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Awareness and Constraints Regarding Water Conservation Practices in Haryana (India)

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ABSTRACT

Water and soil are the most important inputs essential for crops. Both shortage and excess of water affects the growth and development of the plants, yields and quality of produce. There are numerous methods to reduce such losses and to improve soil moisture like mulching, cropping pattern, planting of trees and water harvesting etc. The study was carried out in two agro-climatic zone *i.e.* north-eastern zone and south-western zone of Haryana state. A total 240 farmers were interviewed with well-structured interview schedule for awareness and constraints regarding water conservation practices. The findings revealed that farmers' had high awareness about 'canal water is best for crops', 'nearness of soil and water testing laboratory' and 'water harvesting reduce soil erosion'. The major constraints reported by farmers were 'Lack of soil and water testing facilities and delay in reports' and 'Deterioration of water quality in indigenous water harvesting structure'.

INTRODUCTION

India has a large network of river systems of which the most prominent are the Himalayan river systems of the country. According to central water commission (2014), in majority of river basins, utilization is significantly high and is in the range of 50–95 per cent of utilizable surface resources except the rivers such as Narmada and Mahanadi where the utilization is quite low. It is concerning that only about 145 Mha of the total 329 Mha geographical areas are under cultivation, and there is no way to get more land under cultivation (Manivannan et al., 2017). Increased population has an effect on almost every aspect of growth, including agriculture, industry development, and urbanization, all of which rely heavily on water supplies, resulting in ever-increasing water demands. Water demand is projected to increase from 40 billion cubic meters (bcm) today to about 220 bcm in 2025 (Kumari et al., 2016). A huge amount of irrigation water goes to waste and causing water logging salinity problems in agricultural land (Ahmad et al., 2011).

According to the FAO, global water withdrawal grew from less than 600 km^3 per year in 1900 to nearly 4000 km^3 per year in 2010. Furthermore, it is estimated that by 2025, it will have increased to 5100 km^3, representing an increase of 8.4-12.2 per cent over the current withdrawal rate. The water consumption for agriculture will be around 70 per cent, industry around 20 per cent and residential and commercial around 10 per cent. Due to the effects of climate change and uncertain rainfall the use of water in agriculture will increase by the expansion of irrigated land. Agriculture is often regarded as a foundation for growth (Mucavele, 2013). As a result of the problems that have arisen in agricultural communities, the adoption and dissemination of certain sustainable agricultural practices has become a key issue on the development policy agenda, especially as a means of solving the problems (Ajayi, 2007). In developing countries' rural areas, adoption of some of these sustainable agricultural practices is still limited (Kassie et al., 2009; Wollni et al., 2010). About 51 per cent farmers were under medium level category about different water conservation technologies (Oraon et al., 2020). Agriculture development is dependent on the

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development of appropriate technologies, which are determined by a suitable technology management system comprised of four major institutions, including education, research, extension, and the end user, *i.e.* the farmer (Prasad and Singh, 2004).

Owing to inadequate management and maintenance by farmers, 25 to 30 per cent of water is lost only in watercourses. As a result, significant efforts are needed to maximise the country's water resource capacity and tackle drought and flooding. Soil and water resource management requires a holistic approach that connects socioeconomic development initiatives with environmental protection.

METHODOLOGY

The research was carried out in the north-eastern and south-western agro-climatic zones of India's Haryana province. Kurukshetra and Karnal in the North-Eastern zone, and Bhiwani and Rewari in the South-Western zone, were chosen as the districts with the most nutrient deficient soil. A multi stage stratified random sampling technique was followed to collect data. Two blocks Thanesar and Babain from Kurukshetra; Karnal and Indri from Karnal; Siwani and Kairu from Bhiwani; and Khol and Bawal from Rewari were selected purposively having highest nutrient deficiency. Thirty respondents were selected randomly from each block to make 60 respondents from each district. Thus, a total of 240 farmers were interviewed for this study.

To validate the theoretical models and ideas, primary data can be gathered in three different ways: survey methods, observational procedures and by conducting experiments. In present study, the data was collected with a well-structured interview schedule. The responses were taken on three-point continuum scale in case of Awareness (fully aware, aware and not aware) and constraints (Not so serious, serious, very serious). Frequency, percentage, means, weighted mean, rank order, correlation coefficient, and regression coefficients were calculated for the analysis and interpretation of data.

