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RESEARCH ARTICLE :

Survey of micro irrigation in selected districts of north Karnataka

M.D. MAJEED PASHA, B.H. MEGHA, S.C. ASHWINI, E.G. SHIVAKUMAR AND B. MAHESHWARA BABU

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SUMMARY : The survey of micro irrigation status in selected districts of north Karnataka different talukas was conducted during the period from 2010-11 to 2015-16. In the study area has sever water scarcity problems due to various reasons, such as flood (conventional) method of irrigation, more seepage and percolation losses due to poor lining of canals systems and in other hand it leads to continuously increasing the demand of water for different purposes. The area coverage through irrigation was less and also potential availability of water for irrigation for future use has been declining at a faster rate due to the flood method of irrigation and thereby decreasing the irrigation efficiencies. The available estimates indicate that water use efficiency under flood irrigation method was only about 35 to 40 per cent because of huge conveyance and distribution losses and water use efficiency in case of micro irrigation method was 85 to 90 per cent. The area under flood and drip irrigation method in study area were 175485 ha and 16511 ha during the period 2015-16 and the application of water through drip irrigation has been increased from 3122.64 ha to 16511 ha during the study period. The save of water and energy from drip irrigation as compare to flood irrigation method were12271676.52 lakh litres and 319604222.5 kWh, respectively, therefore, from the study it was concluded that micro irrigation plays a paramount role in optimum use of inputs, increase of water productivity, increase of crop yield and enhancing cropping intensity.

KEY WORDS :
Micro irrigation

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Author for correspondence :
M.D. MAJEED PASHA
Department of Agricultural Engineering, University of Agricultural Sciences, G.K.V.K., BENGALURU (KARNATAKA) INDIA
Email:786012pasha@gmail.com
See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

The term "micro-irrigation" describes a family of irrigation systems that apply water through small devices. These devices deliver water onto the soil surface very near the plant or below the soil surface directly into the plant root zone. Growers, producers and landscapers have adapted micro-irrigation systems to suit their needs for precision water application (Michael, 2007). In irrigated agriculture, micro-irrigation is used extensively for row crops, mulched crops, orchards, gardens, greenhouses and nurseries. Micro-irrigation refers to low-pressure irrigation systems that spray, mist, sprinkle or drip. The water discharge patterns differ because emission devices are designed for

specific applications due to agronomic or horticultural requirements. Fanish (2013) noted that the sustainability of any crop production system requires optimum utilization of resources be it water, fertilizer or soil. The pressure for the most efficient use of water for agriculture is intensifying with the increased competition for water resources among various sectors within the mushrooming population (Morrison *et al.*, 2008*)*.

Studies done in the different zones (Zone-1 and Zone-2) have confirmed that irrigation plays a paramount role in increasing the use of yield increasing inputs and enhancing cropping intensity yield as well as productivity of crops. Zone-1 having the different talukas are Aland, Bhalki, Basavakalyan, Bidar, Chincholi, Humnabad, Aurad and Zone-2 talukas are Afzalpur, Chitapur, Gulbarga, Jewargi, Sedum, Shahapur, Yadagir, Shorapur, Raichur, Devadurga, Manvi. However, water is becoming increasingly scarce worldwide due to various reasons. As per this estimate, the worst affected areas would be the semi-arid regions of Karnataka, all of which are already having heavy concentration of population living below poverty line.

In spite of having many economic and other advantages over the method of flood irrigation, the coverage of area under micro-irrigation is not appreciable in Karnataka (Zone-1 and Zone-2) except for a few states as of today. Among the various reasons for the slow progress of adoption of this new technology, its capital-intensive nature seems to be one of the main deterrent factors. Micro-irrigation technology requires fixed investment that varies from Rs. 40,000 to Rs.1 lakh per hectare depending upon the nature of crops (wide or narrow spaced) and the material to be used for the system. Since the Indian farmers have been getting water for low cost from the public irrigation system and also from well irrigation (because of free and flat-rate electricity tariff), there is less incentive to them to adopt this capital-intensive technology unless it is necessary. Moreover, since it involves fixed investment, farmers often ask questions like what will be the water saving and productivity gains Is investment on drip irrigation economically viable What will be the payback period of the drip investment These issues are raised because of the following two reasons. First, the awareness of the farmers about this technology is very low due to poor extension service. Second, most of the studies available on micro-irrigation in India are based on experimental data collected from different regions, which generally do not present at the field levels. Some of the studies have shown that the results derived from research station data are substantially different from that of survey data. In the absence of reliable field studies, it is difficult to judge the actual economic viability of drip method of irrigation.Environmental problems associated with the surface method of irrigation like water logging and salinity are also completely absent under drip method of irrigation (Narayanamoorthy, 1997).

