

Telangana State Micro-irrigation Project

to address the water scarcity in the state

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After the bifurcation of erstwhile Andhra Pradesh, Telangana state was born. The water resources in the state are limited and with a view to use available water resources efficiently, a drip irrigation project was launched on 03 November, 2003 namely, Telangana State Micro irrigation Project (TSMIP). The major objectives of the project were to provide the farmers with a tool and to provide them with necessary knowhow for utilizing the water efficiently. The project has been a success and has brought several benefits to the farming community who opted for the project. The paper presents the impacts of the project in terms of reduction in use of water, fertilizers, labour, power and production costs and increase in yields contributing to higher farm profitability.

Key words: Drip irrigation, Micro-irrigation, Telangana, TSMIP, Water scarcity

WATER is essential for agricultural production, food and nutritional security. Demand for food in India is expected to surge more than 20% by 2050 in view of the rapidly increasing population. The possibility of extending cultivated area further in the country is rare therefore the increased food requirements would need to be met from irrigated agriculture with higher productivity, crop diversification and crop intensity. Water being the most crucial and limiting input in agriculture; technologies of efficient water utilization in agriculture like, micro-irrigation will play an important role in increasing yields and income of the farmers. Currently only about 12 million hectares of cultivated area in the country is under different forms of micro-irrigation including drip and sprinkler irrigation against an estimated potential of 70 million hectares.

Addressing water scarcity through efficient irrigation is a solution in the agriculture sector which directly contributes to the achievement of the 2030 Agenda for Sustainable

Development, its SDGs and the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC). The Paris Agreement recognizes the fundamental goal of ensuring food security and ending hunger, as well as the vulnerability of food production systems to climate change. Therefore, investments in efficient drip irrigation technology can lead to major improvements in the standard of living of small and marginal farmers who produce the majority of food. Micro-irrigation also offers environmental sustainability and a superior alternative for handling adverse effects of climate change.

Drip irrigation system- key enabling factors

While the benefits of efficient irrigation technology are well known, a number of factors are necessary to realize these benefits fully. The major prerequisite considered to harness the potential benefits of drip irrigation systems are:

- **Awareness and skills-** The adoption decision, performance and

sustainability of efficient drip irrigation technology depends on farmers' initial awareness of its technical feasibility, economic viability, knowledge of system components and their proper use. The technical feasibility parameters include suitability of farmers' land, viz. holding size, topography, agro-ecological conditions, soil hydraulic properties, choice of crops and cropping systems, water source, its yield and quality, pump suitability etc. Whereas, decision criteria for economic viability are yield increase, system cost, subsidy pattern (amount), profitability and payback period.

- **Infrastructure** - A good agriculture infrastructure is required for accelerating the process of adoption of efficient drip irrigation technology and ensuring farmers to realize its full benefits. Agricultural infrastructure includes available resources, farm inputs, physical infrastructures of roads and markets etc and the institutional infrastructure for technical support to the farmers. Both private and



public sectors have important roles to play in creating these infrastructural facilities for raising farm productivity, lowering production costs and accelerate economic growth.

- **Regulatory environment** - The government has a role to play in ensuring that appropriate regulations are in place such as efficient and the transparent subsidy fund flow models, better process management including online tracking and monitoring, ensuring smoother and long-term technical and financial implementation guidelines, crop focussed solutions and priority sector lending status to micro-irrigation, which support small and marginal holding agriculture and ensure farmers' access to modern and efficient drip irrigation technology.
- **Access to inputs** - Quality agricultural inputs play a fundamental role in adoption of efficient drip irrigation and fertigation technology, and enhancing crop productivity. Therefore, access and quality of farm inputs, timely availability of inputs such as good quality seeds, water soluble fertilizers, agro-chemicals combined with high frequency application of water and fertilizers as per crop needs through drip system impact the input use efficiency, yield and farm incomes.
- **Access to markets** - Enhanced crop production resulting from the adoption of drip irrigation and fertigation technologies need linkage to market for translating it into higher income of farmers. The participation of small and marginal farmers in agriculture markets is limited and farmer's actual share in consumer's price is very low (15 to 40%). The agriculture market advisory services for target marketing and positioning the availability and reliability of off-take agreements, farmers participation and involvement in FPO, e-markets (eNAM), traders, processors, exporters and others who purchase farmers' crops help to reduce price fluctuations, wastage and realize higher farm incomes.
- **Access to finance** - Many small and marginal farmers in Telangana

operate with no drip irrigation equipment and can only water their crops when it rains. This means that fields stay dry and uncultivated most of the year, severely limiting output and earning potential. Drip irrigation is critically important as an innovative climate smart irrigation practice in small holder agriculture in semi-arid areas of Telangana. However, the lack of access to finance to purchase efficient drip irrigation equipment is considered to be the main constraint to technology adoption. Government subsidies (80-100% depending on the social category) in Telangana have facilitated the adoption of efficient drip irrigation technology by small and marginal farmers. Other sources of finance for farmers could include partnerships between sugar and oilseeds cooperatives, FPOs, contract farming units and financial institutions.

