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Knowledge and attitude of farmers towards Zero – Tillage Technology in Haryana

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ABSTRACT

A study was conducted in two districts i.e. Fatehabad from South-West zone and Karnal from North- East Zone of Haryana state .A list of all the villages (Zero tillage technology users) in each selected village was prepared. Twenty farmers (having small, medium and large size of land holdings) were selected by using random sampling techniques from each village. Therefore, the sample constituted for the proposed study was one hundred and forty farmers/respondents to collect the information for the purposively study. To measure the knowledge and adoption level of ZTT users, they were asked to reply different questions on recommended aspects/practices of ZTT users. The correct answers were awarded a score and incorrect reply was given zero score. The scores obtained under various aspects/practices were summed up with both respondent wise and as well as component wise. The computing low, medium and high knowledge level on the basis of socio economic status. The study revealed that Mean knowledge score of the respondents was 62.75%. High socio-economic status farmers were found to have high level of knowledge in all practices i.e. pre sowing (72.26%), after sowing knowledge (74.66%) and fertilizer knowledge (74.16%) medium and low socio-economic status farmers had found poor or medium knowledge about ZTT. Pooled farmers (57.85%) had favoural attitude towards ZTT. High socio-economic status farmers (63.63%) had better attitude under favourable conditions than medium (32.09%) and low (24.32%) farmers. The SES farmers, having pre sowing adoption (66.80%) and fertilizer adoption (55.50%), after sowing adoption (50.66%) the medium and low SES. Farmers. High SES farmers than (63.63%) had better attitude under favourable condition than medium (32.09%) and low (24.32%) farmers.

Key words: Adoption, Attitude, Constraints Knowledge, Zero Tillage Technology

INTRODUCTION

Agriculture is the largest and the most important sector of Indian economy. About 67 per cent of the people depend upon agriculture and more than 75 per cent live in the villages (Aggrawal, 1997).

Present day 'Agriculture' in India and elsewhere has evolved itself through the ages. Development of crops cultivation and animals rearing took place concurrently leading to various types of farming systems, which are now seen in different parts of the country.

Zero-tillage technology refers to the growing of crop with the least possible soil disturbance, which involves controlling unwanted vegetation by other than mechanical means or by minimum use of tillage equipment. This is also known as minimum or reduced tillage, as shedding required some tillage operation. Thus zero tillage is a tillage system in which mechanical soil manipulation is reduced to traffic and seed-bed preparation only. (Baeumer and Brkermants, 1973).In some parts of the tropics, ZT is still a part of slash-and-burn-agriculture. After cleaning an area of forest by controlled burning, seed is directly placed into the soil without benefit of tillage. However, research based zero tillage technology was first used successfully in 1950 pasture renovation in USA with mulch farming practices and the till plant system for row crop in order to provide year round protection of the soil from erosion to minimize planting cost

MATERIALS AND METHODS

The proposed study was conducted in two districts i.e. Fatehabad from South-West zone and Karnal from North-East zone. The selection was purposeful for its adoption by the Dept. of Agronomy, CCS HAU, Hisar, for the zero tillage technology. Though the Dept. of Agronomy has taken three districts of Haryana into the account, yet being in the same zone, we could take either Karnal or Kaithal and Fatehabad (Becouse rice wheat cropping area of these districts).Two blocks from Karnal Dist. i.e. Karnal and Nilokheri were selected. From Karnal Block two villages Uchana and Kulvehari, Bhaini and Sultanpur from Nilokheri Block, whereas only one block i.e. Tohana block was selected form Fatehabad Distt. and following three villages were selected purposively namely Prithla, Lalauda and Nagala. A group of 20 respondents from each of selected village was drawn

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with the method of random sampling. Thus, a total of 140 farmers were collecting the information and necessary data required for this study.

To measure the knowledge level of ZTT users, they were asked to reply different questions on recommended aspects/practices of ZTT users. The correct answers were awarded a score and incorrect reply was given zero score. The scores obtained under various aspects/practices were summed up with both respondent wise and as well as component wise. The computing low, medium and high knowledge level on the basis of socio economic status. The collected data were analyzed with suitable statistical test.

