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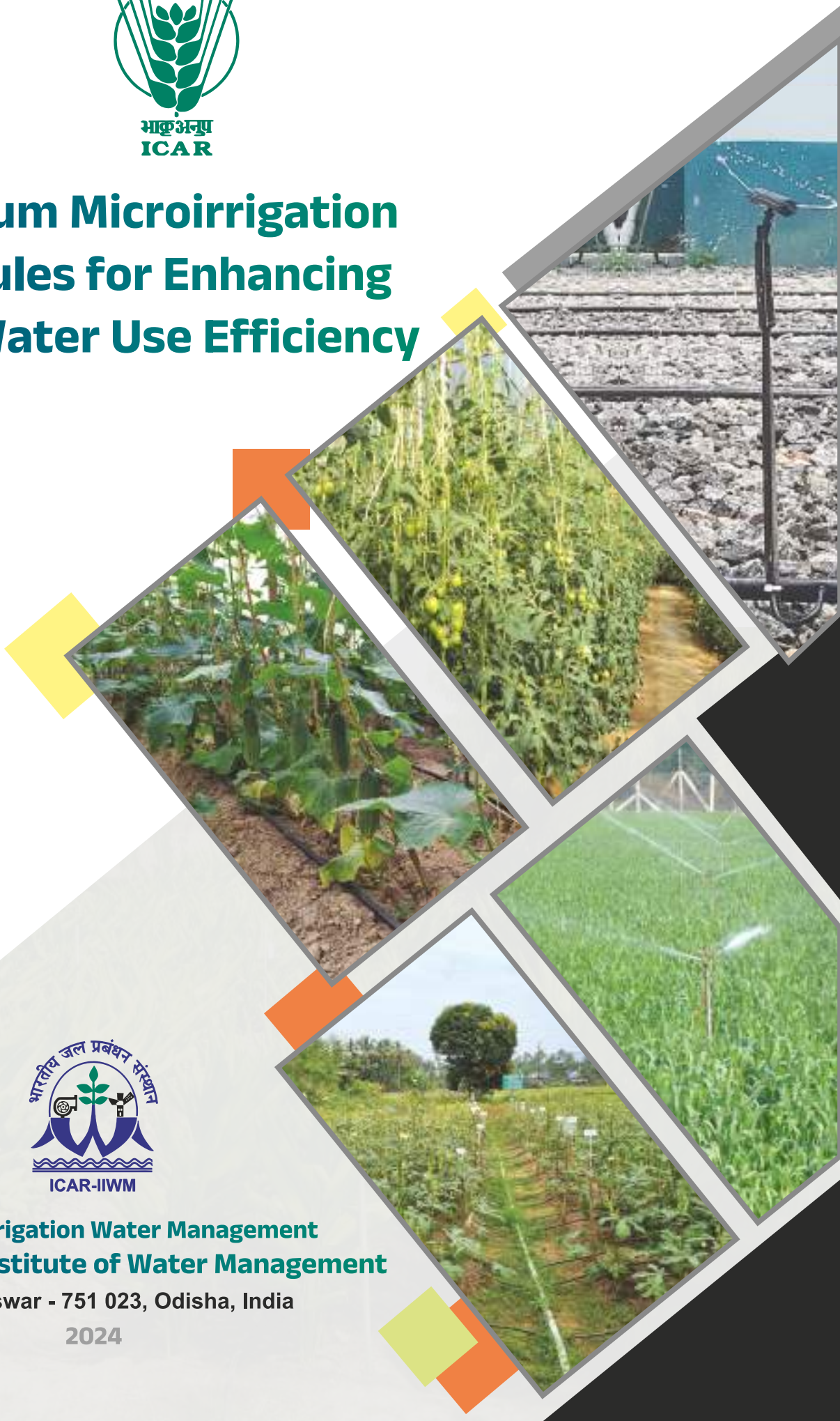
Optimum Microirrigation Schedules for Enhancing Crop Water Use Efficiency



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ICAR - Indian Institute of Water Management
Bhubaneswar - 751 023, Odisha, India
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Message

Agriculture sector is the major user of water in India and accounts for about 80% of Country's freshwater resources. However, increasing population, urbanization, over-exploitation of surface and ground water resources are causing depletion of freshwater resources in the Country. This may reduce the share of freshwater for agriculture in future. Over-exploitation of groundwater has already posed threat to the groundwater resources in several States of the Country. Surface irrigation methods which are commonly adopted by farmers cause loss of water, reduce water productivity and increase the overall production cost. Proper irrigation scheduling using micro-irrigation systems can check indiscriminate use of freshwater resources in agriculture. Studies have shown that judicious application of water through micro-irrigation to crops can not only save water, but also improve crop productivity and crop yields as well.

I am happy to note that ICAR-Indian Institute of Water Management through AICRP on Irrigation Water Management has standardized/developed micro-irrigation schedules for 54 crops in different soil conditions under varying agro-ecological regions of the Country. Many of the irrigation schedules developed on-station for various crops have been demonstrated on farmers' fields, and recommendations included as package of practices of the respective States, and extended to various State government agencies as well as farmers. It is impressive to see substantial improvement in crop yield, water saving and income enhancement with micro-irrigation technologies. I am hopeful that this document would be a reference for line departments in State and Centre besides KVKs, researchers and farmers.

9th December, 2024
New Delhi

(Suresh Kumar Chaudhari)

Preface

Water is the most critical input for enhancing agricultural productivity, and therefore expansion of irrigation has been a key strategy in the development of agriculture in India. Rainfall in the monsoon season is the main source of water in our country. However, even during monsoons, the rainfall is erractic in many parts of the country. Sometimes the monsoon is delayed considerably while sometimes they cease prematurely. This pushes large areas of the country into drought conditions. With the help of irrigation, droughts and famines can be effectively controlled. Provision of irrigation facilities can make possible the growing of two or three crops in a year in most areas of the country. This will considerably enhance agricultural production and productivity. However, for effective and efficient irrigation management, use of microirrigation systems is very important. Suitable micro-irrigation schedule will help in saving of water apart from increasing crop production.

All India Coordinated Research Project (AICRP) on Irrigation Water Management (IWM) since it is inception in 1967 has done extensive research work on developing technologies related to agricultural water management with the aim of improving water and crop productivity. As a part of the research programme, micro-irrigation schedules of a wide variety of crops have been developed in last three decades through its network of 26 research centres distributed across different agro-ecological regions of the country. In this bulletin, an attempt has been made by the authors to compile all the micro-irrigation schedules of different crops developed by the AICRP. We are hopeful that these irrigation schedules will be very helpful for farmers in increasing their water productivity and overall crop production in the country.

