International Journal of Agriculture Innovations and Research
Volume 5, Issue 4, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received: 14/02/2017 | Accepted on: 20/02/2017| Published: 28/02/2017

Perception of Farmers About Maintenance of Drip Irrigation System in Tamil Nadu

C. Karthikeyan[1] and J. Yoga Narasimhulu Naidu[2*]
[1] Professor, e-Extension centre, DoEE, TNAU, Coimbatore – 641 003, India.
[2] Ph.D., Scholar, Department of Agricultural Extension and Rural Sociology, TNAU, Coimbatore- 641003, India.
*Corresponding author email id: yogi.narasimha05@gmail.com

Abstract **– In India drip irrigation was considered as one of the best water efficient irrigation practice. The Central and State departments of agriculture made considerable efforts in adoption of drip irrigation practices by the farmers in larger parts of the country. Beside the higher adoption rate, there is problem in drip maintenance practices at farm level. The present study identifies the perception of trainees on effectiveness of the training and constraints perceived by the farmers on adoption of drip maintenance practices and extent of gratification towards training programme on drip maintenance practices organized by Tamil Nadu Drip Irrigation Project (TNDRIP). The study follows pre and post training evaluation method with a sample size of 150 respondents selected through proportionate random sampling method. Semi structured interview schedule was prepared for data collection. simple percentage analysis and ranking based on mean score were used to analyze the data. The perception of trainees about the effectiveness of the training on the seven indicators viz., venue, time of organizing, relevance of the content, usefulness of the content, adequacy of the content, impact on knowledge, confidence were studied. Insufficient knowledge about pressure maintenance and high cost as well as non-availability of the water soluble fertilizers in the local market, were the major constraints in adoption of drip maintenance technology as perceived by the respondents during before and after training respectively. The extent of gratification score revealed that the trainees were highly gratified towards the TNDRIP training program.**

Keywords **– Constraints, Drip Maintenance, Farmers, Irrigation, Training.**

I. INTRODUCTION

Agriculture being the backbone of India is still consummate in GDP contribution. The main sources of irrigation till now are the ground water and canal system in India. To avoid wastage of water and make efficient utilization of water sources in agriculture there has been several irrigation projects and programme initiated and implemented by central and state departments of agriculture. Among those initiations Micro-irrigation project is the best of its own. In India, the area under micro irrigation is 81.46Lakh Ha, of which the drip irrigation accounts 20.25 Lakh Ha. The leading states in the adoption of micro irrigation were Rajasthan (16.97 Lakh Ha.), Maharastra (13.22 Lakh Ha), Andhra Pradesh (12.21 Lakh Ha) and Tamil Nadu (3.55 Lakh Ha). (**Indiastat,2016**). Even though there is conceivable expansion of drips in states there are several problems related to new investment and management of the existing systems (**Palanisami and Suresh kumar, 2003**). The factors such as huge initial investment, lack of technical support, cropping pattern, access to water and socio-economic conditions of farmers are found to be the major factors influencing adoption of drip irrigation (**Narayana moorthy, 1997**). In several cases, even after the adoption of drip irrigation, the farmers discontinued drip irrigation due to lack of maintenance, irrelevant cultural background and unreliable water supply (**Kulecho and Weatherhead, 2005**). In systematizing the amelioration of drip irrigation practice among farmers in viable manner, they need to possess adequate knowledge and skillful maintenance practices at farm level. Considering the importance of drip maintenance practices, drip irrigation capacity building and management initiative for maximizing productivity and income (TNDRIP initiative) was conceived and implemented with the support of IWMI-TATA water policy program jointly with the Water Technology Centre(WTC) of the Tamil Nadu Agricultural University(TNAU) and Jain Irrigation Systems Limited (JISL) for the benefit of the drip farmers of Coimbatore (including Tirupur) and Erode districts of Tamil Nadu state. The TNDRIP initiative imparts training to the farmers at field level regarding drip irrigation technology and maintenance practices, develop capacity building in component technologies like vermi-composting and maintenance of the systems and to establish a network between drip farmers, research institutes, government departments, private firms and marketing agencies in upscaling the drip adoption. In order to upscale the capacity building initiative of the drip farmers in a massive way through this IWMI-TATA project called TNDRIP initiative, an evaluation study of this kind is needed. This paper will highlight the effectiveness of training programme and constraints perceived by the trainees regarding the TNDRIP training programmes implemented in Tamil Nadu.