Drip irrigation system under TSMIP

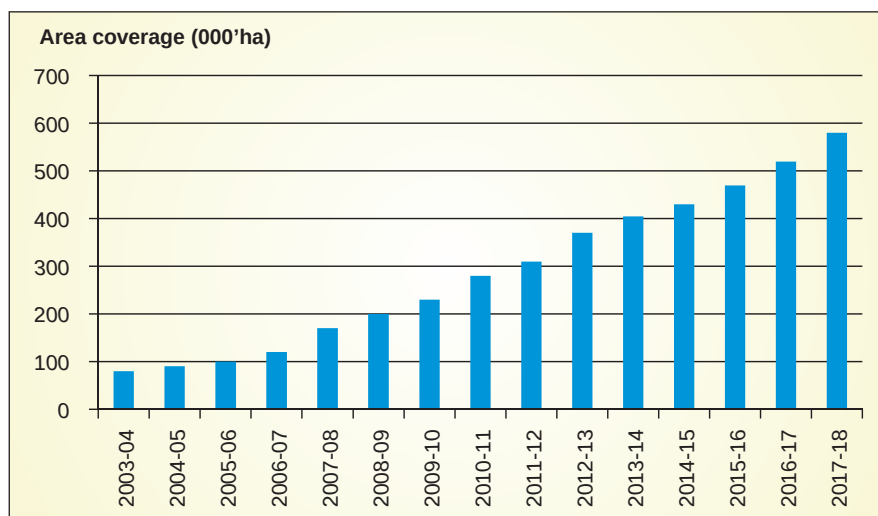
Drip irrigation technologies were initially developed to irrigate high value green house crops and became commercially viable for field crops after the invention of inexpensive, weather resistant polyethylene plastics during post World War II. Drip irrigation systems designed for higher water application efficiency and distribution efficiency of more than 90% only were permitted under the project. Under the project, all components of drip system of good quality were accepted on an

additional condition of providing knowhow on its operation, irrigation and fertigation scheduling to the beneficiaries under the strict monitoring of the State agencies. The specific material and installation requirements varied from field-to-field depending on the field size, land topography, location of water source, water yield and quality, crops and cropping system and agro climatic conditions etc.

Under the project, all the farmers are eligible for financial support by the Government up to a 5.0 ha area at a rate of 80% subsidy or up to 6.5 lakh rupees (whichever is less). The project has a provision of up to 100% subsidy for scheduled caste and scheduled tribe farmers and up to 90% subsidy to farmers from other backward communities. The subsidy is regulated by fixed yearly quotas and allotment of geographical domains to each micro irrigation company. A toll free number is provided for farmers for making enquiries about their application status.

Increase in drip irrigated area

Out of nearly 1524 million ha of arable land in the world, 324 million ha of area is irrigated, and only a little over 13.08 million ha is drip irrigated. Much of this (74%) lies in 7 countries namely India, USA, Spain, China, Korea, Brazil and South Africa. Till 1991, the area under drip irrigation in India was only about 70,000 ha but in the last two decades, the area under drip



Area coverage under the Telangana State Micro-Irrigation Project (TSMIP)



Table 1. Quantitative assessment of impacts of TSMIP

Benefits accrued	Fruits	Vegetables	Field crops
Yield increase (t/ha)	5.0 (Pomegranate)– 66.0 (Sugarcane) gourd)	3.8 (Turmeric)– 34.8 (Bottle	0.5 (Sesame) – 4.0 (Rice)
Water saving (%)	18.5 (Oil palm)– 53.3 (Mango)	21.4 (Chilli)– 47.1 (Onion)	8.0 (Sunflower)– 46.5 (Cotton)
Energy saving (KWh/ha)	450 (Water melon)– 1532 (Banana)	303 (Beet root)– 1415 (Turmeric)	118 (Maize)– 512 (Ground nut)
Increase in fertilizer use efficiency (%)	27.6 (Pomegranate)– 94.4 (Mango)	38.8 (Cucumber)– 110.6 (Chilli)	30.6 (Sesame)– 80.0 (Rice)
Increase in returns over surface method (₹/ha)	62,300 (Water melon)–4,05,600 (Papaya)	44,000 (Brinjal)– 6,35,000 (Gherkins)	25,764 (Sorghum)– 1,13,100 (Cotton)

irrigation has grown to nearly 4.5 million ha, making India the largest drip irrigator in the world.

