E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(6): 163-168
Received: 11-04-2024
Accepted: 20-05-2024

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Constraints faced by the pea growers in adoption of pea production technology and possibilities of future prospects for promotion of pea production technology

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DOI: https://doi.org/10.33545/2618060X.2024.v7.i6c.827

Abstract
Vegetables serve an important purpose in agricultural diversification and have played a vital part in the food and nutritional well-being of our country's ever-growing population, providing the majority of their nutritional requirements. Pea (*Pisum sativum* L.) is a major vegetable crop cultivated near the world. It is a cool-season tropical and season crop. India is predominantly a vegetarian society, relying only on subtropical regions. The current study was conducted with the goal of assessing the obstacles that pea growers experience while adopting pea production technology, as well as the opportunities for future promotion of pea production technology. The findings revealed that farmers confront greater challenges in terms of scientific input supply, and financial, and ecological marketing. Among the technical constraints, 'Inadequate skill for seed handling' ranked #1 (MPS=93.66 & 87.21) across both districts. Similarly, in terms of input supply restrictions, "non-availability of new equipment in the local market" ranked first (MPS=95.67 & 92.67) in both districts. Among financial restraints, the high price of HYV seed ranked highest in both districts (MPS = 70.19 & 70.54). Ecological, marketing, and general restrictions include heavy frost amid the development of flowers and pod formation stages, a lack of quick and cost-effective transportation facilities, the supply of low-quality inputs by input dealerships, and farmers' poor risk-taking abilities.

Keywords: Pea production, MPS, future prospects etc.

Introduction
Pea (*Pisum sativum* L.) is a major vegetable crop farmed around the world. It is a cool-season crop grown in tropical and subtropical climates. The major pea-producing countries include the United States, China, India, France, the United Kingdom, the Netherlands, Hungary, Russia, Egypt, and Australia.

Pea, also known as gardening pea (matar), is particularly popular since both its green pods and dry seeds are in high demand for cooking as vegetables and pulses, respectively. It is relatively hardy and thrives best in chilly climates. Peas can be canned, frozen, or dehydrated, making them available during the off-season. Peas continue to play an essential role in current agriculture as a nitrogen-fixing cycle crop alongside grains. Peas play an essential part in both human nutrition and the Indian national economy. Peas have been farmed in India for decades and are well-adapted to the climate. There are several different local and exotic kinds available. The majority of the exotic types were introduced to India and employed as market varieties. Genetic diversity within the genus Pisum has resulted in a wide range of crop applications. Dry peas are used to feed animals as well as for humans to consume in soups and processing foods.

Methodology
The study was conducted in two purposively selected districts, Sultanpur & Bhadohi district of Uttar Pradesh. The research locales were selected purposively, These districts are maximum and minimum vegetable pea producing districts in eastern Uttar Pradesh region throughout year. Two blocks from each districts were selected for present investigation. Lambhua and Kurebhar

blocks were selected from Sultanpur district, whereas Gyanpur and Suriyawan blocks of Bhadohi district were selected through random sampling method for the present investigation. In together with the Tax and Agriculture departments of the indicated blocks, a comprehensive list of all important pea-growing villages was compiled. From the provided list, 20 villages were found (5 villages from each block) using a proportionate random selection from the designated blocks for the current inquiry. For the current study, 20 respondents were drawn from each village using a simple random sampling procedure, resulting in a total of 200 farmers per district. A total of 400 respondents were chosen for the current study. The ex-post facto research design was used in the study, as the manifestation of the variables has already occurred and having no scope of any manipulation. Different categories of constraints were collected through literature review, expert opinion and farmers' perception. Data was collected using pre structured interview schedule. A three point continuum scale was used for getting the responses. To find out the most important constraint within each group, Mean Percent score (MPS) was assigned to get Rank of each category of constraints.

$$\text{Mean Percent Score (MPS)} = \frac{\text{Total score obtained by respondents}}{\text{Maximum obtained score}} \times 100$$

'Z' test (Standard Normal Deviate Test)

This test was applied to detect significant differences between two sample means in a large number of samples (n > 30). The formula for the 'Z' test is as follows:

$$Z = \frac{|X_1 - X_2|}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where,

X_1: Mean of first sample

X_2: Mean of second sample

S_1: Standard deviation of first sample

S_2: Standard deviation of second sample

n_1: Size of the first sample

n_2: Size of the second sample

This test was intended to determine whether there were any notable differences in information processing behavior, knowledge, adoption, and restrictions regarding pea production technologies between small and marginal farmers.