II. MATERIALS AND METHODS

2.1 Research Design

Non-Experimental research design was adopted for the study. There are four commonly used types of non-experimental designs (Cook and Campbell, 1979):

A. Pre-Test/Post-Test design
B. Time series design
C. Longitudinal study
D. Post-test only design

For the study pre-test/post-test designs was followed. In this design evaluators survey the intervention group before and after the intervention. While evaluators may observe changes in outcome indicators among the subjects (trainees), they cannot attribute all these changes to the

International Journal of Agriculture Innovations and Research
Volume 5, Issue 4, ISSN (Online) 2319-1473

intervention alone using this design because there is no comparison group.

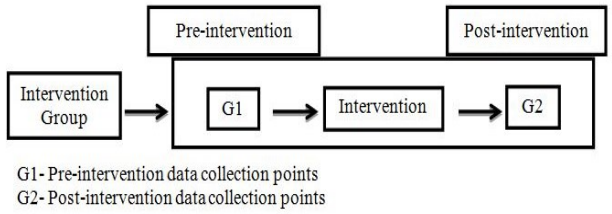

Fig. 1 Non-experimental Pre-test and Post-test research design

2.2 Sampling Procedure

The study was conducted in Coimbatore district of Tamil Nadu state purposively, as TNDRIP initiative was implemented firstly in the Coimbatore district. One day training programmes were organized in 10 blocks covering 18 villages to a total number of 296 farmers who were identified as trainees for the training programme. Among the beneficiaries 50 % of them were selected proportionately from each block. Therefore a sample of 150 beneficiaries were drawn for studying the perception of trainees on the effectiveness of the training and their constraints in the adoption of drip maintenance practices before and after the training programme. The block wise sample selection is presented in Table I.

Table I. Block wise samples drawn proportionately for the study

S. no.	Name of the block	Name of the Village (Including its hamlets)	Total number of trainees	Samples drawn (50%)
1	Karamadai	Vellinkadu, Pagathur, Vachinampalayam, Kandiyur,	78	39
2	Sulur	Karumathampatti, NagamanaikkanPalayam	31	16
3	Sulthanpet	Thalakarai	26	13
4	Anaimalai	Odaiyakulam	13	7
5	P.N.Palayam	Selva puram I and Selva puram II.	39	20
6	Annur	KaragoundanPalayam	22	11
7	Pollachi	Arthnaripalayam	41	21
8	S.S.Kulam	Thottipalayam	10	5
9	Palladam	Ganapathipalayam, Anupati	31	16
10	Perur	Sundakamuthur	5	2
	Total		**296**	**150**

2.3 Data collection

For the study data was collected twice from the trainees of the training programme by abet of semi-structured interview schedule. Data was collected before the commencement of the training programme and three weeks later another data was collected with the same interview schedule after the training programme from the trainees.

2.4 Data analysis

The collected data was analyzed through of simple percentage analysis and ranking based on calculation of the mean score.

III. Result and Discussion

One day training programmes were organized under TNDRIP in various villages. The effectiveness of the training was assessed by mapping the perceptions of the trainees over the seven selected indicators namely the venue, time of organizing, relevance of the content, usefulness of the content, adequacy of the content, impact of the training on the knowledge level and the confidence gained by the trainees to adopt the practices taught in the training program. The results are presented in TableII and discussed as follows:

3.1 Perception mapping of trainees on effectiveness of the training

Farmer's farm/house in the respective village was chosen as the venue for organizing the TNDRIP trainings. A majority of the trainees (73.33%) felt that the venue was highly comfortable followed by one-fifth of them as somewhat comfortable and the rest (6.67%) as not comfortable. Among the 500 farmers who were invited to attend the training, 98 farmers didn't participate the training. About one-fourth didn't felt the venue as highly comfortable. One of the prominent reasons noted for this was that farmers preferred to participate the training if it were to be conducted in common places unlike in some farmer's residence. Venue comfort aligns with the host farmer's friendliness and compatibility and this had reflected on the participation of the farmers.

Most of the trainings were organized either before or after the lunch time for about one and half hour duration. Hence, a majority of them (80%) felt that the training was organized at an apt time and it was perceived as highly convenient (Table II).

As regards the relevance of the content of the training, three-fourth of the trainees (78.66%) perceived that the coverage of contents in the training was 'highly relevant' followed by 13.33 per cent as 'somewhat relevant'. The contents include 10 major aspects of drip maintenance practices such as Fertigation, Cleaning the Screen Filter & Disc Filter, Cleaning the Sand Filter, Cleaning the Sub Mains & Laterals, Acid Treatment for Drip System Maintenance, Pressure Maintenance, Thatching/protecting the drip system from weather damages, Valve protection, Keeping the laterals whirled, without bends, under shade, Irrigation scheduling to crops. The adoption of acid treatment practice demonstrated to the trainees needed venturi unit in the drip fertigation system for its adoption. However majority of the farmers in the study had fertilizer tank instead of venturi unit with their drip system. Hence some of the farmers felt the contents as 'somewhat relevant' (13.33%) and 'irrelevant' (8%).