Authors

Contents

Introduction

Conventional method of irrigation not only causes wastage of water but also results in waterlogging, salinity and soil degradation. In the quest to save water, it has been recognized that modern irrigation technique like microirrigation (MI) facilitates judicious application of water, checks loss of water and covers additional area under irrigation compared to flooding and surface irrigation methods. MI is a resource-efficient irrigation practice that maximizes plant performance and enhances land/farm and water productivities. MI systems are mainly categorized into drip, sprinkler, bubbler irrigation and mist irrigation systems (IWRD, 2022). Drip irrigation system can be categorized into surface (on-line and inline) and subsurface drip irrigation. Sprinkler irrigation comprises of micro sprinkler, mini sprinkler, portable sprinkler and large volume sprinkler (raingun) (GOI, 2017). These systems are best alternatives for efficient use of surface as well as groundwater resources. Main features of MI systems are delivery of water through pressurised piping and pumping systems, and targeted application of water at low rates for longer periods to maintain field capacity at the root zone. Thus, there is low conveyance and distribution losses in delivery of water. It also reduces percolation and seepage losses and leaching of nutrients below plant root zone (NABARD, 2024). Consistent availability of optimum soil moisture in root zone enables better growth and development of plants that often translates into higher production and productivity under MI.

Microirrigation research in our country was initiated in around 1980. However, the large-scale adoption of MI in our country was introduced during the year 2006 by Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India as a Centrally Sponsored Scheme (CSS) on MI. The goal was to enhance water use efficiency in agriculture through interventions of drip and sprinkler irrigation systems, and encourage farmers to use the water saving and conservation technologies. CSS was upscaled to National Mission on Micro Irrigation (NMMI) in June 2010. Later NMMI was subsumed under National Mission for Sustainable Agriculture (NMSA) and implemented as On Farm Water Management (OFWM) during the financial year 2014-15. From April 2015, MI component of OFWM was subsumed under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), with one of its components specifically seeking to maximize water use efficiency at the field level, thereby ensuring Per Drop More Crop (PDMC) through MI. Department of Agriculture & Farmers Welfare (DA&FW) is implementing PDMC scheme which is operational from 2015-16 in the country. This scheme mainly focuses on enhancing water use efficiency at farm level through the use of MI. PDMC is being implemented under Rashtriya Krishi Vikas Yojana (RKVY) from 2022-23. According to ICAR report on 'Potential, Adoption and Impact of Micro Irrigation in Indian Agriculture', it is estimated that India has a potential of 72.2 million hectare

for micro-irrigation, of which 51.0 million hectare can be covered through sprinklers and 21.2 million hectare under drip irrigation (Chand et al., 2020). Due to implementation of various government schemes, the area coverage under MI has increased from 0.43 to 16.73 million hectare (DA&FW, 2023). The present area covered is 23% of the potential area under MI. The adoption of MI has to be increased exponentially in the country.

Initially, MI was used exclusively for high-value or cash crops such as cotton, flowers, broccoli, banana and some other horticultural crops based on profitability. In recent years, application has been done for commonly grown field crops. Improvements in reliability, durability, longevity of MI system materials, and introduction of innovative designs of MI systems have considerably reduced the cost of MI to levels that can enable farmers to adopt. Despite consistent efforts from the government, adoption rate of MI among farmers is still very low mainly due to high initial capital investment, small land holding, delay in subsidy by government, lack of technical skills on maintenance, and lack of guidance post installation (Ayars et al., 2023; Nair and Thomas, 2023). A recent pan-India study on 5000 locations covering 21 states showed that only 12 to 15% adoption of MI was achieved with a gap of 40-50% existing between the physical target and adoption (Suresh and Samuel, 2020). Initiatives are being taken by some agricultural scientists and companies for developing affordable MI systems for farmers in developing countries (Ayars et al., 2023).

The scheme of AICRP on Irrigation Water Management has done extensive research on design, development and refinement of microirrigation systems for a wide range of crops in different agro-ecosystems of India. The scientists working under the scheme have considered various factors like source of water and its availability, soil physical properties, land configuration and economic capabilities of the farmers while conducting research. The goal was to develop robust mircroirrigation schedules which not only improve water use efficiency and crop productivity, but also be remunerative for farmers. Microirrigation research under AICRP on IWM has continued since last 3 decades. The scheme has come a long way in reshaping field and farm trials and popularizing MI among farmers across the country. The scientists working in the scheme have played a pioneering role in covering over 50 crops under MI and transformed the results into economic benefits that can be derived by farmers. The scientists have standardised drip layouts for crops and cropping systems, designed low-cost MI systems that can be farmer-friendly and affordable, distributed MI systems to farmers free of cost, conducted demonstrations, workshops and training programmes for guiding the farmers and encouraging them to adopt MI in their fields. This bulletin is a documentation of the robust mircroirrigation schedules developed for 54 crops. The document may be referred by state line workers, KVKs, farmers and other stakeholders as a guide for MI development, an integral component of overall agricultural policy in the country, rather than just a water conservation strategy.

Irrigation Scheduling in Cereals

Rice

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Madhya Pradesh (Morena, Sandy loam) AER 4	Pusa 1121, *Kharif* (2014 to 2016)	Drip with tubewell water	Irrigation depth: 20 mm at IW/CPE 1.0 Irrigation interval: Alternate days after withdrawal of rains	I = 200 R = 660 T = 860	4.98	6.50	5.79	18.50	30280	5.00	Technology transferred to KVKs, agricultural department and progressive farmers
Uttarakhand (Pantnagar, Sandy loam) AER 9	Pant Basmati 1, *Kharif* (2017 to 2019)	Drip with tubewell water	Irrigation depth: 150% PE Irrigation interval: 2 days	I = 316 R = 790 T = 1106	4.87	10.10	4.40	35.30	36200	17.10	-
West Bengal (Gayeshpur, Sandy loam) AER 15	Satabdi, *Zaid* (2016 to 2019)	Microsprinkler with tubewell water	Irrigation depth: 100% ETc Irrigation interval: 3 days	I = 843 R = 165 T = 1008	3.69	18.27	3.66	46.00	24360	26.60	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling was done for three rice varieties *viz.*, Pusa 1121, Pant Basmati 1 and Satabdi in three agro-ecological regions of 4, 9 and 15 in the states of Madhya Pradesh, Uttarakhand and West Bengal. Trials were done during *kharif* and *summer* seasons using drip and microsprinkler irrigation. Irrigation schedule optimized for the rice varieties showed 6-18% higher yield, 18-46% water saving and 5-27% higher income over surface irrigation practice. The technology developed in Madhya Pradesh has been successfully extended to stakeholders.