Result and Discussion

1.1 Distribution of Pea Growers According To Level of Constraints Faced By Them in Pea Cultivation

Pea cultivators were categorized into low, medium, and high constraints based on their scores to understand the challenges they faced in implementing recommended technologies.

Table 1: Distribution of farmers is based on the level of constraints they face in pea cultivation. n=400

S. No.	Category	Respondents				
		Sultanpur		Category	Bhadohi	
		f	%		*F*	%
1.	Low (up to 64)	27	13.50	Low (up to 61)	33	16.50
2.	Medium (65-77)	92	46.00	Medium (62-70)	96	48.00
3.	High (78 & above)	81	40.50	High (71 & above)	71	35.50
	Total	200	100.00	Total	200	100.00

f = Frequency, % = percent

Mean: 69.12, S.D:4.82, Min: 57, Max: 85 (Sultanpur) Mean: 66.28, S.D: 4.84, Min: 55 Max: 81 (Bhadohi)

The data incorporated in Table 1's data reveals that 46.00 percent of the 200 respondents in Sultanpur district reported facing medium-level barriers when implementing pea production technology. On the other hand, a significant number of respondents—40.50 percent—faced barriers to adopting pea production technologies. Relax Only 13.50% of those surveyed reported significant barriers to the use of pea production technologies. Subsequent data analysis reveals that 48.00 percent of the 200 respondents in the Bhadohi district encountered medium-level barriers when implementing pea production technology. On the other hand, a substantial percentage of respondents—35.50 percent—saw barriers to the implementation of pea production technologies. Relax Low levels of barriers prevented 16.50% of the respondents from adopting pea production.

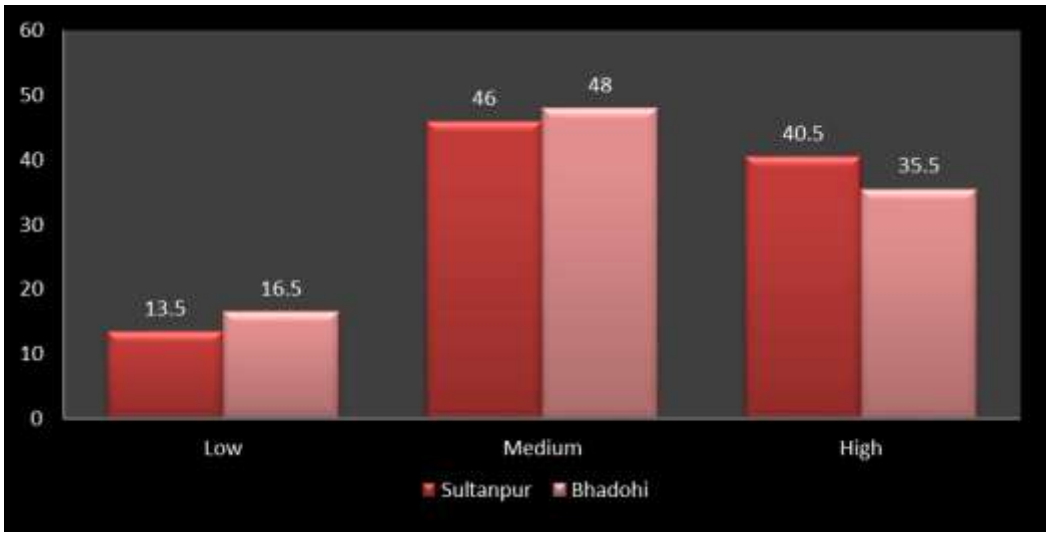

Fig 1: Distribution of farmers according to level of constraints faced by them in pea cultivation

