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Constraints Faced by Farmers in Adopting Different Methods of Wheat Sowing in Punjab

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Abstract

This study examines the problems faced by the farmers in adopting different methods of wheat sowing after paddy harvesting. The research focuses on three districts of Punjab; namely Sangrur, Ludhiana and Patiala using purposive sampling. A list of farmers adopting paddy stubble management practices was prepared and sample of 120 farmers were selected using simple random sampling. The data were analyzed through a five-point Likert scale to assess the severity of constraints. Major constraints identified include high machinery costs, need for high HP tractors, limited availability, and technical handling difficulties. Issues like poor seed germination, soil compaction, and straw blockage also hinder adoption. The study recommends enhanced machine access through custom hiring centers, subsidies, and farmer training programs to promote sustainable practices and reduce residue burning in Punjab.

Keywords: Wheat, Methods of sowing, Constraints, Punjab

JEL classification: Q12, Q16, Q24

Introduction

Agriculture forms the backbone of the Indian economy, with a large segment of the population depending on it, both directly and indirectly, for their sustenance (Mathur et al*.,* 2006). In India, the rice-wheat system covers 9.2 million hectares, making a significant contribution to the country's food security (Jat et al., 2020). Wheat is one of the most widely cultivated cereal crops around the world, serving as a fundamental staple food for billions of people. It holds a crucial place in global food security and agricultural economies. In the Indian state of Punjab, wheat is the second most important cereal crop, following rice. The region plays a significant role in India's overall wheat production, covering approximately 3.52 million hectares of farmland. This area produces around 18.2 million tonnes of wheat annually, with an impressive average yield of 5188 kg per hectare. Punjab, often referred to as the "Granary of India," contributes a substantial share to the nation's wheat production, accounting for roughly 12 per cent of the country's total wheat-growing area. Moreover, the state contributes around 17.6 per cent to India's overall wheat grain production, highlighting its importance in the national agricultural landscape (Statistical abstract of Punjab, 2022). Wheat is the most important *rabi* cereal crop grown in Punjab and is the third largest producer of wheat in country after Uttar Pradesh and Madhya Pradesh. Wheat was grown in an area of 35.2 lakh hectares in Punjab with a production of 176.2 lakh tonnes during the year 2020-21 (Anonymous, 2022).

Paddy residue management before wheat sowing is an important obstacle in north-west India, or at least, Punjab, Haryana, and Uttar Pradesh (Lohan et al., 2018). Burning of straw damages the ecosystem and removes a significant amount of vital nutrients from plants. It results in the release of carbon dioxide, carbon monoxide, soot particles, nitrogen oxides, sulphur dioxide and polycyclic aromatic hydrocarbons, which seriously degrade the quality of the atmosphere and pose health risks to people (Kumar et al., 2019). Therefore, managing the residue becomes the need of hour. This can be achieved by adopting resource conservation practices. Punjab Agricultural University put forward some alternate techniques for wheat sowing by properly managing paddy straw, namely Happy seeder, Super seeder, Zero till drill, Rotavator, Surface seeding (Kaur et al*.,* 2021). The objective of study is to look for constraints faced by farmers in adopting various wheat sowing methods.

Data Sources and Methodology

The present study was undertaken in three districts of Punjab, India. The selected districts were Sangrur, Ludhiana and Patiala which were selected on the basis of highest area

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under rice-wheat cropping system during the year 2021-22. The study was carried out using purposive sampling technique. Hence a list of farmers engaged in wheat sowing following different methods of paddy stubble management was prepared. From the list, a random sample of 40 farmers was selected from each district. Therefore, a total sample of 120 farmers was selected randomly to achieve the objectives of the study. The relevant information pertaining to problems faced by farmers in different wheat sowing methods were collected. The data so collected were analyzed using Likert scale.

Likert scale analysis

The Likert scale analysis procedure involved following steps:

Step 1. Data collection and compilation with Likert scale

Respondents rated the extent to which they agreed with, or the severity of, the problems regarding predefined statements. To collect this information, a five-point Likert scale was used and the following answers corresponded to a numerical score:

5: Strongly Agree / Very Serious Problem

4: Agree / Serious Problem

3: Neutral / Moderate Problem

2: Disagree / Minor Problem

1: Strongly Disagree / No Problem

The numerical values were then entered into a dataset for each statement and to summarize the severity of the problems as perceived by the farmers, the mean and standard deviation were calculated. The mean score provides an average severity rating, while the standard deviation indicates how varied the responses are. These calculations provided insights into how contract farmers perceive the severity of each problem and how consistent or varied their responses are. Thereafter, for each statement, the number of respondents choosing each Likert scale point (1 to 5) was counted. The frequency of each response category was then converted into percentages to show how the responses are distributed across the five options. This step helps in understanding how widespread each opinion is among the respondents.