International Journal of Agriculture Innovations and Research
Volume 5, Issue 4, ISSN (Online) 2319-1473

Table II. Perception of trainees on effectiveness of the training (n= 150)

S.No.	Item	Categorization	Frequency	Percentage
a)	Venue	Not comfortable	10	6.67
		Somewhat comfortable	30	20.00
		Highly comfortable	110	73.33
b)	Time of organizing	Inconvenient	15	10.00
		Somewhat convenient	15	10.00
		Highly convenient	120	80.00
c)	Relevance of the content	Irrelevant	12	8.00
		Somewhat relevant	20	13.33
		Highly relevant	118	78.66
d)	Usefulness of the content	Not useful	9	6.00
		Somewhat useful	10	6.67
		Very much useful	131	87.33
e)	Adequacy of the content	Inadequate	6	4.00
		Somewhat adequate	14	9.33
		Adequate	130	86.66
f)	Impact on knowledge	No change	-	-
		Some Improvement	12	8.00
		Great Improvement	138	92.00
g)	Confidence to adopt	Not confident	18	12.00
		Somewhat confident	17	11.33
		Highly confident	115	76.67

A majority of the trainees (86.66%) perceived the contents of the training as useful followed by somewhat useful (6.67%) and not useful (6%). The perception of usefulness by the trainees might be due to the reason that, so far, there was no extension education service on the subject of maintenance of drip system to the farmers.

With regard to the adequacy of content, majority of them (86.66%) felt that the content given to them were adequate followed by the perceptions such as somewhat adequate (9.33%) and inadequate (4%). The feelings of partial adequacy or inadequacy was due to the fact that the subjects such as fertigation and irrigation scheduling of crops were not dealt in detail to the trainees as per their expectations.

The effectiveness of the training in terms of effecting changes in the knowledge level of the trainees was assessed. An overwhelming majority of the trainees (92%) had perceived great improvement in their knowledge level about the maintenance practices and the rest (8%) perceived some improvement. None of them opined that there was no change in the knowledge which indicated greater impact of the training on the cognition level of the trainees.

The level of confidence to adopt the drip maintenance practices was studied to understand the effectiveness of the training. About three-fourth of them (76.67%) opined that they were highly confident followed by not confident (12%) and somewhat confident (11.33%). Nearly one-fourth of the trainees were not fully confident due to the complexity nature of the technologies recommended such as determining the proportion of the HCl acid to be used based on the pH level of the irrigation water, adjusting and regulating the pressure of the drip system in case theventuri unit is included etc.

3.2 Constraint analysis

The constraints perceived by the farmers before and after their participation in the training program were studied and the results are presented in Table III.

Table III. Constraints in the adoption of drip maintenance practices (n=150)

S. No.	Constraints	Frequency	%
A	**Before attending the training**		
1.	Insufficient knowledge about pressure maintenance	142	94.70
2.	Wrong belief/fear of the farmers	135	90.00
3.	Ignorance about maintenance practices	134	89.30
4	Misunderstanding of farmers about drip irrigation technology	132	88.00
B	**After attending the training**		
5	High cost of water soluble fertilizers	120	80.00
6	Non-availability of pressure gauge	76	50.66
7	Reluctance to invest on venture	63	42.00
8	Non-availability of water soluble fertilizers locally	62	41.33
9	Lack of confidence to use correct concentration of acid	51	34.00

3.2.1 Constraints perceived before the training

More than three-fourth of the farmers had recollected four items of constraints by the farmers before their participation in the training program. One of the constraints for adoption of the maintenance practice was the insufficient knowledge about pressure regulation in the drip irrigation system. Farmers were not aware about the use of pressure gauge in the laterals to maintain uniform pressure so that the water would flow through the system effectively. The farmers believed that use of HCl acid treatment in the drip system would affect the soil health and crop growth and hence feared to adopt the acid treatment technology for

removing the blockage/salt encrustation in the drip system. Most of the farmers also felt that they were ignorant about the maintenance package to be adopted for the drip system which acted as one of the constraint for its adoption. Most of the farmers drip irrigated their crop adequately leaving the soil in fully wet condition throughout the growth stage of the crop. It is against the concept of drip irrigation wherein the soil has to be maintained in moist condition rather than wet or waterlogged condition. Hence the lack of knowledge and understanding of the farmers about the drip and its maintenance practices itself remained as constraint for its adoption.

