

RESEARCH ARTICLE

Farmers' Awareness Towards Water Conservation Management Practices in Haryana

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ABSTRACT

The present study has been conducted in five districts of Haryana in India; viz. Ambala, Kaithal, Karnal, Kurukshetra, and Yamunanagar with the objective of knowing the awareness level of farmers towards management practices of water conservation. The outcomes have been visualized after conducting a field survey during 2020-21 of 150 respondents, who were interviewed with a well-structured interview schedule. The study concluded that most of the respondents had a high level of awareness about 'laser levelling of fields helps in saving the irrigation water' (2.69), 'Zero tillage in paddy-wheat cropping rotation' (2.52), 'Well maintained water supply system' (2.45) and 'DSR (direct seeded rice) technology' (2.44). While, the respondents were less aware of 'Smart mobile applications for scheduling irrigation' (1.24), and 'Agro advisory based applications' (1.25) and did not attend any training or workshop regarding water conservation. Among the various variables like education, land holding, mass media exposure, and extension contact with the awareness had positive and significant correlations. The correlation of farmers' variables with the awareness toward management practices for water conservation in the study jointly contributed 22.90 per cent variation when other factors were kept constant meaning thereby only 22.90 per cent of the variation in the dependent variable was due to these variables and the remaining 77.10 per cent variations is due to other variables.

Key words: *Correlates of farmers' variables; Awareness; Management practices; Water conservation.*

Over-exploitation of water resources is defined as a situation in which the average extraction rate from aquifers is greater than the average recharge rate over a period. The dependence of irrigation water on water resources has increased with the onset of the green revolution, which is dependent on the intensive use of inputs such as water and fertilizers to increase farm production. The situation has gotten worse as a result of incentives like funds for irrigation equipment and subsidies for electricity supply. Low power tariffs have led to excessive use of water, leading to a sharp fall in water tables. Groundwater represents one of India's primary water sources, it accounts for 63 per cent of all irrigation water and more than 80 per cent of rural and urban domestic water supplies. The water table in Haryana is declining at an alarming rate year after year. The 78

blocks (over 60%) in the state are in the overexploited category, where the groundwater recharging is far less compared to withdrawal. The water table of Haryana fell from 10.44 meters in the year 1974 to 20.71 meters in the year 2019 (Govt. of India, 2020). One reason for Haryana's decreasing groundwater level is massive paddy cultivation. The area under paddy cultivation in Haryana was about 1.92 lakh ha in the year 1966 which increased to 14.22 lakh ha in the year 2021. About seven times increase in the area under paddy cultivation was reported in 50 years. The situation is worse in districts like Kaithal, Karnal, Kurukshetra etc. where the water table declines by 0.5-1 meter every year showing that the declining water table is mainly attributed to paddy crops. (Anonymous 2021). Water crisis has evolved as a rising global challenge, particularly for rural communities depending on

rainfed farming. Water scarcity continues to be a major limiting factor driving farmer vulnerability in the face of growing demand from urbanization, cultivation of water-exhaustive crops, agricultural intensification, misuse and over-extraction, population pressures, and the consequences of climate variability. The efficient utilization of water has great importance in increasing groundwater availability. The present study will provide valuable knowledge about the awareness level of water management practices. The results of the present study will be helpful to field extension workers, researchers' policy makers etc. for developing a guide plan to motivate and encourage the farmer for the judicious use of irrigation water.

METHODOLOGY

In this study, the investigator attempted to describe the awareness of respondents towards management practices of water conservation. The study was conducted in the North Eastern part of Haryana and an exploratory research design was employed in this study. The state North Eastern part was purposively selected based on the need and relevancy of the research problem. Taking into consideration the agricultural importance and over-exploitation of irrigation resources, five districts in Haryana state constituting Ambala, Karnal, Kaithal, Kurukshetra, and Yamunanagar, were purposively selected due to the intensive and extensive agricultural practices currently on-going in these districts. Furthermore, two villages from each district were selected randomly. Overall, ten villages namely Jansui and Niharsi from Ambala, Kaul and Chandlana from Kaithal, Raison and Karsa from Karnal, Kirmich and Harthira from Kurukshetra, Aurangabad and Damla from Yamunanagar and 15 respondents from each village were selected randomly. Thus, a total number 150 respondents were interviewed for to study. The data were collected through the personal interview method with the help of a structured interview schedule constructed and then analysed. The independent variables were Age, Education, Family type, Family size, Occupation, land holding, cropping pattern, Irrigation facilities, Irrigation methods, Water conservation structure, Mass media exposure, and Extension contact. The scores were given for all twelve independent variables to know their relationship with the awareness of respondents. To measure the farmers' awareness level of farmers towards management practices of water conservation, they were given

