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Assessing the Knowledge Levels of Farmers on Paddy Straw Management Techniques as the Survey Based Approach in Central Region of Uttar Pradesh

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ABSTRACT

This Study the knowledge level on Perception of Farmers towards paddy straw management techniques in Central Region of Uttar Pradesh, particularly study was conducted in four districts namely; Lakhimpur Kheri, Barabanki, Kanpur Dehat and Kanpur Nagar during 2024-2025, 320 paddy farmers selected from each district, two blocks were selected randomly. Thus, total numbers of eight blocks were selected for the study area. From each block, four villages were selected randomly. Thus, total numbers of thirty two villages were selected for the study. From each village, ten farmers were selected randomly. The study aimed to knowledge levels of various practices related to paddy straw management techniques of mulching, animal fodder, mushroom farming, biofuel and implements paddy straw chopper, zero tillage seed drill, baler etc. The results revealed a generally medium knowledge level for Paddy Straw Management Techniques and implements. Thus, total three hundred twenty farmers were selected and personally interviewed with the help of well-structured schedule. The study was knowledge of farmers related to paddy straw management techniques. Thus the concluded majority of the respondents had medium level (59.68%) of knowledge about paddy straw management technique, (23.13%) were in the low category and (17.19%) were classified in the high category.

INTRODUCTION

Paddy also knows as rice (*Oryza sativa L.*) It belongs to the family poaceae and chromosome no. 24. and origin of the paddy Indo Burma Region (South East Asia) Rice is the staple food of more than 60% world population and most of the people of South East Asia, about 90% rice grown in the world is produce and consumed Asia and Pacific Region.

Paddy prefers wet tropical climate for its growth and development. In case of nutritional benefits, rice contains 7% of protein, 36–58% of crude fat, 16–25% of crude ash, 21% of calcium, 47–52% of thiamine, 35-43% of riboflavin, and 45–55% of niacin. Moreover, it is also used for treating many health related maladies such as in digestion; diabetes etc. More than 90 per cent of the world's rice is produced and consumed in Asia, where it is an integral part of culture and tradition.

In Indian context, rice live in a essential place and contributes about 13 per cent of annual agriculture GDP and provides 43 per cent calorie requirement for more than 70 per cent of Indian population. India is the second largest producer of rice after China. The India has area about 88.07 million ha and production of 125.29 million tonnes with productivity of 2800 kg/ha. And China is the top rice producing country in the world total production 145.95 million tonnes. The top rice producing state in india namely West Bengal, Uttar Pradesh, Punjab, Telengana, Odisha, Andhra Pradesh, Chhattisgarh, Tamilnadu, Bihar and Assam are the leading states in rice production. **(usda.gov.in)**

Uttar Pradesh is the largest rice growing state after west Bengal in the country, in which rice in growing over the area of 6.93 million ha. and producing 15.27 million tonnes. The top rice producing district in Uttar Pradesh namely Bijnor, Kushi Nagar, Pilibhit, Chandauli, Baghpat, Banaras and Ambedkar Nagar. **(www.agricoop.gov.in)**

According to Indian Meteorological Department (IMD), burning of rice straw contributes to nearly 17% of the particulate matter 10 pollution and 19% of the particulate matter 2.5 pollution in Delhi and NCR towns. Around 64% of Delhi's particulate matter 2.5 pollution in winter develops outside the city, which ultimately cause several respiratory problems among people. Moreover, it causes environmental pollution, produces greenhouse gases causing global warming and results in loss of plant nutrients like N, P, K and S. Therefore, appropriate paddy straw management techniques assume a great significance.

