

## Capacity Building Needs and its impact on Micro Irrigation implementation

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### Introduction

With dwindling water resources and manpower required for farming, the area expansion with introduction of micro irrigation systems is rapid. However, the success of drip irrigation systems depends on proper maintenance. The Water Technology Centre of TNAU implemented a capacity building project for the drip irrigated farmers of Western region of Tamil Nadu. The project was funded by M/s Tata Trusts, Mumbai with the technical collaboration from International Water Management Institute, Colombo and private organization M/ s.Jain Irrigation Systems Ltd. The main objectives of the project were to build the capacities of the drip irrigated farmers on periodical maintenance, empowering them with recommended fertigation techniques etc. The 1<sup>st</sup> phase of the project TN-DRIP was executed for three years from 2009-12 in Erode district of Tamil Nadu where the drip installations were the highest in the State. Subsequently, the 2<sup>nd</sup> phase of the project funded by M/s NavajbaiRatan Tata Trusts, Mumbai was implemented by WTC during 2013-16 and the uncovered areas of Erode district and the neighboring Coimbatore and Tirupurdistricts were also included. Saturation approach was adopted in this project to cover the drip irrigated areas of the western region of Tamil Nadu.

### Issues with Micro irrigation

A base line survey was conducted in the initial phase of the project to study the farming situation in the project areas. It was revealed that the following issues were flagged during the survey.

- ❖ The systems needs periodical maintenance which requires constant monitoring.
- ❖ Most of the maintenance crew were not familiar with Micro Irrigation system repair, maintenance or even simple scheduling since there were too many different systems.
- ❖ For most efficient use, systems require pressure regulation (usually pressure reduction); a bit of information rarely shared at purchase.
- ❖ Often shoddy products (There are quality products available but that's not usually what people are looking for with "Micro irrigation" systems – usually people are seeking a cheaper irrigation solution).
- ❖ Products are constantly being introduced, often disappearing after a few months; hence, failed products become hard to replace or impossible to find or repair.

- ❖ Small tubing often becomes clogged from hard water and although new designs include filters and self-flushing emitters, they are costly.
- ❖ Easy prey for kids and pets.
- ❖ Easy prey for rodents.
- ❖ Easy prey for vandalism.

### Progress made in WTC Capacity Building Project

The farmers who have laid out the micro irrigation systems needed sensitization on the layout and maintenance thro' capacity building programmes. The longevity of these micro irrigations was found to be higher when these systems were maintained properly. The Water Technology Centre of TNAU trained 474 farmers of 8 blocks of Erode district during 2013-14, 398 farmers of 8 blocks of Erode and Tirupur districts during 2014-15 and 488 drip farmers of 9 blocks of Erode and Coimbatore districts during 2015-16.

Apart from the farmers, the rural youth who were seeking employment were also identified from the project areas and were trained at the Water Technology Centre and the Jain Irrigation Systems Ltd., Udumalpet for providing the consultancy mode drip maintenance. Totally, 74 rural youth of the above three districts were trained intensively for enabling them to serve the drip farmers on need basis.

The baseline survey involving the basic particulars of the drip farmers viz., extent of land holding, type of land, water source, crop pattern, irrigation pattern adopted, knowledge on drip system maintenance, marketing facilities etc., were collected. It was revealed that the drip farmers were not fully aware of the maintenance aspects and few farmers had been doing the acid cleaning alone with the help of local nontechnical artisans and mostly the acid dealers of nearby town. Almost all the farmers who were interviewed for the baseline particulars wanted the capacity building exercises for all of them as they came across severe clogging in their drip system often. Considering the need, one day training cum demonstrations was organized in Erode, Tirupur and Coimbatore districts. The observations recorded during the survey revealed that clogging of emitters by the salt deposition in laterals and sub mains were the major problems. During the drip system maintenance demo programme, acid treatment, disc and screen filter cleaning and usage of water soluble fertilizers were demonstrated. Pressure regulation, use of pH papers in acid/alkalinity maintenance in water also demonstrated. Different component in drip system operation and maintenance was explained and demonstrated to participated farmers. Fertigation scheduling details gave to farmers in different crops. The soil and water samples were collected from the participants of the demo. The samples are analyzed and based on the results recommendations were given to drip farmers for maintaining drip system, suitable cropping pattern, methods and time of acid treatment and fertigation scheduling of different crops

**Details of Capacity Building activities undertaken by WTC during 2013-16**

District	No. of Blocks	No. of Villages	No. of Farmers
Coimbatore	9	42	337
Tirupur	4	38	269
Erode	13	215	754
<b>Total</b>	<b>26</b>	<b>295</b>	<b>1360</b>

The trained farmers helped their neighboring farmers @ 1: 6 in drip system maintenance as a multiplier effect. In this manner, almost all the drip system installed villages were saturated with the capacity building initiatives.

**Capacity Building Programme on Drip System Maintenance to Rural Youth**

- Unemployed Rural youth have been equipped with drip maintenance skills. Totally 74 youth from these 3 districts were trained for providing additional maintenance support to the drip farmers.
- 10 entrepreneurs have been developed for providing maintenance consultancy to the farmers.

