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Training assessment on land and water management technologies under watershed project at Chakwal, Punjab-Pakistan

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Abstract

The present study evaluated the impact of training on professional knowledge about the water saving technologies. In this regard, a three day professional training was organized on "Land and Water Management Technologies" under the project titled "Watershed Rehabilitation and Irrigation Technology Improvements". The training was held in district Chakwal of Punjab, Pakistan from 2nd to 4th February, 2015. This training event was arranged by Barani Agricultural Research Institute (BARI) and Soil and Water Conservation Research Institute (SAWCRI) with financial support of "International Center for Agricultural Research in the Dry Areas (ICARDA) and United States Department of Agriculture (USDA). The core purpose of this professional training was to build up the respondents' insight with proficiency in water saving techniques to enhance further dissemination and adoption of the specific technologies in other districts of the country. Overall, twenty respondents from different government and non- government organizations attended this professional training. The obtained results showed that the training had positive impact on respondents' knowledge regarding water saving technologies. The results of t-test were statistically highly significant among all the knowledge categories. The t-values and p-values were 8.8, 5.36, 9.69, 13.43 and 0.000, 0.001, 0.000, 0.000 respectively. Similarly, the training respondents were satisfied from the presenters' skills, comprehensive lectures delivered in training session and overall training activities. Majority of the respondents reported that after training, they are capable to adopt these water saving technologies as well as disseminate to others. They appreciated and suggested such kind of training events in future and consider such activities really useful in disseminations and adoption of the water saving techniques.

Keywords: Awareness, professionals, water saving, technologies, dissemination.

Introduction

Soils are poor because of latest development as well as climatic conditions do not favor high natural plant biomass production. Therefore, levels of soil organic matter are low due to intensive management of soil through agricultural practices during the past thousand years provoked these circumstances. Soil erosion is an important problem and salinity and alkalinity are also common in many areas of the country. Shallow soils are typical and their water-holding capabilities are not enough to sustain productivity of agriculture[1].

Pakistan has several water resources, but the deficiency of foods still exist with low income and low human growth index. For sustainable agriculture, the adoption of latest and efficient technologies is essential for increasing water productivity of crops. At present, poverty can be reduced through improved agricultural productivity and profitability to some extent[2].

The increasing demand of water and gradual water deficiency has exaggerated each continent of the world. Fresh water availability was inadequate everywhere and therefore 700 million people of the world were under severe water stress[3]. Furthermore, poor quality of water also caused decline in yield[4]. Conventional flooding efficiency is approximately 30% whereas due to drip irrigation 70 to 80% of water can be saved[5]. In Asia, irrigation farming comprised of seventy percent of the world's irrigated area[6]. Agriculture is the back bone of most of the countries in the world and that's why its role is significant in security of food and economic development. It sustains the chief source of livelihood for 75% of the earth's poor[7]. The competition for fresh water due to urbanization development, industry and agriculture caused the decline of fresh water for irrigation on earth[8]. Watercourses lining is the most excellent alternate for sustainable water savings against clean-up and earthen upgrading[9]. The adaptation of latest water saving intervention positively affects the livelihood of farmers. Some positive changes are; rise in income, more usage of fruits, preferred child health care, expansion in cattle, more amusement for children etc[10]. In Pakistan, the gap between water demand and supply is rising quickly and watercourses are under great stress. There is prevailing huge potential for the construction of massive and mini dams. Suitable technologies can be adopted as an alternative for conserving water and using modern water techniques such as rainwater[11]. Although, having such a recognized irrigation system in the country, afterward it does not meet up the agricultural requirements. Pakistan has nearly exceeded the water stressed level and will shortly turn into a

water scarce country. It's now graded among the worst performers in Asian Nations[12]. Restricted supply of water with rising water shortage is the primary and big dilemma of Pakistan. The culturable waste is by now 48.6% and the country population has climbed from 32.4 million in the year 1948 to 168 million in the year 2010. The predicted population of Pakistan for the year 2025 would be 221 million[13].

In short, appropriate water management amplifies the water use proficiency and subsequently the grain produce. There are many efficient irrigation techniques that used in orchards and vegetables gardens like basin, flood, furrow, sprinkler and drip irrigation system. Irrigation through modern management practices is feasible for sustainable agriculture. There is need of more consideration on the improvement of irrigation efficiency and water application practice. To make efficient water handling, the plants need a specific amount of water and that should be applied appropriately with minimum losses. The current study was outlined to evaluate the training program through getting the professional feedback. The responses included both pre and post observations of the practical demonstrations at the project site and to contribute possible advices for the advancement and betterment of such positive events.