a properly developed interview schedule and the responses were obtained on a three-point continuum (Likert-type) scale representing agree, undecided, and disagree. So, a score was given against each statement, and aggregated total score was calculated, then the weighted mean score was calculated accordingly.

RESULTS AND DISCUSSION

Personal profile of respondents : It was observed (Table 1) that majority of respondents (48.67%) belonged to the middle age group (35-50 year), 34.00 per cent of the respondents had the level of education up to matric only, more than two third (77.33%) of respondents were living in a joint family, nearly half (47.33%) of the respondents had medium size (5-7 members) family, majority of respondents (83.33%) had farming as a major occupation, 34.67 per cent of respondents had the medium (5.1-10 acres) size land holding, most of the respondents (96%) were following only double cropping pattern (mainly paddy-wheat), most of the respondents (88%) were using only tubewell/borewell/submersible for irrigation, all respondents were using only flood irrigation method, the vast majority of respondents (94%) had only natural pond as a water conservation structure, more than half (53.34%) of respondents had the medium level of mass media exposure, and 80.67 per cent of respondents had a high level of extension contacts.

The data presented in Table 2 revealed that 35.33 per cent of respondents fell under the category of the fully aware level of awareness followed by 26.00 per cent of respondents who fell under the category of only aware level of awareness while only 37.68 per cent of respondents fell under the category of the not aware level of awareness. Thus, from the above findings, it can be deduced that the respondents were very much aware of the management practices to conserve water. Similar results were obtained by *Anseera et. al. (2019)* that most farmers had awareness of water conservation measures such as mulching, maintaining farm ponds, construction of live bunds conservation tillage etc. These results are in line with the findings of *Sharma et. al. (2017)* who found that the higher the education level, the greater one's capacity to understand the management practices of water conservation. To enhance the overall awareness, it is imperative to bolster targeted awareness campaigns, extend educational resources, and encourage collaboration

Table 1. Personal profile of respondents (N=150)

Attributes	No.	%
<i>Age</i>		
Young	30	20.00
Middle	73	48.67
Old	47	31.33
<i>Education</i>		
Illiterate	02	01.33
Primary	04	02.67
Middle	20	13.33
High	51	34.00
Senior Secondary	27	18.00
Graduate & above	46	30.67
<i>Family type</i>		
Nuclear	34	22.67
Joint	116	77.33
<i>Family size</i>		
Small (up to four members)	34	22.67
Medium (five to seven members)	71	47.33
Large (more than seven members)	45	30.00
<i>Occupation</i>		
Farming	125	83.33
Agricultural Labour	00	00.00
Shopkeeper	10	06.67
Service	10	06.67
Businessman	05	03.33
<i>Landholding</i>		
Marginal (< 2.5 acres)	18	12.00
Small (2.5-5 acres)	45	30.00
Medium (5.1-10 acres)	52	34.67
Large (more than 10 acres)	35	23.33
<i>Cropping pattern</i>		
Fallow land	00	00.00
Mono cropping	06	04.00
Double cropping	144	96.00
Multiple cropping	00	00.00
<i>Irrigation facilities</i>		
Canal	00	00.00
Tubewell/borewell/submersible	132	88.00
Both	18	12.00
On hiring basis	00	00.00
<i>Irrigation methods</i>		
Flood irrigation	150	100
Drip irrigation	00	00.00
Sprinkler	00	00.00
Mixed (Flood + Drip + sprinkler)	00	00.00
<i>Water conservation structures</i>		
Natural ponds	141	94.00
Small ponds near field/ dig ponds	09	06.00
Micro-dam reservoir/soil bunds	00	00.00
Rainwater harvesting in tanks	00	00.00
Percolation tanks	00	00.00
<i>Mass media exposure</i>		
Low	32	21.33
Medium	80	53.34
High	38	25.33
<i>Extension contacts</i>		
Low	08	05.33
Medium	121	80.67
High	21	14.00