1.2 Aspect-Wise Constrains Perceived By the Pea Growers

Table 2: Technical constraints perceived by pea growers

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Poor knowledge about high yielding varieties	81.27	III	74.37	III	77.82	III
2.	Inadequate skill for seed treatment	93.66	I	87.21	I	90.43	I
3.	Lack of know-how about the proper use of chemical fertilizers and micronutrients	41.34	XI	39.25	XI	40.29	XI
4.	Poor knowledge about plant protection measures	50.76	IX	45.12	X	47.94	IX
5.	Use of weedicides is technically complex practice	74.73	IV	66.67	V	70.70	IV
6.	Non-availability of timely technical advice for crop cultivation	91.67	II	86.66	II	89.16	II
7.	Lack of knowledge about soil treatment	71.39	V	68.34	IV	69.86	V
8.	Ignorant about rhizobium culture	55.87	VIII	51.79	VIII	53.83	VIII
9.	Lack of skill for application of plant protection chemicals	48.23	X	45.34	IX	46.78	X
10.	Poor knowledge about insurance	37.12	XII	37.39	XII	37.25	XII
11.	Lack of knowledge about preservation techniques of pea	61.67	VII	57.45	VII	59.56	VII
12.	Inadequate knowledge of maturity standards and harvesting of pea	69.71	VI	65.23	VI	67.47	VI

MPS = Mean Percent Score

According to data in Table 2, the pea growers in Sultanpur and Bhadohi identified "inadequate skill for seed treatment" as the most severe constraint, with mean percent scores of 93.66 and 87.21, respectively, with both types of farmers ranking it first. "Non-availability of timely technical advice for crop cultivation" was second on the list of issues that Sultanpur and Bhadohi farmers experienced, with percent of 91.67 and 86.66, respectively. Next came the issue of "poor knowledge about high yielding varieties," which farmers in Sultanpur and Bhadohi ranked third with 81.27 and 74.37 MPS, respectively, and so forth. Meena (2014) [13] also reported similar findings.

Table 3: Input supply constraints perceived by the pea growers

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Non-availability of improved seed at the time of sowing	62.12	VII	63.34	VII	62.73	VII
2.	High requirement of manures and fertilizers for HYVs	91.27	III	87.41	III	89.34	III
3.	Non-availability of recommended chemicals for seed treatment	83.34	V	75.23	VI	79.28	V
4.	Non-availability of fertilizers at the peak season	43.47	XI	40.76	XI	42.11	XI
5.	Inadequate irrigation water	39.57	XII	31.67	XII	35.62	XII
6.	Non-availability of improved tools in the local market	95.67	I	92.63	I	94.15	I
7.	Non-availability of culture at the sowing time	77.25	VI	77.89	V	77.57	VI
8.	Non-availability of labour at the time of harvesting of crop	94.12	II	90.59	II	92.35	II
9.	Non-availability of weedicides, insecticides and pesticides in the area	84.76	IV	86.34	IV	85.55	IV
10.	Non-availability of suitable equipment for seed treatment	44.37	X	41.54	X	42.95	X
11.	Irregular supply of electricity for irrigation	57.39	IX	56.67	IX	57.03	IX
12.	Non-availability of sprayers and duster in the locale	61.37	VIII	61.33	VIII	61.35	VIII

MPS = Mean Percent Score

According to data in Table 4, The pea growers of Sultanpur & Bhadohi identified the lack of improved agriculture tools as the most significant constraint, ranking first with 95.67 and 92.63 MPS respectively. The next most important constraint was the lack of labor during crop harvesting, with 94.12 and 90.59 MPS respectively. The third most important constraint was the high requirement of manures and fertilizers for HYVs, with 91.27 and 87.41 MPS respectively. These findings align with previous research by Patel (2005) [6] and Meena (2014) [13].

Table 4: Financial constraints perceived by the pea growers

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	High cost of seed of HYVs	70.19	I	70.54	III	70.36	II
2.	High cost of chemical fertilizers	69.45	II	69.67	IV	69.56	III
3.	High cost of plant protection chemicals	66.20	VII	71.23	II	68.71	IV
4.	High wage rate of labour	67.33	V	64.89	VIII	66.11	VII
5.	Non-availability of credit at marginal interest rate	67.70	III	74.76	I	71.23	I
6.	Minimum support price in not timely declared	64.58	VIII	66.78	VII	65.68	VIII
7.	High cost of machinery	67.39	IV	67.94	VI	67.66	VI
8.	High premium amount of crop insurance	67.20	VI	68.12	V	67.66	V

MPS = Mean Percent Score

The data presented in Table 4 reveal that '' High cost of seed of HYVs as most important constraints faced by pea growers of Sultanpur district while same constraint was perceived as third by Bhadohi pea growers with MPS of 70.19 & 70.54 respectively. Furthermore High cost of chemical fertilizers ranked second for pea growers of Sultanpur with MPS of 69.45 and so on.

"Non-availability of credit at marginal interest rate" was expressed as most important constraint by the pea growers of Bhadohi and ranked first with MPS of 74.76 and so on. Kumar's (2004) [3] study revealed that the high cost of inputs for gram cultivation is a significant constraint for gram growers.