The research conducted to evaluate the potential area for drip irrigation in different zones. The objectives are to survey the current micro-irrigation area covered under Zone-1 and Zone-2 of Karnataka. To survey the micro irrigation installation under Zone-1 and Zone-2 of Karnataka. To calculate water and energy saved in micro irrigation under different crops. To find the potential area for micro irrigation in different zones.

RESOURCES AND METHODS

The survey was conducted from November 2015 to June 2016 in north Karnataka, to evaluate the status of micro irrigation. Survey carried out across different areas are Aland, Bhalki, Basavakalyan, Bidar, Chincholi, Humnabad, Auradtalukas, comes under zone-1 and similarly Afzalpur, Chitapur, Gulbarga, Jewargi, Sedum, Shahapur, Yadagir, Surapur, Raichur, Devadurga, Manvi comes under zone-2.

Information pertaining to the geographical area, cultivable area, horticulture area, MI area, etc., collected from the Department of Horticulture, Statistical and Economics department, Government of Karnataka. All four districts are Bidar, Gulbarga, Yadagiri and Raichur, coming under Zone-1 and Zone-2. The before going for the farmers fields MI survey a proforma is prepared, incorporating the proforma prepared by "WALANTRI" (Water and Land Management Training and Research Institute) proforma is monitoring and evaluation of MI system installed for the year 2014-15 Anantpur district in Andhra Pradesh. Information collecting from individual farmer field in the zone 1 and 2 of Karnataka region and collect a data pertaining to micro irrigation. The information incorporated in the proforma is general information such as district, taluk, panchayat, village and habitation. The personal information of farmer like Name, Age, Social Status, Identification Proof, Contact No. etc. The land details are ownership of land, irrigated land, dry land, category of farmer, type of soil, nature of soil,

depth of soil and land slope,

The crop information such as horticulture crop, area, variety, age of crop, productivity, date of sowing, date of harvesting, variety and duration, type of micro irrigation, manual or automation the water source information like water source type own or drawing from neighbours which include open well, tube well, canal and tank. The wells information like depth of well, HP of motor, working condition and yield of well.

In status of MI information are MI existing or not existing, reason for not existing, farmer not aware of sanction, delay in administration. Sanction, company not responding or delayed, trench cutting not done etc. In sanction details information of MI are Area, crop, Lateral diameter, lateral spacing, emitter/emission point spacing, MI company name.

In MI system details are location, elevation, system installed as per design, if MI not performing, the reasons are no water in the bore, intermittent discharge in bore well, partial installations, presently no crop, maintenance issues. In fertigation and acid treatment information are whether fertigation tank or ventury is installed by the company, if installed is used by the farmers. If no reasons, insufficient material given by the company, no awareness on the fertigation. The types of fertilizers used in fertigation are soluble fertilizers and liquid fertilizers. The number of after sales services attended by MI companies, number of trainings attended by the farmer, kinds of PVC filters using.

OBSERVATIONS AND ANALYSIS

This chapter presents the summarized results for the various parameters that were considered in the MI

Table 1 : Area covered under micro irrigation in Bidar district during period 2010-11 to 2015-16

Sr. No.	Taluk	Total geographical area (ha)	Total cultivable area (ha)	Area covered under DIM (ha)						Cumulative area covered under DIM from 2011-12 to 2015-16 (ha)
				2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	
1.	Aurad	121622.00	108999.00	21.40	38.24	96.29	109.64	128.88	132.8	394.45
2.	Basavakalyan	119438.00	97834.00	66.94	150.00	179.45	285.80	87.81	90.50	770.00
3.	Bhalki	109259.00	90189.00	149.43	157.25	251.02	221.20	286.80	302.00	1065.70
4.	Bidar	92203.00	79332.00	82.53	210.85	528.48	316.00	225.30	225.30	1363.16
5.	Humnabad	99243.00	71692.00	163.55	312.86	375.99	322.02	288.57	300.00	1444.99
	Total	541765.00	448046.00	483.50	869.20	1431.23	1254.68	1017.36	1050.6	6106.57