Methodology

The present training on water saving technologies was conducted by BARI and SAWCRI with collaboration of ICARDA and USDA. This event was held under the project titled "Watershed Rehabilitation and Irrigation Technology Improvements" in district Chakwal of Punjab-Pakistan. A total of twenty professionals participated and they all were treated as respondents for the current study. To achieve the objectives, pre and post-training questionnaires were designed and developed and distributed among the training professionals accordingly. The methodology and training course contents was assessed by ranking the level of convinced/not convinced of different statements from 1 to 4. These statements are rated on the following 4-point scale (Not Convinced=1, Somewhat Convinced =2, Convinced =3, Strongly Convinced =4).

To examine the pre and post-training observations of respondents, a paired t-test was applied. Paired samples t-tests typically consist of a sample of matched pairs of similar units or two different samples from the same individual. The two competing hypotheses are null hypothesis and alternative hypothesis. The null hypothesis visualizes that true mean difference between the paired samples is zero and alternative hypothesis visualizes that true mean difference between the paired samples is not equal to zero.

The mathematical symbol of the null and alternative hypothesis is outlined underneath: i. The null and alternative hypothesis is $H_0 : d = 0$, $H_1 : d \neq 0$, where d = difference between means, H_0 = no difference, H_1 = difference. ii. $\alpha = 0.05$, iii. The paired t test presumes that variations between pairs are normally distributed. The pairs are one person's pre-test and post-test scores and degrees of freedom used in this test is n–1, where "n" represents the number of pairs.

Paired t-test: This test is used when the samples are dependent; that is, when there is only one sample that has been tested twice (repeated measures) or when there are two samples that have been matched or "paired" (before and after comparison-same groups).

$$t = \frac{\bar{d}}{S_d / \sqrt{n}}$$

$$\bar{d} = \sum \frac{di}{n} \quad \text{and} \quad s_d = \sqrt{\frac{\sum (di - \bar{d})^2}{n-1}}$$

Where: $\bar{d}$ = sample mean difference, s_d = standard deviation of sample differences, n = sample size (number of sample differences), n-1 = degrees of freedom for the t test statistic.

Results and discussion

The socio-economic characteristics of training respondents, pre and post-training findings about instructors' capability and their lectures effectiveness delivered in training, respondents' observations about overall training course and pre and post-knowledge status of the training respondents are outlined here.

Socioeconomic status of the training respondents: The data regarding key features expressed that age, education and professional experience of respondents play a significant role in the selection of new technologies as well as improved their skills and attitude that helps them to learn and accept new ideas and take right decision at right time. The findings in Table-1 indicated that majority of respondents (55%) were from the age group of (41-50) years. Similarly, a significant number of respondents (45%) had bachelor level education; followed by master and intermediate level education respectively. While majority of training respondents (45%) had 11-15 years of professional experience while (55%) of training respondents were performing duties in office, 35% were engaged in field work through direct link with the farmers while only 10% were involved in both office and field work.

Respondent's Observations about Instructors: Table-2 presented the respondents observations about the training instructors. The results showed that most of training respondents (80%) were strongly convinced and (20%) were merely convinced about the question that "Did the instructors conveyed the information visibly"; followed by query that "Did the instructors presenting their subjects effectively", 65% were strongly convinced, 30% were merely convinced and 5% were somewhat convinced, and the query that "Did the instructors

have sufficient knowledge of the subject matter", 45% were strongly convinced and 55% were merely convinced. Similarly the question that "Did the instructors responded well of respondents questions", 60% were strongly convinced and 40% were merely convinced; followed by the question that "Did the instructors retain the respondents attention during lectures", 55% were strongly convinced, 35% were merely convinced and 10% were somewhat convinced. Overall, the training results showed that resource persons were knowledgeable and have good command on their subject matters and proficiently and positively conveyed the information of the subjects.

Table-1: Socio-economic characteristics of the training respondents.

