J. Indian Soc. Coastal agric. Res. 30(2): 77-82 (2012)

Effectiveness of the Trainers' Trainings on Scaling-up of Water Productivity in Agriculture in Coastal Odisha

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The present study was carried out to study the impact of the trainer's trainings each of 14 days duration conducted by Directorate of Water Management, Bhubaneswar in five districts of Odisha in the year 2011-12. Trainees from different Govt. line departments, NGOs; SHGs etc. took part in the trainings. Responses were collected from the trainees and analyzed, which revealed that trainings helped the trainees significantly in improvement of their knowledge on different water management techniques in agriculture with mean Learning Index of 56.78%.

(Key words: *Learning index, Training, Water productivity, Knowledge gain)*

Water shortage is going to be an acute problem in near future, so water need to be utilized in productive and efficient way. Water productivity term in agriculture is now considered to be vital focusing more crops per drop of water. It includes application of scientific techniques for efficient and multiple uses of water in agriculture which as a whole play a role for increasing the production. It is defined as the production obtained (Rs.) per unit volume of water (m^3).

Training is an important process of capacity building of individuals as to improve the performance through improved knowledge, skill and changed attitude. According to Charles (1990) the main objective for investing resources in training is to eliminate performance deficiency. To achieve this objective, the training organization must be concerned about the effectiveness of the training programme (Ajayi, 2001). Training effectiveness is often operationalised as the transfer effects of training: the extent to which professionals use their newly gained knowledge, skills and attitudes in the workplace. Training is also considered as basic feature of the agricultural extension approaches that can help block supervisors in building their confidence to solve farmers' problems and to provide information needed (DAE, 1999). The success of any training programme depends greatly on the perception of the trainees towards it. It was also proven that the farmers are likely to benefit more when they receive technological package from a qualified and trained personnel, a person who knows what to carry and give to farmers.

Monitoring and evaluation is an in-built mechanism in extension and training system. It serves as a tool for efficient operation of training programmes by providing feedback. It assists for taking corrective measures by the course/ training coordinator for effectiveness of training programmes (Kumar *et al.,* 2005). Keeping this in view, the present study was undertaken to assess the impact of the two-week trainers' trainings on scaling up of water productivity in agriculture conducted at eight places in Odisha by Directorate of Water Management, Bhubaneswar.

MATERIALS AND METHODS

The present study was conducted in five coastal districts (Khurda, Cuttack, Puri, Dhenkanal, Nayagarh) of Odisha where eight trainers' training programmes (each of duration of 14 days) on scaling up of water productivity in agriculture were organized by Directorate of Water Management during the year 2011-12. A total of 208 (N=208) personnel from different government line departments, NGOs, SHGs etc. were participated in the training programmes. These trainees were taken as respondents for the impact study.

A questionnaire was devised and socio-personal information along with knowledge level of the trainees (before and after the trainings) were collected. The knowledge level was measured on a three point continuum scale: low, medium, high with score as 1, 2 and 3, respectively.

The Learning Index (LI) of each trainee was calculated using following formula:

$$LI_i = \frac{(K_{i(Post)}) - K_{i(Pre)})}{(100 - Ki_{(Pre)})} \times 100$$

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Where

LI_i = Learning Index of i^{th} trainee

i=1, 2, 3,....., N

N=Total number of trainees=208

$K_{i\ (Post)}$ = Post-training knowledge level of i^{th} trainee (in %) = Post-average knowledge level score on all techniques/ practices/ issues deliberated during training.

$K_{i\ (Pre)}$ = Pre-training knowledge level of i^{th} trainee (in %) = Pre-average knowledge level score on all techniques/ practices/ issues deliberated during training.

Knowledge Gain (KG) of the trainees on each of the technique/ practice / issue deliberated during the training was calculated by

$$KG_{ij} = \frac{(KG_{ij\ (Post)} - KG_{ij\ (Pre)})}{(100 - KG_{ij\ (Pre)})} \times 100$$

KG_{ij} = Knowledge Gain (%) on the j^{th} technique / practice / issue for the i^{th} trainee

i=1, 2, 3,.....,N

N=Total number of trainees=208

J=1, 2,....., M

M= Total techniques/ practices oriented during training=21

Here, the pre-training knowledge level, post-training knowledge level scores, age, education, trainings experience on water management, trainings undergone during past years, water management work experience, training imparting experience were considered as independent variables and the Learning Index was considered as the dependent variable. The data thus collected were tabulated and analyzed using descriptive statistics and correlation coefficient matrix.