Wheat

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	HD 2932, *Rabi* (2015 to 2019)	Sprinkler with tubewell water	Irrigation depth: 75% CPE Irrigation interval: 4 days	I = 480 R = 130 T = 610	3.52	25.00	5.77	9.20	42480	34.74	-
Chhattisgarh (Bilaspur, Clay loam) AER 11	Swati, *Rabi* (1997 to 1999)	Sprinkler with tubewell water	Irrigation depth: 80% CPE Irrigation interval: 11 days	I = 360 R = 70 T = 430	3.92	9.89	9.12	28.50	15640	12.50	-
Rajasthan (Kota, Clay loam) AER 5	Raj 3077, *Rabi* (2009 to 2012)	Mini-sprinkler with tubewell water	Pre-sowing irrigation: 100 mm Irrigation depth: 50 mm at IW/CPE 1.0 Irrigation interval: 22-25 days	I = 500 R = 0 T = 500	5.69	16.10	11.38	16.60	47520	21.46	Technology included in *rabi* crops POP for ACZ V of Rajasthan
Rajasthan (Kota, Clay loam) AER 5	Raj 4037, *Rabi* (2016 to 2019)	Sprinkler with tubewell water	Pre-sowing irrigation: 100 mm Irrigation depth: 50 mm at IW/CPE 0.8 Irrigation interval: 25-30 days	I = 450 R = 40 T = 490	4.90	15.80	10.00	11.30	60460	18.67	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	Lok 1, *Rabi* (2007 to 2010)	Sprinkler with open dugwell water	Pre-sowing irrigation: 60 mm Irrigation depth for remaining irrigations: 50 mm Irrigation interval: 20-25 days	I = 360 R = 20 T = 380	4.82	13.88	12.68	9.28	40370	14.29	Technology disseminated by line department & adopted by Marathwada farmers

Madhya Pradesh (Powarkheda, Clay) AER 10	GW 273, *Rabi* (2007 to 2012)	Sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 1.0 Irrigation interval: 18-22 days	I = 300 R = 90 T= 390	4.25	8.14	10.90	29.00	41000	12.32	-
Bihar (Pusa, Sandy loam) AER 13	HD 2733, *Rabi* (2011 to 2016)	Mini-sprinkler with tubewell water	Irrigation depth: 60 mm at IW/CPE 1.0 Irrigation interval: 17 days	I = 360 R = 53 T = 413	3.96	14.18	9.58	15.15	40340	17.20	-
Rajasthan (Sriganganagar, Sandy loam) AER 2	Raj 1482, *Rabi* (1998 to 2001)	Sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 0.8 No. of irrigations: 7	I = 350 R = 84 T = 434	5.25	36.06	12.09	58.93	22450	36.06	Technology included in POP after verification by ATC (under state agriculture department) and farmers' field
Madhya Pradesh (Morena, Sandy loam) AER 4	HI 1544, *Rabi* (2014 to 2018)	Subsurface drip with tubewell water	Irrigation depth: 20 mm at IW/CPE 0.6 Irrigation interval: 7 days	I = 280 R = 37 T = 317	5.40	52.10	17.03	28.50	62570	17.00	Technology transferred to KVKs, state agricultural department & progressive farmers
Gujarat (Junagadh, Clay loam) AER 5	GW 451, *Rabi* (2021 to 2023)	Drip with tubewell water	Irrigation depth: 100% ETc No. of irrigations: 17	I = 377 R = 0 T = 377	4.65	35.28	12.33	34.43	89616	31.00	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in wheat was optimized in seven agro-ecological regions of the country *viz.*, 2, 4, 5, 6, 10, 11 and 13 in the states of Madhya Pradesh, Bihar, Chhattisgarh, Rajasthan, Maharashtra and Gujarat. Irrigation scheduling was done for 10 wheat varieties using sprinkler, mini-sprinkler, surface drip and subsurface drip irrigation. There was 8-52% improvement in yield, 9-59% water saving and 12-36% more income generation through the microirrigation scheduling technologies. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Maize

State (Centre, soil texture) AER	Crop (Variety, season) (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Dapoli, Sandy clay loam) AER 19	Sweetcorn (Sugar 75, *Rabi*) (2009 to 2012)	Inline drip with open dugwell water	Irrigation depth: 10 mm Irrigation interval: Alternate day	I = 350 R = 50 T = 400	12.04	14.10	30.10	15.80	126060	9.60	Technology recommendation to state agriculture department
Maharashtra (Parbhani, Clay) AER 6	Maize (DKC 9149, post *kharif*) (2015 to 2018)	Drip with open dugwell water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 359 R = 89 T = 448	8.58	13.34	19.15	22.25	92800	13.61	Technology disseminated by line department and adopted by farmers of Marathwada region
Uttarakhand (Pantnagar, Sandy loam) AER 9	Sweetcorn (Sugar 75, *Kharif*) (2022 to 2024)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 50 R = 435 T = 485	11.30	28.50	23.30	18.60	152000	24.90	-
Tamil Nadu (Coimbatore, Red loam) AER 8	Maize (COMH 8, *Spring*) (2020 to 2023)	Drip with tubewell water	Irrigation depth: 30 mm Irrigation interval: 3 days No. of irrigations: 28	I = 300 R = 200 T = 500	8.74	15.00	17.48	44.00	157320	25.00	Technology disseminated in farmers' trainings
Haryana (Hisar, Loamy sand) AER 2	Maize (BIO 9544, *Rabi*) (2022 to 2024)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 2 days	I = 50 R = 435 T = 485	6.30	22.97	12.99	45.00	86113	18.40	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in maize and sweetcorn was optimized in five agro-ecological regions of the country *viz.*, 2, 6, 8, 9 and 19 in the states of Haryana, Maharashtra, Tamil Nadu and Uttarakhand. Irrigation scheduling was done for four maize varieties using drip irrigation. There was 13-29% improvement in crop yield, 16-45% water saving and 10-25% more income generation through the microirrigation scheduling technologies. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Finger millet

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Tamil Nadu (Madurai, Silty loam) AER 8	CO (Ra) 14, *Kharif* (2016 to 2018)	Raingun with tubewell water	Irrigation depth: 75% PE No. of irrigations: 4 (one at vegetative, two at flowering & one at maturity stages)	I = 60 R = 534 T = 594	3.00	28.00	5.05	23.00	33170	8.00	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in finger millet (ragi) was optimized in Madurai region under agro-ecological region 8 of Tamil Nadu. There was 28% higher yield, 23% water saving and 8% more income through the microirrigation scheduling technology over surface irrigation.