Step 2. Decision on problem severity using mean and weighted average

A weighted average method was used to find the severity of problems. The weighted average of each statement was calculated by adding of the mean values of all the statements and dividing it with the number of statements. Following calculation of weighted average, the severity of each problem was assessed on the basis of following criteria:

a) If the mean value of a statement was less than the weighted average, it indicated that the problem was perceived as less severe**.**

b) Conversely, if the mean value was greater than or equal to the weighted average**,** the problem was considered more severe.

Results and Discussion

Distribution of sample farmers

The sample consisted of 120 farmers from Punjab, categorized based on landholding size. Small farmers formed the largest proportion (35.84%), followed by medium (33.33%) and large farmers (30.83%). The relatively balanced distribution across all farm sizes helps ensure diverse representation in understanding the constraints faced in wheat sowing.

Table 1: Distribution of sample farmers according to farm category, Punjab 2022-23 (Acres)

Category	Number	Per cent
Small (0-5)	43	35.84
Medium (5-15)	40	33.33
Large (15 and above)	37	30.83
Total	120	100.00

Distribution of farmers on the basis of method of sowing wheat crop

Table 2 represents distribution of farmers on the basis of method of sowing wheat crop. The Super Seeder was the most widely adopted method across all farm categories, especially among medium and large farmers, accounting for 34.96% of the total. Rotavator use was also significant (21.68%), followed by Happy Seeder (14.68%) and Zero Till Drill (11.89%). Conventional methods were less popular (9.79%), indicating a gradual shift towards mechanized sowing. Surface seeding remained the least adopted, with only 6.99 per cent overall usage, though it found relatively higher use among large farmers.

Constraints in conventional method of wheat sowing

Table 3 highlights the major problems faced by farmers in Punjab during 2022-23 using conventional method of wheat sowing. The most severe issue across all farm sizes was the requirement for additional family labor for land preparation, with an overall mean score of 4.21, followed by method being time consuming (mean: 3.79). Costliness and excessive tillage were generally seen as less severe problems, with overall mean scores of 3.36 and 3.14, respectively. Small farms report the most severe challenges with labor requirements, while large farms face greater concerns regarding costs and time to undertake sowing by this method. Overall, labor demands and time required were more pressing issues compared to cost and tillage operation.

Table 2: Distribution of farmers on the basis of method of sowing wheat crop, Punjab 2022-23

S. No.	Method of sowing/ Machine used	Small		Medium		Large		Overall	
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
1.	Conventional method	8	18.60	3	7.50	3	8.11	14	9.79
2.	Happy seeder	8	18.60	7	17.50	6	16.22	21	14.68
3.	Super seeder	11	25.58	19	47.50	20	54.05	50	34.96
4.	Zero till drill	7	16.28	7	17.50	3	8.11	17	11.89
5.	Rotavator	7	16.28	14	35.00	10	27.03	31	21.68
6.	Surface seeding	2	4.65	2	5.00	6	16.22	10	6.99

Table 3: Major problem faced by sample farmers in case of conventional method, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	Small								
1.	Requirement of more family labour for land preparation	-	-	-	-	8	5.00	-	More severe
2.	More costly	-	1	4	3	-	3.25	0.71	Less severe
3.	Excessive tillage	-	-	8	-	-	3.00	-	Less severe
4.	Time consuming	-	-	5	3	-	3.38	0.52	Less severe
B.	**Medium**								
1.	Requirement of more family labour for land preparation	-	-	2	1	-	3.33	0.58	Less severe
2.	More costly	-	-	3	-	-	3.00	-	Less severe
3.	Excessive tillage	-	-	1	2	-	3.67	0.58	More severe
4.	Time consuming	-		1	1	1	4.00	1.00	More severe
C.	**Large**								
1.	Requirement of more family labour for land preparation	-	-	3	-	-	3.00	-	Less severe
2.	More costly	-	-	-	3	-	4.00	-	More severe
3.	Excessive tillage	-	-	3	-	-	3.00	-	Less severe
4.	Time consuming	-	-	-	1	2	4.67	0.58	More severe
D.	**Overall**								
1.	Requirement of more family labour for land preparation	-	-	5	1	8	4.21	0.97	More severe
2.	More costly	-	1	7	6	-	3.36	0.63	Less severe
3.	Excessive tillage	-	-	12	2	-	3.14	0.36	Less severe
4.	Time consuming	-	-	6	5	3	3.79	0.80	More severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