RESULTS AND DISCUSSION

Profile of the trainees

The social and personal information of the trainees were studied and the results are given in Table 1. Majority of the participants were male (81%) and 19% were female participants. From the age distribution of the trainees, it was found that 29% of trainees were in young age groups (<40 yrs) and majority (65%) was in middle age (40-60 yrs) group. There is a need to emphasize participation of the young trainees in the trainings as young officers are needed to be more receptive to client's needs, better equipped with latest scientific concepts and more enthusiastic in accomplishing their duties. It was also observed that 55% of the trainees were in the under-graduation level. So, trainings were very much essential as education through training is expected to enhance the decision making and motivation for adoption of agricultural water management technologies (Cavane, 2011). From Table 1, it was revealed that around 65% trainees had not taken any training on water management, 74% of trainees were not involved in any of the water management related projects/activities. Around 80% of trainees had no training imparting experience on water management techniques. This indicates the need of water management trainings which emphasize the efficient utilization of water through more crops per drop of water.

Learning index and knowledge gain of trainees

A total of 21 techniques/practices/issues related to scaling-up of water productivity in agriculture were deliberated during the training and the Learning Index of the trainees (category wise) presented in the Table 2. The overall knowledge level of the trainees was increased from 43% to 75% with mean Learning Index 57%, which showed that trainings enhanced the knowledge to a considerable level on the water management techniques/ practices/issues. This is in conformity with Das and Sharma (1998) who also found that training programme contributed significantly in improvement of respondent's knowledge about scientific practices. Learning Index (80%) was found to be more for the office bearers of farmers groups/ SHGs as compared to that of the *Pani Panchayat* (LI= 60%). The officials representing state line departments like Agriculture (LI=54%), Fishery (LI=54%), Horticulture (LI=54%), Soil Conservation (LI=51%) and Irrigation (LI= 50%) also gained the knowledge substantially regarding different scientific water management techniques deliberated during training.

From the Table 3, it was found that knowledge gain of the trainees representing from Agriculture department was relatively more on the techniques *viz.* residual soil moisture utilization (66%), multiple uses of conserved rainwater (64%), rice-fish integration (63%), groundwater utilization and recharging techniques (61%). Trainees from Horticulture departments gained maximum knowledge on soil and water quality issues (69%), groundwater utilization and recharging techniques (67%), horticultural crops cultivation (67%), waterlogged area management (65%), methods of

Table 1. *Profile of the trainees (N=208) undergone two-week trainers' training programmes*

SI. No.	Variables		Category	Frequency	Percentage
1.	Gender		Male	168	80.77
			Female	40	19.23
2.	Age		Young (<40 years)	60	28.72
			Middle (40-60 years)	137	65.64
			Old (>60 years)	12	5.64
3.	Education		Upto Higher secondary	114	54.79
			Graduation	63	30.32
			Post graduation	31	14.89
4.	Experience	Training undergone on water management during past years	Nil	135	64.88
			One training	56	26.83
			Two trainings	9	4.39
			Three trainings	7	3.41
			Seven trainings	1	0.49
		Training undergone during past 10 years	Nil	125	60.29
			One Training	17	8.33
			Two Trainings	28	13.24
			Three Trainings	18	8.82
			Four Trainings	12	5.88
			Five Trainings	5	2.45
			Seven Trainings	2	0.98
		Work experience on water management	Nil	154	74.15
			One year	34	16.59
			Two year	5	2.44
			Three year	11	5.37
			Four year	2	0.98
			Six year	1	0.49
		Training imparting experience by the trainers on water management	Nil	167	80.49
			One training	32	15.61
			Two trainings	1	0.49
			Three trainings	5	2.44
			Four trainings	2	0.98

Table 2*. Learning index of different categories of trainees*

SI. No.	Category of trainees	Knowledge level (%)		Learning index(%)
		Pre- training	Post- training	
1.	Agriculture (39)	46.57	75.53	54.20
2.	Horticulture (36)	44.82	74.39	53.58
3.	Soil conservation (5)	56.79	78.75	50.82
4.	Irrigation (15)	44.12	71.99	49.88
5.	Veterinary (3)	34.92	74.21	60.37
6.	Fisheries (2)	38.10	71.43	53.85
7.	*Pani Panchayat* Funct. (77)	45.21	77.73	59.35
8.	NGOs (3)	36.56	65.11	45.00
9.	SHGs (28)	35.71	87.37	80.35
	Overall (208)	42.53	75.17	56.78