RESULTS AND DISCUSSION

Distribution of respondents according to cropping pattern: In the Table 1 rabi season, 74.21 per cent land was covered under wheat crops and 25.78 percent land was under Toria, Mustard and Barley. In the *kharif* season, majority of the lands were covered under rice (67.57%) and only 32.42% land was covered under cotton, jawar and sugarcane. The maximum of farmers used the rice-wheat cropping pattern under zero tillage technology. The findings of the study were in agreement with the results obtained by Singh *et al*. (2009).

Knowledge of farmers towards ZTT: The mean knowledge scores about pre-sowing, after sowing, fertilizers and mean overall knowledge have been presented in Table 2.

It is apparent from the Table 2 that the mean overall knowledge score of (i) 18.31, (ii) 6.11, (iii) 3.87 and (iv) 28.24 against the maximum attainable score of (i) 30.00, (ii) 9.00, (iii) 6.00 and (iv) 45.00 with regard to (i) pre-sowing knowledge, (ii) after sowing knowledge, (iii) fertilizers knowledge (iv) mean overall knowledge about ZTT.

Respondents possessing after sowing knowledge (67.88%), fertilizers knowledge (64.50%), pre-sowing knowledge (61.03%) and mean overall knowledge (62.75%) were of medium level knowledge about ZTT.

It was found that farmers' knowledge belonging to high socio-economic status was more regarding pre-sowing (72.26%), after sowing (74.66%) and fertilizer (74.16%) as compared to their counterparts of medium and low socio-economic status.

The low coefficient variation of farmers knowledge regarding (i) fertilizers (ii) pre-sowing (iii) after-sowing were (i) 25.70, (ii) 25.40 and (iii) 23.71.

The variation was not so wide with regard to overall knowledge related to ZTT as indicated by their low value of coefficient of variation 21.50.

In case of after sowing knowledge, the least variation was observed within the three SES categories of farmers as indicated by low value 23.71 of coefficient of variation. It can, therefore, be generalized that farmers on an average had poor to medium knowledge and need education regarding of ZTT.

It had been revealed by the study that the average score of the respondents was 28.24 against the maximum attainable score of 45 regarding knowledge about ZTT. The mean score achieved by the respondents was 62.75%. It indicated that the average score fell in the medium level categories of knowledge. The overall knowledge was found to be medium level.

The variation in knowledge within the three categories of socio-economic status might be due to the fact that the high socio-economic status farmers were supposed to have better education background, economic position, more social participation and could find it easy to approach the information sources and extension agencies.

After taking the comprehensive view, it could be concluded that by and large farmers had medium level of knowledge. Similar, conclusions were arrived by Singh *et*

Table 1: Distribution of respondents according to cropping pattern

Season	Crops	Area under each crop	Total cropped area in acre	Per cent
Rabi	Wheat	1085	1462	74.21
	Others i.e. Toria, Mustard and Barley	377	1462	25.78
Kharif	Rice	988	1462	67.57
	Others i.e. Cotton, Jawar and sugarcane	374	1462	32.42

Table 2: Practices wise knowledge level of the farmers on the basis of socio-economic status

N = 140

Variable	Min. & Max. Score	C.V.	Socio-economic status			
			High n=22	Medium n=81	Low n=37	Total n=140
Pre-sowing knowledge	0-30	25.40	21.68 (72.26)	19.69 (65.63)	13.29 (44.30)	18.31 (61.03)
After-sowing knowledge	0-9	23.71	6.72 (74.66)	6.43 (71.44)	5.05 (56.11)	6.11 (67.88)
Fertilizer knowledge	0-6	25.70	4.45 (74.16)	4.07 (67.83)	3.08 (51.33)	3.87 (64.50)
Overall knowledge	0-45	21.50	32.81 (72.91)	30.17 (67.04)	21.29 (47.31)	28.24 (62.75)

Figure in parentheses indicate percentage

al. (2007), Singh *et al*. (2009),Singha and Devi (2013) ,Sasane *et al*.(2013),Mohapatra *et al*.(2016),Parmar *et al*.(2014), Rani et al.(2017),Ghosalya *et al*.(2016) and Bashir *et al.* (2017) were also reported same type of information.