MATERIALS AND METHODS

The present Study was conducted in 2024-25 to the socio- economic profile paddy growers on perception of farmers towards paddy straw management techniques in central region of Uttar Pradesh. The uttar pradesh state comprises seventy-five districts; there are 10 districts in the central region of Uttar Pradesh. Out of these, four districts were selected on the basis of paddy production top two district lakhimpur kheri and barabanki and top two lowest production district namely first is Kanpur nagar an second is kanpur dehat purposely selected for the study to understand the ground reality of farmer towards paddy straw management techniques in these district. Data for the study was collected from a sample of 320 paddy farmers. Another consideration for selecting this district was the close understanding of the investigator with this area, its people, official, nonofficial, and local talks, which enabled the investigator to carry out the work more efficiently. The study was conducted in four districts namely; Lakhimpur Kheri, Barabanki, Kanpur Dehat and Kanpur Nagar from each district, two blocks were selected randomly. Thus, total numbers of eight blocks were selected for the study. From each block, four villages were selected randomly. Thus, total numbers of thirty two villages were selected for the study. From each village, ten farmers were selected randomly. The data was collected through personal interview method with the help of pre-tested interview schedule. The data gathered were analysed for statistical treatments in the light of objectives. Mean score was obtained by total scores of each item divided by total number of respondents. The correlation coefficient ("r" value) was used to measure the relationship between dependent and independent variables. Thereafter; the data will be gathered with the help of structure schedule by employing personal interview technique.

Statistical Methods Used:

The 'percentage' and 'average' SD and correlation coefficients 'r' were used for making simple interpretation.

1 Percentage (%):

The frequency of a particular cell was divided by the total number of respondents or (MPS) in that particular category and multiplied by 100 for calculating the percentage.

2 Averages ($\overline{X}$):

The average ($\overline{X}$) was calculated by adding the total scores obtained by the respondents and divided it by the total number of respondents using the following formula:

$$(\overline{X}) = \frac{\sum X}{N}$$

Where,

$\overline{X}$ = Average or mean

$\sum X$ = Total number of scores obtained by respondents

N = Total number of respondents

3 Standard Deviation (σ):

S.D. is the square root of mean of the squares of all deviations, the directions being measured from the arithmetic mean of the distribution. It is commonly developed by symbol (σ).

$$\text{S.D. } (\sigma) = \frac{\sqrt{\sum d^2}}{n}$$

Where,

σ = Standard deviation

d = Deviation of variables mean

M = Total number of items

4 Correlation Coefficient (r):

The coefficient of simple correlation (r) in a measure of the mutual relationship between two variables that in *i.e.* x and y, where relationship is measured and commonly termed as product movement correlation coefficient and is computed by the following formula:

$$Correl(X,Y) = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$$

Where,

r = Correlation in coefficient

X = mean of all the observation

xi = observation of the variable

Yi = observation of the variables

$\overline{Y}$ = mean of all the observation

RESULT

Table-1: Distribution of respondents according to the knowledge about paddy straw management technique.

n=320

S.No.	Particular	Full Knowledge		Partial Knowledge		No Knowledge		Total score	Weighted mean score	Rank Order
		f	%	*f*	%	*f*	%			
1	Mulching	35	10.94	178	55.62	107	33.44	568	1.77	V
2	Animal fodder	304	95.00	16	5.0	00	00	915	2.85	I
3	Bailing	74	23.13	138	43.12	108	33.75	607	1.89	III
4	Composting	35	10.94	164	51.25	121	37.81	554	1.73	VI
5	Bio-char	16	05.00	187	58.44	117	36.56	540	1.68	VIII
6	Mushroom Farming	36	11.25	72	22.50	212	66.25	487	1.52	X
7	Domestic purpose	25	07.82	167	52.18	128	40.00	538	**1.69**	**VII**
8	Burning	10	3.12	251	78.44	59	18.44	592	1.85	IV
9	Packing material	59	18.44	98	30.62	163	50.94	536	1.67	XI
10	Biomass plant	32	10.00	94	29.37	194	60.62	446	**1.39**	**XIII**
11	Biofuel	12	3.75	101	31.56	207	64.69	445	1.39	XIV
12	Incorporation	16	5.0	95	29.68	209	65.32	448	1.40	XII
13	Sell to brick Kilns	5	1.56	118	36.88	197	61.56	383	1.20	XV
14	Thatching	271	87.81	39	12.19	10	0	899	2.80	II
15	Sell to paper/ Cardboard making Industry	15	09.38	129	35.62	176	55.00	479	1.50	XI
	Average								1.75	

f =Frequency, %=Percentage, Mean= 22.05, **S.D.** = 1.86**, Min=19, Max=26**

The table reviled that Animal fodder ranked first with the highest weighted mean score of 2.85, indicating that the majority of the respondents (95%) had full knowledge of using crop

