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RESEARCH ARTICLE

KNOWLEDGE AND AWARENESS OF CONSERVATION AGRICULTURE AMONG THE FARMERS OF MEWAT DISTRICT OF HARYANA

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ABSTRACT

Conservation agriculture offers a powerful option for meeting future food demands while also contributing to sustainable agriculture and rural development. CA methods can improve the efficiency of input, increase farm income, improve or sustain crop yields, and protect and revitalize soil, biodiversity and the natural resource base. Still there exists a wide gap between the technology available at the research level and its knowledge at farmer's level. Keeping this in view, an attempt has been made to know about the awareness and knowledge level of the farmers of Mewat District of Haryana state. The study has been conducted in the three clusters comprising of 17 villages of 5 blocks of the Mewat District. It is found that most of the farmers are not aware about the practice of zero tillage only 13, 10 and 6.5 % of the farmers in cluster 1, 2 and 3 respectively are aware of the practice of zero tillage and it is adopted only in one village. Retention of crops in the field is also not practiced because the crop residue is mostly used as fuel and fodder; if some alternate arrangement for fuel and fodder is made then residue retention is possible in that area.

INTRODUCTION

Among the major resources available in the country, the most important is land comprising soil, water and associated plant and animals involving the total eco-system. The community's demand for food, energy and many other needs has to depend on the preservation and improvement of the productivity of this natural resource. However there has been continuous depletion of land resource and the quality of land is deteriorating due to various factors like soil erosion caused mainly due to shifting cultivation, overgrazing, large scale deforestation, reckless mining activity, and general mismanagement etc such soil erosion lead to degradation of soil . So underlying issues are conservation of resources and protection of the environment and it can be done by adopting conservation agriculture. Conservation agriculture was introduced by the FAO (2008) as a concept for resource-efficient agricultural crop production based on an integrated management of soil, water and biological resources combined with external inputs. To achieve this, CA is based on three principles that are believed to enhance biological processes above and below the ground. Appropriate conservation agricultural technologies encompass innovative crop production systems that combine the following basic tenets (Sayre 1998; Derpsch 1999): Dramatic reductions in tillage that can be done by adopting Zero till or controlled till seeding for all crops in a cropping system if feasible. Rational retention of adequate levels of crop residues on the soil surface, ultimate goal of surface retention of sufficient crop residues is to protect the soil from water run-off and erosion; improve water infiltration and reduce evaporation to improve water productivity; increase soil organic matter and biological activity; and enhance long-term sustainability. Use of sensible crop rotations: Employ economically viable, diversified crop rotations to help moderate possible weed, disease, and pest problems; enhance soil biodiversity; take advantage of biological nitrogen fixation and soil enhancing properties of different crops; reduce labor peaks; and provide farmers with new risk management opportunities. So the trend of land degradation needs to be reversed by appropriate scientific interventions tuned with socio-economic fabric and family system perspective at the same time Knowledge and awareness about the conservation agricultural technologies and identification of factors hampering the adoption is also important for the adoption of these interventions. So keeping this in new present study is under taken with following specific objectives.

- To see the existing practises and awareness about Conservation Agriculture
- To know the perceptions of the farmers about CA
- To identify the constraints for the adoption of CA Practises

MATERIALS AND METHODS

To know the farmer's perception on conservation agriculture, a diagnostic survey on tillage, crop rotation and residue management was conducted in the rural areas of Mewat District. Overall 170 farm families were selected from 17 villages undertaken from the 5 blocks of the district. The study

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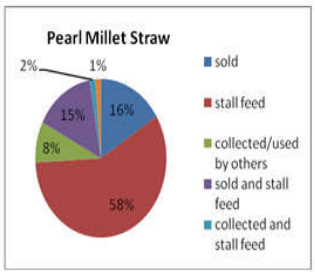
villages were categorized in three clusters on the basis of interventions to be given. Primary data on various aspects of tillage; crop rotation and residue management were collected from the respondents of different farm size (small, medium and large) groups through PRA technique and well structured schedule. Simple tabular analysis has been done for this purpose

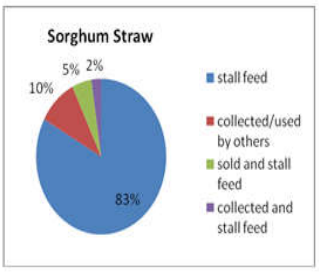
RESULTS AND DISCUSSION

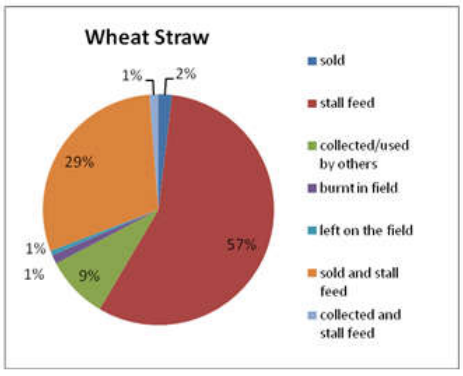
Information on the three basic aspects namely Zero tillage, retention of crop residue and crop rotation of conservation agriculture have been analysed and given in this section.