Note: Figures in the parenthesis indicate number of trainees from respective organization

irrigation and drainage (63%), multiple uses of conserved rainwater (63%). Trainees from Soil conservation departments acquired maximum knowledge on crop planning and crop diversification (70%), participatory irrigation management (70%), methods of irrigation and drainage (63%), residual soil moisture utilization (63%). Trainees from Irrigation departments gained maximum knowledge on horticultural crops cultivation (58%), soil and water quality issues (58%), groundwater utilization

Table 3. *Knowledge gain (%) of the trainees representing different agencies on techniques/ practices deliberated during trainers' training programmes*

Sl. No.	Techniques/ practices	Knowledge gain (%) of the trainees representing different agencies									All trainees (N=208)
		Agriculture (n=39)	Horticulture (n=36)	Soil conservation (n=5)	Irrigation (n=15)	Veterinary (n=3	Fishery (n=2)	*Pani Panchayats* (n=77)	NGOs (n=3)	SHGs (n=28)	
1	Water management problems and solutions	63.03	65.41	44.44	50.51	71.43	50.00	65.95	50.00	87.50	66.69
2	*In-situ* rainwater conservation techniques	57.39	53.26	40.00	47.34	71.43	50.00	62.84	50.00	79.17	62.31
3	*Ex-situ* rainwater conservation techniques	45.31	42.97	25.00	52.25	62.50	50.00	64.31	50.00	78.13	59.97
4	Multiple uses of conserved rainwater	63.59	62.65	50.00	48.40	75.00	100.00	64.66	50.00	82.29	65.85
5	Rice-fish integration	62.69	40.41	50.00	55.81	50.00	100.00	52.04	20.00	79.55	59.13
6	Crop planning and crop diversification	58.91	52.85	70.00	50.00	50.00	100.00	63.02	50.00	86.36	64.13
7	Horticultural crops cultivation	56.35	66.54	57.14	57.94	50.00	50.00	60.24	50.00	78.41	63.21
8	Methods of irrigation and drainage	58.66	63.06	62.50	50.00	62.50	50.00	64.51	50.00	78.13	64.83
9	Water-saving irrigation techniques	43.95	54.68	50.00	47.22	62.50	50.00	68.32	40.00	79.17	63.71
10	Pressurized irrigation systems (drip and sprinkler)	39.20	48.59	57.14	44.62	62.50	50.00	53.44	33.33	79.55	56.94
11	SRI for growing more rice with less water	55.38	54.01	50.00	52.38	71.43	50.00	62.99	50.00	76.14	64.94
12	Water requirement and irrigation scheduling of different crops	44.07	41.00	54.55	43.24	50.00	50.00	66.29	40.00	76.14	59.87
13	Soil and water quality issues	55.72	69.17	37.50	57.50	50.00	50.00	50.66	50.00	81.25	57.61
14	Residual soil moisture utilization	65.59	49.84	62.50	51.88	50.00	50.00	42.38	33.33	78.41	54.36
15	Groundwater utilization issues	61.40	66.99	57.14	56.41	62.50	50.00	53.43	50.00	80.21	63.57
16	Waterlogged area managt. techniques	46.82	64.76	44.44	50.00	75.00	50.00	63.49	60.00	90.63	63.81
17	Micro level water resources development	49.46	51.97	57.14	52.27	62.50	50.00	50.48	50.00	81.25	56.07
18	Economic use of waterlogged areas	56.76	52.83	50.00	50.45	50.00	50.00	47.59	50.00	83.33	57.06
19	Integrated farming system approach	48.54	56.98	40.00	52.38	57.14	50.00	67.80	50.00	82.29	67.70
20	On-farm water management issues/ techniques	56.24	49.83	40.00	53.33	62.50	50.00	67.39	33.33	73.86	61.52
21	Participatory irrigation management	54.59	49.71	70.00	44.52	62.50	50.00	62.52	33.33	73.86	59.08
	Overall	54.47	55.01	52.17	51.05	60.37	53.85	59.46	45.00	80.27	61.45
	t-statistic	28.92**	28.37**	12.91**	32.25**	33.56**	65.53**	43.42**	19.72**	55.70**	91.84**

