

**STUDY ON EFFICACY OF MICRO IRRIGATION SYSTEM
(DRIP AND SPRINKLER) IN DROUGHT PRONE PARTS OF
HARYANA**



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Dr.S.S.Grewal
President SPACE

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EXECUTIVE SUMMARY

Water is one of the most important natural resources for sustaining human life on mother earth. However, it has become increasingly scarce worldwide and it is being presumed that more than one-third of the world population would face absolute water scarcity by the year 2025. The worst affected areas would be the arid and semi-arid regions which are already having dense population living below poverty line. Rising demand for urban and industrial water supplies pose a serious threat to irrigated agriculture. However, to achieve the required food and fiber production for ever-increasing population, water is to be used most judiciously. The situation in India is not different and is most critical, where absolute water scarcity is already affecting a substantial population. In order to feed the growing population, we would have to increase farm income substantially. For that the overall agricultural production needs to be increased. One of the key ways to boost overall agricultural production is to implement better soil-water management techniques in arid and semi-arid areas.

Irrigation is essential for increasing the efficiency of input-use, adoption of high-yielding varieties, and improving cropping intensity and yields. The water requirement is bound to increase with the expansion and intensification of agriculture in addition to the increased demand from the industrial and domestic sectors. There is still a wide gap between the created irrigation potential and utilization. Since water is a scarce resource, it is important to conserve and manage it efficiently. The over-exploitation of water has cropped up the problem of depletion in mainland and also rise in water table which has resulted in creation of salinity and water logging problems. The concern of economic efficiency in water-use has remained largely unattended.

One of the water management strategies introduced relatively recently in Indian agriculture is micro-irrigation (MI). Unlike flood method of irrigation (FMI), micro-irrigation supplies the water at the required interval and in desired quantity at a place where water is demanded using a pipe network, emitters and nozzles. Therefore, MI in principle results in low conveyance and distribution losses leading to higher water use efficiency. The net utilization of irrigation water in drip system is 90% and through sprinkler system, it is 82%. In view of the same, micro-irrigation is having paramount importance with brighter future prospects.

In Haryana state, the soil conditions, topography and the climate that are prevailing in the south western part of the state, especially in districts of Bhiwani, Mahendergarh, Rothak, Sirsa and Hisar, have prompted the adoption of sprinkler irrigation. When farmers shift the cropping pattern more in favor of horticultural crops because of their high profitability, the potential area for drip irrigation is expected to increase significantly in times to come. Further, in many areas where the water table has depleted it has encouraged the farmers to shift the irrigation method from flood to MI.

Micro Irrigation systems are significant not only in water saving but also in efficient energy, labour and fertilizer management for more crop production. These are helpful in uniformity of water application, higher water use efficiency, no land leveling, assured irrigation to the agricultural fields, improving cropping intensity, increasing efficiency through judicious use of irrigation water, saving farm land, appreciating land use and improving socio-economic condition of the farmers. Besides higher water use efficiency, MI has other economic and social benefits too. The field observations show that the MI increases productivity by 20 to 90 % for different crops; reduces weeds, checks soil erosion; and

minimizes cost of cultivation, especially in labor-intensive operations and lower energy use (electricity) for operating irrigation wells due to reduced water consumption.

The water deficit state of Haryana gave a big push to MI, particularly in southern districts where this was most suited due to light textured sandy soils and low rainfall. During the process of implementation in last 20 years, several constraints were noted which were coming in the way of achieving the potential of this technology. Keeping this in view, the National Bank of Agriculture and Rural Development supported a study on the efficacy of micro-irrigation (sprinkler and drip) in drought prone area of Haryana state. Based on the intensive study in three districts namely Bhiwani, Mahendergarh and Nuh through exhaustive consultation of literature, field observations, interaction with officers and farmers, and pre-designed Performa-based collection of field data from 150 beneficiary farmers, the conclusions have been drawn which are summarized in this report.

The responses of the farmers to the pre-designed questionnaire across six study blocks were almost similar and hence combined and summarized as mentioned below:

- a) **The reasons which encouraged farmers to adopt MI. system** included sandy soils requiring more irrigation water; usually farmers have one tube-well which could not cover whole farm, more loss of water in Kacha irrigation channels, more labour cost, more time needed for irrigation and ever-increasing shortage of water.
- b) **The effect of these problems on socio-economic conditions of farmers** was due to low crop yield, less farm income, poor status of living, lowering of water table, more cost involved, borrowing of money for routine needs such as health problems, social customs, education of children and daily requirements; farm operations.
- c) **The effect of these problems on agricultural production** included choice of crops decreased; no fruit/ vegetable/Cotton crops could be raised, low and uncertain production and no market surplus, less use of fertilizer and less crop yields.
- d) **The impact of these problems on livestock and farming** included shortage of fodder for livestock, could not keep high yielding animal, low milk production and no milk for sale, could not afford livestock rearing cost.
- e) **Problems in case processing** included more time in case processing, completion of documents particularly obtaining land record caused problem, less faith on the honesty of the dealer and dealer did not stick to committed time.
- f) **These problems were solved** by getting help to complete the paper from friends, visited department office for help, had detailed discussion with the dealers of the company.

The main problems faced are that the average farmers do not have much knowledge about the procedure and formalities, every work done by dealer and no local service providers, drip and filters blocked very frequently.

How the problems were solved? Most farmers used acid to unblock the filters and drips.