Table 2 : Water and energy saving under micro irrigation in Bidar district during

Items	Bidar district					
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Total water saved over FIM (lakh lit)	29927.75	52598.08	84893.47	69647.24	56013.84	58689.36
Energy saved over FIM (KWh)	778555.54	28482814.80	46899975.87	41105433.60	33335903.70	34407450.00

Table 3 : Area covered under micro irrigation in Kalaburgi district during 2012-13 to 2015-16

Sr. No.	Taluk	Total geographical area (ha)	Total cultivable area (ha)	Area covered under DIM (ha)				Cumulative area covered under DIM from 2012-13 to 2015-16 (ha)
				2012-13	2013-14	2014-15	2015-16	
1.	Afzalpur	130479.00	120396.00	567.01	579.88	450.16	530.8	2127.85
2.	Aland	173417.00	159454.00	629.31	331.02	586.05	412.93	1959.31
3.	Chincholi	155854.00	110122.00	111.57	156.80	124.98	173.02	566.37
4.	Chittapur	176447.00	152015.00	121.54	83.91	170.72	176.34	552.51
5.	Kalburgi	173165.00	152202.00	590.49	788.67	349.60	402.28	2131.04
6.	Jewargi	182313.00	168008.00	108.49	57.84	49.96	132.65	348.94
7.	Sedam	102445.00	90272.00	20.81	41.56	43.75	589	164.01
	Total	1094120.00	952469.00	2148.91	2039.68	1775.22	1885.19	7849

Table 4 : Water and energy saving under micro irrigation in Kalburgi district during 2012-13 to 2015-16

Items	Kalburgi district			
	2012-13	2013-14	2014-15	2015-16
Total water saved over FIM (lakh lit)	3231309.56	3067144.08	2669399.56	2835189.10
Energy saved over FIM (KWh)	95220660.00	903830.45	78662221.9	83547730.20

Table 5 : Area covered under micro irrigation in Yadagir district during 2010-11 to 2015-16

Sr. No.	Taluk	Total geographical area (ha)	Total cultivable area (ha)	Area covered under DIM (ha)					Cumulative area covered under DIM from 2011-12 to 2015-16 (ha)
				2011-12	2012-13	2013-14	2014-15	2015-16	
1.	Yadagir	123479.00	123479.00	7.10	22.59	45.49	23.30	122.50	220.98
2.	Shahpur	133888.00	133888.00	21.65	53.81	9.37	27.00	151.00	262.83
3.	Surpur	148645.00	148645.00	26.60	25.17	64.95	96.75	77.84	291.31
	Total	406012.00	406012.00	55.35	101.57	119.81	147.05	351.34	775.12

Table 6 : Water and energy saving under micro irrigation in Yadagir district during 2011-12 to 2015-16

Items	Yadagir district				
	2011-12	2012-13	2013-14	2014-15	2015-16
Total water saved over FIM (lakh lit)	4508.36	7654.62	6959.32	8477.66	30617.74
Energy saved over FIM (KWh)	94222.68	188300.3	161186.3	214325.3	617901.6

Table 7 : Area covered under micro irrigation in Raichur district during 2010-11 to 2015-16

Sr. No.	Taluk	Total geographical area (ha)	Total cultivable area (ha)	Cumulative area covered under DIM from 2013-14 to 2015-16 (ha)			Cumulative area covered under DIM from 2013-14 to 2015-16 (ha)
				2013-14	2014-15	2015-16	
1.	Raichur	151415.00	137729.00	434.88	285.35	202.30	922.53
2.	Manvi	179273.00	160586.00	56.93	41.30	39.50	137.73
3.	Deodurga	150979.00	126345.00	81.56	23.40	25.00	129.96
4.	Sindhanur	160166.00	141493.00	94.93	29.70	33.50	158.13
5.	Lingasugur	194010.00	166664.00	38.72	198.04	195.00	431.76
	Total	732817.00	835843.00	707.02	577.79	495.30	1780.11

Table 8 : Water and energy saving under micro irrigation in Raichur district during 2013-14 to 2015-16