Table 2. Distribution of respondents based on the awareness level of farmers towards management practices of water conservation (N=150)

Category	No.	%
Fully aware	53	35.33
Aware	40	26.67
Not aware	57	38.00

between agricultural experts and local communities. This holistic approach can facilitate the dissemination of water conservation practices, empowering farmers to make informed decisions that promote both productivity and environmental sustainability in Haryana's agriculture.

Item-wise analysis of the awareness level of farmers towards management practices of water conservation: Awareness is a function of an innovation-decision process, which has been defined as “The individual comes to know of something which is related to one’s own need or arouses the need.” At this stage, a person is aware of the basic idea but lacks the details regarding the idea. It is quite clear from the data placed in Table 3 that respondents had a high level of awareness about ‘laser levelling of fields helps in saving the irrigation water’ (2.69), ‘Zero tillage in paddy-wheat cropping rotation’ (2.52), ‘Well maintained water supply system’ (2.45), ‘DSR (direct seeded rice) technology’ (2.44). Similar results were also reported by *Aryal et al. (2015)* who concluded that laser land levelling helps in saving water and it helps in saving irrigation water and that respondents were in favour of anti-seepage channels respectively. It was observed from the data presented in Table 3 that respondents were less aware of ‘Smart mobile applications for scheduling irrigation’ (1.24), ‘Agro advisory based applications’ (1.25), and ‘Have you attended any workshop regarding water conservation resources?’ (1.38) and ‘Have you attended any training regarding water conservation resources?’ (1.38).

Suggestive measures to increase the adoption of water conservation practices : It was observed from the data presented in Table 4 that the most effective measure ‘MSP of the alternative crop should be more than paddy crop’ (436) as respondents agreed that they get a higher price of another suitable crop they are ready to shift from paddy to the other crop, and ‘proper implementation of govt schemes related to water conservation’ (432), and ‘field levelling may increase the efficiency of water’ as same reported by

Table 3. Item-wise analysis of the awareness level of farmers towards management practices of water conservation (N = 150)

Statements	Responses						Total score	WMS	Rank
	Fully aware		Aware		Not aware				
	No.	%	No.	%	No.	%			
Water harvesting practices	32	21.33	80	53.34	38	25.33	294	1.96	XIII
Use of water harvesting structures like check dams and ponds etc.	25	16.66	34	22.27	91	60.67	234	1.56	XX
Water saving irrigation technologies i.e drip and sprinkler irrigation	69	46.00	49	32.67	32	21.33	337	2.25	XI
Irrigation recommendations for crop cultivation	45	30.00	37	24.67	68	45.33	277	1.85	XV
Well maintained water supply system	84	56.00	49	32.67	17	11.33	367	2.45	III
Laser levelling of field helps in saving of water	117	78.00	20	13.33	13	8.67	404	2.69	I
Zero tillage in paddy-wheat crop rotation	104	69.34	20	13.33	26	17.33	378	2.52	II
DSR (direct seeded rice) technology	76	50.67	64	42.67	10	6.66	366	2.44	IV
Time of transplanting in paddy as per recommendation	85	56.67	37	24.67	28	18.66	357	2.38	VII
Critical irrigation stages of crops	40	26.67	33	22.00	77	51.33	263	1.75	XVII
Crop rotation/crop diversification	100	66.67	16	10.66	34	22.67	366	2.44	IV
Short duration varieties	87	58.00	26	17.33	37	24.67	350	2.33	IX
Existing crop replacing with less water consuming crop	95	63.34	20	13.33	35	23.33	360	2.4	VI
Control of weeds	86	57.33	30	20.00	34	22.67	352	2.35	VIII
Organic manures to increase water holding capacity of soil	57	38.00	78	52.00	15	10.00	342	2.28	X
Mulching to conserve moisture	56	37.33	26	17.33	68	45.34	288	1.92	XIV
Furrow irrigated raised bed (FIRB) in wheat	24	16.00	33	22.00	93	62.00	231	1.54	XXI
Artificial intelligence (AI) to control the irrigation	20	13.33	57	38.00	73	48.67	247	1.65	XIX
Smart mobile applications for scheduling irrigation	13	8.67	10	6.66	127	84.67	186	1.24	XXV
Agro advisory based applications	10	6.67	17	11.33	123	82.00	187	1.25	XXIV
Recycled water decreases the dependency of fresh water	21	14.00	84	56.00	45	30.00	276	1.84	XVI
Govt. policies for water conservation	20	13.33	66	44.00	64	42.67	256	1.71	XVIII
State policy "Mera Pani Meri Virasat" for farmers	51	34.00	50	33.33	49	32.67	302	2.01	XII
Have you attended any workshop regarding water conservation resources?	15	10.00	10.00	18.00	108	72.00	207	1.38	XXII
Have you attended any training regarding water conservation resources?	15	10.00	10.00	18.00	108	72.00	207	1.38	XXII

