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Attitude of farmers towards adoption of straw baler for residue management-A sociological study

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Abstract

Paddy - wheat crop rotation is the most common practice among farmers of the Northern India. And huge amount of paddy straw is wasted annually either by burning in the fields or due to poor utilization which otherwise could contribute to the income of farmers. These crop residue if left as it is in the field, create problem during the sowing of wheat crop. So, there is a way through adoption of straw baler to manage the residue in an economic and sustainable way. A study was planned to observe the attitude of farmers towards straw baler along with constraints in adoption. The findings revealed that attitude level of the respondents regarding baler technology was found high (46.25%) followed by low (31.25%) and medium (22.50%). A significant majority of respondents (68.75%) had favorable attitude that it is a profitable technology while more than one fourth of the respondents (27.50%) indicated that the sale of balers poses a problem which is the major constraint. Moreover, straw baler is a very profitable farm machine.

Keywords: Straw baler, attitude, constraints, technology

Introduction

In recent years, the problem of burning crop residue has become more serious, presenting serious agronomic and environmental difficulties. Stems, stalks, and roots that remain in the field after harvest are examples of residue, which is a consequence of intensive farming methods (Kathpalia *et al.*, 2023) [3]. Due to labor limitations, mechanization, and the decreased market for paddy residue in animal feed, farmers are forced to burn stubble, a quick and inexpensive way to clear fields, because so much crop waste goes to waste (Bimbraw, 2019) [1]. This technique, however, has detrimental effects and contributes to soil erosion, air pollution, and climate change.

The second-largest agro-based economy, India, generates over 686 million tons of crop waste a year, of which 368 million tons are from cereals (Hiloidharim *et al.*, 2014) [2]. Approximately 50 million tons of rice straw are burned annually in Punjab and Haryana, particularly in October and November, releasing particulate matter, aerosols, black carbon, and greenhouse gases into the atmosphere (Kaur *et al.*, 2022; Ravindra *et al.*, 2019) [5, 10]. Burning residues speeds up field preparation and lowers pests, but it also damages soil fertility, creates subsurface hardpan, and complicates drainage (Mohanty, 2004) [8]. While countries like China, Japan, Thailand, and Malaysia successfully recycle crop residues for the production of bioenergy, open-field burning is still a problem in India, Pakistan, Nepal, and Indonesia (Meteei *et al.*, 2019) [9].

The introduction of straw balers and other alternative technologies has addressed this dilemma by processing wastes into round or rectangular bales that can be used as

fuel, animal feed, and as a raw material for papermaking (Krishnappa *et al.*, 2015) [6]. According to Lohan *et al.* (2018) [7], adoption rates are still low despite these potential solutions because of financial obstacles, a lack of awareness, and insufficient institutional support. To reduce environmental impact and encourage sustainable farming practices, effective residue management calls for technological incentives, farmer education, and regulatory initiatives.

In this study, the sociological aspects of farmers' views and barriers to using rice straw balers are examined. Agricultural economics, environmental science, and rural sociology views are integrated in this study to examine adoption hurdles and provide ways to enhance sustainable residue management.

Objectives

1. To know the level of Attitude towards Baler technology of the farmers
2. To find out the constraints in adoption of Baler technology

Methodology

The study was conducted in Kaithal district of Haryana state. The study was carried out in Kaithal block of the district. The villages undertaken for the study were Malkheri, Jaswanti, Sanghan, Teek, Kakot, Jagdishpur, Pattiafgan, Kultaran, Padla, Dinuwala and Franswala villages were selected from where more no. of farmers adopted Baler. On the whole, a total of 80 Baler adopter farmers were selected. Interview schedule was prepared to

collect the desired information as per objectives of the study. Finally selected farmers were surveyed with the help of interview schedule. Statistical techniques were used as per the nature of data.

Results

Contextual matrix of the respondents

In context of age, 35 percent of the farmers belonged to age group of up to 35 years, while by 45 percent of the respondents belonged to age group of between 35 to 50 years and rest (20%) of the respondents belonged to the age group above 50 years. Regarding caste three fourth (75%) belonged to general caste and 15 percent belonged to backward class. Concerning education, 10 percent of the respondents were illiterate, 22.50 percent of the respondents had education up to middle schooling and 36.25 percent of the respondents had education up to secondary schooling. The data further revealed that 46.25% of the respondents were involved in business and services while 35 percent of

the respondents had no subsidiary occupation.