Attitude of farmers towards ZTT: In Table 3 Pooled farmers (57.85%) had favourable attitude towards ZTT while high socio-economic status farmers (63.63%) had better attitude favourable conditions than medium (60.49%) and low (59.45%) farmers.

Pooled farmers (35.00%) had neutral attitude towards ZTT while high SES farmers (36.36%) had less attitude under neutral conditions than medium (32.09%) and low (24.32%) farmers.

No single farmers had unfavourable attitude in high SES farmers. Farmers had medium SES (7.40%), low SES (16.21%) and pooled (7.14%) unfavourable attitude towards ZTT.

This study indicated that attitude of the high SES farmers towards zero tillage was better attitude than medium and low SES farmers. It is further evident from the Table 3 that pooled farmer had favourable attitude towards zero tillage technology and now they are welcoming the technology. This has brought another change in their mindset that 'old is gold' is not always true, so before criticizing just give a try.

These findings are in conformity with the results of Singh *et al*.(2007), Malik *et al*.(2005),Singh *et al.*(2009), Assis and Mohd Ismail (2014), Islam *et al.* (2014), Roy *et al*.(2016) and Patodiya and Meena (2016) who had found that maximum number of farmers had favourable attitude towards the viable and effective technology.

Adoption about zero tillage technology: This section concerns with the farmers' mean adoption score about the various aspects i.e. pre-sowing, after sowing, fertilizer and mean overall adoption regarding ZTT.

The mean adoption score about pre-sowing, after sowing, fertilizer and mean overall adoption have been presented in Table 4.

It is apparent from the Table 4 that the mean overall adoption score of (i) 9.85, (ii) 2.60, (iiii) 1.72 and (iv) 14.22 was against the maximum attainable score of (i) 15.00, (ii) 6.00, (iii) 4.00 and (iv) 25.00 with regard to (i) pre sowing adoption, (ii) after sowing adoption, (iii) fertilizer adoption and (iv) mean overall adoption about ZTT.

The respondents possessing pre-sowing adoption (65.66%), after sowing adoption (43.33%), fertilizer adoption (43.00%) and mean overall adoption (56.88%) were medium and low level of adoption regarding ZTT.

It was found that farmers belonging to high socio-economic status possessed more pre sowing adoption (66.80%), after sowing adoption (50.66%) and fertilizer adoption (55.50%) as compared to their counter parts of medium and low socio-economic status.

The values of coefficients of variations of the farmers regarding (i) fertilizers adoption (ii) after sowing adoption (iii) pre-sowing adoption are, (i) 40.67, (ii) 28.99 and (iii) 23.39. Overall adoption was indicated by their low value of coefficient of variation 18.95.

In case of pre-sowing adoption, the least variation was observed with the three S.E.S. categories of farmers as indicated by its low value 23.39 of coefficient of variation. It can, therefore, be generalized that farmers on an average had medium adoption skewed towards poor adoption and

Table 3: Attitude of farmers towards ZTT on the basis of socio-economic status

N=140

Level of attitude	Scoring range	Socio-economic status			
		High n=22	Medium n=81	Low n=37	Pooled n=140
Favourable	41-60	14 (63.63)	49 (60.49)	22 (59.45)	81 (57.85)
Neutral	21-40	08 (36.36)	26 (32.09)	09 (24.32)	49 (35.00)
Unfavourable	0-20	-	06 (7.40)	06 (16.21)	10 (7.14)
		Mean = 38.45	Mean = 35.01	Mean = 33.37	Mean = 35.05
		SD = 5.02	SD = 5.82	SD = 5.23	SD = 5.70
		Max. = 47.00	Max. = 45	Max. = 42	Max. = 47.00
		Min. = 30.00	Min. = 18	Min. = 20	Min. = 18.00

Figures in parenthesis indicate percentage

Table 4: Practices wise adoption level of the farmers on the basis of socio-economic status

N=140

Variable	Min. & Max. Score	C.V.	Socio-economic status			
			High n=22	Medium n=81	Low n=37	Total n=140
Pre-sowing adoption	0-15	23.39	10.02 (66.80)	9.68 (64.53)	7.16 (47.73)	9.85 (65.66)
After-sowing adoption	0-6	28.99	3.04 (50.66)	2.56 (42.66)	2.43 (40.50)	2.60 (43.33)
Overall adoption	0-25	18.95	16.13 (64.52)	15.01 (60.04)	11.35 (45.40)	14.22 (56.88)

