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A study on constraints pertaining to implements in adoption of crop residue management practices in Haryana, India

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Abstract
A study was conducted on constraints pertaining to implements in adoption of crop residue management practices in Haryana. A sample of 240 respondents were selected for the study from four districts namely, Kaithal, Karnal, Fatehabad and Sirsa. The respondents were interviewed personally with the help of structured interview schedule. The result revealed that depth of sowing with happy seeder takes longer time for emergence of seedlings (Z score= 1.17) was very serious constraints, rotavator cannot work properly on standing straw & stubbles (Z score= 0.73) was serious constraint while on the other hand, operation of happy seeder requires technical training for proper field calibration (Z score=-1.35) was not so serious constraints pertaining to implements in adoption of crop residue management practices.

Keywords: Constraints, pertaining, implements, management, practices

Introduction
Crop residues are the materials left in an agricultural field after the crop harvested. These residues include stalks, stems, leaves and seedpods. There are two types of agricultural crop residues such as field residues and process residues. Field residue is left in the field after harvesting of crop and processed residue is left after processing of farm produce through milling. In India there are 500-550 Million Tonnes (Mt) of crop residues are produces annually (MoA, 2012) [2]. Ministry of New and Renewable Energy (2009) [1] estimated that it is highest in Uttar Pradesh (60 Mt) followed by Punjab (51 Mt) and Maharashtra (46 Mt). Among different crops, cereals generate maximum residues (352 Mt) followed by fibres (66 Mt), oilseeds (29 Mt), pulses (13 Mt) and sugarcane (12 Mt). Cereal crops (rice, wheat, maize, millets) contribute 70% while rice crop alone contributes 34% to the crop residues. Out of various crops grown, rice, wheat and sugarcane are prone to crop residue burning (Directorate of Economics & Statistics, MOA, DAC, New Delhi (final estimate-2012-13). Farmers burn a significant portion of the crop residues on-farm so that the succeeding crop can be sown on clear field. This is major problem in northern states of India. Crop residues are primarily used as bedding material for animals, livestock feed, soil mulching, bio-gas generation, compost, thatching for rural homes, mushroom cultivation, biomass energy production, fuel for domestic and industrial use (NPMCR, 2014) [3]. These are also retained in the field as green manure cover crops (Saini, 2009) [4]. Due to the high demand for crop residues, there is need for sustainable crop residues management practices that ensures maintenance of a permanent soil cover. Despite this, today also farmers are facing many constraints regarding adoption of crop residue management practices. By considering all these facts this study has been framed entitled "A Study on Constraints pertaining to Implements in Adoption of Crop Residue Management Practices in Haryana, India".

Methodology
The present study was conducted in Haryana state. Four districts namely, Sirsa & Fatehabad from South-western and Kaithal & Karnal from North-eastern part of the Haryana state were selected purposively because of Rice- wheat cropping system of cultivation. Two blocks were selected, randomly from each of four districts and further from each of eight blocks, two villages were selected, randomly and thereby a total number of sixteen villages were selected for data collection. Thus, total sixteen villages were selected, namely, Abubseher and Lohgarh from Dabawali block, Hassu and Naurang from Odhan block, Bhawanikhera and Mehmra from Ratia block, Jhlaniya and Salamkhera from Fatehabad block, Kailram and Balu from Kalayat block, Kasan and Jakholi from Rajond block, Sadarpur and Bharatpur from Gharaunda and Agondh and Katalahari from Nissing block.

Fifteen farmers were selected, randomly from each of 16 villages who are practising Rice –wheat cropping system for the study and thus, a total number of 240 farmers were interviewed personally on their farm or home.