**Difference in pre-training and post-training knowledge level significant at 1%level as evident from t-statistic

and recharging techniques (56%), rice-fish integration (56%), on-farm water management issues/techniques (53%), growing more rice with less water through system of rice intensification (SRI)(52%), integrated farming system approach (52%), micro level water resources development (52%), *ex-situ* rainwater conservation techniques (52%), residual soil moisture utilization (52%). Trainees from Veterinary departments got maximum knowledge on multiple uses of water (75%). Trainees from Fishery departments gained maximum knowledge on multiple uses of conserved rainwater (100%), rice-fish integration (100%). *Pani Panchayat* Functionaries acquired maximum knowledge on the technologies/practices like water-saving irrigation techniques (68 %), integrated farming system approach (68%), on-farm water management issues/ techniques (67%), water requirement and irrigation scheduling of different crops (66%), multiple uses of conserved rainwater (65%), methods of irrigation and drainage (65%), *ex-situ* rainwater conservation techniques (64%), waterlogged area management (63%), crop planning and crop diversification (63%), SRI for growing more rice with less water (63%), *in-situ* rainwater conservation techniques (63%). Trainees from NGOs acquired maximum knowledge on waterlogged area management (60%), integrated farming system approach (50%), water management problems and solutions (50%), multiple uses of conserved rainwater (50%), methods of irrigation and drainage (50%), *ex-situ* rainwater conservation techniques (50%). Office bearers of the SHGs who have attended the training, showed enhancement in knowledge on several aspects like waterlogged area management (91%), crop planning and crop diversification (86%), economic use of waterlogged areas (83%), multiple uses of conserved rainwater (82%), integrated farming system approach (82%), soil and water quality issues (81%), micro level water resources development (81%), groundwater utilization issues (80%).

The overall knowledge gain of all the trainees were found be varied and relatively high for certain techniques/practices/issues like integrated farming system (68%), water management problems and solutions (67%), multiple uses of conserved rainwater (66%), SRI for growing more rice with less water (65%), methods of irrigation and drainage (65%), crop planning and crop diversification (64%). The t-test revealed that the change in knowledge level on the techniques/practices/issues is significant at 1% level (Table 3). Thus, it may be inferred that the trainings had significantly contributed towards the improvement of knowledge of the trainees. This finding is in accordance with the findings of Kumar *et al.,* (2005).

Correlation between socio-personal variables with the Learning Index

The correlation analysis was done to find the relationship between the socio-personal variables and Learning index of the trainees. From Table 4, it is revealed that Learning Index hold negative correlation with education, trainings undergone on

Table 4. *Correlation analysis between socio-personal variables of trainees and their learning index*

Variables	Age	Education	Trainings undergone on water management	Trainings undergone during past years	Water management work experience	Training imparting experience by the trainers on water management	Learning index
Age	1						
Education	-0.016	1					
Trainings undergone on water management	0.178*	0.001	1				
Trainings undergone during past years	0.059	0.426**	0.287**	1			
Water management work experience	-0.033	0.171*	0.115	0.398**	1		
Training imparting experience by the trainers on water management	-0.126	0.160*	0.024	0.272**	0.202**	1	
Learning index	-0.070	-0.259**	-0.265**	-0.190**	0.072	-0.124	1

** 1 % level of significance; * 5% level of Significance

water management, trainings undergone during past years, which were found to be significant at 1% level. This may be inferred that more educated and experienced trainees showed relatively low level of learning which implies that those trainees, who had a considerable experiences and knowledge on water management showed relatively low increase in knowledge. This may be due to reason that experienced trainees are relatively more at home of scientific techniques and knowledge in their respective fields. Correlations between age, training imparting experience and Learning Index are found to be non- significant.

CONCLUSION

The overall Learning Index was found to be enhanced considerably which in turn would help the developmental / extension personnel to improve their skill and job performance in the organization as well as to motivate the farmers for the implementation of the latest scientific water management techniques in agriculture leading to enhancing water productivity in agriculture. As the experience of the extension personnel in scientific water management was found meager, these types of trainings need to be conducted in the state line extension departments at a large scale to realize better impact.

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