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Knowledge of farmers regarding patterns for using paddy residue in Haryana state

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Abstract
In the districts of Karnal and Kurukshetra in the state of Haryana, a study was carried out in 2021–2022 to gauge the level of farmers' knowledge on the use of paddy residue. According to the study's goal, a well-structured and pre-tested interview schedule was created. Two blocks from each district were chosen at random. Additionally, one community was randomly chosen from each block. To gather data, four communities were chosen. 75 male paddy farmers with more than 5 acres of land from each chosen village were also chosen using the snowball method. As a result, 300 respondents in total were questioned. Present study concluded that all respondents (100.00%) were aware about straw baler machine and feeding the livestock, followed by making cattle shed roof (96.33%), hey rake (93.67) and mulching in the field (93.67). Study also concluded that sufficient time to sow next crop because it takes one and half months to decompose, paddy straw management delays wheat sowing and paddy residue burning is cheap option were major reasons for paddy residue burning.

Keywords: Knowledge, paddy residue, utilization, etc.

Introduction
Increasing population spurt the food demand in across the world which leads increase the food production and for maintaining a sustainable agricultural production it is essential to recycle the nutrients from the crop residue after harvesting. (Hou *et al*., 2019) [3]. India being an agriculture dominant country generates around 500-550 million tons (MT) of crop residues every year (IARI, 2012) [4] and still a surplus of 140 MT out of which 92 MT burned each year. Traditional uses of crop residues are animal feed, fodder, fuel, roof thatching, packaging and composting. Residues of cereal crops are mainly used as cattle feed. While, paddy residue used as domestic fuel or in boilers for parboiling rice. Farmers use crop residues either themselves or sell it to landless households or intermediaries, who further sell them to industries however, a large portion of unused crop residues burnt in the fields which results the pollution in the atmosphere and also affects the soil productivity by burning the essential nutrients inside the soil. There are many management alternatives for crop residue management (Gadde *et al*., 2009 & Pathak *et al*., 2011) [2, 8]. The Government of India is taking many lucrative and punitive approaches to mitigate residual crop burning for sustainable agriculture. So, keeping in view the importance, the present research was carried out to assess the awareness level of farmers regarding utilization of paddy residue in Karnal and Kurukshetra districts of Haryana state.

Methodology
Karnal and Kurukshetra districts in the state of Haryana were purposefully chosen since they are rice farming districts to evaluate farmers' understanding of burning paddy residue. Randomly, two blocks from each district were chosen. Additionally, a settlement was randomly chosen from each block. So, total 4 villages were selected to collect the research data. From each selected village, 75 male paddy growing farmers having more than 5 acres of land were selected through snowball technique. Thus, a total of 300 farmers were interviewed to assess the awareness level of respondents. While, 15 farmers were also selected from the each village among the 75 to impart training so that training organized for the 60 farmers with the help of KVK Scientist by the interviewer and after that only 54 respondents found who practiced the crop residue burning and reasons were recorded accordingly. According to the study's goals, a well-structured and pre-tested interview schedule was created. For the purpose of creating the interview schedule, existing research-based literature and expert recommendations were also consulted. Collected data processed, tabulated and analyzed using frequency, percentages and weighted mean score.

Results and Discussion

Table 1: Pre-exposure knowledge regarding utilization of paddy residue in any form at farm/home

(n=300)

Sr. No	Utilization at farm/home	WMS	Rank
(1)	Feeding the livestock	1.30	IV
(2)	Making storage house for wheat straw for feeding cattle	1.34	III
(3)	Making scarecrow/dummy in the field	1.17	VI
(4)	Making cattle shed roof	1.67	II
(5)	Making cattle bed during winter season	1.73	I
(6)	Making dung cake house	1.06	IX
(7)	Laying down under the mattress/carpet	1.30	IV
(8)	Making shade in poultry farm	1.04	XI
(9)	Mulching in the field	1.29	V
(10)	Growing mushroom	1.08	VII
(11)	Making mushroom cultivation shed	1.05	X
(12)	Making vermin compost	1.07	VIII
(13)	Making of mud pots	0	XII

*multiple responses

Pre-exposure knowledge regarding utilization of paddy residue in any form at farm/home

