

GOOD PRACTICES 39: AUGUST 2020



THE INTEGRATED MODEL OF EXTENSION DEVELOPED BY JAIN IRRIGATION



Micro-irrigation provides significantly higher water use efficiency, which can lead to increase in the area under irrigation. The combination of water and fertilizer application through MIS results in higher crop productivity also. For successful adoption of micro-irrigation systems (MIS), farmers need integrated technical support. In this good practice note, Dr P Soman discusses the integrated model of extension support provided by Jain Irrigation Systems Limited (JISL) which continues to be the market leader for MIS in India.

CONTEXT

Agriculture production is highly dependent on water and managing water sustainably is key to the future of food and agriculture. Under dominant surface irrigation, the crop can utilise only less than half of the water released as the rest of the water gets wasted, mostly as runoff and percolation. Micro-irrigation systems (MIS) can significantly reduce water lost through surface irrigation. MIS was introduced as a comprehensive solution in India in 1987 by Jain Irrigation, and by 2019 it has been adopted across 10 million hectares in India. The integrated approach evolved by JISL and the support provided by various government and other agencies have been the two main factors behind the rapid growth of micro-irrigation in India.

For successful implementation of MIS numerous technical services, such as land survey, water and soil analysis, climatological data, design, availability of high-quality components, installation, extension and training of farmers as well as after sales customer services, etc., are necessary. These vital services were not available in India during the early phase of introduction of micro-irrigation by overseas-based companies. Their distributors sold irrigation systems like any other commodity. The result was total rejection of the systems and distrust among farmers. When Jain Irrigation surveyed the situation it became very clear to them that a strong extension effort should precede the actual provision of the physical systems to the growers. Jain then had to set up the required infrastructure and provide technical and support services. Educating farmers prior to their actual use of the system became the key step and an experienced extension programme was established right from the beginning.



EXTENSION AT JAINS

Rationale

An average farmer in a village (that means 95% of our customers) has very limited access to information. Public extension machinery is woefully inefficient and not sufficiently focused. In India (as in other developing countries too) micro-irrigation is not a topic generally taught at the undergraduate level in agriculture courses. Because of these deficiencies, companies have to take the onus on themselves. We realised that farmers fully adopt micro-irrigation technology only if they understand:

1. the basics of soil-plant-water relationships;
2. the parts of the system and their working; and
3. the adjustments they need to make in their customary cultivation practices.

Only if they internalise these, can the actual and precise operation of the irrigation system happen. And only by following the exact operational steps can they get the benefits – higher yield, lower input use, and higher incomes.

Objectives

At JISL, the extension programme and farmer capacity building process are the responsibility of the agronomists. We have a Chief Agronomist and a team of agronomists for each state of the country. The objectives of the programme are as follows:

1. Build awareness among the farmers of the concept of micro-irrigation, fertigation and micro-irrigation assisted precision farming of each and every crop the farmer chooses to grow.
2. Bring in changes in their cultivation practices and attitude towards input use.

Process

The extension work begin with a pre- system-acquiring stage and a post-installation phase. Jain Agronomists ensure a close follow up with the farmer during the first crop using the micro-irrigation system, and may follow up into the next crop in rotation. The types of extension work needed for micro-irrigation adoption by small farmers are as follows:

- Educating the farmers/stakeholders about micro-irrigation;
- Familiarizing them with the physical components of the system;
- Impressing upon them the benefits of sharing crop data from other locations;
- Educating them on the changes required in the cultivation when micro-irrigation is adopted;
- Teaching them by demonstrating the operation and maintenance of the system in their farm;
- Enlightening them about the productivity increases deriving from this technology;
- Removing the doubts and wrong ideas that are prevalent in the area;
- Collect and transmit feedback information from them for solving product-related problems (Lessons learned).

Approach

At Jains, we follow a Research-Development-Demonstration (R-D&D) approach and research is an integral part of our extension delivery.

In 1990 the company set up a large farm for Research, Development and Demonstration at Jalgaon, Maharashtra. MIS has been installed on as many as 45 different horticultural crops. Many farmers – from different parts of the country – visit this demonstration cum-R&D farm to see how MIS can be applied for different crops. On seeing the benefits of micro-irrigation on different crops, farmers get convinced and they begin to prepare themselves for adopting it in their own farms. Later, in 2004 a

second large farm was set up in the southern state of Tamil Nadu, near Coimbatore, where a large number of fruit crops and annual and seasonal crops common to the southern peninsula of India were grown under innovative crop geometry and appropriate micro-irrigation and fertigation systems. A third farm was established in Alwar, Rajasthan, in 2012, where several annual/seasonal crops are grown including seed spices.



