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Yield and Marketing Attributes of Different Pea Varieties under Organic Conditions of Mid Hills

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ABSTRACT

An assessment of different vegetable pea varieties under organic conditions of hills was conducted during *rabi* season of 2021-22 and 2022-23. Eight vegetable pea varieties namely PM 128, Vivek Matar 11, Vivek Matar 12, Vivek Matar 13, Arkel, PC531, PSM 3 and PMR 85 with 3 replications were assessed in Randomized Block Design (RBD). The sowing was done in mid-November in both the years. Vivek Matar 13 was the first to flower 50 per cent (83.6 days in 2021-22 and 82 days in 2022-23) and gave first harvest (116 days in 2021-22 and 114.7 days in 2023) in both the years, followed by Arkel and PM 128. Significant differences were found in yield among different varieties of vegetable pea and Vivel Matar 13 gave the height yield that was statistically *at par* to Vivel Matar 11 and Vivel Matar 12. For quality attributes depending on consumer preference and marketability, Vivek Matar 13 and PMR 85 gained highest points and ranked as excellent followed by Vivek Matar 11 and Vivek Matar 12. Maximum gross return, net return and B:C was calculated for Vivek Matar 13, followed by Vivek Matar 11 and Vivek Matar 12.
Key Words: Consumer preference, Economic analysis, Organic conditions, Vegetable pea Yield.

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INTRODUCTION

Vegetable pea or garden pea (*Pisum sativum*L.var. *hortense*) is an important *rabi* season vegetable.The high percentage of digestible protein (7.2 g), carbohydrates (15.8 g), vitamin A (139 I.U.), vitamin C (9 mg), magnesium (34 mg) and phosphorus (139 mg) per 100 g of edible portion (Gopalkrishnan, 2007), makes it a nutritive and favourite vegetable. Vegetable pea is a winter season crop and temperature of 15-25°C is favourable for its flowering and fruiting. The crop can withstand low temperature and even frost during its vegetative stage, but during flowering it is very sensitive to frost. An abrupt increase in temperature during fruiting reduces the yield and number of pickings, while longer cool spell above frosting increases its yield and number of pickings.

Considering these climatic requirements, location specific assessment of vegetable pea varieties in a holistic manner that not only includes the yield, but flowering and fruiting duration and marketing attributes need to be investigated. In addition to these objectives, varietal performance of vegetable pea under organic conditions has very meagre studies. Therefore, the present study of practical significance was carried out for two consecutive years to find out the complete performance of various vegetable pea varieties under organic conditions of mid hills of Uttarakhand.

Organic farming is a method which primarily aims to cultivate the land and raising crops to keep the soil alive and in good health without adding any synthetically produced chemicals or fertilizers. Generally, for small and marginal farmers of India and particularly of hills, organic farming is most pertinent as they are resource poor to provide costly inputs for enhancing yield.

The inclusion of legume vegetables in the farming system has added advantage of fixing atmospheric nitrogen into the soil and make it available for companion or succeeding crops and will also help to sustain organic matter levels and promote good soil tilth (Seaman, 2011). This also helps the soil from soil erosion. Farmers should

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S. No.	Quality preference	Marks	Expected Price (Above or Below percentage of average market rates)
1.	Excellent	5	Above 30 %
2.	Very good	4	Above 20 %
3.	Good	3	Average market price
4.	Fair	2	Below 20 %
5.	Poor	1	Below 30 %

Table 1. Yield and marketing attributes of different varieties of vegetable pea.

Sr. No.	Entry	Flowering (50%) duration (Days)			Duration of first harvest (Days)			Yield (q/ha)		
		2021	2022	Mean	2021	2022	Mean	2021	2022	Mean
1	PM 128	88.3 ^{b}	88.7 ^{b}	88.5	122.4 ^{b}	121.5 ^{b}	122.0	60.00 ^{a}	65.22 ^{a}	62.6
2	Vivek Matar 11	93.0 ^{c}	94.7 ^{c}	93.85	128.6 ^{c}	128.3 ^{c}	128.5	76.33 ^{c}	82.22 ^{c}	79.3
3	Vivek Matar 12	94.3 ^{c}	93.8 ^{c}	94.1	130.3 ^{c}	129.7 ^{c}	130.0	75.78 ^{c}	81.11 ^{c}	78.4
4	Vivek Matar 13	83.6 ^{a}	82.0 ^{a}	82.8	116.0 ^{a}	114.7 ^{a}	115.4	77.67 ^{c}	83.33 ^{c}	80.5
5	Arkel	89.7 ^{b}	88.7 ^{b}	89.2	122.3 ^{b}	121.3 ^{b}	121.8	66.89 ^{b}	73.20 ^{b}	70.0
6	PC531	94.3 ^{c}	94.7 ^{c}	94.5	127.6 ^{c}	127.3 ^{c}	127.5	67.89 ^{b}	74.00 ^{b}	70.9
7	PSM 3	90.7 ^{b}	91.0 ^{b}	90.9	129.3 ^{c}	129.3 ^{c}	129.3	65.78 ^{ab}	71.11 ^{ab}	68.4
8	PMR 85	94.5 ^{c}	93.7 ^{c}	94.1	128.6 ^{c}	129.0 ^{c}	128.8	61.33 ^{ab}	65.56 ^{a}	63.4
CD (0.05)		3.5	4.4	--	2.7	2.6	--	6.21	7.11	--

*Values within columns having common letter are statistically *at par*.