Characteristics	Description	% (f)
Age (years)	31-40	35 (07)
	41-50	55 (11)
	51 and above	10 (02)
Education Level	Intermediate	20 (04)
	Bachelor	45 (09)
	Master	35 (07)
Professional Experience (years)	5-10	40 (08)
	11-15	45 (09)
	16 and above	15 (03)
Nature of Duty and Work	Office work	55 (11)
	Field work	35 (07)
	Both	10 (02)

Respondent's Observations about Training: Appropriate training and education are essential to make creative and ideal farmers to perform with the professional objectives. Table-3 showed that majority of respondents (80%) convinced and (20%) were merely convinced about the training relevancy; followed by the question that "How were the training arrangements", 45% were strongly convinced and 50% were merely convinced while 5% were somewhat convinced, and the query that "Did the training course met your intentions", 35% were strongly convinced and 60% were merely convinced while 5% were somewhat convinced. Similarly the question that "Did the supporting material were helpful", 70% were strongly convinced and 30% were merely convinced; followed by the question that "Was the training timing and period suitable", 30% were strongly convinced and 70% were merely convinced. The query that "Did you improve the awareness of subjects", 60% were strongly convinced and 40% were merely convinced, and the question that "Did the skills learnt in training assist you in your job", 35% were strongly convinced and 55% were merely convinced while 10% were somewhat convinced and the question that "Did the training enhanced your potential capability", 35% were strongly convinced and 50% were merely convinced while 15% were somewhat convinced respectively.

Respondents Observations regarding Water Saving Technologies: Table-4 presented the pre and post-training knowledge of respondents of water saving technologies. The findings showed the clear difference in knowledge levels of the respondents. As pre-training, majority of respondents have no knowledge and majority of respondents were evenly not heard about the specific technologies while after training, they improved their knowledge substantially and the majority were convinced from the training activities and the knowledge shared by the resource persons during training.

In general, the average belief remarks about the water saving techniques before training were (nil=47.2%, low=40%, moderate=10.5% and high= 2%) while after training the average belief remarks were (nil=0%, low=10.5%, moderate=55.5% and high= 33.8%).

Nil = Know nothing, Low = Know very little about this technology, Moderate = Know about this technology but there are more things to learn, High = Have a good knowledge but there are things to learn.

Table-2: Findings of Training Respondents regarding Instructors.

About Instructors	Respondents (N=20)			
How much convinced are you with	Not Convinced (%)	Somewhat Convinced (%)	Convinced (%)	Strongly Convinced (%)
Did the instructors conveyed the information visibly	0	0	20	80
Did the instructors presenting their subjects effectively	0	5	30	65
Did the instructors have sufficient knowledge of the subject	0	0	55	45
Did the instructors responded well of respondents questions	0	0	40	60
Did the instructors retain the respondents attention	0	10	35	55

Table-3: Respondent's observations about training.

About Training	Respondents (N=20)			
How much convinced are you with:	Not Convinced (%age)	Somewhat Convinced (%age)	Convinced (%age)	Strongly Convinced (%age)
How appropriate was the training course	0	0	80	20
How were the training arrangements	0	5	50	45
Did the training course met your intentions	0	5	60	35
Did the supporting material/handouts were helpful	0	0	30	70
Was the training timing and period suitable	0	0	70	30
Did you improve the awareness of subjects	0	0	40	60
Did the skills learnt in training assist you in your job	0	10	55	35
Did the training enhanced your potential capability	0	15	50	35

Table-4: Respondents Observations regarding Water Saving Technologies.

About Knowledge					Respondents (N=20)			
Particulars	Pre-training knowledge				Post-training knowledge			
	Nil (%age)	Low (%age)	Moderate (%age)	High (%age)	Nil (%age)	Low (%age)	Moderate (%age)	High (%age)
Micro-catchments	70	20	10	0	0	0	60	40
Rooftop harvesting	65	35	0	0	0	0	65	35
Raised bed technology	45	45	10	0	0	15	55	30
Solar pumping	25	60	15	0	0	15	50	35
Drip irrigation	35	40	15	10	0	0	65	35
Sprinkler irrigation	30	55	05	10	0	05	50	45
Gully farming	60	20	20	0	0	25	35	40
Gypsum application	55	40	05	0	0	20	60	20
Irrigation scheduling	40	45	15	0	0	15	60	25
Average percentage	47.22	40	10.56	2.22	0	10.56	55.56	33.89

Training Impact on Respondent's Knowledge Status: Knowledge can be describe as to manage systematic skills, influential ideas, capability to make well judgments, and awareness of particular agricultural practices. To compare the pre and post-knowledge status of training respondents about water saving techniques, the following results of paired t-test are compiled in Table-5. The results showed that training has conclusive impact on respondent's knowledge and there has seen an enormous difference between the knowledge of respondents before and after training. The t-values are highly significant and clarify the variation in knowledge levels among all the categories. The P-values are < 0.01 which proved strong evidence against the null hypothesis in favor of the alternative. On the basis of these results, the training activities are statistically highly significant and we conclude that the training program was much informative and effective.