Along with Rajasthan, Maharashtra, Gujarat, Karnataka and Andhra Pradesh, Telangana has emerged as the leading state under the TSMIP in the adoption of drip irrigation. As per the records of Horticulture Department, a cumulative area of 0.73 lakh ha was brought under drip irrigation in Telangana by the end of 2003-04. Whereas, the drip irrigated area coverage after the launch of TSMIP (earlier under APMIP before the bifurcation of the State of Andhra Pradesh), from 2003-04 to 2016-17 increased significantly to a total of 5.93 lakh ha.

Project achievements

The project (TSMIP) has made significant impact in the saving of water (8.8–53.3%), fertilizers use efficiency (30.1–110.6%), energy (118–1532 KWh/ha), and reduced production costs (15.4–27.3%). Drip irrigation and fertigation also led to

higher yields ranging between 20.9–104% in different horticultural and agricultural crops. This in turn increased the net incremental cash flow of ₹ 28,329 – ₹ 2,44,073 per hectare over surface irrigation in different horticultural and agricultural crops. Farmers growing papaya accrued a net present value of ₹ 4,54,715 per hectare. Fertigation benefitted the farmers to recover the equipment cost just in one crop season. Quantitative assessment of the project impact resulted in large ranges of the benefits in different crops (Table 1).

Adoption of efficient drip irrigation technology resulted in higher cropping intensity, input savings, system automation, enhanced crop yield, improved quality of produce, in a favourable business environment, help farmers generate greater farm profits and livelihood security. Further, through its effects on resource use efficiency (water and energy) and soil quality, efficient drip irrigation technology also promotes environmental

sustainability. The use of efficient drip irrigation technology therefore helps farmers in vulnerable districts to adapt and strengthen their resilience to climate change.

CONCLUSION

Irrigation of crops using inefficient gravity irrigation is a major impediment to optimizing productivity to majority of small and marginal farmers world over including, Telangana. Therefore, Government of Telangana's investment in TSMIP - to strengthen the farmers hands with efficient drip irrigation and fertigation tools through 80-100% subsidies is aimed at promoting highly productive yet climate-smart agriculture. Providing means to small and marginal farmers to use innovative and efficient drip irrigation and fertigation technologies in crop production is a key to averting water scarcity, increasing agri- horticultural productivity, incomes and household food security. Efficient drip irrigation also broadens farmers' crop choices and enables them to grow higher-value vegetables and fruits for higher farm profitability. It also generates employment for people both with and without land, since more people are needed to harvest, process, and market the crops and to supply farm inputs. The project paves the way for other similar placed states to follow and adopt similar projects.

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Micro-irrigation in Indian agriculture (Coverage and impact)

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) launched in 2015–16, led to increase in total area under micro-irrigation to 8.6 million ha (Mha) in 2016–17. Rajasthan having the highest area under micro-irrigation and leading in adoption of sprinkler irrigation contributed about 33% of sprinkler irrigated area in 2016–17. This study analysed the farm level impacts from the Bikaner district of Rajasthan.

Farmers adopting sprinkler system cultivated relatively higher area than their counterparts, and varied across seasons and crops. The increase in cropped area for *rabi* crops varied from 21% in rapeseed and mustard to 254% in chickpea. The increase in chickpea area is attributed to assured irrigation, which is critical for crop growth and good harvest. In *kharif* crops, highest increase in cropped area was observed in *bajra* (149%), followed by *moong* and *gwar*. Adopted farmers started growing high value crops like fenugreek (*methi*) and isabgol for better returns. Yield on adopted farms also increased significantly. Among *rabi* crops, highest increase in yield was for chickpea (43%), followed by R&M (12%) and wheat (6%); while in *kharif* crops, yield increase was highest for *bajra* (41%), *moong* (38%) and *gwar* (15%). The yield obtained on adopted farms was statistically significant than that achieved on non-adopted farms.

Source: DARE-ICAR Annual Report 2018-19