Sorghum

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Parbhani, Clay) AER 6	Parbhani Jyoti, *Rabi* (2009 to 2013)	Drip with open dugwell water	Irrigation depth: 75% ETc Irrigation interval: Alternate day	I = 238 R = 23 T = 261	5.77	72.24	22.11	11.72	136080	68.45	Technology disseminated by line department and adopted by farmers of Marathwada region

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sorghum was optimized in Parbhani region of Maharashtra for agro-ecological region 6. There was 72% higher yield, 12% water saving and 68% higher income through the microirrigation scheduling technology over farmers' practice of surface irrigation.

Irrigation Scheduling in Oilseeds

Castor

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Gujarat (Navsari, Clay) AER 19	GCH 4, *Rabi* (1997 to 1998)	Drip with borewell water	Irrigation depth: 75% ETc Irrigation interval: Alternate day	I = 420 R = 0 T = 420	7.27	32.00	17.30	38.00	94450	28.00	Technology adopted by 20% of local farmers

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in castor was optimized for Navsari region of Gujarat in agro-ecological region 19. There was 32% higher yield, 38% water saving and 28% higher profit through drip irrigation scheduling technology over surface irrigation.

Groundnut

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Tamil Nadu (Madurai, Silty loam) AER 8	VRI 2, *Rabi* (2010 to 2013)	Micro-sprinkler with tubewell water	Irrigation depth: 100% PE Irrigation interval: 3 days	I = 321 R = 241 T = 562	2.80	22.00	4.98	15.00	68000	25.00	-
Tamil Nadu (Madurai, Silty loam) AER 8	VRI 2, *Rabi* (2010 to 2013)	Subsurface drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 2 days	I = 274 R = 245 T = 519	2.20	13.00	4.23	25.00	54670	21.80	-
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	CO 2, *Rabi* (2011 to 2012)	Micro-sprinkler with tubewell water	Irrigation depth: 80% PE Irrigation interval: 2 days	I = 367 R = 288 T = 655	3.61	41.72	5.51	27.10	36110	41.83	-

Rajasthan (Kota, Clay loam) AER 5	UG 5, *Zaid* (2017 to 2019)	Drip with tubewell water	Irrigation depth: 125% PE Irrigation interval: 3 days	I = 360 R = 30 T = 390	2.30	27.78	5.90	15.90	68790	15.39	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	TAG 24, *Zaid* (2013 to 2017)	Drip with open dugwell water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 502 R = 102 T = 604	4.09	24.69	6.77	43.01	73240	24.75	Technology disseminated by line department and adopted by Marathwada farmers
Maharashtra (Rahuri, Clay loam) AER 6	TAG 24, *Zaid* (2009 to 2011)	Sprinkler with tubewell water	Irrigation depth: 20 mm at IW/CPE 1.0	I = 539 R = 46 T = 585	3.65	24.91	6.24	13.20	65650	24.71	Technology approved in Joint Agresco meet of 4 state agril. universities. Technology passed on to state agriculture department for dissemination to farmers.
Odisha (Chiplima, Silty loam) AER 12	Smruti, *Rabi* (2019 to 2021)	Sprinkler irrigation	Irrigation depth: 90% PE	I = 377 R = 32 T = 409	2.01	29.67	4.91	45.27	59440	30.89	Technology transferred to state government & KVKs through ZREAC and SLREC meetings

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in groundnut was optimized in four agro-ecological regions of the country *viz.*, 5, 6, 8 and 12 in the states of Rajasthan, Maharashtra, Tamil Nadu and Odisha. Irrigation scheduling was done for five groundnut varieties using sprinkler, micro-sprinkler, drip and subsurface drip irrigation systems. There was 13-42% higher crop yield, 13-45% water saving and 15-42% higher profit through microirrigation scheduling technologies. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Mustard

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Madhya Pradesh (Morena, Sandy loam) AER 4	RVM 1, *Rabi* (2014 to 2017)	Drip with tubewell water	Irrigation depth: 30 mm Irrigation interval: 7 days	I = 180 R = 40 T = 220	2.35	10.30	10.68	13.50	32890	15.00	Technology transferred to KVKs, state agriculture department and progressive farmers
Chhattisgarh (Bilaspur, Clay loam) AER 11	Chhattisgarh Sarson 1, *Rabi* (2019 to 2022)	Drip with tubewell water	Irrigation depth: 60% ETc Irrigation interval: Alternate day	I = 174 R = 48 T = 222	2.44	23.20	11.00	50.00	79502	27.10	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in mustard was optimized in two agro-ecological regions of the country *viz.*, 4 and 11 in the states of Madhya Pradesh and Chhattisgarh. There was about 10-23% higher yield, 14-50% water saving and 15-27% more income through the microirrigation scheduling technology over farmers' practice of surface irrigation.

Sesame

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Kerala (Chalakudy, Sandy loam) AER 19	Kayamkulam 1, *Zaid* (2002 to 2004)	Sprinkler with pond water	Irrigation depth: 60% PE No. of irrigations: 5	I = 150 R = 121 T = 271	0.30	16.50	1.11	45.00	16120	16.50	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sesame was optimized in Chalakudy region of Kerala under agro-ecological region 19. There was about 17% higher yield, 45% water saving and 16% more income through the sprinkler irrigation technology over farmer's practice of surface irrigation.

Soybean

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Rajasthan (Kota, Cay loam) AER 5	JS 93-05, *Kharif* (2011 to 2013)	Mini-sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 1.0 Irrigation interval: 15-20 days	I = 100 R = 366 T = 466	1.74	18.74	3.73	16.20	28990	22.06	Technology included in horticultural crops POP for ACZ V of Rajasthan
Madhya Pradesh (Morena, Sandy loam) AER 4	JS 93-05, *Kharif* (2011 to 2014)	Sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 0.6 Irrigation interval: 15-20 days	I = 95 R = 408 T = 503	2.38	38.40	4.73	12.30	35120	16.90	As per RRA data, the technology is adopted in over 4 lakh hectare in Madhya Pradesh

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in soybean was optimized in Rajasthan and Madhya Pradesh states under agro-ecological regions 4 and 5. There was 19-38% higher yield, 12-16% water saving and 17-22% higher income through mini-sprinkler and sprinkler irrigation technology over surface irrigation practice.

Sunflower

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Rahuri, Clay) AER 6	Phule Raviraj, *Zaid* (2009 to 2011)	Drip with tubewell/ farm pond water	Irrigation depth: 75% PE Irrigation interval: Alternate day	I = 525 R = 10 T = 535	0.97	14.28	1.81	45.00	44300	18.20	Technology approved in Joint Agresco meet of 4 state agriculture universities. Technology passed on to state agriculture department for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sunflower was optimized in Rahuri region of Maharashtra under agro-ecological region 6. There was about 14% higher yield, 45% water saving and 18% increase in income through drip irrigation over surface irrigation.