**Impact Analysis on the Project interventions**

The 2<sup>nd</sup> phase of the Drip capacity building project was commenced during 2013-14. During the 1<sup>st</sup> year, the project activities were undertaken in 9 left over blocks in Erode district covering 20 villages. 474 drip farmers were benefited directly. During 2014-15, 6 blocks in Erode and 2 blocks in Tirupur were covered benefiting 398 drip farmers apart from rural youth. During 2015-16, 2 blocks in Tirupur district covering 23 villages and in Coimbatore district, 8 blocks covering 42 villages were involved. The total number of direct beneficiaries was 488 drip farmers and 73 rural youth.

The samples were taken from the above project areas of Erode, Coimbatore and Tirupur districts. 20 farmers from each cluster were identified for collecting the information on the impact of interventions made earlier. The results have been compiled and presented in the Table. The major crops grown were banana, sugarcane, turmeric, tapioca, maize, vegetables brinjal, tomato, onion, papaya and coconut.

- (i) **Impact on Crop yields:** The data revealed that the knowledge empowerment thro' capacity building resulted in the yield enhancement of 19 to 37 percent in the above field crops. Among the crops, the highest yield improvement of 37 percent was noticed in vegetable crops i.e. brinjal and tomato. Onion recorded 30 percent increment due to intervention. The banana and sugarcane farmers could increase the mean yield by 22 and 25 percent respectively due to capacity building initiatives. The coconut productivity was found to

enhance by 30 percent due to project activities undertaken in these three districts. The reasons for yield enhancement were attributed to the maintenance of required pressure in the drip system, installing sand filters wherever required, periodical cleaning of filtration units, judicious fertigation and acid cleaning whenever required. These techniques acquired by the drip farmers thro' the Project's onsite demonstration had helped them in increasing the crop productivity.

- (ii) **Impact on Farm Net Income:** The farm net income was increased due to capacity building initiatives. The per hectare net income was increased by Rs.1,77,900 in banana due to yield enhancement and reduction in cost of cultivation. Similarly Rs.79375 was recorded as additional income in sugarcane. The short duration crops like onion and maize had incremental income of Rs.57,500 and Rs.31,450 respectively due to periodical maintenance and judicious fertigation schedules adopted by the beneficiary farmers.
- (iii) **Impact on Water Use Efficiency of crops:** The water used by these crops was reduced significantly and the quantity of water saved ranging from 55 mm in tomato to 540 mm in turmeric. The Water Use Efficiency was enhanced significantly irrespective of the crops. In banana, the WUE was enhanced from 70 kg/ha-mm to 115 kg/ha-mm. In sugarcane, the WUE was increased to 141 kg/ha-mm from 83 kg/ha-mm. In vegetable crops, the WUE was enhanced from 146 kg/ha-mm to a maximum of 285 kg/ha-mm. Thirty seven percent of water was saved in coconut because of project interventions.
- (iv) **Impact on Water Productivity:** The water productivity expressed in terms of monetary value for every unit of water consumed revealed that all the crops recorded increased water productivity due to project activities. One mm of irrigation water gave additional income of Rs.505 in banana, Rs.128 in sugarcane, Rs.122 in turmeric, Rs.289 in tapioca, Rs.305 in onion, Rs.1210 in brinjal and Rs.1252 in tomato when compared to the period prior to the project period. These additional benefits in income and water productivity were made possible because of understanding of the techniques demonstrated thro' the project.
- (v) **Impact of socio-economic conditions:** In general, the lateral spread of the technologies was found to be around 1:10 indicating that every trained farmers helped around 10 neighbouring farmers in adopting the techniques which resulted in overall improvement of the socio economic conditions of the farmers in the project areas.

**Impact of interventions on Crop Productivity, Farmers' Income, WUE and Water  
Productivity in the  
Project areas**

S.No	Crop	Ave Yield (kg ha <sup>-1</sup> )		Ave Income (Rs./ha)		Water Requirement under drip irrigation(mm)		WUE (kg ha-mm <sup>-1</sup> )		Water productivity (Rs ha-mm <sup>-1</sup> )	
		Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention	Before Intervention	After Intervention
1.	Banana	67375	82200	70850 0	88640 0	970	718	70	115	730	1235
2.	Sugarcane	12700 0	158750	24250 0	32187 5	1540	1124	83	141	158	286
3.	Turmeric	4560	6000	22360 0	31000 0	1800	1260	3	5	124	246
4.	Tapioca	37500	50000	17625 0	24500 0	600	420	62.5	119	294	583
5.	Onion	9625	12500	92500	15000 0	400	280	24	45	231	536
6.	Maize	5550	7400	54350	85800	350	240	16	31	155	358
7.	Papaya	18550	22000	16260 0	20400 0	740	530	25	41	220	385
8.	Coconut	23100	30000	21100 0	28000 0	130 lit day <sup>-1</sup>	95 lit day <sup>-1</sup>	37 % increase			
9.	Brinjal	30560	42000	66400 0	95000 0	600	410	51	102	111	232
10.	Tomato	26960	37000	20960 0	31000 0	185	130	146	285	113	239