'Seeing is believing' - Orchard growers at the Jain R&D farm in Tamil Nadu

The company has also carried out extensive field trials. A number of R&D projects were undertaken to develop irrigation schedules, optimization of drip design, and development of agronomical practices to optimize the benefits of micro-irrigation, and to obtain higher yields at reduced operating costs. The results obtained/the findings were published from time to time and made available to growers. The R&D work has been very beneficial in achieving higher productivity and optimum use of inputs. Research is still continuing in these farms. The company donated MIS to universities and research institutions, and worked together to study different aspects of micro-irrigation and to optimize the performance of several crops.

Extension methods



An Extension Agronomist giving a seminar on coffee micro-irrigation

The extension department continues to participate in exhibitions, seminars, farmer rallies, etc., to promote the MIS concept at the doorsteps of farmers in rural areas. This department has also prepared various booklets with the information generated from the R&D work. Information regarding various aspects of MIS, including irrigation scheduling, importance of filtration, possibility of blockage of drippers and acid/chemical treatment, application of fertilizers through MIS, etc., are provided. Crop-specific booklets, success stories/experiences of MIS users, etc., are also prepared and made available to farmers, bankers, agriculture departments and others. Different media – exhibitions, newspapers, periodicals, radio and TV – were extensively used to carry out these promotional activities. Last mile connectivity is established by the field agronomists placed in each district/location through their regular visits and meetings with individual farmers. This was found to be the most effective method, and this has resulted in a large number of farmers successfully adopting MIS.

In addition to the demonstration farm established by the company, many MIS were supplied to farmers in different areas for different crops – either free or at a subsidized price. Close contact and collaborative work are always carried out. These farms have become good demonstration farms and farmers from nearby areas visit these farms and see the benefits of MIS on a given crop. These farms also provided vital information/feedback which helped the company improve design, practices and products. These farmers also became unofficial spoke persons for the company and spread the word regarding the benefits of Jain micro-irrigation.

SYSTEM OPERATION SUPPORT



Operating a micro-irrigation system in a village in Telangana

JISL had set up a service department which provides services, such as periodical inspection, repairs and maintenance, and training for operations. Through these activities, the company ensures that every MIS installed functions properly and delivers the expected results. The company's extension and R&D team visit MIS installations periodically to study the problems encountered by farmers. Numerous problems were encountered in using MIS arising from animals, birds, farming practices, etc. Some of these problems were peculiar to the local conditions. Then the R&D team would do research and find solutions to overcome these problems.



An Extension Agronomist demonstrating filter cleaning in a village in Maharashtra

Promotional activities to expand reach

Once the decision to manufacture MIS was taken by the company, a massive educational campaign through newspapers was started to educate farmers, policy makers, researchers and others regarding the progress of irrigation in India, the drawbacks/limitations of conventional irrigation systems, and the urgent need for improving water use efficiency and productivity in agriculture. In the second phase of the campaign, the concept of highly efficient water management system, i.e., MIS was introduced. In the third phase, the specifics of MIS, i.e., its advantages, various stages and its importance in implementation of MIS, and the drawbacks of the MIS installed in the past, were introduced.

Through these campaigns, awareness on the need for improving productivity and water use efficiency was created. The company also took up massive campaign to educate and bring awareness to policy makers, public opinion makers, government officials and politicians on the importance, relevance, and the benefits of taking MIS to Indian farmers and the support needed from them in popularizing MIS in India. A number of presentations were made to Agriculture Ministers, officers and researchers on the benefits of MIS. Their visits to the company's R&D farm as well as to farmers' fields, were arranged. Even in recent times (25 years since the beginning) these activities continue.



A farmer meeting in collaboration with an NGO in a Bihar village

DEVELOPMENT OF HUMAN RESOURCES

Jain's extension agronomists are trained in-house at the company's R&D farms, and later in farmers' fields. Many new entrants, including toppers from universities, are finding it difficult to understand the concept and expectations from them once they are on the job. After training and exposure to farms these graduates and post-graduates take up independent farmer support at different locations. First thing one should understand is that a micro-irrigation agronomist is different from a classical agronomist graduating from a university. It is imperative to note here that many Agriculture Universities in India do not teach micro-irrigation in their BSc and MSc courses. Only BTech and MTech courses have irrigation as a subject but micro-irrigation is not dealt in detail in these courses either.



A Jain Agronomist teaching a farmer in Madhya Pradesh

A micro-irrigation Agronomist should be proficient in all these five different areas:

- Crop related knowledge;
- Micro-irrigation system related knowledge;
- Micro-irrigation technology related knowledge;
- Communication ability;
- Consultancy related knowledge.