RESULTS AND DISCUSSION

It is evident from the data presented in Table 1 that respondents had high awareness about 'Canal water is best for crops' was ranked 1st position with weighted mean score (WMS) 3.00, followed by 'irrigation with both underground and canal water together is good alternate in problematic soil' with WMS 2.07. Whereas, awareness about 'the water table depth' and 'water table is declining progressively' was with WMS 2.00, followed by 'irrigation scheduling', 'the well water is problematic water', 'use of sewerage water (heavy metal) for irrigation is injurious to crop', 'best irrigation method for your field', 'the quality of your water' and 'that flood irrigation method have comparatively lowest water productivity' with WMS 1.94, 1.84, 1.76, 1.39, 1.22 and 1.00, respectively followed. The result of the study also emphasized by Kazmi et al., (2012); Ashraf et al., (2017) and Wahaj & Asghar (2002).

It is evident from the data presented in Table 2 that respondents had high awareness about 'nearest soil and water testing laboratory' with weighted mean score (WMS) 2.58, followed by 'collection of soil and water sample' and 'able to understand the soil and water test report' with WMS 2.16 and 2.03, respectively. Awareness level was low in case of 'soil testing advice dose of fertilizers' and 'time gap for soil and water testing' with WMS 1.79 and 1.73, respectively. Farmers' awareness of soil and water testing was strong, likely as a result of the government's active involvement through the launch of various schemes such as the Soil Health Card, which allows farmers to get their soil and water samples checked at a low cost and in a short amount of time (Patel, 2013). Farmers, on the other hand, had the least knowledge of the time difference for soil and water testing due to the infrequent visits of experts to their fields/farms (Niranjan et al., 2018). Farmers have adopted soil testing as a method in agricultural management practices, with guidelines centered on soil fertility status analysis that help farmers improve fertiliser use efficiency and increase agricultural production and productivity. Awareness level was high about timely irrigation enhance crop yield, followed by critical stage of crops for irrigation. The results of the study were supported by Sims et al., (2000).

From the data presented in Table 3 it is apparent that awareness level about 'timely irrigation enhance crop yield' was

Table 2. Farmers' awareness regarding soil and water testing

S.No.	Items	Weighted Mean Score	Rank Order
1	Are you aware about collection of soil and water samples	2.16	II
2	Time gap for soil and water testing	1.73	V
3	Soil testing advise dose of fertilizers	1.79	IV
4	Nearest soil and water testing laboratory	2.58	I
5	Do you able to understand the soil and water test report	2.03	III

Table 1. Farmers' awareness regarding irrigation water

S.No.	Items	Weighted Mean Score	Rank Order
1.	Do you know about the quality of your water?	1.22	VIII
2.	Do you aware that Canal water is best for crops?	3.00	I
3.	Do you know the well water is problematic water?	1.84	V
4.	Do you know irrigation with both underground and canal water together is good alternate in problematic soil?	2.07	II
5.	Do you know about the water table depth?	2.00	III
6.	Do you know about irrigation scheduling?	1.94	IV
7.	Do you know that water table is declining progressively?	2.00	III
8.	Do you know that best irrigation method for your field?	1.39	VII
9.	Do you know that flood irrigation method have comparatively lowest water productivity?	1.00	IX
10.	Do you know use of sewerage water (heavy metal) for irrigation is injurious to crop?	1.76	VI

Table 3. Farmers' awareness towards irrigation

S.No.	Statements	Weighted Mean Score	Rank Order
1	Sprinkler and drip irrigation methods	2.15	III
2	Critical stage of crops for irrigation	2.20	II
3	Efficient methods of irrigation	1.96	V
4	Timely irrigation enhance crop yield	2.55	I
5	Aware about fertigation	1.45	VII
6	Various schemes offered by government	1.51	VI
7	Do you aware about laser land leveler	2.08	IV

high with weighted mean score (WMS) 2.55, followed by 'critical stage of crops for irrigation' with WMS 2.20. 'Sprinkler and drip irrigation', 'aware about laser land leveler' and 'efficient methods of irrigation' with WMSs 2.15, 2.08 and 1.96, respectively followed. On the other hand, farmers had low awareness about 'various schemes offered by government' and 'aware about fertigation' with WMSs 1.51 and 1.45, respectively. The research findings got support from the study of Manvar et al., (2003); Shakya et al., (2008) & Tiewtoy et al., (2011).