Irrigation Scheduling in Pulses

Chickpea

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	JG 74, *Rabi* (2015 to 2019)	Sprinkler with tubewell water	Irrigation depth: 30 mm Irrigation interval: 11 days	I = 180 R = 13 T = 193	1.96	37.00	10.16	23.00	59550	34.64	-
Uttarakhand (Pantnagar, Sandy loam) AER 9	Pant G 186, *Rabi* (2016 to 2019)	Micro-sprinkler with tubewell water	Irrigation depth: 30 mm No. of irrigations: 3	I = 90 R = 49 T = 139	1.71	14.80	12.30	29.50	46470	24.50	-
Maharashtra (Parbhani, Clay) AER 6	BDNG 797, *Rabi* (2014 to 2017)	Sprinkler with open dugwell water	Irrigation depth: 60 mm No. of irrigations: 4	I = 240 R = 0 T = 240	2.17	24.00	9.04	50.00	86120	24.47	Technology disseminated by line department and adopted by farmers of Marathwada region
Maharashtra (Rahuri, Clay) AER 6	Kabuli, *Rabi* (2001 to 2004)	Sprinkler with tubewell water	Irrigation depth: 20 mm No. of irrigations: 12	I = 240 R = 0 T = 240	2.48	13.00	10.33	27.00	35280	18.00	Technology approved in Joint Agresco meet of 4 state agriculture universities. Technology transfererd to line department for dissemination among farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in chickpea was optimized in three agro-ecological regions of the country *viz.*, 6, 9 and 11 in the states of Maharashtra, Uttarakhand and Chhattisgarh. Irrigation scheduling was done for four chickpea varieties using sprinkler and micro-sprinkler irrigation systems. There was 13-37% higher crop yield, 23-50% water saving and 18-35% higher profit through microirrigation scheduling technologies. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Greengram

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Rajasthan (Kota, Clay loam) AER 5	IPM 02-03, *Zaid* (2016 to 2018)	Sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 1.0 Irrigation interval: 8-15 days	I = 300 R = 22 T = 322	0.82	17.10	2.55	13.00	30940	23.00	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Gujarat (Junagadh, Clay loam) AER 5	GAM 5, *Zaid* (2021 to 2023)	Drip with tubewell water	Irrigation depth: 50 mm at IW/CPE 1.0 Irrigation interval: 8-15 days	I = 301 R = 0 T = 301	1.24	21.77	4.12	20.16	95534	23.27	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in greengram was optimized in Kota and Junagadh under agro-ecological region 5. There was about 17-22% higher yield, 13-20% water saving and 23% higher net profit through sprinkler and drip irrigation over surface irrigation method.

Lentil

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttarakhand (Pantnagar, Sandy loam) AER 9	Pant Lentil 8, *Rabi* (2016 to 2019)	Micro-sprinkler with tubewell water	Irrigation depth: 60% PE Irrigation interval: 10-15 days	I = 240 R = 48 T = 288	1.47	8.60	5.10	49.90	40540	10.50	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in lentil was optimized in Pantnagar region under agro-ecological region 9 in Uttarakhand. There was about 9% higher yield, 50% water saving and 11% higher net profit through micro-sprinkler irrigation over surface irrigation method.

Pea

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Himachal Pradesh (Palampur, Silty clay loam) AER 14	Palam Priya, *Rabi* (2013 to 2015)	Mini-sprinkler with pond water	Irrigation depth: 80% PE Irrigation interval: 10 days	I = 192 R = 181 T = 373	9.55	22.00	25.60	41.00	95800	19.00	Technology highlighted in training programmes for farmers & extension functionaries
Uttarakhand (Pantnagar, Sandy loam) AER 9	AP 3, *Rabi* (2016 to 2018)	Drip with tubewell water	Irrigation depth: 75% CPE Irrigation interval: 3 days	I = 172 R = 33 T = 205	11.80	12.30	57.56	48.00	121620	10.30	-
Uttarakhand (Pantnagar, Sandy loam) AER 9	Arkel, *Rabi* (2006 to 2009)	Micro-sprinkler with tubewell water	Irrigation depth: 30 mm at IW/CPE 1.0 Irrigation interval: 10-15 days	I = 90 R = 88 T = 178	7.24	13.40	40.67	30.00	72360	13.40	Farmers follow this irrigation schedule in 80% of the area under sprinkler irrigation in *Tarai* plains of Uttarakhand

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in pea was optimized in two agro-ecological regions of the country *viz.*, 9 and 14 in the states of Uttarakhand and Himachal Pradesh. Irrigation scheduling was done for three pea varieties using drip, mini-sprinkler and micro-sprinkler irrigation systems. There was 12-22% higher crop yield, 30-48% water saving and 10-19% higher income through the microirrigation scheduling technologies over farmers' practice. Two technologies have been successfully extended to farmers with wide adoption in the local areas.

Pigeonpea

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	Rajeev Loachan, *Rabi* (2016 to 2019)	Drip with tubewell water	Irrigation depth: 60% PE Irrigation interval: Alternate day	I = 340 R = 5 T = 345	2.34	43.00	6.78	38.00	77320	49.26	-

Madhya Pradesh (Morena, Sandy loam) AER 4	ICPL 88039, *Kharif* (2014 to 2017)	Subsurface drip with tubewell water	Irrigation depth: 10 mm at IW/CPE 0.6 Irrigation interval: 3 days	I = 70 R = 447 T = 517	2.34	27.80	4.53	21.20	74650	28.00	Technology demonstrated in ORP area and extended to local progressive farmers by AICRP-IWM and state agriculture department
Maharashtra (Parbhani, Clay) AER 6	BDN 716, *Kharif* (2018 to 2021)	Drip with open dugwell water	Irrigation depth: 80% ETc Irrigation interval: Alternate day	I = 242 R = 430 T = 672	2.45	59.00	3.65	20.00	81370	60.00	Technology disseminated by line department and adopted by farmers of Marathwada region

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in pigeonpea was optimized in three agro-ecological regions of the country *viz.*, 4, 6 and 11 in the states of Chhattisgarh, Madhya Pradesh and Maharashtra. Irrigation scheduling was done for three pigeonpea varieties using surface drip and subsurface drip irrigation systems. There was 28-59% higher crop yield, 20-38% water saving and 28-60% higher profit through microirrigation scheduling technologies. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Rajma

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	HUR 137, *Rabi* (2016 to 2019)	Drip with tubewell water	Irrigation depth: 60% PE Irrigation interval: 3 days	I = 240 R = 12 T = 252	2.71	39.57	10.75	43.40	205200	47.21	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in rajma was optimized in Ayodhya region of Uttar Pradesh under agro-ecological region 9. There was about 40% higher yield, 43% water saving and 47% higher net profit through microirrigation over surface irrigation.