Table 4. Suggestive measure to increase the adoption of water conservation practices (N=150)

Statement	TS	WMS	Rank
MSP of the alternative crop should be more than paddy crop	436	2.91	I
Proper implementation of govt schemes related to water conservation	432	2.88	II
Field levelling may increase the efficiency of water	426	2.84	III
Regular maintenance of water channels	399	2.66	IV
Ring irrigation is more effective in plantation crops	389	2.59	V
Farmers should adopt and implement water conservation practices	380	2.53	VI
Award for adopting water conservation practices	371	2.47	VII
Use mobile based application for weather forecasting	365	2.43	VIII
Subsidy on water conservation practices should be increase	338	2.25	IX
Check runoff water in rainy days	326	2.17	X
Demonstration for water conservation technology should be conducted	322	2.15	XI
Farmer institutions organize regular training on water conservation	322	2.15	XI
Govt. should conduct training/workshop/awareness campaign for water conservation	320	2.13	XIII
Improve water retention capacity by using organic manure	317	2.11	XIV
More tree plantation on field boundary	314	2.09	XV
Use of DSR (direct seeded rice) technology	306	2.04	XVI
Use deep ploughing to conserve the water	303	2.02	XVII
Build new water storage structure e.g., dam, reservoirs, and tanks etc.	279	1.86	XX
Diversification in cropping pattern	277	1.85	XXI
Use of mulch to conserve moisture	276	1.84	XXII
Drip irrigation is best alternative of flood irrigation	275	1.83	XXIII
Initiative to adopt water conservation technologies	256	1.71	XXV
Use wastewater for irrigation purpose	250	1.67	XXVI
Farmers should use water harvesting practices like small pond etc.	243	1.62	XXVII
Use of FIRB (furrow irrigated raised bed) technology	232	1.55	XXIX
Motivate farmers to adopt water conservation technologies	226	1.51	XXX

Aryal *et al.* (2015) that field levelling in helps in a significant reduction of water use in paddy crop, and 'regular maintenance of water channels' (399) regular maintenance helps in saving irrigation water.

Relationship of socio-personal characteristics with the awareness level of farmers towards management practices of water conservation.

The correlation coefficient was computed to indicate the nature and extent of association and variation caused by these independent variables on the awareness level of farmers towards management practices of **water conservation (Table 5)**. It can also be seen from Table 5 that among the various variables like education, land holding, mass media exposure, and extension contact with the awareness had a positive and significant correlation. The results were fully supported by *Lalthamawii et al. (2022)*, *Ankit et al. (2021)*, and *Kumar et al. (2021)* who concluded that education, operational land holdings, and extension contacts were found to have a highly significant relationship with the awareness of respondents regarding the management practices of water conservation Coefficient of correlation showed age, family type, family size, occupation, cropping pattern, irrigation facilities, irrigation methods, water conservation structures were not found significantly correlated with the awareness of respondents towards management practices for water conservation. The higher the educational qualifications, the more the chance to access the information of management practices in their field and thus, to check the losses that occurred. Higher operational land holding means that the respondents had the dispensable income

Table 5. Relationship of socio-personal characteristics with the awareness of respondents towards management practices for water conservation.