Reasons of dissatisfaction were stated as the material supplied is sometimes of not good quality, drip system does not work properly, and subsidy often comes late, online system cannot be adopted by ordinary farmers and he do not have full knowledge about this system.

Suggestions for improvement included more involvement of the Department in implementation, early release of subsidy should be ensured, less dependence on company dealers, quality of material should be

ensured, more transparency in dealings and farmer should be made aware of procedure by holding workshops.

Farm level constraints in adoption includes that farmers do not have full knowledge about the quality of materials supplied and drip system is limited to few crops mainly Cotton, Department should organize awareness camps, farmers have to depend on dealers and their dealings lack transparency.

The farmers held that there is no way to sustain agriculture in this drought prone area suffering from an acute shortage of water, low rainfall and sandy soils without water saving through micro-irrigation. It was noted that in case of Bhiwani district covering data of Bahal and Tosham blocks the annual net returns was from all the three components namely flood, sprinkler and drip irrigation. Whereas in case of Mahendergarh district, the main focus remained on flood and sprinkler irrigation and drip system was not adopted because of heavy nature of soils. While in case of Nuh district, the sprinkler system was not adopted by the farmers because of heavy nature of soils and problem of salinity and only flood and drip irrigation were adopted. It was noted that drip irrigation adopted on vegetable crops gave the highest annual net returns in case of both the blocks of Nuh district as shown in Table below:

Table: Annual returns of 25 beneficiary farmers of study blocks from three irrigation systems

District	Block	Annual Net Returns of 25 farmers (lakh Rs)			Main income source
		Flood	Mini Sprinkler	Drip	
Bhiwani	Bahal	39.2	57.6	67.0	Mustard and Cotton
	Tosham	39.4	52.4	61.8	Mustard and Cotton
Mahendergarh	Ateli	30.3	52.7		Mustard and Wheat
	Narnaul	41.5	72.59		Mustard and Wheat
Nuh	Nuh	85.1		174.8	Vegetables + Livestock
	Nagina	127.03		271.05	Vegetables+ Livestock
Labour cost Rs/ acre/year		9000	6000	2000	

The B:C ratio was maximum in Mustard followed by drip irrigated vegetables and sprinkler irrigated Wheat. It was low in case of Cotton due to large number of irrigations required, high cost of picking and expenditure on chemicals and repeated sprays.

The field data collected from number of farmers across three districts comparing the cost of cultivation, gross and net returns from crops irrigated by flood, mini sprinkler and drip irrigation has conclusively proved that financial benefit increase by 60 to 70 percent upon shift from flood to mini sprinkler irrigation and more than 80 to 100 percent upon further shift to drip irrigation Such benefits in vegetable crops with drip goes more than 200 percent against flood irrigation.

There is huge saving in labor cost of irrigation. For example, the cost of flood irrigation is Rs 1000 per acre per irrigation; it is around Rs 300 in mini sprinklers and less than Rs 100 in drip irrigation system. The annual irrigation labour cost is around Rs 9000 with flood, around Rs 600 with mini sprinklers and hardly Rs 200 with drip irrigation. Due to time saving in MI, farmers get time to attend other farm operations.

It was interesting to note that the cost of cultivation varied across blocks and districts. For example, in Narnaul area, the cost of cultivation is high since farmers tend to put all inputs required to get better yield levels and their net returns are much higher than Bhiwani.

In case of NUH, the water table is shallow and water is of good quality near the hills where study farmers were located and have opted for drip irrigated Tomato crop and earning profits ranging from Rs 60000 to one lakh/ acre. The economy is sustained by vegetable cultivation.

Though Bajra and Mustard are the main Kharif and Rabi crops but the economy of Bhiwani district is sustained by Mustard and Cotton. Mustard is a wonderful crop requiring less water and less input costs yet provide handsome returns even by one or two irrigations by mini sprinklers.

It is interesting to note that all the micro-irrigation systems may be mini sprinkler or drip system are operational and are fully functional with all the 150 beneficiary farmers contacted during survey. All of them by and large agree that their cases were processed by dealers of the company, but they all participated in planning, and the design was made with their consent and found no problems in installation.

Most farmers are of the view that after handing over the main responsibility to the companies, the department has gone in the background. Most rural farmers with poor education levels fail to understand procedures and formalities and have to depend on the dealers whose hands are not always very clear. This leads to less faith on dealers and an element of less transparency comes in. The departments on the other hand complaint of acute shortage of staff. But they hold that payments are duly made after field verification at site and verification of bills. It is also claimed that now portal system is followed where all the information upwards and downwards flow through net and with these complaints due to delays have reduced. The dealers are clever enough to get no objection/ satisfaction certificate from the farmers so that there is no problem in release of grant.

The officers handling the program and KVK scientists were of the view that small farmers are only to make payment of GST and rest of the system duly installed at farm is free, so farmers are seldom seen making complaints in interactive meetings and workshops. It also came to notice that in order to earn quick profit from the subsidy programs, many companies are marketing various sub-standard components in the market which affect the working condition of the system and creates doubt in the farmer's mind about the functioning of the system. It is to be ensured that only good quality components having the certification of Bureau of Indian Standards (BIS/ISO) are supplied to the farmers. It may be claimed like this but some farmers contest this claim. Lastly, as informed by Sarpanch and farmers of village Tejpur of Ateli block of Narnaul district, all the tube wells in the village has MI system and saturation level has reached. Even in some cases two or three brothers who have separated their land are having separate systems but use the same tube well. Finally, the sum total of discussions was that there is no survival without micro-irrigation system as water table has gone down and availability of water is very low.