Irrigation Scheduling in Vegetables

Bittergourd

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Kerala (Chalakudy, Sandy loam) AER 19	Priyanka, *Zaid* (1994 to 1997)	KAU Micro sprinkler with farm pond water	Irrigation depth: 75% PE Irrigation interval: Daily	I = 227 R = 111 T = 338	15.48	16.42	45.80	69.00	65760	16.42	Technology included in POP recommendation of KAU. Adopted by department of agriculture and recommended to farmers
Kerala (Chalakudy, Sandy loam) AER 19	Priyanka, *Zaid* (1994 to 1997)	Drip with farm pond water	Irrigation depth: 40% PE Irrigation interval: Daily	I = 190 R = 20 T = 210	16.26	12.50	77.43	67.00	80080	15.60	-
Rajasthan (Kota, Clay loam) AER 5	Pusa Do Mausami, *Zaid* (2011 to 2013)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 315 R = 50 T = 365	28.34	33.50	77.64	28.89	187880	40.91	Technology included in *kharif* crops POP for ACZ V of Rajasthan

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in bittergourd crop was optimized in agro-ecological regions 5 and 19 in the states of Rajasthan and Kerala. Irrigation scheduling was done for two bittergourd varieties using drip and micro-sprinkler irrigation systems. There was 13-34% higher crop yield, 29-69% water saving and 16-41% higher net profit through microirrigation scheduling technologies against surface irrigation technique. The technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Brinjal

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Punjab (Bathinda, Loamy sand) AER 2	PBHR 42 (hybrid), *Kharif* (2020 to 2022)	Drip with canal water	Irrigation depth: 100% ETc Irrigation interval: 2 days	I = 328 R = 0 T = 328	32.20	65.00	98.17	56.60	236720	56.00	Technology adopted by few commercial growers
Kerala (Chalakudy, Sandy loam) AER 19	Haritha, *Zaid* (2001 to 2005)	Subsurface drip with farm pond water	Irrigation depth: 100% PE Irrigation interval: Daily	I = 325 R = 325 T = 650	22.68	27.00	34.89	30.00	50720	27.00	-
Maharashtra (Dapoli, Sandy clay loam) AER 19	CHES 309, *Rabi* (2009 to 2012)	Drip with open dugwell water	Irrigation depth: 75% PE Irrigation interval: Alternate day	I = 388 R = 0 T = 388	32.34	22.80	83.35	41.70	168480	17.00	Recommendations provided to farmers through state agriculture department
Rajasthan (Kota, Clay loam) AER 5	Arka Navneet, *Rabi* (2016 to 2019)	Drip with tubewell water	Irrigation depth: 125% PE Irrigation interval: 3 days	I = 462 R = 18 T = 480	23.60	35.60	49.17	17.69	155800	33.10	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	Ankur Ajay, *Rabi* (2004 to 2008)	Drip with open dugwell water	Irrigation depth: 60% PE Irrigation interval: Alternate day	I = 370 R = 83 T = 453	30.40	48.87	67.11	42.24	82400	48.87	Technology disseminated by line department and adopted by farmers of Marathwada region
Gujarat (Navsari, Clay loam) AER 19	Surti Ravaiva, *Rabi* (2004 to 2006)	Drip with borewell water	Irrigation depth: 75% PE Irrigation interval: Alternate day	I = 570 R = 0 T = 570	46.00	35.00	80.70	40.00	130000	28.00	Technology adopted by about 10% of local farmers

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in brinjal was optimized in four agro-ecological regions of the country *viz.*, 2, 5, 6 and 19 in the states of Punjab, Rajasthan, Maharashtra, Gujarat and Kerala. Irrigation scheduling was done using surface and subsurface drip irrigation systems. There was 23-65% improvement in crop yield, 18-57% water saving and 17-56% higher net income with the microirrigation scheduling technologies against surface irrigation methods. Most of the technologies have been successfully extended to line departments and farmers with wide adoption in the local areas.

Cabbage

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Dapoli, Sandy clay loam) AER 19	Golden Acre, *Rabi* (2004 to 2008)	Micro-sprinkler with open well water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 303 R = 0 T = 303	17.69	27.50	58.38	52.40	31800	15.70	Recommendations provided through state agriculture department
Rajasthan (Kota, Clay loam) AER 5	Golden Acre, *Rabi* (2008 to 2011)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 3 days	I = 405 R = 15 T = 420	23.37	31.60	55.64	13.30	71870	34.10	Technology included in *rabi* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	Improved Bahar, *Zaid* (2017 to 2020)	Drip with open dugwell water	Irrigation depth: 100% ETc Irrigation interval: Alternate day	I = 347 R = 0 T = 347	36.85	15.08	106.20	25.00	295250	18.20	Technology disseminated by line department and adopted by farmers of Marathwada region

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cabbage was optimized in three agro-ecological regions of the country *viz.*, 5, 6 and 19 in the states of Rajasthan and Maharashtra. Irrigation scheduling was done for two cabbage varieties using drip and micro-sprinkler irrigation systems. It was observed that crop yield increased by 15-32%, with 13-52% water saving and 16-34% increase in net profit through miccroirrigation scheduling technologies against surface irrigation technique. All the technologies have been successfully extended to line departments and farmers with adoption in the local areas.

Capsicum

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	Indra, *Rabi* (2014 to 2017)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 360 R = 50 T = 410	17.78	15.00	43.37	30.00	162500	12.00	-
Assam (Jorhat, Sandy loam) AER 15	California Wonder, *Rabi* (2008 to 2010)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 7 days	I = 458 R = 49 T = 507	18.20	30.00	35.90	42.00	145000	38.00	Technology recommended through POP & given to state horticulture department under NMMI

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in capsicum was optimized in two agro-ecological regions *viz.*, 11 and 15 in the states of Chhattisgarh and Assam. Irrigation scheduling was done for two capsicum varieties using drip irrigation system. There was 15-30% higher crop yield, 30-42% water saving and 12-38% higher profit through microirrigation scheduling over conventional surface irrigation method. The technology developed in Assam has been included in state package of practices and successfully extended to state line department.