Table 1: Farmer's Awareness & Extent of Adoption in Mewat:

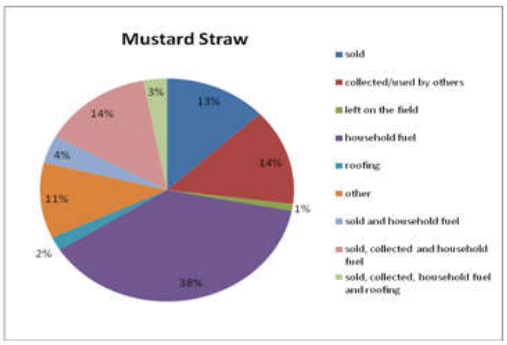
	No. of farmers	
Village	Awareness	Adoption
Cluster 1		
Dalawaas	0	0
Nangal Mubarakpur	1	0
Khori	0	0
Padheni	0	0
Sunari	0	0
Agon	2	0
Indari	7	4
Sulela	2	0
Ghagus	0	0
Total	12	4
Cluster 2		
Chapeda	1	0
Badarpur	3	0
Maroda	0	0
Jharpadi	1	0
Singlehedi	0	0
Total	5	0
Cluster 3		
Mundheta	1	0
Rahapua	1	0
Gumat Bihari	0	0
Total	2	0

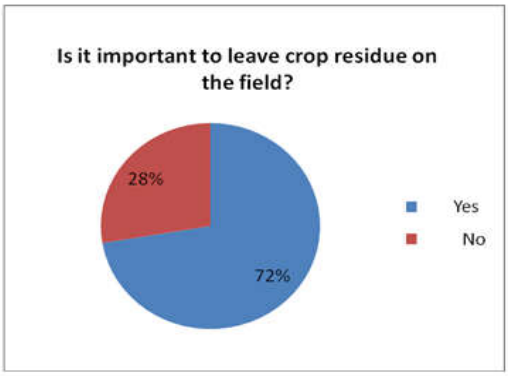






observed that most of the farmers are not aware about the practice of zero tillage only 13, 10 and 6.5 % of the farmers in





cluster 1, 2 and 3 respectively are aware of the practice of zero tillage. As far as its adoption is concerned, it can be seen from the table that Indari is the only village where farmers have adopted the practice with the extent of adoption being 33% covering an average area of 10 acres. Indari can therefore be used as a base for improving the awareness of the technology among fellow farmers and its adoption can be increased by making custom hiring facility available on easy terms and conditions.

Retention of crop residue: Retention of crop residue in the field is an important practice among the practices of conservation agriculture. It has been found in this study that farmers are not retaining crop residue in their fields, they are using it in other various uses undermining the benefits of retaining crop residue in the field. The following pie charts show the various uses of crop residue in the selected farm fields in Mewat: Around 16% of the farmers in Mewat sell pearl millet straw with 58% of the farmers using it as dry fodder for livestock. Further, 15% of the farmers partly sell it and partly use it as fodder for livestock. Sorghum straw, on the other hand, is mainly being used by 83% of the farmers as green fodder for livestock. Wheat straw is also being used mainly as dry fodder for livestock with 29% of the farmers using it partly as fodder and partly for the purpose of sale. Wheat straw is also being burnt and left on the field by some of the farmers. Mustard straw is mainly used as household fuel by 38% of the farmers with 14% of the households simply collecting the straw. Collection in Mewat takes the form of payment made to hired labour in kind. Around 13% of the farmers are selling mustard straw.It is also being used for the roofing by some of the farmers.On the basis of the information given in these pie charts it can be inferred that if some alternate arrangement of fuel and fodder can be made then farmers can retain their crop residues in their fields because there isa acute shortage of fuel and fodderin this area.