A list of constraints was prepared and farmer were asked to speak out their responses against each constraint, whether it was 'very serious', 'serious' and 'not so serious'. Weightage given to their corresponding responses category were 3, 2, and 1, respectively. Aggregate total score were calculated for all constraint separately, based on calculated score; A weighted mean score for each constraint was obtained and by weighted mean score, percentage was obtained and ranked according to the maximum mean scores for assessing the seriousness of constraints. The maximum mean score/ percentage so obtained were given the rank 1st and the next subsequent one was given 2nd and so on the descending orders. Z score was also calculated for judging the seriousness of each constraint contained in the schedule by using the formula as under:

$$\text{Z score} = \frac{x-\mu}{\sigma}$$

Where,
Z score= Standard score
x=observed value
μ= mean
σ= Standard deviation

Results and Discussion

Constraints pertaining to implements in adoption of crop residue management practices

The table 1 revealed that Depth of sowing with happy seeder takes longer time for emergence of seedlings (Z score= 1.17), Happy seeder cannot be used on unlevelled fields (Z score= 1.05) and Higher maintenance cost of rotavator & happy seeder machineries (Z score= 1.03) were very serious constraint pertaining to implements in adoption of crop residue management practices. The other constraints were rotavator cannot work properly on standing straw & stubbles (Z score= 0.73), Rotavator makes the soil harder leads delay & restrict germination of seeds (Z score= 0.80), Cost of renting SMS attached combine harvester is higher (Z score= 0.24), SMS causes a significant reduction in the field capacity of combine leads to higher fuel consumption (Z score= 0.29), Mould board plough can't be used in sandy soil (Z score= -0.63) and Mulcher can't be used in moist straw (Z score= -0.72) were serious constraint while on the other hand, Operation of happy seeder requires technical training for proper field calibration (Z score=-1.35), Irrigation requirement in rotavator operated fields is almost same as burnt fields (Z score= -1.32), Excessive heaping of straw with super SMS at times led to burning of heaps in these pockets (Z score= -1.21) were encountered as not so serious constraints.

Table 1: Constraints pertaining to Implements in adoption of crop residue management practices n=240

Sr. No.	Constraints pertaining to Implements	Total score	WMS	Z score	Seriousness	Rank order
1.	Happy seeder cannot be used on unleveled fields	587	2.44	1.05	VS	II
2.	Operation of happy seeder etc. requires technical training for proper field calibration	257	1.07	-1.35	NSS	XI
3.	Depth of sowing with happy seeder takes longer time for emergence of seedlings	604	2.51	1.17	VS	I
4.	Rotavator cannot work properly on standing straw & stubbles	543	2.26	0.73	S	V
5.	Higher maintenance cost of rotavator & happy seeder machineries	584	2.43	1.03	VS	III
6.	Rotavator makes the soil harder leads delay & restrict germination of seeds	554	2.30	0.80	S	IV
7.	Irrigation requirement in rotavator operated fields is almost same as burnt fields	262	1.09	-1.32	NSS	X
8.	Cost of renting SMS attached combine harvester is higher	476	1.98	0.24	S	VII
9.	SMS causes a significant reduction in the field capacity of Combine leads to higher fuel consumption	484	2.01	0.29	S	VI
10.	Excessive heaping of straw with super SMS at times led to burning of heaps in these pockets	277	1.15	-1.21	NSS	IX
11.	Mulcher can't be used in moist straw	257	1.43	-1.23	NSS	XI
12.	Mould board plough can't be used in sandy soil	344	1.43	-0.63	S	VIII

VS-Very Serious S-Serious NSS-Not So Serious WMS-Weighted Mean Score Mean= 1.84 SD=0.56

Conclusion

From the study, it is concluded that depth of sowing with happy seeder takes longer time for emergence of seedlings, happy seeder cannot be used on unlevelled fields and higher maintenance cost of rotavator & happy seeder machineries are very serious constraint pertaining to implements in adoption of crop residue management practices. The other constraints were rotavator cannot work properly on standing straw & stubbles, rotavator makes the soil harder leads delay & restrict germination of seeds, cost of renting SMS attached combine harvester is higher, SMS causes a significant reduction in the field capacity of combine leads to higher fuel consumption, mould board plough can't be used in sandy soil and mulcher can't be used in moist straw are serious constraint while on the other hand, operation of happy seeder requires technical training for proper field calibration, irrigation requirement in rotavator operated fields is almost same as burnt fields, excessive heaping of straw with super SMS at times led to burning of heaps in these pockets are encountered as not so serious constraints.

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