residues for animal feed. This may be attributed to its traditional and widespread application in rural areas. Thatching was ranked second (WMS = 2.80), reflecting that a high proportion of respondents (87.81%) were aware of using straw for roofing and fencing in rural homes. Bailing (WMS = 1.89) and burning (WMS = 1.85) followed in third and fourth positions, respectively. Although burning is environmentally harmful, a significant number of farmers still considered it a common practice due to convenience and lack of awareness of alternatives. Mulching, composting, and domestic purposes received moderate attention, with weighted mean scores ranging from 1.69 to 1.77. These practices are recognized to some extent, but further education and demonstration could enhance adoption. On the other hand, technical and commercial uses such as bio-char production (WMS = 1.68), mushroom farming (WMS = 1.52), biomass plant (WMS = 1.39), biofuel production (WMS = 1.39), and incorporation into soil (WMS = 1.40) reflected a lower level of knowledge among the respondents. Selling residues to brick kilns ranked lowest (WMS = 1.20), suggesting a significant knowledge gap or lack of market linkage for this practice.

Table-2: Distribution of respondents according to the knowledge about implements use in paddy straw management technique.

n=320

Sr. No.	Implements	Fully Knowledge		Partial Knowledge		No Knowledge		Total score	Weighted mean score	Rank Order
		f	%	*f*	%	*f*	%			
1.	Spreader/Shrub Master	12	03.75	60	18.75	248	77.50	393	1.23	X
2.	Super SMS (attached with Combine Harvester)	26	08.13	116	36.25	178	55.62	463	1.45	VII
3.	Paddy straw Chopper	60	18.75	89	27.82	171	53.43	531	1.66	V
4.	Mulcher	36	11.25	130	40.63	154	48.12	491	1.53	VI
5.	Happy Seeder	25	07.82	80	25.00	215	67.18	451	1.41	VIII
6.	Rotavator	206	64.38	114	35.62	00	00	846	2.64	I
7.	Reversible MB plough	68	21.25	148	46.25	104	32.25	604	1.89	II
8.	ZT seed drill	64	20.00	120	37.50	136	42.50	568	1.77	III
9.	Raker	94	29.38	132	41.25	94	29.37	383	1.20	XI
10.	Baler	26	08.12	84	26.25	210	65.63	430	1.34	IX
11.	Super seeder	47	14.68	145	45.32	128	40.00	561	1.75	IV
	Average								1.63	

f = Frequency, %= Percentage, Mean= 17.87**, S.D. =** 2.47**, Min=**14**, Max=**23.

The analysis reveals that the Rotavator emerged as the most widely known implement with the highest weighted mean score of 2.64, securing Rank I. About 64.38% of respondents had full knowledge and 35.62% had partial knowledge of the rotavator, indicating its widespread adoption in tillage and residue incorporation operations. The Reversible MB Plough and Zero-Till (ZT) Seed Drill were ranked second (WMS = 1.89) and third (WMS = 1.77), respectively, suggesting moderate levels of awareness. These implements are relatively well-known due to their roles in conservation agriculture and residue incorporation. The Super Seeder (WMS = 1.75) and Paddy Straw Chopper (WMS = 1.66) followed next, indicating a fair level of knowledge, though adoption may be limited due to higher costs or lack of accessibility. Implements such as the Mulcher (WMS = 1.53), Super SMS (WMS = 1.45), and Happy Seeder (WMS = 1.41) reflect a low to moderate knowledge level, likely due to limited demonstrations and technical complexity. On the lower end of the spectrum, the Baler (WMS = 1.34), Spreader/Shrub Master (WMS = 1.23), and Raker (WMS = 1.20) had the lowest awareness levels among the respondents. These implements may be underutilized due to high capital costs or lack of training and awareness.

Table-3: Overall extent of the knowledge about paddy straw management technique.