3.2.2 Constraints perceived after the training

Farmers were asked to express the factors that remained as constraints to the adoption of the maintenance practices. The findings revealed that, a majority of the trainees (80%) expressed high cost of the water soluble fertilizers as the constraint. About half of them opined that non-availability of pressure gauge was one of the constraints. It is a fact that pressure gauge apparatus was not sold commonly in the shops located in rural/town areas. This was perceived as one of the reason for non-adoption of the maintenance practices. More than one-third of the trainees (42%) were reluctant to invest on the venturi unit which is needed for the adoption of the acid treatment technology. About 41 per cent of them stated the non-availability of water soluble fertilizers in the local village/town market remained as one of the reason for non-adoption of fertigation practice even though they had been supplied with the fertilizer tank on subsidy for the purpose by the Government of Tamil Nadu. One-third of the farmers (34%) expected the assistance of the extension or development staff to adopt acid treatment technology in their farm as they were not very confident in adopting the technology on their own.

3.3 Gratification of the trainees

The extent of gratification derived by the trainees over the training programs was assessed in terms of five components of the training namely, resource persons, handouts, training module, scope for deliberations and demonstration using a five point continuous gratification scale. Mean score of the trainees were worked out for each of the component and ranked accordingly. The results are presented in Table IV.

The trainees were highly gratified with regard to the training components namely the use of various resource persons to offer the technical inputs about the subject of the training. Secondly, they were highly gratified over the extension handouts about the various aspects of the drip maintenance practices that were offered to the trainees after their participation in the training program. The third aspect of gratification perceived by the trainees was attributed to the contents of the training module delivered in the training program. As regards the scope for deliberations, the trainees recorded their gratification at fourth level followed by the demonstrations at fifth level. The overall mean score for the extent of gratification as expressed by the trainees about the various components of the training program was found to be 3.94. This indicates that the trainees were highly gratified over the training program. However the nature of conducting the demonstration of the maintenance practices needs further improvement by way of involving the farmers to enjoy the hand-on-experience.

Table IV. Extent of gratification of the trainees over the training programme (n =150)

S. No.	Components of training	Mean score*	Rank
1.	Resource persons	4.60	I
2.	Handouts	4.18	II
3.	Training module	4.10	III
4.	Scope for deliberations	3.70	IV
5.	Demonstration	3.10	V
	Overall	3.94	

* Computed on a 1-5 point gratification scale(5-very high, 4-high, 3-moderate, 2-least,1- not gratified)

IV. Conclusion

An overwhelming majority of the trainees perceived that the training programme offered under TNDRIP initiative was found to be effective to impart knowledge and skill regarding drip maintenance practice.

The constraints which are identified and remained as bottleneck for the adoption of drip maintenance technology by the farmers are the high cost as well as non-availability of the water soluble fertilizers in the local market, reluctance to invest on venturi device, non-availability of pressure gauge device in the market and lack of confidence to use the correct concentration of HCl acid for cleaning the drip system. The input dealers must be encouraged to sell water soluble fertilizers and pressure gauge unit in their retail outlets. Trainers may give emphasis on the use of correct dose of HCl acid for cleaning the drip system. They should also educate the farmers to invest on venturi device.

Majority of the farmers had high level of gratification towards the training programmedrip maintenance practices and hence if they were appropriately motivated they can also become adopters in near future. TNDRIP could partly address these issues by disseminating the results/information related to the economic advantages of adopting the water soluble fertilizers and acid treatment technology using venturi unit to the trainees. This attempt could make the farmers to get convinced about the technologies and motivate them to invest on these technologies.

With all the joint efforts put forth by extension officials and researchers of public and private agencies in developing effective technologies in drip irrigation and providing trainings regarding maintenance practices through initiatives like TNDRIP for abetter adoption of those technologies by the farmers was observed in certain areas only. A support should be provided for the horizontal spread of initiatives like TNDRIP to other social systems with effective strategies and policy frame works by the government was in hardship.