From the data presented in Table 4 it is clearly evident that awareness level among farmers about 'reduce soil erosion' was highest ranked 1st position with weighted mean score (WMS) 2.30, followed by 'harvested water can be use for irrigation and drinking', 'benefits of water harvesting' and 'helps to recharge the ground water table' and ranked 2nd, 3rd and 4th positions with WMSs 1.83, 1.77 and 1.76, respectively. Moreover, awareness about 'improve quality of ground water' and 'different type of water harvesting' was low ranked 5th and 6th positions with WMSs 1.72 and 1.28. The level of knowledge about various types of water harvesting was found to be poor. Farmers' lack of awareness may be due to a lack of public awareness campaigns encouraging them to use effective rainwater harvesting practices. Farmers should be inspired and encouraged to use better water management methods by holding demonstrations or organising field visits to farmers who are already using them Rohilla (2018) supported the findings. The research finding were opposed by the research finding of Sangeetha (2012) who concluded that awareness about rain water harvesting was high among the students of higher secondary schools.

Table 4. Farmers' awareness towards water harvesting

S.No.	Statements	Weighted Mean Score	Rank Order
1	Different type of water harvesting	1.28	VI
2	Benefits of water harvesting	1.77	III
3	Harvested water can be used for irrigation and drinking	1.83	II
4	Helps to recharge the ground water table	1.76	IV
5	Improve quality of ground water	1.72	V
6	It reduces soil erosion	2.30	I

The data presented in Table 5 shows that the major constraints reported by farmers were 'Lack of soil and water testing facilities' and 'Delaying of reports on time' ranked 1st position jointly with WMS 2.47 followed by 'Lack of knowledge about soil and water sampling methods', 'Lack of awareness about importance of soil and water testing' and 'Extension personal did not take action for soil and water testing' ranked 2nd, 3rd and 4th positions with WMSs 2.39, 2.09 and 1.88, respectively. These findings are closely collaborated with Patel (2013).

The data presented in Table 5 indicates that the major constraints reported by respondents were 'Deteriorate of water quality in Indigenous Water Harvesting Structure', 'More water loss in IWHS due to evaporation' and 'Heavy initial investment for the construction of tankas' ranked 1st, 2nd and 3rd positions with WMSs 2.65 2.63 & 2.55, respectively followed by 'Maintenance cost of tankas is high 'and 'Maintenance requires technical skill hence it is

Table 5. Constraints faced by Farmers

S.No.	Statements	Weighted Mean Score	Rank Order
About soil and water testing			
1	Lack of soil and water testing facilities	2.47	I
2	Extension personal did not take action for soil and water testing	1.88	IV
3	Lack of knowledge about soil and water sampling methods	2.39	II
4	Lack of awareness about importance of soil and water testing	2.09	III
5	Delaying of reports on time	2.47	I
Related to water harvesting			
1	Heavy initial investment for the construction of tankas	2.55	III
2	Difficulties of getting loan	1.67	XII
3	Maintenance cost of tankas is high	2.46	IV
4	Maintenance requires technical skill hence it is difficult	2.46	IV
5	Lack of experience among local artisans for construction of the tankas	2.28	VII
6	Difficulty in making large catchment area for the tankas	1.87	IX
7	Unavailability of technical guidance at the time of construction of Tankas	2.36	V
8	No facility for transport of raw material in remote area	1.98	VIII
9	Deteriorate of water quality in Indigenous Water Harvesting Structure	2.65	I
10	Lack of cooperation among community in this system of IWHP	2.28	VII
11	Negative approaches of the local leaders regarding IWHP	1.98	VIII
12	Lack of awareness and motivation of the respondents	2.38	V
13	More water loss in IWHS due to evaporation	2.63	II
14	Inadequate rainfall in the rainy season	2.36	VI
15	Availability of coarse texture soil results in high water leaching	2.36	VI
16	Lack of training and visit programme for benefits of improved Tanka technology/ IWHP	1.80	X
17	Apathy towards govt. programmes	1.78	XI

Table 6. Correlation and regression coefficients of farmers' personality traits with constraints