Figure in parentheses indicate percentage

need awareness regarding of zero tillage technology. Similar conclusions were arrived by Erenstein *et al.*,(2007), Singh *et al.,* (2005), Singh *et al*.(2012), Dudi and Meena (2012), Mehta *et al.*(2013), Borthakur *et al*. (2015) and Roy *et al*.(2016) were also reported same type of information

Constraints/problems perceived by farmers in adoption of ZTT: The constraints encountered by the respondents pertaining to the use of ZTT are summarized in Table 5.

A. Financial constraints: It was significant to note from Table 5 that all the farmers (98.57%) including even those in the higher socio-economic status found it difficult to purchase ZTSD due to its high cost and that was the most serious constraint in adoption of ZTT.

On account of less subsidy on ZTSD,(85.71%) of the farmers faced the problem in purchasing ZTSD. It was noteworthy that the high socio-economic status farmers thought it to be a bigger constraint factor than the medium and the low group farmers.

ZTSD was not available on rent and it was another problem encountered by majority of farmers (84.28%). This problem was taken more seriously by the medium and the low respectively, whereas farmers from high socio economic status gave the 3rd place to this problem.

There were no local manufacturers for ZTSD. This problem was placed at 4th position (82.14%) by High, medium and low socio-economic status of farmers. The similar findings were observed by Jehangir *et al*. (2007), Singh *et al*. (2007) and Singh *et al*.(2009)

B. Technical constraints: The first major problem faced by the composite group was due to the fact that ZTSD cannot work properly in the presence of rice straw. It was significant to note that this problem was placed at 1st rank by high, SES farmers. Medium and low socio-economic status farmers placed it at 3rd rank.

Less knowledge of farmers about ZTT was placed at 2nd position by composite group of farmers. This problem was perceived as second major problem by high socio-economic status and got 4th place by medium and low socio-economic status farmers. It clearly showed that farmers from high socio-economic status wanted to have more knowledge.

ZTT did not involve the use of bullocks and it was a problem faced by 85.71% of the farmers and they rated it at 3rd place. The problem was ranked at 1st place by the low and the medium SES farmers. High SES farmers placed the problem at 5th rank. It clearly showed the concern of low and medium SES farmers who faced more serious problems.

Marginal farmers also could not use ZTSD because it was not drawn by bullocks. It was the 4th major problem reported by the farmers. It was rated it at (i) 6th, (ii) 2nd and (iii) 2nd by (i) high, (ii) medium and (iii) low socio-economic status.

Table 5: Constraints/Problems perceived by farmers in adoption of ZTT.

N = 140

Sr. No.	Constraints/ Problems	Ranking of problems in descending order as perceived by composite group	Ranking of high S.E.S. group	Ranking by medium S.E.S. group	Ranking by low S.E.S. group
A.	**Financial constraints**				
1	High cost of Zero Till Seed Drill (ZTSD)	138 (98.57%)	1	1	1
2	Less subsidy on (ZTSD)	120 (85.71%)	2	3	3
3	ZTSD are not available on rent	118 (84.28%)	3	2	2
4	Lack of local manufacturer	115 (82.14%)	4	4	4
B.	**Technical constraints**				
1	Due to rice straw, ZTSD cannot properly work	131(93.57%)	1	3	3
2	Less knowledge of farmers about ZTT	128 (91.42%)	2	4	4
3	ZTT does not use the bullocks	120 (85.71%)	5	1	1
4	Marginal farmers cannot use it because ZTT is not drawn by bullocks	118 (84.28%)	6	2	2
5	Hardening of upper soil	112 (80.00%)	3	5	5
6	Non-availability of appropriate moisture percentage at sowing time	110 (78.57%)	4	6	6
C.	**Information and communication Constraints**				
1	Lack of extension literature about ZTT	136 (97.14%)	1	1	1
2	Lack of attention of mass media towards ZTT	124 (88.57%)	2	2	3
3	Lack of knowledge of extension agencies about Z.T.T.	116 (82.85%)	3	3	2
4	Lack of fellow farmer's co-operation	115 (82.14%)	4	4	4

Farmers (80%) faced difficulties due to hardening of the upper soil. It was more serious for high socio-economic status farmers than the low and medium farmers.