Constraints in using Happy seeder

Table 4 highlights the major problems faced by farmers in Punjab using the Happy Seeder during 2022-23. Across all farm sizes, the high initial cost was considered the most severe issue. The need for high HP tractors was also a significant concern, though less severe than the cost. Ineffectiveness in high residue fields and rodents and crop lodging were generally seen as less severe. The less availability of Happy seeders in cooperative societies was another notable challenge, seen as moderately severe. Small, medium, and large farms report similar concerns, with small farms particularly affected by the high initial cost and high HP tractor requirement, while larger farms face issues with rodents and crop lodging. Singh and Kaur (2021) also concluded in their study that this technology was restricted to large farmers due to the problem of high cost.

Table 4: Major problems faced by sample farmers in case of Happy seeder, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	Small								
1.	High initial cost	-	-	-	2	6	4.75	0.46	More severe
2.	Ineffective in high residue fields	1	3	3	1	-	2.50	0.93	Less severe
3.	Need high HP tractors	-	-	-	3	5	4.63	0.52	More severe
4.	Problem of rodents and crop lodging	-	2	3	2	1	3.25	1.04	Less severe
5.	Less availability of Happy seeder in cooperative societies	1		4	3	-	3.13	0.99	Less severe
B.	Medium								
1.	High initial cost	-	-	3	2	2	3.86	0.90	More severe
2.	Ineffective in high residue fields	5	2	-	-	-	1.29	0.49	Less severe
3.	Need high HP tractors	-	2	3	2	-	3.00	0.82	Less severe
4.	Problem of rodents and crop lodging	1	2	3	1	-	3.57	0.98	More severe
5.	Less availability of Happy seeder in cooperative socities	-	-	1	4	2	4.14	0.69	More severe
C.	Large								
1.	High initial cost	-	2	1	-	3	3.67	1.51	More severe
2.	Ineffective in high residue fields	4	1	1	-	-	1.50	0.84	Less severe
3.	Need high HP tractors	4	2	-	-	-	1.33	0.52	Less severe
4.	Problem of rodents and crop lodging	-	-	1	2	3	4.33	0.82	More severe
5.	Less availability of Happy seeder in cooperative societies	-	-	4	1	1	3.50	0.84	More severe
D.	Overall								
1.	High initial cost	-	2	4	4	11	4.14	1.06	More severe
2.	Ineffective in high residue fields	10	6	4	1	-	1.81	0.93	Less severe
3.	Need high HP tractors	4	4	3	5	5	3.14	1.49	Less severe
4.	Problem of rodents and crop lodging	1	4	7	5	4	3.67	1.02	More severe
5.	Less availability of Happy seeder in cooperative societies	1	-	9	8	3	3.57	0.93	More severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

Constraints faced in using Super seeder

Table 5 outlines the major problems faced by farmers in Punjab using the Super seeder method for wheat sowing during 2022-23. Across all farm sizes, the most severe issue was the requirement of high HP tractors, with the problem considered particularly pressing for all farm sizes. More pest incidence was another significant challenge, rated as more severe in overall, especially on small and medium farms. Issues with seed germination due to low moisture and operating the machine were generally seen as less severe, though they still caused concerns. Small and medium farms reported higher issues with pests and tractor requirements, while large farms also highlighted difficulties with machine operation. Bishnoi *et al* (2024) also concluded similar results, reporting that the super seeder machine required more than a 55 horsepower tractor, whereas most farmers had tractors below 55 HP for normal farming.

Constraints faced in using Zero till drill

Table 6 presents the major problems faced by farmers in Punjab using the Zero till drill method for wheat sowing during 2022-23. Across all farm sizes, the most severe problems were related to the look of the field due to standing stubbles and the management of standing stubbles, both considered more severe. The issue of being afraid of low yield was generally seen as less severe, though it was a concern on medium and large farms. Less availability of zero till drills was another issue, but it was perceived as less severe in overall, especially among larger farms. Small and medium farms report more significant challenges with