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select the crops which are easy to grow, according to their needs, marketing opportunities and season for the organic farming. Vegetable pea is a good leguminous vegetable crop for the organic farming especially in hills, which helps in sustaining the soil fertility, fits well in cropping system and also gives good economic yield to fetch good price in the market.

MATERIALS AND METHODS

Krishi Vigyan Kendra (ICAR-VPKAS), Kafligair- Bageshwar is situated in the mid Himalayas between 29º45'07" N latitude and 79º44'03" E longitude at an altitude of 1245 meters above the mean sea level and represents humid sub- temperate climate with average annual rainfall of 1256 mm. The summers are somewhat warmer, while mid-winters are chilly with frosting of around 30-40 days.

The experiment was conducted during *rabi* season of 2021-22 and 2022-23, which is most suitable season for the growth, yield and marketing of vegetable pea in mid hills. Eight vegetable pea varieties namely PM 128, Vivek Matar 11, Vivek Matar 12, Vivek Matar 13, Arkel, PC531, PSM 3 and PMR 85 with 3 replications were assessed in Randomized Block Design (RBD). The sowing was done during mid-November in both the years. The selected field had not received any chemical or synthesized fertilizer for last 5 years. The preceding crop was buckwheat and the succeeding crop was french bean. Well rotten compost was applied @ 25 t/ ha during ploughing.

Seed treatment of all the varieties was done with *Trichoderma harzianum@* 10 g/ kg seed and regular prophylactic sprays of *Neem* oil (2 ml/L) at 15 days interval were also applied equally. The sowing geometry was 30 cm x 10 cm and the plot size was 3.00 m x 2.00 m (6.00 m^2). All the intercultural operations including weeding and hoeing were similar for all the plots.

Observations for flowering and harvesting duration, yield attributes and marketing related quality characteristics including pod length and number of seeds per pod were recorded and analysed statistically. Consumer preference along with expected price and economic analysis were

Table 2. Quality characteristics and expected price based on consumer preference for different varieties of vegetable pea.

Variety	Photo	Pod Length (cm)		No. of seeds per pod		Consumer preference and Marks		Expected Price (Rs./ q)	
		2021	2022	2021	2022	2021	2022	2021	2022
PM 128		7.20[a]	7.12[a]	6.3 [a]	6.1 [a]	Good - 3	Good - 3	3300.00	3700.00
Vivek Matar 11		8.53[b]	8.53[b]	7.3 [b]	7.2 [b]	Very Good - 4	Very Good - 4	3960.00	4440.00
Vivek Matar 12		8.50[b]	8.41[b]	7.5 [b]	7.4 [b]	Very Good - 4	Very Good - 4	3960.00	4440.00
Vivek Matar 13		9.67[c]	9.62[c]	8.7 [c]	8.3 [c]	Excellent - 5	Excellent - 5	4290.00	4710.00
Arkel		8.37 [ab]	8.33[b]	5.6 [a]	5.7 [a]	Good - 3	Good - 3	3300.00	3700.00
PC531		8.60[b]	8.52[b]	5.3[a]	5.5 [a]	Good - 3	Good - 3	3300.00	3700.00
PSM 3		8.40[b]	8.32[ab]	5.5 [a]	5.8 [a]	Good - 3	Good - 3	3300.00	3700.00
PMR 85		9.50[bc]	8.83[bc]	8.3[c]	8.2[c]	Excellent - 5	Excellent - 5	4290.00	4710.00
CD	--	1.18	1.20	0.9	0.7	--	--	--	--

*Values within columns having common letter are statistically *at par*.

Table 3. Economic analysis for different varieties of vegetable pea.

Variety	Cost of cultivation (Rs./ ha)			Gross return (Yield x Expected price) (Rs./ ha)			Net return (Rs./ ha)			B: C		
	2021	2022	Average	2021	2022	Average	2021	2022	Average	2021	2022	Average
PM 128	1,10,885	1,12,325	1,11,605	1,98,000	2,41,314	2,19,657	8,7115	1,28,989	1,08,052	1.79	2.15	1.97
Vivek Matar 11	1,16,775	1,19,236	1,18,006	3,02,267	3,65,057	3,33,662	1,85,492	2,45,821	2,15,657	2.59	3.06	2.83
Vivek Matar 12	1,15,676	1,18,577	1,17,127	3,00,089	3,60,128	3,30,109	1,84,413	2,41,551	2,12,982	2.59	3.04	2.82
Vivek Matar 13	1,17,855	1,19,945	1,18,900	3,33,204	3,92,484	3,62,844	2,15,349	2,72,539	2,43,944	2.83	3.27	3.05
Arkel	1,12,928	1,14,730	1,13,829	2,20,737	2,70,840	2,45,789	1,07,809	1,56,110	1,31,960	1.95	2.36	2.16
PC531	1,13,681	1,14,920	1,14,301	2,24,037	2,73,800	2,48,919	1,10,356	1,58,880	1,34,618	1.97	2.38	2.18
PSM 3	1,12,215	1,13,348	1,12,782	2,17,074	2,63,107	2,40,091	1,04,859	1,49,759	1,27,309	1.93	2.32	2.13
PMR 85	1,11,357	1,12,360	1,11,859	2,63,106	3,08,788	2,85,947	1,51,749	1,96,428	1,74,089	2.36	2.75	2.56