Carrot

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Rajasthan (Sriganganagar, Sandy loam) AER 2	Jyoti, *Rabi* (2019 to 2022)	Drip with tubewell water	Irrigation depth: 80% ETc	I = 220 R = 50 T = 270	43.60	38.40	161.50	58.00	621170	35.50	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in carrot was optimized for Sriganganagar region of Rajasthan under agro-ecological region no. 2. Irrigation scheduling was done for carrot variety Jyoti using drip irrigation. There was 38% higher crop yield, 58% water saving, and 36% higher profit through microirrigation scheduling technology over surface irrigation.

Cauliflower

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttarakhand (Almora, Silty clay loam) AER 14	PSB 1, *Rabi* (1992 to 1996)	Microtube drip with river lift irrigation	Irrigation depth: 40% PE	I = 253 R = 136 T = 389	21.90	42.10	56.30	37.50	43740	40.40	-
Kerala (Chalakudy, Sandy loam) AER 19	Pusa Deepali, *Rabi* (2011 to 2014)	Drip with farm pond water	Irrigation depth: 80% PE Irrigation interval: Daily	I = 240 R = 120 T = 360	21.21	14.00	58.92	20.00	212100	6.20	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cauliflower was optimized in two agro-ecological regions of the country *viz.*, 14 and 19 in the states of Uttarakhand and Kerala. Irrigation scheduling was done for two cauliflower varieties using microtube drip and surface drip irrigation systems. There was 14-42% higher crop yield, 20-38% water saving and 6-40% higher profit through microirrigation scheduling technology over conventional practice.

Chilli

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Tamil Nadu (Madurai, Sandy loam) AER 8	Namdhari Hybrid, *Kharif* (1995 to 1997)	Drip with tubewell water	Irrigation depth: 60% PE Irrigation interval: 3 days	I = 480 R = 290 T = 770	9.50	22.15	12.34	26.99	39800	35.65	-
Maharashtra (Dapoli, Sandy clay loam) AER 19	Konkan Kirti, *Rabi* (2006 to 2010)	Micro-sprinkler with open well water	Irrigation depth: 100% PE Irrigation interval: 3 days	I = 610 R = 0 T = 610	16.64	85.50	27.28	46.40	227290	76.50	Recommendations provided through state agriculture department

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in chilli was optimized in two agro-ecological regions *viz.*, 8 and 19 in the states of Tamil Nadu and Maharashtra. Microrrigation scheduling was done for two chilli varieties using drip and micro-sprinkler irrigation systems. There was 22-86% higher crop yield, 27-46% water saving, and 36-77% higher profit through the microirrigation scheduling technology over surface irrigation.

Clusterbean

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Parbhani, Clay) AER 6	Pusa Navbahar, *Zaid* (2021 to 2023)	Drip with open dugwell water	Irrigation depth: 80% ETc Irrigation interval: Alternate day	I = 348 R = 32 T = 380	10.40	41.50	27.37	20.00	161270	41.70	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in clusterbean was optimized in Parbhani region of Maharashtra under agro-ecological region no. 6. Irrigation scheduling was done for clusterbean variety Pusa Navbahar using drip irrigation system. There was 42% higher crop yield, 20% water saving and 42% higher profit through the microirrigation scheduling technology over surface irrigation.

Coriander

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Rajasthan (Kota, Clay loam) AER 5	RCr 41, *Rabi* (2016 to 2019)	Sprinkler with tubewell water	Pre-sown irrigation: 100 mm Irrigation depth: 50 mm at IW/CPE 0.8 Irrigation interval: 25-30 days	I = 300 R = 0 T = 300	1.57	12.76	5.23	14.28	73680	18.62	Technology included in *rabi* crops POP for ACZ V of Rajasthan

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in coriander was optimized in Kota region of Rajasthan under agro-ecological region no. 5. Irrigation scheduling done for coriander variety RCr 41 using sprinkler irrigation system gave 13% higher crop yield, 14% water saving and 19% higher profit through microirrigation scheduling technology over surface irrigation.

Cowpea

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	Pusa Phalguni, *Zaid* (2012 to 2014)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 215 R = 43 T = 258	5.31	43.13	20.58	53.86	56890	51.22	-
Kerala (Chalakudy, Sandy loam) AER 19	Sarika, *Zaid* (1996 to 2000)	Sprinkler with farm pond water	Irrigation depth: 15 mm Irrigation interval: 6-8 days	I = 255 R = 135 T = 390	9.38	36.40	24.05	63.60	28140	36.40	-
Kerala (Chalakudy, Sandy loam) AER 19	Lola, *Zaid* (2014 to 2016)	Drip with farm pond water	Irrigation depth: 80% PE Irrigation interval: Daily	I = 320 R = 38 T = 358	4.22	29.00	11.79	20.00	102660	13.50	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cowpea was optimized in agro-ecological region no. 9 and 19 in the states of Uttar Pradesh and Kerala. Irrigation scheduling was done in three cowpea varieties using sprinkler and drip irrigation systems. There was 29-43% higher crop yield, 20-64% water saving and 14-51% higher profit through the microirrigation scheduling technologies over farmers' practice.

Cucumber

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Kerala (Chalakudy, Sandy loam) AER 19	Mudicode Local, *Zaid* (1997 to 1999)	Drip with farm pond water	Irrigation depth: 20 mm at IW/CPE 0.4 Irrigation interval: Daily	I = 270 R = 10 T = 280	12.28	12.20	43.86	67.00	49120	15.40	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cucumber was optimized in Chalakudy under agro-ecological region 19 of Kerala. There was 12% increase in yield, 67% water saving and 15% higher income with drip irrigation over surface irrigation.

Garlic

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttarakhand (Almora, Silty clay loam) AER 14	VL Garlic 3, *Rabi* (2013 to 2019)	Drip with river lift irrigation	Irrigation depth: 100% PE	I = 289 R = 189 T = 478	11.59	93.60	24.25	24.26	92400	85.20	-
Assam (Jorhat, Sandy loam) AER 15	Local variety, *Rabi* (2009 to 2012)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 2 days	I = 295 R = 168 T = 463	7.22	59.56	15.59	73.19	71800	47.00	Technology recommended through state POP and given to state horticulture department under NMMI
Rajasthan (Kota, Clay loam) AER 5	G 50, *Rabi* (2009 to 2012)	Micro sprinkler with tubewell water	Irrigation depth: 100% PE Irrigation interval: 3 days	I = 390 R = 10 T= 400	10.58	52.09	26.45	21.10	65250	64.70	Technology included in horticultural crops POP for ACZ V of Rajasthan

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in garlic was optimized in three agro-ecological regions of the country *viz.*, 5, 14 and 15 in the states of Rajasthan, Uttarakhand and Assam. Two improved varieties and one local variety of garlic were studied using drip and micro-sprinkler irrigation systems. There was 52-94% higher crop yield, 21-73% water saving and 47-85% higher profit through microirrigation scheduling technologies over farmers' practice. Most of the technologies have been successfully included in package of practices and extended to line departments and farmers with wide adoption in local areas.