Table 5: Ecological constraints perceived by the pea growers

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Excess moisture in the soil	65.21	II	69.23	I	67.22	I
2.	Heavy frost during flowering and pod formation stage	66.25	I	67.66	II	66.95	II
3.	High rainfall during kharif season	64.46	III	66.33	III	65.39	III
4.	Cloudy weather and untimely rainfall at flowering time	61.97	VI	61.67	VI	61.82	VI
5.	Higher susceptibility to insect pest and diseases	62.59	IV	64.12	IV	63.35	IV
6.	Heavy damage by the birds	62.34	V	62.59	V	62.46	V

MPS = Mean Percent Score

The data presented in Table 5 reveal that "excess moisture in the soil" was of the primary ecological limitations with MPS of 69.23 among pea growers of Bhadohi and same constraints perceived as second rank with MPS of 65.21 for pea growers of Sultanpur. The constraint related to "heavy frost at flowering and pod formation stage" was given first rank by Sultanpur farmers with MPS of 66.25 and same constraint was ranked second by Bhadohi farmers with MPS of 67.66.

Table 6: Growers of peas perceive marketing restraints.

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Absence of adequate cold storage facilities	64.21	VI	65.59	III	64.9	III
2.	Lack of quick and cost effective transport facilities	66.20	I	61.79	VI	63.99	V
3.	Mal practices by merchants in the market	65.33	II	68.56	I	66.94	I
4.	Non-availability of preservation unit in the area	63.73	VIII	66.67	II	65.20	II
5.	Lack of well set marketing	64.08	VII	63.12	V	63.60	VI
6.	Seasonal glut of the produce in the market	63.71	IX	64.67	IV	64.19	IV
7.	Lower prices at harvesting time	64.82	IV	51.33	IX	58.07	IX
8.	Perishable nature of crop	64.83	V	54.23	VIII	59.53	VIII
9.	Absence of legal standards	65.08	III	58.67	VII	61.87	VII

MPS = Mean Percent Score

Table 6 analysis shows that the pea growers in Sultanpur, with MPS of 66.20, 65.33, and 65.08 respectively, identified "Lack of quick and cost effective transport facilities, mal practices by merchants in the market, & Absence of legal standards" as the main constraints. With MPS of 68.56, 66.67, and 58.67, respectively, the pea growers in Bhadohi district stated that "malpractices by merchants in the market, Non-availability of preservation unit in the area, Absence of adequate cold storage facilities" were the main obstacles. Mutkule *et al.* (2001) [5] also reported findings that were similar.

1.7 General constraints perceived by the pea growers

Table 7: General constraints perceived by the pea growers

S. No.	Technical constraints	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Lack of training institutions for training of the farmers	89.46	II	91.56	II	90.51	II
2.	Supply of inferior quality inputs by the input dealers	84.58	III	93.34	I	88.96	III
3.	Problem of grazing animals	83.84	IV	84.46	IV	84.15	IV
4.	Poor risk bearing ability of farmers	95.58	I	87.89	III	91.73	I

MPS = Mean Percent Score

Data presented in Table 7 shows that "supply of inferior quality inputs by the input dealers" Pea growers are experiencing the most severe constraint. of Bhadohi district with the extent of 93.34 MPS while Lack of training institutions for training of the farmers & Poor risk bearing ability of farmers were ranked second and third by pea growers of Bhadohi District with MPS of 91.56 & 87.89 respectively. Furthermore Poor risk bearing ability of farmers, Pea growers in Sultanpur with MPS scores of 95.58, 89.46, and 84.58 identified the lack of training facilities for farmer education and the supply of subpar inputs by input dealers as the top, second, and third major obstacles, respectively. Meena (2014) [13] and Saharan and Pudhir (2004) [8] also observed similar findings.

2.1 Comparison of Constraints Perceived By the Respondents

The comparison of constraints perceived by the pea growers was made under following heads:

2.1.1 Comparison of constraints between pea growers of Sultanpur and Bhadohi.

The 'Z' test was used to compare the perceived constraints of pea growers in Sultanpur and Bhadohi, with the results presented in table 8.