Table-5: Training Impact on Respondents' Knowledge Status.

Knowledge Status	Pre-Training Knowledge (Mean)	Post-Training Knowledge (Mean)	T-values	P-values
Nil	47.22	0	8.83**	0.000
Low	40	10.56	5.36**	0.001
Moderate	10.56	55.56	9.69**	0.000
High	2.22	33.89	13.43**	0.000

**Statistically highly significant at 1% level of probability.

Conclusion

Agriculture with tremendous research and enrollment of attentive and devoted human resources can provide a significant output. This all will be viable only if appropriate agriculture knowledge with trainings is conveyed to target distant groups and agriculture policy of a country. The objective of the present training was to prepare the respondents about water saving techniques for future dissemination. Findings of the study indicated that it was a good training in respect to practical work and field lectures. The practical session of the training was initiated in early hours at first day without killing extra time in inaugural session as before. Majority of training respondents appreciated field activities and lectures and they showed highly interest in demonstration sites under watershed project. The pre-training results illustrated that averagely 47.2 percent of respondents had no knowledge of any water saving technologies presented during training, 40 percent of respondents were low knowledge, and 10.5 percent of respondents were moderate knowledge while only 2 percent of respondents were high knowledge respectively. While post-training results showed that all training respondents were acquainted with water saving techniques as well as decline in low knowledge of respondents. Similarly the low knowledge shift to moderate and high knowledge as after training, 55.5 percent were moderate knowledge and 33.8 percent were high knowledge respectively. All the t-values were highly significant as well as the p-values also determined the significance of the post training results. The training respondents were dedicated to adopt these techniques personally and also share their knowledge to others. After training, the respondents recognized the significance of water saving technologies and dynamic challenges of water stress in future. To improve such type events in future, it is proposed that: i. The resource persons should make sure the attention of the respondents during field lectures; ii. For more dissemination, invitation should be given to respondents of other rain-fed and remote areas of the country; iii. To ensure additional and timely participation of respondents, dispatch invitation letters to relevant departments in time with request of urgent nomination by the host institutes.

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References

1. Ameziane T., Angas P., Cantero-Martinez C. and Pisante M. (2004). Land and water management technologies. In: Cantero-Martinez C. (ed.), Gabina D. (ed.). Mediterranean rainfed agriculture: Strategies for sustainability. Zaragoza: CIHEAM. 35-50.

2. Khan I. (2010). Water availability drops substantially.

3. World Bank (2011). Land and water development division (FAO). www.fao.org

4. Rukhsana A., Amir A., Rahmat U., Jahangir M. and Yousaf M. (2005). Effect of Soil Salinity/Sodicity on the Growth and Yield of Different Varieties of Cotton. *Intl. J. Agri. and Biol.*, 07(4), 606-608.

5. Ishfaq M. (2002). Water New Technology. *Global Water Institute, Lahore, Pakistan*.

6. Mukherji A. and Facon T. (2009). Revitalizing Asia's irrigation: To sustainably meet tomorrow's food needs.

7. Wheeler T. and Kay M. (2010). Food crop production, water and climate change in the developing world. *Outlook on Agriculture*, 39(4), 239-243.

8. Ma W., Mao Z., Yu Z., Van Mensvoort M.E.F. and Driessen P.M. (2008). Effects of saline water irrigation on soil salinity and yield of winter wheat–maize in North China Plain. *Irrigation and Drainage Systems*, 22(1), 3-18.

9. Chatha Z.A., Arshad M., Bakhsh A. and Shakoor A. (2014). Design and cost analysis of watercourse lining for sustainable water saving. *J. Agric. Res*., 52(4).

10. Mahmood N., Ali T., Ahmad M. and Maan A.A. (2012). Impact Assessment of Adoption of Water Saving Irrigation Interventions on the Socio-Economic Development of Small Farmers in District Faisalabad. *Journal of Agricultural Research*, 50(1).

11. Pakistan Water Partnership (2000). The framework for action for achieving the Pakistan Water Vision 2025.

12. Asia-Pacific Water Forum (2007). Asian Water Development Outlook. Asian Development Bank.

13. Qureshi A.L., Lashari B.K., Kori S.M. and Lashari G.A. (2011). Hydro-salinity behavior of shallow groundwater Aquifer underlain by salty groundwater in Sindh Pakistan. Fifteenth international water technology conference, IWTC-15 2011, Alexandria, Egypt.