Table 5: Major problem faced by sample farmers in case of Super seeder method of wheat sowing, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	Small								
1.	Problem of seed germination due to low moisture	-	-	11	-	-	3.00	-	Less severe
2.	More pest incidence	-	-	-	2	9	4.82	0.40	More severe
3.	High HP tractors required	-	-	-	-	11	5.00	-	More severe
4.	Operating issues of the machine	-	1	10	-	-	2.91	0.30	Less severe
B.	Medium								
1.	Problem of seed germination due to low moisture	-	-	9	10	-	3.53	0.51	Less severe
2.	More pest incidence	-	-	7	12	-	3.63	0.50	Less severe
3.	High HP tractors required	-	-	-	3	16	4.84	0.37	More severe
4.	Operating issues of the machine	-	-	15	4	-	3.21	0.42	Less severe
C.	Large								
1.	Problem of seed germination due to low moisture	-	6	14	-	-	2.70	0.47	Less severe
2.	More pest incidence	-	-	8	12	-	3.60	0.50	Less severe
3.	High HP tractors required	-	-	-	2	18	4.90	0.31	More severe
4.	Operating issues of the machine	-	1	12	4	-	3.25	0.55	Less severe
D.	Overall								
1.	Problem of seed germination due to low moisture	-	6	34	10	-	3.08	0.57	Less severe
2.	More pest incidence	-	-	15	26	9	3.88	0.69	More severe
3.	High HP tractors required	-	-	-	5	45	4.90	0.30	More severe
4.	Operating issues of the machine	-	2	37	8	-	3.16	0.47	Less severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

stubble management and field appearance, while larger farms experience fewer issues with its availability. Singh (2005) revealed similar results, showing that there was a problem due to standing stubble of rice if sowing was done by zero till drill.

Constraints faced in using Rotavator

Table 7 presents the major problems faced by farmers in Punjab using the rotavator method for wheat sowing during 2022-23. Across all farm sizes, the most severe issue was the requirement for high HP tractors, which was considered a more severe problem overall. Compaction of soil was also rated as more severe, especially for medium and large farms. The issue of low germination was generally seen as less severe across all farm sizes, with small and medium farms reporting this issue less frequently. Large farms also experience soil compaction as a more pressing concern, while smaller farms focus more on the need for high HP tractors. Similar findings were reported by Mukesh *et al* (2013), who concluded that the use of a rotavator led to soil compaction.

Constraints in using Surface seeder

Table 8 outlines the major problems faced by farmers in Punjab using the Surface seeder method for wheat sowing during 2022-23. Across all farm sizes, the most severe issue was straw blockage into the machine, which was considered more severe in overall. High custom hiring charges were rated as less severe, though still a concern, especially on small and medium farms. The issue of straw blockage was a consistent challenge across small, medium, and large farms, while high custom hiring charges were a relatively less severe problem.

Conclusions and Policy Implications

During the survey it was found that farmers confront serious issues that inhibit the adoption of different methods of wheat sowing. Many farmers reported that during peak sowing period, accessing the machines like Happy seeder and others is challenging, therefore, these should be made available in custom hiring centers in higher number. For running these machines, there is need of high HP tractor (upto 50-60 HP), therefore, the facility of subsidized purchase of

Table 6: Major problem faced by sample farmers in case of Zero till drill method of wheat sowing, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	Small								
1.	Look of field due to standing stubbles	-	-	-	-	7	5.00	-	More severe
2.	Afraid of low yield	-	-	-	4	3	3.43	0.53	Less severe
3.	Management of standing stubbles	-	-	-	-	7	5.00	-	More severe
4.	Less availability of zero till drill	-	-	7	-	-	3.00	-	Less severe
B.	Medium								
1.	Look of field due to standing stubbles	-	-	-	-	7	5.00	-	More severe
2.	Afraid of low yield	-	-	2	3	2	4.00	0.82	More severe
3.	Management of standing stubbles	-	-	-	-	7	5.00	-	More severe
4.	Less availability of zero till drill	2	3	2	-	-	2.00	0.82	Less severe
C.	Large								
1.	Look of field due to standing stubbles	-	-	-	-	3	5.00	-	More severe
2.	Afraid of low yield	-	-	-	1	2	3.67	0.58	Less severe
3.	Management of standing stubbles	-	-	-	-	3	5.00	NA	More severe
4.	Less availability of zero till drill	2	1	-	-	-	1.33	0.58	Less severe
D.	Overall								
1.	Look of field due to standing stubbles	-	-	-	-	17	5.00	NA	More severe
2.	Afraid of low yield	-	-	2	8	7	3.71	0.69	Less severe
3.	Management of standing stubbles	-	-	-	-	17	5.00	NA	More severe
4.	Less availability of zero till drill	4	4	9	-	-	2.29	0.85	Less severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