A Jain extension agronomist – over a period of one year after joining – becomes efficient in all the above mentioned areas. Besides providing technical support to farmers they also:

- Guide farmers in optimizing his land allocation with different crops with the aim of boosting his returns;
- Introduce him/her to exotic crops that are high income providers but not grown in his area;
- Connect him/her to finance institutions;
- Connect him/her to buyers of his produce;
- Encourage him/her to adopt crop diversification.

Why is field research so important?

Micro-irrigation provides soil moisture only in the wetting zone. Matching the wetting zone with the crops' root zone (rhizosphere) is an art; when successfully perfected it produces the highest yield per unit of water used. To arrive at this point, one needs to change the practices followed in cultivation, either fully or partly. This is indeed a major challenge that requires prior validation through field research.

Thus, extension agronomists help achieve the corporate objective of provision of service and assistance to farmer customers at the highest possible level. They also support and participate in applied research in farmers' fields for improving cultivation practices and introducing high-tech farming technologies matching the micro-irrigation technology.

IMPACT

As a technology, when adopted micro-irrigation needs certain well-defined changes in the way farming is done. In this system water is not allowed to flow from one point to another through channels in the field. The very method of not needing field channels releases a lot of unplanted or under-utilized portions of the field for crop planting. For instance, in onion, conventionally, two-thirds of the total land area is occupied by water channels and only one-third has onion plants standing. What a waste of good land! We changed this when drip laterals for supplying water and nutrients were placed on beds with onion plants. As a result we increased the population of onion plants from 67,000/acre to 2.5 lakh plants per acre. This knowledge was obtained from field research done in several onion growing areas and the rest is history. Farmers understood the value of this *CHANGE*.



Onion cultivation in a conventional system / Onion cultivation in the modern high-tech system

Banana, traditionally seen as a *villain* in terms of water consumption is made to grow and yield far higher (80% more) by regulating the irrigation as per crop water requirement. Micro-irrigation research on this issue in several states changed the image of banana from a ‘Water Guzzler’ to a ‘Water User’. In high-tech production of banana, micro-irrigation and fertigation became the most critical inputs. Farmers became masters of this technology shift.

Conventionally, sugarcane is fertilized in 2 or 3 splits, and all fertilizers are applied before the crop reaches 90 days. Imagine the depth of change that has happened in cane cultivation now due to the persistent efforts of the Jain extension team. We studied and now farmers and sugar mills have made it a compulsory practice to fertigate sugarcane till 270 days of its growth. This happy state of affairs would not have been possible had Jain Irrigation sold only micro-irrigation physical components.

In the last 10 years our R&D has standardised the method of growing rice (a well-known water guzzler) with drip irrigation bringing down the crop water use from 9.5 million litre /per acre per season to 3.2. Farmers are now adopting this technology.

The following numbers also inform the extent of our work.

- More than 350,000 farmers visit Jain’s R-D&D farms each year.
- More than 6 million have visited our farms in the last two decades.
- A team of 120 to 150 Jain agronomists (extension) reach out to farmers every day.
- Jain micro-irrigation systems are irrigating some six million ha in India.

The integrated model of extension developed by Jain Irrigation India, has caught the attention of Jain subsidiaries in other countries, and they too have started adopting the model in their countries of operation. Two of the best examples come from USA and Brazil where JAIN Irrigation USA and Jain Irrigation Brazil have adopted the model. Similarly, Jain Irrigation implements the same model in all countries where Jain India has taken up micro-irrigation projects – countries in Asia, Africa and the Pacific.

CHALLENGES

While scaling-up MIS, we faced two important challenges and we addressed these in the following ways (see Table 1).

Table 1: Challenges and solutions

Main Challenges	Solutions adopted
Low awareness among farmers about MIS and the need for training and capacity building	Taking up extension work by Jain Irrigation
	Establishing field demonstration for most crops
	Entering into collaborative research with universities and public research institutions
	Establishing farmer-owned farmer training centres (in progressive farmers’ fields)
	Providing on-field technical support to farmers
	Providing a platform for farmer-to-farmer contact – bringing adoptee and non-adoptee farmers together
	Establishing the largest technical experts pool in the private sector

	Handholding of farmers during one to two seasons
Cost of initial investment by farmers	Presenting case studies to government departments
	Ensuring dialogue with policy makers
	Governments introducing subsidy programs for equipment
	Bringing banks to part/full finance for equipment

END NOTE

Field research is critical for focussed outreach and effective utilization of micro-irrigation technology. It is essential to study a new crop or a new situation each time we introduce the micro irrigation solution. Merely disseminating information on MIS will not lead to successful adoption or scaling up. Farmers need to experience the technology and see its impact in a real life situation and they need customised support (depending on their field situation) from pre-system acquiring stage till the post-installation phase. At Jains, we recognise this need for integrated support and our extension agronomists are trained to provide this support to farmers.

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