Variables	(r)
Age	-0.155 ^{NS}
Education	0.210*
Family type	0.065 ^{NS}
Family size	-0.065 ^{NS}
Occupation	0.091 ^{NS}
Land holding	0.209*
Cropping pattern	-0.009 ^{NS}
Irrigation facilities	-0.099 ^{NS}
Water conservation structures	0.097 ^{NS}
Mass media exposure	0.362*
Extension contacts	0.268*

$R^2 = 0.229$, *Significant at 0.01% level, NS – not significant

to manage their land through novel techniques like laser land leveller, protected cultivation, mulching and drip irrigation etc. Furthermore, higher extension contacts and mass media exposure means a higher number of valid and necessary information regarding management practices of water conservation. By recognizing these relationships, policymakers and organizations can tailor awareness campaigns to specific demographics, bridging knowledge gaps and fostering more effective water management practices among farmers in Haryana. Further, it is revealed that all the 12 independent variables included in the study jointly contributed 22.90 per cent variation in the awareness level of farmers towards water conservation practices when other factors were kept constant. This means that only 22.90 per cent of the variation in the dependent variable was due to these variables and the remaining 77.10 per cent of variations were due to other variables.

CONCLUSION

Conserving water is essential to ensure the sustainability of mankind and agriculture and there are many ways to increase awareness about the management practices of water conservation. It is only effective when it is done in a coordinated manner by all the elements of society. Educate people about the importance of water conservation, use social media platforms to create awareness about water conservation, collaborate with state agricultural universities, and organize community events, such as water conservation workshops, awareness campaigns, and competitions, to engage people and encourage them to take action etc. are the effective measure to increase the awareness. The study shows that the majority of the respondents were aware of the management practices of water conservation. It was revealed that education, total land holding, mass media exposure, and extension contacts of the farmers had a significant relationship with the awareness of the farmers. It is recommended that the extension agencies functional in Haryana like Krishi Vigyan Kendras (KVKs), Agricultural Officers of the State Department of Agriculture & Farmers' Welfare, and Non-Government Organisations (NGOs) should try to contact more and more large farmers who are educated and willing to share their knowledge about water conservation practices with the small and marginal farmers by means of Farmer-to-Farmer extension. State Department of Agriculture & Farmers'

Welfare and all other Extension personnel should conduct extension activities at regular intervals and take responsibility to increase the level of awareness of people where it is still low and provide new information regarding better agriculture practices.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

Ankit; Kaur, R.; Mohapatra, L. and Rathore, S. (2021). Factors determine awareness of management practices of over-exploitation of groundwater among farmers of Punjab, India. *Indian J. Ext. Edu.*, **57**(3): 67-71.

Anonymous (2021). Retrieved from <https://www.news18.com/news/india/>

Anseera, T. P., and Alex, J. P. (2019). Awareness of climate resilient technologies and their adoption by farmers of Palakkad and Wayanad districts of Kerala State.

Indian Res. J. Ext. Edu., **19** (1): 7-12.

Aryal, J.P., Mehrotra, M.B., Jat, M.L., and Sidhu, H.S. (2015). Impacts of laser land levelling in rice-wheat systems of the north-western Indo-Gangetic plains of India. *Food Security*, **7**(3): 725-738.

Government of India (GOI) (2020). Retrieved from <https://pib.gov.in/PressReleasePage.aspx?PRID>

Kumar, P., Mukteshwar, R., Rani, S., Malik, J. S., and Kumar, N. (2021). Awareness and constraints regarding water conservation practices in Haryana (India). *Indian J. Ext. Edu.*, **57**(3): 48-52.

Lalthamawii, Patra, N. K., and Sailo, Z. (2022). Knowledge and Adoption Status of Recommended Practices of Rice by Farmers in Mizoram, India. *Indian Res. J. Ext. Edu.*, **22**(3): 91-98.

Sharma, P., Kaur, L., Mittal, R., Kaur, S., and Kaur S., (2017). A study of farm women's awareness for climate variability and its effect on water resources in Punjab. *British J. Applied Sci. and Tech.*, **21**(5): 1-9.