It was found that 20 percent of the respondents were marginal farmers with up to 1 ha of land, 15 percent of the respondents were small farmers with 1-2 ha of land, followed by semi-medium farmers with 2-4ha of land and medium farmers with 4-10 ha of land (i.e. 37.50% and 27.50% respectively). About 3/4th of the respondents (72.50%) belonged to nuclear families, while 27.50 percent of the respondents belonged to joint families. In terms of family size, 35 percent of the respondents had up to 4 members and 28.75 percent of the respondents had more than 8 members. With regards to mass media exposure, 37.50 percent of the respondents had a low level of mass media exposure and 17.50 percent of the respondents had high level of mass media exposure. About 1/3rd of the respondents (33.75%) had low socio-economic status and 22.50 percent of the respondents had high socio-economic status.

Table 1: Contextual matrix of the respondents (n=80)

Sr. No.	Variables	Frequency	Percentage
1.	Age		
	Up to 35 years	28	35.00
	35-50 years	36	45.00
	Above 50 years	16	20.00
2.	Caste		
	General Caste	60	75.00
	Backward Class	12	15.00
3.	Education		
	Illiterate	8	10.00
	Up to middle	18	22.50
	Secondary level	29	36.25
	Senior secondary level	15	18.75
4.	Subsidiary occupation of the Family		
	Nil	28	35.00
	Business and service	37	46.25
	Custom hiring	15	18.75
5.	Size of land holding		
	Marginal (up to 1 ha)	16	20.00
	Small (1-2 ha)	12	15.00
	Semi-medium (2-4 ha)	30	37.50
6.	Type of Family		
	Medium (4-10 ha)	22	27.50
	Nuclear	58	72.50
7.	Size of Family		
	Joint	22	27.50
	Up to 4 members	28	35.00
	5-8 members	29	36.25
8.	Annual Income		
	Above 8 members	23	28.75
	Between Rs.75,000 - 1,50,000/-	18	22.50
9.	Social organization Participation		
	Between Rs.1,50,000 - 3,00,000/-	25	31.25
	More than one organization participation	20	25.00
10.	Mass media exposure		
	One organization participation	41	51.25
	Low (4-6)	30	37.50
11.	Socio-economic Status		
	Medium (7-09)	36	45.00
	High (10-12)	14	17.50
	Low (5-8)	27	33.75
11.	Socio-economic Status		
	Medium (9-12)	35	43.75
	High (13-16)	18	22.50

Attitude towards Baler technology

Table 2 illustrates the respondents' attitudes towards baler technology. A significant majority of respondents (68.75%) had favorable attitude that it is a profitable technology. Additionally, 57.50 percent of the participants expressed their agreement that all farmers should adopt it. Exactly half of the respondents reported favorable attitude towards the adoption of baler technology elevates the socio-economic status of farmers due to its numerous benefits. On the other

hand, 27.50 percent of the participants mentioned that advertisements promoting this technology are a complete waste. Furthermore, 23.75 percent of the respondents stated that baler technology is not a successful proposal. Another 17.50% of the participants considered baler technology to be a risky project. Lastly 68.75 percentages of the respondents had unfavorable attitude that it is not a time-saving technology.

Table 2: Attitude towards Baler technology (n=80)

Statements	Attitude		
	Favourable (3)	Neutral (2)	Unfavourable (1)
It is a profitable technology	55(68.75)	15(18.75)	10(12.50)
All the farmers should adopt baler technology	46(57.50)	20(25.00)	14(17.50)
Adoption of baler raises the SES of the farmer due to its benefits	40(50.00)	15(18.75)	25(31.25)
Advertisements on this technology is a total waste	22(27.50)	26(32.50)	32(40.00)
Baler is not a successful proposal	19(23.75)	21(26.25)	40(50.00)
Baler technology is a risky project	14(17.50)	18(22.50)	48(60.00)
Baler technology is very simple and does not requires any special skill	12(15.00)	11(13.75)	57(71.25)
It is not a diesel saving proposal	12(15.00)	8(10.00)	60(75.00)
It is not a time saving technology	15(18.75)	10(12.50)	55(68.75)