Table 2 : Crop wise area sown in different study villages (Acres/ household)

Village	Area sown per household (acres)									
	Kharif						Rabi			
	Cereals			Oil seeds	Pulses	Vegetables	Cereals			Vegetables
	Pearl Millet	Sorghum	Paddy	Sesame			Wheat	Mustard	Barley	
Cluster1										
Dalawaas	4.1	0.4	0	0.2	0	0.1	4.3	4.2	0	0
Nangal .M	5.6	0.7	0	0.9	0.15	0.3	3.7	6.8	0.3	0.5
Khori	4.4	0.2	0	0	0	1.7	5.1	2	0	0
Padheni	6.5	0.5	0	0.2	0.4	0	6.5	4.7	0	0
Sunari	4.5	0	0.2	0	0	0	4.8	4.4	0	0
Agon	0.9	1	0	0	0	1.1	2.7	0.9	0	1.8
Indari	1.1	0.5	7.5	0	0	0	10.9	1.6	0	0
Sulela	3.2	0.7	0	0	0.2	0.6	3.8	2.2	0	0
Ghagus	2	0.9	0	0	0	0	2.2	6.2	0	0
Cluster 2										
Chapeda	0.7	0.9	0	0	0.2	0	1.2	0.9	0.6	0
Badarpur	0.8	0.9	0	0	0	0	1.4	0.9	0	0
Maroda	0.9	0.6	0	0	0	0	1.5	0.6	0	0
Jharpadi	2.5	0.6	0	0	0	0	3.1	2.3	0	0
Singlehedi	1.1	1.1	0	0	0	0	2.4	0	0	0
Cluster3										
Mundheta	0.4	0.9	0.3	0	0.3	0.83	2.5	0.2	0	0.2
Rahapua	1.9	1.5	0	0	0	0.2	3.5	1.3	0	0
Gumat Bihari	2.4	0.2	0	0	0	0.7	3.2	0.3	0	0.3

Table 3: Prevalent cropping patterns in the study villages

Village	Cropping Pattern	
	Cropping Pattern 1	Cropping Pattern 2
Cluster 1		
Dalawaas	Pearl Millet- Wheat	Fallow- Mustard
Nangal Mubarakpur	Pearl millet, Sesame- Wheat	Pearl Millet/Fallow-Mustard
Khori	Pearl Millet- Wheat	Kharif Vegetables (cluster bean)-Mustard
Padheni	Pearl Millet- Wheat	Fallow- Mustard
Sunari	Pearl Millet- Wheat	Fallow- Mustard
Agon	Pearl Millet, Sorghum, Kharif vegetables (onion)- Wheat	Fallow- Mustard, Rabi vegetables (carrot)
Indari	Paddy- Wheat	Nil
Sulela	Pearl Millet- Wheat	Fallow- Mustard
Ghagus	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Cluster 2		
Chapeda	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Badarpur	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Maroda	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Jharpadi	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Singlehedi	Pearl Millet, Sorghum- Wheat	Nil
Cluster 3		
Mundheta	Sorghum, Kharif vegetables (mix varieties)- Wheat	Nil
Rahapua	Pearl Millet, Sorghum- Wheat	Fallow- Mustard
Gumat Bihari	Pearl Millet, Kharif vegetables-Wheat	Nil

Table4: Farmers practicing diversified farming in Mewat

Village	No of Farmers	Diversification	Reason for diversification
Dalawaas	1	Sesame and bottle gourd	Higher rate in the market
Nangal Mubarakpur	1	Tomato, Brinjal and Cucumber English Skinny (kakri)	Vegetable cultivation is highly profitable
Nangal Mubarakpur	1	Moth, Barley and Tomato	Barley requires less irrigation
Padheni	1	Pigeon pea	Higher rate in the market
Indari	1	Dhaincha	Higher rate in the market
Chapeda	1	Green and Black Gram	Production of gram is a result of low rainfall
Maroda	1	Red Lentil	Higher rate in market and requires less irrigation
Mundheta	1	Green Gram	Maximum utilization of land
Rahapua	2	Onion and Dhaincha	Higher rate in the market
Gumat bihari	1	Carrot	Vegetable cultivation is profitable

Table 6: Constraints in the adoption of conservation agriculture

Constraints	Cluster		
	Cluster 1	Cluster 2	Cluster 3
Non availability of machinery	50 (55.55)	10 (20.0)	9 (30.0)
Non availability of fodder for animals	21 (29.6)	13 (43.3)	8 (36.4)
Non availabilty of fodder for animals and fuel for household	26 (36.6)	8 (26.7)	6 (27.3)
Need for increased ploughing	8 (11.3)	0 (0)	0 (0)
Termite problem	10 (14.1)	8 (26.7)	6 (27.3)
Affects sowing of next crop	6 (8.5)	1 (3.3)	0 (0)
No constraint	0 (0)	0 (0)	2 (9.1)
Total households	71	30	22

Use of sensible crop rotation: Growing of diversity of crops on the same piece of land in each cropping season is another principle of CA; it is the use of sensible and profitable crop rotations. It has been analysed on the basis of prevalent cropping pattern and extent of diversification in the study area

Cropping Pattern of Mewat (village-wise)