S. No.	Category	Respondents	
		f	***%***
1.	Low (up to 36)	74	23.13
2.	Medium (37 to1 43)	191	59.68
3.	High (44 and above)	55	17.19
	Total	**320**	**100**

f =Frequency, %=Percentage, Mean= 39.93**, S.D. =** 4.04**, Min=35, Max=49,**

Overall extent of the knowledge about **191 respondents (59.68%)** fell under the **medium category**, indicating that the majority of farmers possess a moderate level of knowledge or awareness regarding crop residue management practices. This group forms the core segment that can be effectively targeted for further capacity building and technology dissemination. **74 respondents (23.13%)** were in the **low category**, showing limited knowledge or exposure to sustainable or innovative residue management techniques. This group represents a key area where immediate extension interventions, awareness campaigns, and training programs are necessary. Only **55 respondents (17.19%)** were classified in the **high category**, suggesting that a relatively small portion of the farming population has a comprehensive understanding and possibly adoption of best practices in residue management.

DISCUSSION

The study aimed to assess the knowledge and awareness of farmers regarding the alternative uses of crop residues and the implements used in crop residue management. A total of 400

respondents were categorized and analysed based on their responses to various practices and technologies. The findings provide significant insights into the current status of farmers' understanding and the scope for improvement in sustainable agricultural practices.

1. Knowledge of Alternative Uses of Crop Paddy Straw Management

The analysis of alternative uses of crop residue showed that traditional and locally familiar practices such as using residues for animal fodder (WMS = 2.85, Rank I) and thatching (WMS = 2.80, Rank II) were highly recognized among the respondents. These practices are deeply embedded in rural farming systems and reflect the farmers' reliance on conventional knowledge on the contrary, modern or commercial applications such as biofuel production (WMS = 1.39), biomass plant (1.39), and selling to brick kilns (1.20) were found to have very low awareness and adoption levels. This highlights a significant knowledge gap concerning technologically advanced and income-generating practices, which could contribute to environmental sustainability and economic diversification if promoted effectively.

2. Knowledge about Implements Used in Paddy Straw Management

In terms of equipment knowledge, the Rotavator received the highest weighted mean score (2.64, Rank I), indicating widespread awareness and usage, most likely due to its affordability, availability, and perceived utility in tillage and residue mixing. Implements like the Reversible MB Plough (WMS = 1.89) and ZT Seed Drill (WMS = 1.77) also showed moderate awareness, revealing a partial shift towards conservation agriculture practices.

However, advanced implements specifically designed for residue management such as the Happy Seeder (WMS = 1.41), Super SMS (1.45), and Super Seeder (1.75) were relatively less known. This lack of awareness can be attributed to the cost of machinery, limited access, and inadequate technical support, indicating a need for institutional support, training, and demonstration programs to improve adoption. Implements such as the Spreader/Shrub Master and Raker ranked lowest (WMS = 1.23 and 1.20 respectively), suggesting they are either under-promoted or deemed non-essential by the farming community.

CONCLUSION

The following observations can be made regarding the knowledge levels of participants about various paddy straw management techniques and agricultural implements. The practice with the highest level of full knowledge is Animal Fodder (95%), followed by Thatching (87.81%), indicating that these practices are well-known and widely understood. On the other hand, Biofuel and Biomass Plant have the lowest levels of full knowledge, with only 3.75% and 10%, respectively. Bailing (23.13%), Composting (10.94%), and Mulching (10.94%) show a mixed understanding among respondents. Thatching, Animal Fodder, and Bailing stand out in the rankings due to their high knowledge levels. However, practices like Mushroom Farming, Bio-char, and Packing Material show significant gaps in knowledge, with large percentages of respondents reporting no knowledge. Some practices, such as Animal Fodder and Thatching, are more ingrained in daily life and culture, explaining their higher knowledge levels. In contrast, others, such as Bio-char and Mushroom Farming, are less familiar and may require more education and awareness. Regarding the use of implements in paddy straw management, the Rotavator stands out with a substantial 64.38%

of participants indicating full knowledge. The Reversible MB Plough and Zero Tillage Seed Drill also show a high level of knowledge, with 21.25% and 20% of respondents indicating full knowledge, respectively. However, Spreader/Shrub Master, Baler, and Raker show significant gaps in knowledge, with high percentages of respondents indicating no knowledge—Spreader/Shrub Master at 77.50% and Baler at 65.63%. The Happy Seeder and Super Seeder rank at the lower end of full knowledge (7.82% and 14.68%, respectively), yet still show reasonable partial knowledge among respondents.

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