Results in table 1 shows the pre-exposure knowledge regarding utilization of paddy residue by respondents in any form at farm/home. Regarding pre-exposure knowledge statement 'making cattle bed during winter season' got rank I (WMS-1.73), followed by 'making cattle shed roof' which got rank II (WMS-1.67), 'making storage house for wheat straw for feeding cattle' got rank III (WMS-1.34), 'feeding the livestock' and 'laying down under the mattress/carpet' got rank IV (WMS-1.30), 'mulching in the field' got rank V (WMS-1.29), 'making scarecrow/dummy in the field' got rank VI (WMS-1.17), 'growing mushroom' got rank VII (WMS-1.08), 'making vermicompost' got rank VIII (WMS-1.07), 'making dung cake house' got rank IX (WMS-1.06), 'making mushroom cultivation shed' got rank X (WMS-1.05), 'making shade in poultry farm' got rank XI (WMS-1.04) and 'making of mud pots' got last rank XII.

Table 2: Gain in knowledge regarding utilization of paddy residue in any form at farm/home

(n=60)

Sr. No	Utilization of paddy residue at farm/home	Pre- knowledge f (WMS)	Post- knowledge f (WMS)	Gain in knowledge (WMS)
(1)	Feeding the livestock	15(1.25)	18(1.3)	0.05
(2)	Making storage house for wheat straw for cattle feeding	21(1.35)	21(1.35)	0
(3)	Making scarecrow/dummy in the field	13(1.21)	13(1.21)	0
(4)	Making cattle shed roof	29(1.48)	32(1.53)	0.05
(5)	Making cattle bed during winter season	24(1.4)	29(1.48)	0.08
(6)	Making dung cakes house	7(1.11)	7(1.11)	0
(7)	Laying down under the mattress/carpet	4(1.06)	8(1.13)	0.07
(8)	Making shade in poultry farm	9(1.15)	11(1.18)	0.03
(9)	Mulching in the field	6(1.1)	14(1.23)	0.13
(10)	Growing mushroom	8(1.13)	19(1.31)	0.18
(11)	Making mushroom cultivation shed	8(1.13)	19(1.31)	0.18
(12)	Making vermicompost	3(1.05)	3(1.05)	0
(13)	Making of mud pots	0	0	0

*Multiple responses

Table 2 shows that maximum gain in knowledge regarding utilization of paddy residue in farm/home was found in case of "growing mushroom" and "making mushroom cultivation shed" (WMS=0.18), followed by "mulching in the field" (WMS=0.13), "making cattle bed during winter season" (WMS=0.08), "laying down under the mattress/carpet" (WMS=0.07), "feeding the livestock" and "making cattle shed roof" (WMS=0.05), "making shade in poultry farm" (WMS=0.03). There was no gain in knowledge in case of "making storage house for wheat straw for cattle feeding", "making scarecrow/dummy in the field", "making dung cakes house", "making vermicompost" and "making of mud pots".

Table 3: Correlation between independent variables and pre-exposure knowledge and gain in knowledge regarding utilization of paddy residue in any form at farm/home

Sr. No.	Independent variables	Pre-exposure knowledge (n=300)	Gain in knowledge (n=60)
1.	Age	-0.236**	0.408**
2.	Education	0.209**	0.297**
3.	Family size	0.088*	0.070*
4.	Land holding	0.090*	-0.057*
5.	Income of farmers	-0.008NS	0.171**

**significant at 1% level of significance
*significant at 5% level of significance
NS- Non significant

Table 3 highlights the correlation between independent variables and pre-exposure knowledge and gain in knowledge. It was found that there was negative and highly significant correlation of pre-exposure knowledge with age; correlation was highly significant with education. Correlation of pre-exposure knowledge was regarding utilization of paddy residue in any form at farm/home with family size and land holding was found to be insignificant whereas, it was negatively correlated and non- significant with income of farmers. Correlation with age, education and income of farmers was found to be highly significant with gain in knowledge; correlation was significant with family size but was negatively correlated with land holding.

Conclusion

The majority of farmers, according to the study, are unaware of crop residue management tools and how to use them at home or on the farm. Even though there are numerous programs, technologies, schemes, interventions, rules, and regulations, crop residue management remains a significant problem. As a result, there is a strong need to modify all of these things in order to replace crop residue burning effectively. It is also time to develop a strategy and concentrate on raising awareness of and using crop residues in other fields. For agriculture to be sustainable and resilient, crop residue management requires the involvement of researchers, extension specialists, and policymakers.

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