S.No.	Variables	Correlation Coefficient	Regression Coefficient	't' values
1	Age	0.189**	0.435	1.655NS
2	Education	-0.283**	-6.807	-4.140*
3	Caste	0.033NS	1.404	0.529NS
4	SES	-0.030NS	-0.036	-0.107NS
5	Land Holding	-0.022NS	0.208	0.103NS
6	Farm Inputs	0.074NS	2.256	1.167NS
7	Farm Equipments	0.052NS	1.397	0.876NS
8	Irrigation	-0.010NS	-1.888	-0.349NS
9	Cropping system	0.036NS	5.523	0.797NS
10	Crop rotation	-0.050NS	-3.333	-1.506NS
11	Agro-chemicals	0.063NS	4.133	0.834NS
12	SHC	0.017NS	0.653	0.292NS
13	MME	-0.134*	-3.142	-2.829*
14	Extension Contacts	-0.002NS	-0.373	-0.854NS

*Dependent variable-constraints, *Significant at 0.05 levels, R^2=0.1480*

difficult 'ranked 4th position jointly with WMS 2.46. 'Difficulty in making large catchment area for the tankas' and 'Lack of training and visit programme for benefits of improved Tanka technology/ IWHP' were ranked 9th and 10th positions, respectively. While, 'Apathy towards govt. programmes' and 'Difficulties of getting loan' were not so serious constraints reported by respondents ranked 11th and 12th positionswith WMSs 1.78 and 1.67, respectively. The findings showed that 'Lack of soil and water testing facilities' and 'Delaying of reports on time' were most serious constraints faced by the farmers. Therefore, it is suggested from the finding that there is need to improve the soil and water facilities via. Establishing the laboratories at taluka level and delivering the reports on short time span to overcome the constraints related to soil and water testing. 'Deteriorate of water quality in Indigenous Water Harvesting Structure' and 'more water loss in IWHS due to evaporation' were found very serious constraints. The findings are in line with Gupta & Rao (2019); Pannu (2014) and Sharma & Sisodia (2006).

Table 6 shows that correlation coefficient between the different personality traits like age, education and mass media exposure with the constraints had significant correlation at 0.05 level of probability. However, remaining traits namely, caste, SES, land holding, farm inputs, farm equipments, irrigation, crop rotation, cropping pattern, agro-chemicals and SHC did not show any significant association with the constraints in adoption of water conservation practices. While in case of the partial regression coefficient, the farmers' education and MME were found significant, whereas, age, caste, SES, land holding, farm inputs, farm equipments, irrigation, SHC, cropping system, crop rotation, agro-chemicals and extension contacts did not significantly contribute to the constraints in adoption of soil health management practices. It was further reveals that all independent variables jointly contributed 14.00 per cent variation in the constraint faced by the respondents regarding different soil and water conservation practices when other factors were remain constant. This implies that only 14.00 per cent of the variation in the dependent variable was due to independent variables included in the study and remaining 86.00 per cent variations is due to other variables.

CONCLUSION

Nowadays, it is not only necessary to increase water availability, but also to improve water efficiency by employing alternative techniques such as multiple water usage, proper soil and crop management, low-cost micro irrigation, drip irrigation, integrated farming systems, and so on. The first and most critical factor that can alleviate soil depletion problems is knowledge and implementation of appropriate water and soil management practices, as well as cultivating crops based on land suitability. The best way to increase rural farmers' water productivity and livelihood protection is to use integrated rain water harvesting from farm lands and then put it to multiple uses in their fields. Real farmers' participation is needed in the planning and implementation of conservation practices in order to increase their willingness to follow these practices.

REFERENCES

Ahmad, H., Bokhari, J.I. & Siddiqui Q.T.M. (2011). Flashflood risk assessment in Pakistan. Pakistan Engineering Congress. *71st Annual Session Proceedings*, *707*, 696-708.

Ajayi, O.C. (2007). User acceptability of sustainable soil fertility technologies: Lessons from farmers' knowledge, attitude and practice in Southern Africa. *Journal of Sustainable Agriculture*, *30*(3), 21–40.

Ashraf, I., Muneer, B., Muhammad, S. & Rehman, F. (2013). Farmers' awareness and application of improved water management practices. *International Journal of Advanced Research in Management and Social Sciences*, *2*(2), 20-27.