Table shows area sown per household for cereals, pulses and vegetables grown in each of the 17 villages of Mewat separately for kharif and Rabi seasons. An average household in Dalawaas sows pearl millet, sorghum, sesame, wheat and mustard in 4.1, 0.4, 0.2, 4.3 and 4.2 acres of land respectively. Hence, it is clear that a farmer in Dalawaas sows primarily 3 crops namely pearl millet, wheat and mustard. In fact, it is further clear from the table that farmer makes full utilization of land in Rabi season by sowing wheat (4.3 acres) and mustard (4.2 acres) whereas some part of the land is kept fallow in Kharif season by sowing only pearl millet. Hence two prominent cropping patterns in Dalawaas are pearl millet-wheat and fallow- mustard. Similar is the case with Padheni, Sunari and Sulela. As far as the cropping pattern of Nangal Mubarakpur is concerned, it can be seen from the table that on average pearl millet and sesame is sown in around 6.5 acres of land in kharif followed by sowing of wheat on 3.7 acres in rabi and the remaining land of 2.8 acres is either used for sowing of mustard or is kept fallow in rabi. Crops that are primarily grown in Khori include pearl millet, wheat and mustard among cereals and cluster beans among vegetables. Two cropping patterns that are visible from table consist of pearl millet (4.4 acres) in kharif followed by wheat (5.1 acres) in rabi and cluster beans (1.7 acres) in kharif followed by mustard (2 acres) in rabi. Coming to the cropping pattern of Agon, onion and carrot are the vegetables grown in kharif and rabi respectively. A farmer in Agon on average sows pearl millet, sorghum and onion in 3 acres of land together in kharif followed by wheat (2.7 acres) in rabi. However, some part is kept fallow in kharif by an average farmer in Agon on which mustard and carrot are grown in rabi. Cropping pattern of paddy- wheat for Indari and pearl millet, sorghum- wheat for Singlehedi is quite evident from the above table. Ghagus, Chapeda, Badarpur, Maroda, Jharpadi and Rahapua witness two cropping patterns namely pearl millet along with sorghum followed by wheat and fallow- mustard. Gumat Bihari and Mundheta witness cereal and kharif vegetable based cropping pattern. Hence Dalawaas,Nangal Mubarakpur, Padheni, Sunari, Sulela, Indari, Ghagus, Chapeda, Badarpur, Maroda, Jharpadi, Rahapua and Singlehedi witness cereal based cropping pattern whereas Khori, Agon, Mundheta and Gumat Bihari witness a mix of cereal and vegetable based cropping pattern

Diversified Farming

A very small proportion of the households in sample villages of Mewat practice diversified farming. Table 4 shows that only 11 out of 170 farmers grow crops that are different from the crops grown by their fellow farmers belonging to the same village. Crops that are prevalent in the cropping pattern of the most of the villages consist of pearl millet, sorghum, wheat and mustard with paddy, sesame and vegetables forming part of cropping pattern for some of the villages. Table shows that pulses, vegetables and cover crops are the broad categories of diversified crops. Some of the common reasons for diversification include higher prices in market, lack of rainfall and poor irrigation facility. None of the farmer is aware of how systematic and calculated diversification can help moderate possible weed, disease, pest problems and improve soil quality.

Perception of farmers on conservation agriculture

Majority of farmers in the sample villages of Mewat agree that retention of crop residue improves soil fertility.

Constraints

Constraints that prevent farmers from adopting CA practices on the field are summarised in the table6.One of the biggest constraints in the adoption of zero tillage in Mewat observed during the base line survey was that of unavailability of machinery. Its popularity in Indari is mainly due to the prevalence of paddy- wheat cropping pattern with machinery being hired mainly on rent. Though majority of farmers in Mewat feel that retaining crop residue helps in improving soil fertility but still it was found that hardly 2% of the farmers leave wheat and mustard straw on the field. Out of all those farmers who felt that retention of residue is important majority complaint of non availability of fodder for animals and fuel

for household as the most important constraint. Growth of termite and need for increased ploughing were observed as other constraints preventing farmers from retaining residue.

Conclusion

It is observed that most of the farmers are not aware about the practice of zero tillage As far as its adoption is concerned, it can be seen from the table that Indari is the only village where farmers have adopted the practice with the extent of adoption being 33% covering an average area of 10 acres. Indari can therefore be used as a base for improving the awareness of the technology among fellow farmers and its adoption can be increased by making custom hiring facility available on easy terms and conditions. It has been found in this study that farmers are not retaining crop residue in their fields, they are using it in other various uses undermining the benefits of retaining crop residue in the field. cereal based cropping pattern whereas Khori, Agon, Mundheta and Gumat Bihari witness a mix of cereal and vegetable based cropping pattern.

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