Figures in parentheses indicate percentage

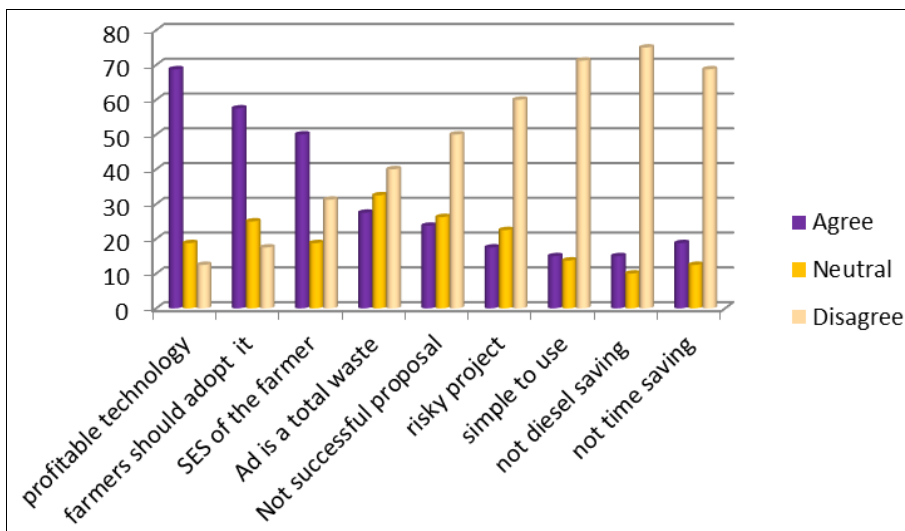


Fig 1: Attitude of farmers towards Baler technology

Level of Attitude of respondents regarding Baler

It was observed (Table 3) that attitude level of the respondents regarding baler technology was found high (46.25%) followed by low (31.25%) and medium (22.50%).

Table 3: Level of Attitude of respondents regarding Baler (n=80)

S. No.	Adoption level	Frequency	Percentage
1.	Low (9-14)	25	31.25
2.	Medium (15-21)	18	22.50
3.	High (22-27)	37	46.25

Constraints in adoption of Baler technology

The Table 4 presents the constraints in the adoption of baler technology. More than one fourth of the respondents (27.50%) indicated that the sale of balers poses a problem.

One-fourth of the respondents mentioned issues related to choking and slow machinery speed. During operation. Respondents stated that the straw must be dry for effective baler (22.50%). Furthermore, 1/5th of the respondents mentioned that wet soil conditions hinder the baler process. Additionally, 18.75 percent of the respondents highlighted that a tractor power requirement of 30kw or more is necessary for baler. A significant number (31.25%) of the respondents agreed that the lack of an adequate training program is a constraint. Similarly, 26.25 percent of the respondents stated that there is a shortage of information regarding baler technology. Moreover, 22.50 percent of the respondents mentioned inadequate extension contacts with ADOs and SDOs. Lastly, 33.75 percent of the respondents reported a high cost of balers or increased custom charges.

Table 4: Constraints in adoption of Baler technology (n=80)

Constraints	Agree (3)	Somewhat Agree (2)	Disagree (1)	WMS	MS	Rank
Agro - technical problems						
Sale of baler is a problem	22(27.50)	24(30.00)	34(42.50)	148	1.85	I
Choking and slow speed of machinery while working.	20(25.00)	22(27.50)	38(47.50)	142	1.77	II
Straw must be dry for bales	18(22.50)	20(25.00)	42(52.50)	136	1.70	III
Wet soil conditions hinder the baler process	16(20.00)	19(23.75)	45(56.25)	131	1.63	IV
Tractor power requirement is 30KW or more for baler	15(18.75)	17(21.25)	48(60.00)	127	1.58	V
Size and uniformity of windrows affect the baler performance	12(15.00)	15(18.75)	53(66.25)	119	1.48	VI
Educational problems						
Lack of adequate training program	25(31.25)	26(32.50)	29(36.25)	156	1.95	I
Shortage of information on Baler technology	21(26.25)	23(28.75)	36(45.00)	145	1.81	II
Inadequate extension contacts with ADOs and SDOs	18(22.50)	19(23.75)	43(53.75)	135	1.68	III
Financial problem						
Higher cost of baler/ More custom charges	27(33.75)	25(31.25)	28(35.00)	159	1.98	I

Figures in parentheses indicate percentage

Conclusion

In Northern India, paddy straw burning is still a significant problem because of a lack of workers, mechanization, and the need to prepare land quickly for wheat production. Straw balers recycle leftovers into industrial products, fuel, and animal feed, providing a sustainable alternative. The majority of farmers (68.75%) have a positive attitude toward straw baler technology, acknowledging its practical advantages and profitability, according to this study. Additionally, farmers noted that adopting a baler leads to a higher net return. Moreover, participants reported that using a baler is environmentally friendly (Kathpalia *et al.* 2024)^[4]. However, a number of obstacles stand in the way of its broad adoption, such as exorbitant expenses, inefficient machinery, insufficient training initiatives, and a lack of institutional backing. Balers help with residue management, however regulatory changes, technology advancements, and farmer education initiatives are needed to address some operational issues, such as poor machinery speed, challenges in wet soil conditions, and power requirements.

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