REFERENCES

[1] Bennett, F. Claude, Analyzing impacts of extension programs, Washington, DC: US Department of Agriculture, Science and Education Administration (ES C-575), 1979.
[2] CGWB, Annual report on overall development strategy for the X plan, Faridabad, New Delhi, 2006.
[3] Cook and Campbell, Classic textbook on "*Quasi-Experimentation: Design and Analysis Issues for Field Settings*", 1979.
[4] Garrett, E. Henry and Woodworth, Statistics in psychology and education. Vakils, Feffer and Simons Ltd., Bombay, 1977.
[5] Government of Tamil Nadu, Various G.Os related to WRCP and IAIP.
[6] Indiastat, Selected State-wise Area Covered under Micro Irrigation (Drip and Sprinkler) in India, 2016.
[7] Kannan, S. and Gurumurthy, S. Drip irrigation and water management, *Yojana,* Feb.15-16, 1999.
[8] Kulecho, I.K. and Weather head, E.K. Reasons for smallholder farmers discontinuing with low cost micro irrigation: A case study from Kenya. *Irrigation and Drainage Systems*, 19: 179-188, 2005.
[9] Magar, S.S., Firke, N.N. and Kadam, J.R., Importance of drip irrigation. Sinchan, 7, 61-62, 1988.
[10] Namara, R.E., Upadhyay, B. and Nagar, R.K., Adoption and impacts of micro irrigation technologies: Empirical results from selected localities of Maharashtra and Gujarat States of India. Research Report 93, International Water Management Institute, Colombo, Sri Lanka, 2005.
[10] Narayanamoorthy, A., Drip irrigation: A viable option for future irrigation development, Productivity, 38 (3): 504-511, 1997.
[11] Palanisami, K. and D. Suresh Kumar. Power pricing, groundwater extraction, use and management: Comparison of Andhra Pradesh and Tamil Nadu states. *Water, Livelihoods and Environment in India: Front Issues in Water and Land Management and Policy*, IRMA, Gujarat, January 27-29, 2003.
[12] Rockwell S.Kay; Kohn Harriet. Post Then-Pre evaluation, *Journal of Extension*. 1, 27(2), 1998.
[13] Seckler, D., Molden, U.A.D., de Silva, R. and Barker, R., World water demand and supply, 1990 to 2025:Scenarios and Issues. Research Report 19, International Water Management Institute (IWMI), Colombo, Sri Lanka, 1998.
[14] Qureshi, M.E, Wegener, M.K. Harrison, S.R. and Bristow, K.L., Economic evaluation of alternate irrigation systems for sugarcane in the burdekin delta in North Queensland, Australia. In: Brebbia, C.A., Anagnostopoulos, K, Katsifarakis, K. and Cheng, A.H.D. Eds., *Water Resource Management*, WIT Press, Boston, 47-57, 2001.

AUTHOR'S PROFILE

C. Karthikeyan, born on 14th November 1970, did his B.Sc., (Ag.) from University of Agricultural Sciences (UAS), Bangalore during 1987-91; completed M.Sc.(Ag.) and Ph.D., in Agricultural Extension during 1992-97 at Tamil Nadu Agricul--tural University (TNAU), Coimbatore. Won Post Doc Fellowship to work on a project at Rockefeller Centre, Italy during 2006. Completed Australian Government's Competitive Post Doc. Fellow at Charles Sturt University, Australia during 2009-10. Graduated MBA (HRM) during 2010 at Bharathiar University, Coimbatore. He is certified by AIIMA, New Delhi as an accredited management teacher in HRM. Started his career as Scientist (Ag. Extension) at Central Institute of Fisheries Technology, ICAR, Cochin during March-June, 1997 and later joined as Assistant Professor (Ag. Extension) on 11th July 1997 at Tamil Nadu Agricultural University, Coimbatore. Currently, working as Professor (Ag. Extension) at e-extension center, Directorate of Extension Education, TNAU, Coimbatore. He has published 18 standard books (with ISBN) in various subjects of Agricultural Extension for the benefit of UG/PG students in Agricultural Extension. Published 18 book chapters, 18 technical books based on research projects, 114 Scientific and popular articles in International and National journals for the benefit of fellow extension researchers across the world.

J. Yoga Narasimhulu Naidu, born on 5th May 1989, did his B.Sc. (Agriculture) in 2012 from Agricultural College, Mahanandi, ANGRAU, Hyderabad (Andhra Pradesh) and M.Sc. (Agricultural Extension) in 2014 from SHIATS, Allahabad (Uttar Pradesh). Presently he is pursuing Ph.D., (Agricultural Extension) at Department of Agricultural Extension and Rural. Sociology, Tamil Nadu Agricultural University, Coimbatore. Won Gold Medal at his M.Sc. level and obtained DST- INSPIRE Fellowship during Ph.D. He has published 07 research articles and two books and one book chapter. Cell : +91-9490100851.