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also documented. For consumer preference and expected price a panel of ten-woman judges was assigned to rank the overall acceptability of pods on five-point scale (Pande, 2024) and accordingly the expected price was assigned depending on the prevailing average market rates, which are as follows;

RESULTS AND DISCUSSION

Floweringduration and yield

The data (Table 1) clearly showed that Vivek Matar 13 was the first to flower 50 percent (83.6 days in 2021-22 and 82 days in 2022-23) and gave first harvest (116 days in 2021-22 and 114.7 days in 2023) in both the years, which was significantly shorter to all the other varieties. For the duration of 50 percent flowering and first harvest, Vivek Matar 13 was followed by Arkel and PM 128.Vivek Matar 13 has also been documented as early maturity variety by Joshi *et al* (2019). Das *et al* (2014) has also observed significant differences in flowering and harvesting duration for various varieties of similar leguminous vegetable *i.e.,* french bean.

Significant differences were found in yield among different varieties of vegetable pea.Vivek Matar 13 gave significantly highest yield of 75.78q/ ha and 81.11q/ha in 2021-22 and 2022-23, respectively, that was statistically *at par* to Vivel Matar 11 and Vivel Matar 12. It was followed by PC 531 and Arkel, while the lowest was recorded in PM 128 during both the years.Muthuramu *et al* (2015), Kushwah *et al* (2017) Pachiappan *et al* (2020),Kumar (2022) and Anitha and Hanumantharaya (2022) have also reported differences in yield attributes of various vegetable pea and french bean varieties.

Quality characteristics

Quality is the most important parameter that decides the value of vegetables, especially of vegetable pea. Pod length, number of seeds per pod and appearance are the major factors that plays significant role in valuing the price of vegetable pea. Wide range of price differentiation has been observed in market for vegetable pea. The data (Table 2) showed that the varieties had significant differences. This eventually influenced the consumer preference and accordingly the expected price was assigned depending on average market price. Although, none of the assessed variety of vegetable pea ranked below good, but Vivek Matar 13 and PMR 85 scored highest with excellent grade during both the years due to long pod length, a greater number of seeds per pod and attractive appearance. Consequently, these two were awarded with highest price of Rs. 4,290/ q and Rs. 4,710/ q for the year 2021-22 and 2022-23, followed by Vivek Matar 11 and Vivek Matar 12.

Economic analysis

Economic analysis is the most important stage to find out the suitability and applicability of tested treatments. As the price of seed and other intercultural operations were almost similar for all the varieties, the calculated differences among various varieties are due to cost occurred in harvesting and packaging. Cost of cultivation was higher for those varieties that gave greater yield. Thus, the maximum cost of cultivation (Rs. 1,17,855/ ha in 2021-22 and Rs. 1,19,945/ ha in 2022-23) was calculated for Vivek Matar 13, while the minimum of Rs. 1,10,885/ ha and Rs. 1,12,325/ ha in 2021-22 and 2022-23, respectively was in PM 128.

Not only yield but price depending on quality and consumer preference also played the major role for getting the gross returns. Maximum gross return, net return and B:C was calculated for Vivek Matar 13. The average gross return of Vivek Matar 13 was Rs. 3,62,844/ ha, net return was Rs. 2,43,944/ ha and B:C was 3.It was followed by Vivek Matar 11, Vivek Matar 12 and PMR 85. PM 128 remained least profitable with average net return of Rs. 1,08,052/ ha and its B:C was 1.97.

CONCLUSION

The holistic assessment of various vegetable pea varieties showed that yield as well as pod length, number of seeds per pod and appearance played important role in deciding the profitability of vegetable pea production in mid hills. Possibly, the varieties that mature late and did not have required level of heat tolerance for mid to late spring temperature gave comparatively less yield. Vivek Matar 13 showed very good balance of yield, quality and marketability under

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organic conditions of mid hills. However, other varieties that gave almost similar yield but had longer maturity duration may be utilized for extended marketing opportunities for distant places. Considering the importance of consumer preference and marketing attributes, pod length, number of seed per pod and pod appearance should be the major identifying parameters for developing new varieties of vegetable pea. Moreover, tolerance towards increasing temperature of mid to late spring also needs to be taken in varietal development.

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