Non-availability of appropriate moisture percentage at sowing time was placed at 6th position by the composite group. This problem was perceived at 4th rank by the high socio-economic status farmers and it got 6th place by both the medium and the low socio-economic status farmers. The problem was more serious for high socio-economic status than medium and low SES. Singh et al. (2005), Sutariya and Mistry (2016) and Sharma et al. (2017) also observed this type of results in their investigation.

C. Information and communication constraints: Lack of extension literature about ZTT was placed at 1st position by the composite group of farmers (97.14%). High, medium and low socio economic status farmers placed it at 1st rank and perceived it as a major problem for all the groups. It was a serious constraint.

Lack of attention of mass media towards ZTT was perceived as a problem by 88.57% of the composite group farmers. The high and medium socio-economic status placed it at 2nd position. The low SES farmers placed the same constraint regarding mass media at 3rd place.

Lack of knowledge of extension agencies about ZTT was a constraint faced by 82.85% of the farmers. This problem was given the 3rd rank by the high and medium SES farmers. Low SES farmers placed this problem at 2nd rank. So this problem was more serious for low SES farmers.

Lack of co-operation by the fellow farmers was faced by 84.14% of the farmers. This problem was given the equal weightage by the three SES farmers.

It should be noted from the findings of the study that the farmers belonging to different socio-economic status categories attached the same weightages to the following problems (i) high cost of ZTSD, (ii) lack of local manufacturer facilities, (iii) lack of extension literature about ZTT and (iv) lack of fellow farmers' co-operation. Less subsidy on ZTSD and problems due to rice straw in ZTSD were considered very important problems by the farmers possessing high socio-economic status whereas these problems were not considered so serious by the farmers belonging to the medium and low socio economic status categories. It was further revealed that the ZTSD could not be available on rent and ZTSD did not use bullocks; these were found to be the problems which the farmers belonging to the medium and low socio-economic status categories viewed very seriously in comparison to the farmers belonging to the high socio-economic status.

These findings look to be logical because resources available to the high SES farmers are not available with the medium and the low SES categories. Needs of different categories of farmers are different. It should be noted that the problems of lack of knowledge of extension agencies is rated as one of the major problems faced by the farmers of low socio-economic status in comparison to high and medium socio-economic status farmers.

Haryana is one of the leading states in the country in matter of agricultural production. The high cost of ZTSD, and less subsidy, lack of extension literature and lack of attention of mass media on same should be tackled upon top priority by the concerned quarters responsible for agricultural production. Such constraints in adoption of ZTT have been brought out by the earlier workers also. Findings are in accordance with the findings of the Tidke *et al*.(2012), Kumar and Sharma (2016), Chaudhary and Chauhan (2016)and Prajapat *et al*. (2016).

CONCLUSION

The maximum of farmers used the rice-wheat cropping pattern under zero tillage technology. Respondents possessing after sowing knowledge, fertilizers knowledge, pre-sowing knowledge and mean overall knowledge were of medium level knowledge about ZTT. It was found that farmers' knowledge belonging to high socio-economic status was more regarding pre-sowing, after sowing and fertilizer as compared to their counterparts of medium and low socio-economic status. Pooled farmers had favourable attitude towards ZTT while high socio-economic status farmers had better attitude favourable conditions than medium and low farmers. It was found that farmers belonging to high socio-economic status possessed more pre sowing adoption, after sowing adoption and fertilizer adoption as compared to their counter parts of medium and low socio-economic status. All the farmers including even those in the higher socio-economic status found it difficult to purchase ZTSD due to its high cost and that was the most serious constraint in adoption of ZTT. The first major problem faced by the composite group was due to the fact that ZTSD cannot work properly in the presence of rice straw. It was significant to note that this problem was placed at 1st rank by high, SES farmers. Medium and low socio-economic status farmers placed it at 3rd rank. Lack of extension literature about ZTT was placed at 1st position by the composite group of farmers (97.14%). High, medium and low socio economic status farmers placed it at 1st rank and perceived it as a major problem for all the groups.

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