Hypotheses

H_0: There is no significant difference in constraints perceived by the pea growers of Sultanpur and Bhadohi

H_1: There is significant difference in constraints perceived by the pea growers of Sultanpur and Bhadohi

Table 8: Comparison of constraints perceived by the pea growers of Sultanpur and Bhadohi in adoption of pea production technology

S. No.	District name	Mean	S.D.	'Z' value
1.	Sultanpur	68.04	14.65	0.77^{NS}
2.	Bhadohi	66.42	15.11	

** Significant at 1 percent level

The study found that the calculated 'Z' value is less than the tabulated value at a 1 percent level of significance, rejecting the research hypothesis (H1) that there is a significant difference in constraints perceived by pea growers of Sultanpur and Bhadohi regarding the adoption of pea production technology. However, the mean value of pea growers in Sultanpur was higher than in Bhadohi farmers, contradicting previous research by Vashishtha (2007) [9].

Mean value table

S. No.	District name	Mean	C.D. value
1.	Sultanpur	68.04	1.62
2.	Bhadohi	66.42	

The information provided in the above table demonstrates that respondents from the chosen districts varied little, somewhat, or not at all in terms of the barriers they saw to the adoption of pea production technology. The current research contradicts the conclusions of Vashishtha (2011) [10].

Table 9: Possibilities of future prospects for promotion of pea production technology

S. No.	Statement	Parameter					
		Sultanpur		Bhadohi		Total	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Establishment of preservation centre at panchayat level	63.34	XIV	60.66	XIV	62.00	XIV
2.	Development of multi chamber cold storage units in cluster of villages	84.44	III	79.21	III	81.82	III
3.	Establishment of good marketing network in nearby village	89.13	I	82.55	I	85.84	I
4.	Establishment of rural knowledge centre/ information kiosks	73.24	IX	66.50	IX	69.87	IX
5.	Well equipped Kisan Seva Kendra should be developed	68.67	XII	63.07	XII	65.87	XIII
6.	Popularization of contract farming for pea cultivation	44.66	XVIII	39.30	XVIII	41.98	XVIII
7.	Promotion of area under pea cultivation	71.11	X	63.79	X	67.45	X
8.	Regular updating to agriculture supervisors about latest pea cultivation technology	57.56	XV	52.34	XV	54.95	XV
9.	Mobile network coverage should be established	46.37	XVII	41.83	XVII	44.10	XVII
10.	Kisan call centre should be established at zonal level.	80.11	VI	75.64	VI	77.87	VI
11.	Training on post harvest technology be imparted to the farmers	82.23	IV	77.67	IV	79.95	IV
12.	Blending of indigenous and scientific practices of pea cultivation	69.11	XIII	63.02	XIII	66.06	XII
13.	Cooperative farming in pea cultivation be promoted	81.44	V	76.77	V	79.10	V
14.	Essay excess to credit of reasonable rate of interest	71.07	XI	63.28	XI	67.17	XI
15.	Organisation of farmers field school at the village level	53.47	XVI	45.44	XVI	49.45	XVI
16.	Establishment of value added units	74.66	VIII	68.66	VIII	71.66	VIII
17.	Minimum support price of govt. should be declared for pea crop	88.67	II	81.79	II	85.23	II
18	Road transport facilities should be developed	78.54	VII	73.56	VII	76.05	VII

MPS = Mean Percent Score

The study indicates that Sultanpur farmers have a higher potential for promoting and adopting improved pea production technology, with potential ranging from 44.66 to 89.13 percent, compared to 39.30 to 82.55 percent in Bhadohi farmers. This suggests that implementing these technologies can ensure livelihood security for farmers in the study area. The results showed that marginal and small farmers positively viewed the following future opportunities for the promotion of pea production technology in the study area: the creation of a strong marketing network in a nearby village; the government's declaration of minimum support prices for pea crops; the development of multi-chamber cold storage units in clusters of villages; the training of farmers in post-harvest technological advances; the advertising of cooperative agriculture in pea cultivation; and the development of a Kisan call centre at the zonal level. The results obtained by Vashishtha (2011) [10] corroborate the current facts.

Conclusion

It is concluded The study found that pea growers face challenges in adopting pea production technology due to factors such as inadequate seed treatment skills, lack of technical advice, and improved agriculture tools. Additionally, labor availability, marginal interest rate credit, and high costs of plant protection chemicals are significant barriers. The study suggests that establishing a good marketing network, declaring a minimum government support price for pea crops, developing multi-chamber cold storage units, providing post-harvest technology training, promoting cooperative farming, and establishing a kisan call center at the zonal level could help promote pea production technology in the study area.

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