi Phali and Snow Green were categorized as Light Green, whereas Swarna Tripti and Toledo Sugar were categorized as Medium light green and Green, respectively. The formation of strings in pods at harvest maturity also showed variation. The low or less string formation was recorded in Mithi Phalli and Snow Green. However, it ranged from medium to very high in all other varieties. Non-formation of fibrous parchment layer is essential characteristics of edible podded varieties of peas. In all these varieties the fibrous parchment layer was absent. The pods of different cultivars were tasted for their sweetness and difference in sweetness were recorded for sweetness. The pods of Mithi Phali and Toledo Sugar were categorized as very sweet. All other varieties were comparatively less sweet (Table 4).

Table 1: List of edible podded pea genotypes studied along with their sources of availability

Genotype	Source
Mithi Phali	Punjab Agricultural University, Ludhiana, India
Swarna Tripti	Horticulture and Agroforestry Research Programme (HARP), Ranchi, India
Arka Sampoorna	Institute of Horticulture Research, Bangalore, India
Toledo Sugar	Commercial Check
Snow Green	Commercial Check

Table 2: Growth and yield parameters of different cultivars of edible podded peas

Variety	Days to 50% flowering	Days to pod setting	Number of pods plant ⁻¹	Pod length (cm)	Pod breadth (cm)	Plant height (cm)
Arka Sampoorna	114.00	124.00	23.20	7.56	1.65	72.90
Mithi Phali	111.33	123.00	25.80	8.39	1.87	83.83
Snow Green	113.00	123.00	24.87	8.17	1.77	78.97
Swarn Tripti	112.67	122.33	20.47	7.07	1.92	71.47
Toledo Sugar	113.00	122.33	23.50	8.06	1.73	76.60
Grand Mean	112.80	122.93	23.57	7.85	1.79	61.75
CD ($p=0.05$)	0.84	0.89	2.61	0.71	0.15	8.47

The data recorded on seed parameters (Table 5) revealed that there was significant difference among the treatments and variety Mithi Phali recorded the maximum seed yield of 12.58 q ha⁻¹ i.e. 100.67 kg bigha⁻¹ projected from plot yield of 755.0 g 5.4 m⁻² which was statistically different from all other treatments. It was followed by variety Toledo Sugar (11.96 q ha⁻¹, 95.67 kg bigha⁻¹, 717.5 g 5.4 m⁻²).

4. Conclusion

Edible podded peas offers a new avenue in exotic vegetable cultivation and export. Out of the few cultivars developed by public sector in India, cultivar Mithi Phali recorded the maximum pod yield of 13.17 t ha⁻¹ and maximum seed yield of 12.58 q ha⁻¹ i.e. 100.67 kg bigha⁻¹ projected from plot yield of 755.0 g 5.4 m⁻².

5. Further Research

The overall results obtained from this experimentation revealed that the variety Mithi Phali performed well with respect to majority of the parameters recorded under this study. These cultivars need to be tested in multi-location trials across the different agro-climatic zones at different planting times, so that round the year production system can be developed for commercial cultivation.

Table 3: Growth and yield parameters of different cultivars of edible podded peas

Variety	100 pod weight (g)	Yield plant ⁻¹ (g)	Yield plot ⁻¹ (kg 5.4 ⁻²)	Yield (t ha ⁻¹)	Yield (q bigha ⁻¹)
Arka Sampoorna	260.33	60.24	7.23	10.71	8.57
Mithi Phali	286.67	74.06	8.89	13.17	10.53
Snow Green	252.67	62.71	7.52	11.15	8.92
Swarn Tripti	291.56	59.80	7.18	10.63	8.50
Toledo Sugar	300.60	70.86	8.50	12.60	10.08
Grand Mean	278.37	65.53	7.86	11.65	9.32
CD ($p=0.05$)	39.85	12.20	1.46	2.17	1.74

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Table 4: Pod quality parameters of different cultivars of edible podded peas

Variety	Pod colour	String	Parchment layer	Sweetness
Arka Sampoorna	Light Green	Very High	Absent	Sweet
Mithi Phali	Light Green	Low	Absent	Very Sweet
Snow Green	Light Green	Low	Absent	Less Sweet
Swarn Tripti	Medium Light Green	High	Absent	Sweet
Toledo Sugar	Green	Medium	Absent	Very Sweet

Table 5: Seed yield of different cultivars of edible podded peas

Variety	Yield plant ⁻¹ (g)	Yield plot ⁻¹ (g 5.4 m ⁻²)	Yield hectare ⁻¹ (q)	Yield bigha ⁻¹ (kg)
Arka Sampoorna	5.16	619.75	10.33	82.63
Mithi Phali	6.29	755.00	12.58	100.67
Snow Green	5.33	640.00	10.67	85.33
Swarn Tripti	5.08	610.00	10.17	81.33
Toledo Sugar	5.98	717.50	11.96	95.67
Grand Mean	5.57	668.45	11.14	89.13
CD ($p=0.05$)	0.217	26.033	0.433	3.471

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