Table 7: Major problem faced by sample farmers in case of Rotavator, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	Small								
1.	Low germination issue	-	-	7	-	-	3.00	-	Less severe
2.	Compaction of soil	-	-	2	5	-	3.71	0.49	Less severe
3.	High hp tractors	-	-	-	-	7	5.00	-	More severe
B.	Medium								
1.	Low germination issue	-	4	7	2	-	2.85	0.69	Less severe
2.	Compaction of soil	-	-	6	7	-	3.54	0.52	Less severe
3.	High hp tractors	-	-	-	9	4	4.31	0.48	More severe
C.	Large								
1.	Low germination issue	-	2	9	-	-	2.82	0.40	Less severe
2.	Compaction of soil	-	-	3	8	-	3.73	0.47	More severe
3.	High hp tractors	-	-	3	6	2	3.91	0.70	More severe
D.	Overall								
1.	Low germination issue	-	6	23	2	-	2.87	0.50	Less severe
2.	Compaction of soil	-	-	11	20	-	3.65	0.49	More severe
3.	High hp tractors	-	-	3	15	13	4.32	0.65	More severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

Table 8: Major problem faced by sample farmers in case of Surface seeder, Punjab 2022-23

S. No.	Major problems	SD	D	N	A	SA	Mean	SD	Decision
A.	**Small**								
1.	Straw blockage into machine	-	-	-	-	2	5.00	-	More severe
2.	High custom hiring charges	-	-	1	1	-	3.50	0.71	Less severe
B.	**Medium**								
1.	Straw blockage into machine	-	-	-	-	2	5.00	-	More severe
2.	High custom hiring charges	-	-	2	-	-	3.00	-	Less severe
C.	**Large**								
1.	Straw blockage into machine	-	-	-	-	6	5.00	-	More severe
2.	High custom hiring charges	-	-	3	3	-	3.50	0.55	Less severe
D.	**Overall**								
1.	Straw blockage into machine	-	-	-	-	10	5.00	-	More severe
2.	High custom hiring charges	-	-	6	4	-	3.40	0.52	Less severe

SD- Strongly disagree, D- Disagree, N- Neutral, A-Agree, SA- Strongly agree

tractors and other machines at custom hiring centers must be expedited by the Government. There was some technical problem in handling of Super seeder machine. For the best use of machine, skill based training must be provided to the farmers for using this machine. Government should reduce the cost of new machines by delivering it to the farmers at more subsidized rates so that it could be used by all the farmers and area under new methods of wheat sowing after paddy harvesting may be increased. Capacity building of the farmers is urgently required for using paddy stubble management machinery by providing requisite training by the various government departments.

References

Anonymous 2022. Statistical data https://www.statista.com.

Bishnoi R, Kumar V, Bishnoi D K and Meena M S 2024. Economic viability analysis of super seeder machine adoption in wheat cultivation: a case study in Haryana: Economic analysis of super seeder machine in wheat. *Annals Arid Zone* **63**:55-60. https://doi.org/10.56093/aaz.v63i2.144989

Jat M L, Chakarborty D, Ladha J K, Rana D S, Gathala M K and McDonald A 2020. Conservation agriculture for sustainable intensification in South Asia. *Nature Sustainability* **3**:336–43. https://www.nature.com/articles/s41893-020-0500-2

Kaur A, Kaur P and Kumar P 2021. Status of paddy straw management technologies in Punjab. *Indian Journal of Extention Education* **57**:78-83. https://www.researchgate.net/publication/357876256

Kumar S, Sharma D K, Singh D R, Biswas H, Praveen K V and Sharma V 2019. Estimating loss of ecosystem services due to paddy straw burning in north-west India. *International Journal Agricultural Sustainability* **17**:146-57. https://doi.org/10.1080/14735903.2019.1581474

Lohan S K, Jat H S, Yadav A K, Sidhu H S, Jat M L, Choudhary M, Peter J K and Sharma P C 2018. Burning issues of paddy residue management in north-west states of India. *Renewable Sustain Energy Review* **81**: 693-706. https://doi.org/10.1016/j.rser.2017.08.057

Mathur A S, Das S and Sircar S 2006. Status of agriculture in India: Trends and prospects. *Economic and Political Weekly* **41**:5327-36. DOI: 10.2307/4419078

Mukesh S, Rani V and Kumar A 2013. Effect of using rotavator on soil properties and crop: A review. *Annals of Agri-Bio Research* **18**:356-59.

Singh D and Kaur P 2021. Happy seeder technologies in Punjab state of India: Lessons learned from farmers. *Indian Journal of Economics and Development* **17**:910-16.

Singh G 2005. A case study of village Kaunke kalan in Ludhiana district (Punjab) with respect to zero-tillage in wheat. M.Sc. dissertation, Department of Economics and Sociology. Punjab Agricultural University, Ludhiana, India.

Government of Punjab (GOP) 2022. Department of planning, Government of Punjab. Publication [Internet]. 2023;(956):709. Available from: www.esopb.gov.in

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