Items	Raichur		
	2013-14	2014-15	2015-16
Total water saved over FIM (lakh lit)	31249.6	4840.63	22556.55
Energy saved over FIM (KWh)	917260.9	558763.6	652094

Table 9 : Potential area of drip irrigation in Zone-1 and Zone-2

Sr. No.	District	Total horticultural area (ha)	Total area covered under drip irrigation (ha)	Total potential area (ha)
1.	Bidar	100475.00	5055.97	95419.03
2.	Raichur	4177.00	1780.11	2396.89
3.	Yadagir	20175.00	775.12	19399.88
4.	Gulbarga	66118.26	7849.12	58269.14

survey and their relationship to each other. The chapter also highlights the statistical relatedness of the measured parameters between and among the various years considered in the survey.

In Bidar district the major soil type is red soil and the major crops are mango, banana, grapes, vegetables, and sugarcane etc. under drip irrigation. The water source is tube wells, the average depth of tube wells are 350 ft. There is generally 5 HP submersible pump is used for lifting the water the type of filter used in Bidar district is screen filter. The type of power available in the district is electrical power. The major micro irrigation supplying company is Jain irrigation, in this area both liquid and solid fertilizers used.

In Yadagir district the major soil type is loamy soil the major crops are grown under drip irrigation are mango, lemon, banana, papaya, tomato, and chilli etc., the water source are tube well and open well, Generally 5 and 7.5 HP submersible and centrifugal pump is being used for lifting the water. Screen and media filters are using. The type of power available in the district is electrical power. The major micro irrigation system equipment supplying companies are Jain, Godavari, and Netafem irrigation limited in this area both liquid and solid fertilizers are being used through fertigation system.

In Kalaburgi district the major soil type is loamy soil and the major crops grown under drip irrigation are rose mango, banana, orange, tomato, cabbage, medicinal plants, green chilli and capsicum, the water source are open wells and tube wells. The average depths of tube wells are 370 ft and open wells are 50 ft. Generally 5 to 7.5 HP motors are being used for the lifting water. The media and screen filters are widely used in this district. The type of power used in the district is electrical power from thermal power station. The micro irrigation supply companies are Jain Godavari and Nagarjuna irrigation systems limited. In this area liquid fertilizers are used.

In Raichur district the major soil type comes under are sandy loam and black cotton soil. The major crops grown under micro irrigation are mango, cotton, pomegranate, capsicum, tomato etc. The water sources for irrigation are bore wells and canal fed farm ponds. The depth of tube well is (300-400 ft) and (10-12ft) for farm ponds. The pumps used for lifting the water from tube well is having 5 HP submersible pump, and for farm ponds is centrifugal pumps of 5-7.5 HP and diesel engine pumps of 5 HP are used. Generally media and screen filters are used for filtering the water in the Raichur district. The type of power available is thermal power and diesel engines. The micro irrigation companies are Jain, Godavari, Finolex and Nagarjuna private limited. There is no knowledge to majority farmers regarding acid treatment to prevent the clogging problem in MI.

Considering the limited potential of water resources as well as growing demand for water for different purposes, it has become essential to adopt water saving technologies (WSTs) so as to avoid the water stress in the future. It has been proved by studies that drip irrigation method helps to save water and improves water use efficiency (INCID, 1994 and 1998). While reducing water consumption, it also reduces substantial amount of electricity required for irrigation purpose, by reducing working hours of irrigation pump. Considering the importance of drip irrigation method in the sustainable use of irrigation water, efforts are being made to propagate the adoption of DIM from 1970 onwards in India (INCID, 1994). Though studies using field level data are rarely available focusing water use efficiency and water saving of DIM, many research stations situated in different parts of the country have evaluated the water saving capacity of DIM for different crops.

There are three main reasons for enormous water saving under drip irrigation method. Firstly, since water is supplied through a network of pipes, the evaporation and distribution losses of water are minimized. Secondly, unlike FIM, water is supplied under DIM at a required time and required levels, over-irrigation is avoided. Finally, under the conventional method of irrigation, water is supplied for the whole cropland, whereas DIM irrigates only the crop and not the soil.

Authors' affiliations :

B.H. MEGHA, S.C. ASHWINI, E.G. SHIVAKUMAR AND B. MAHESHWARA BABU, Department of Soil and Water Engineering College of Agricultural Engineering, University of Agricultural Sciences, RAICHUR (KARNATAKA) INDIA

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