CGWB (Central Ground Water Board) (2002). Master Plan for Artificial Recharge to Ground Water in India, Ministry of water resources, Government of India, New Delhi.

CWC (Central Water Commission) (2014). Annual report 2013-14. Ministry of water Resources New Delhi.

Kassie, M., Zikhali, P., Manjur, K. & Edwards, S. (2009). Adoption of sustainable agriculture practices: Evidence from a semi arid region of Ethiopia. *Paper presented at the Natural Resources Forum*. doi: 10.1111/j.1477–8947.2009.01224.x.

Kazmi, S.I., Ertsen, M.W. & Rafique Asi, M. (2012). The impact of conjunctive use of canal and tube well water in Lagar irrigated area, Pakistan. Physics and Chemistry of the Earth, Parts A/B/ C.86-98.

Kumari, M. & Singh, J. (2017). Water conservation: strategies and solutions. *International Journal of Advanced Research and Review*, *1*(4), 75-79.

Manivannan, S., Thilagam, V.K. & Khola, O.P.S. (2017). Soil and water conservation in India: Strategies and research challenges. *Journal of Soil and Water Conservation*, *16*(4), 312-319.

Manvar, V.S., Wakle, P.K., Raul, U.S. & Shinde, G.B. (2003). A study on knowledge and adoption of recommended package of practices of mango by farmers in Marathwara region. *Journal of Soils and Crops*, *13*(2), 282-285.

Mucavele, F.G. (2013). True contribution of agriculture to economic growth and poverty reduction. A synthesis report. Malawi Mozambique and Zambia.

NCA (1976). Report of the National Commission on Agriculture. National Commission of Agriculture, Government of India, New Delhi.

Niranjan, H.K., Chouhan, R.S., Sharma H.O. & Rathi, D. (2018). Awareness and performance of soil health card scheme in central India. *Journal of Crop and Weed*, *14*(1), 99-103.

Oraon, D., Kumar, A., Singh, R.K., Singh, U.K. & Alam, Z. (2020). Adoption Level of Soil and Water Conservation Technology under NICRA in Chatra District in Jharkhand. *Indian Journal of Extension Education*, *56*(2), 35-38.

Pannu, H.R., Lakhera, J.P., Yadav, J.P. & Jeengar, K.C. (2014). Constraints Perceived in Adoption of Indigenous Water Harvesting Practices. *Indian Research Journal of Extension Education*, *14*(2), 120-122.

Patel, N.G. (2013). Attitude of the farmers towards soil health card programme. M.Sc. thesis, B.A. College of Agriculture, Anand Agricultural University.

Prasad, C. & Singh, S.P. (2004). Research-Education-Extension-Clientele Linkages for Accelerating Farm Productivity and Agribusiness. *Indian Journal of Extension Education*, 40(3&4).

Rohilla, A.K., Shehrawat, P.S., Kumar, A. & Malik, J.S. (2018). Awareness level of smart agricultural practices in Haryana state. *Indian Journal of Agricultural Sciences*, *88*(12), 1920–25.

Sangeetha, S. (2012). Awareness towards rainwater harvesting among the students of higher secondary schools in perambalur district. Tamilnadu Teachers Education University. Master of Education Thesis.

Shakya, M.S., Patel, M.M. & Singh, V.B. (2008). Knowledge level of chickpea growers about chickpea production technology. *Indian Research Journal of Extension Education*, *8*(2/3), 65-68.

Sharma, C. & Sisodia, S.S. (2006). Constraints in adoption of watershed development technologies in Rajsamand district of Rajasthan. *Rajasthan Journal of Extension Education, 14*, 97-98.

Sims, J.T., Edwards, A.C., Schoumans, O.F. & Simard, R.R. (2000). Integrating soil phosphorus testing into environmentally based agricultural management practices. *Journal of Environmental Quality*, *29*(1), 60-71.

Tiewtoy, S., Clemente, R.S., Perret, S.R., Babel, M.S. & Weesakul, S. (2011). Irrigation sustainability assessment of selected projects in Tha Chin Basin, Thailand. *Irrigation and Drainage*, *60*(3), 296-307.

Wollni, M., Lee, D.R., & Thies, J.E. (2010). Conservation agriculture, organic marketing, and collective action in the Honduran hill sides. *Agricultural Economics*, *41*(3–4), 373–384.