Ginger

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Dapoli, Sandy clay loam) AER 19	Satara Local, *Kharif* (2009 to 2012)	Micro-sprinkler with open dugwell water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 676 R = 0 T = 676	3.04	69.80	4.50	21.00	62040	49.50	Recommendations provided through state agriculture department
Maharashtra (Rahuri, Clay loam) AER 6	Mahima, *Kharif* (2007 to 2011)	Mini-sprinkler with tubewell water	Irrigation depth: 20 mm at IW/CPE 0.7 Irrigation interval: Twice a week	I = 671 R = 18 T = 689	8.87	40.80	12.87	17.60	201127	22.97	Technology approved in Joint Agresco meet of 4 state agril. universities. Technology passed on to state agriculture department for dissemination among farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in ginger was optimized in two agro-ecological regions of the country *viz.*, 6 and 19 in Maharashtra. Irrigation scheduling was done for two ginger varieties using micro-sprinkler and mini-sprinkler irrigation systems. There was 41-70% higher crop yield, 18-21% water saving and 23-50% higher profit through microirrigation scheduling technologies over farmers' practice. Both the technologies have been successfully extended to line departments and farmers with wide adoption in the State.

Okra

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Kerala (Chalakudy, Sandy loam) AER 19	Arka Anamika, *Zaid* (1996 to 2000)	Drip with farm pond water	Irrigation depth: 75% PE Irrigation interval: Daily	I = 243 R = 10 T = 253	13.75	10.00	54.35	20.00	101120	10.00	-
Rajasthan (Kota, Clay loam) AER 5	Akra Anamika, *Zaid* (2014 to 2016)	Sprinkler with tubewell water	Irrigation depth: 50 mm at IW/CPE 0.8 Irrigation interval: 15-20 days	I = 200 R = 320 T = 520	11.50	13.20	22.12	26.20	119656	19.20	Technology included in horticultural crops POP for ACZ V of Rajasthan

Rajasthan (Kota, Clay loam) AER 5	Arka Abhay, *Zaid* (2006 to 2007)	Drip with tubewell water	Irrigation depth: 75% PE Irrigation interval: 3 days	I = 255 R = 16 T = 271	9.33	44.40	34.43	44.50	94450	33.75	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	Parbhani Kranti, *Rabi* (2008 to 2012)	Drip with open dugwell water	Irrigation depth: 40% PE Irrigation interval: Alternate day	I = 321 R = 0 T = 321	11.67	73.92	36.36	38.31	133330	71.87	Technology disseminated by state line department and adopted by farmers of Marathwada region

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in okra was optimized in three agro-ecological regions of the country *viz.*, 5, 6 and 19 in the states of Rajasthan, Maharashtra and Kerala. Irrigation scheduling was done for three okra varieties using drip and sprinkler irrigation systems. There was 10-74% higher crop yield, 20-45% water saving and 10-72% higher income through the microirrigation scheduling technologies over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP) and extended to line departments and farmers with wide adoption in the local areas.

Onion

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttarakhand (Almora, Silty clay loam) AER 14	VL Pyaz 3, *Rabi* (2013 to 2019)	Drip with river lift irrigation	Irrigation depth: 100% PE	I = 201 R = 183 T = 384	16.67	28.10	43.41	49.70	166770	32.20	-
West Bengal (Gayeshpur, Sandy loam) AER 15	Suksagar, *Rabi* (2016 to 2019)	Sprinkler with tubewell water	Irrigation depth: 120% PE Irrigation interval: 3 days	I = 317 R = 17 T = 334	11.28	22.90	33.77	17.91	171750	31.10	-
Rajasthan (Kota, Clay loam) AER 5	Nasik Red, *Rabi* (2008 to 2011)	Microjet sprinkler with tubewell water	Irrigation depth: 60% PE Irrigation interval: 3 days No. of irrigations: 15-16	I = 320 R = 54 T = 374	18.78	13.64	50.21	48.44	144650	13.64	Technology included in *rabi* crops POP for ACZ V of Rajasthan

Himachal Pradesh (Palampur, Silty clay loam) AER 14	Palam Lohit, *Rabi* (2015 to 2018)	Mini-sprinkler with pond water	Irrigation depth: 120% PE No. of irrigations: 5	I = 100 R = 190 T = 290	15.00	24.00	51.72	40.00	155600	21.20	Technology propagated in training programmes for farmers & extension functionaries
Maharashtra (Parbhani, Clay) AER 6	N 53, *Rabi* (2005 to 2008)	Drip with open dugwell water	Irrigation depth: 125% ETc Irrigation interval: Alternate day	I = 442 R = 0 T = 442	39.09	55.19	88.44	30.96	176680	55.19	Technology disseminated by line department and adopted by Marathwada farmers
Odisha (Chiplima, Sandy loam) AER 12	Nashik Red, *Rabi* (2017 to 2019)	Drip with groundwater	Irrigation depth: 120% PE Irrigation interval: Alternate day	I = 369 R = 39 T = 408	21.46	32.47	52.60	68.44	149810	34.11	Technology transferred to state government and KVKs through ZREAC and SLREC meetings

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in onion was optimized in five agro-ecological regions of the country *viz.*, 5, 6, 12, 14 and 15 in the states of Rajasthan, Maharashtra, Odisha, Himachal Pradesh, Uttarakhand and West Bengal. Irrigation scheduling was done for five onion varieties using drip, sprinkler, mini-sprinkler and microjet sprinkler irrigation systems. There was 14-55% higher crop yield, 18-68% water saving and 14-55% higher income through the microirrigation scheduling technologies over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP) and extended to line departments and farmers with wide adoption by the local farmers.

Potato

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
J&K (Jammu, Sandy loam) AER 14	Kufri Sinduri, *Rabi* (2011 to 2013)	Sprinkler with groundwater	Irrigation depth: 60% PE	I = 72 R = 248 T = 320	17.10	25.73	53.44	38.60	106230	25.73	Technology demonstrated in farmers' field at Village-Rattian, Tehsil- R.S. Pura, District- Jammu

Rajasthan (Kota, Clay loam) AER 5	Kufri Bahar, *Rabi* (2005 to 2007)	Drip with tubewell water	Irrigation depth: 75% PE Irrigation interval: 3 days	I = 300 R = 0 T = 300	28.23	67.80	94.10	37.20	80630	41.89	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Madhya Pradesh (Powarkheda, Clay) AER 10	Kufri Jyoti, *Rabi* (2007 to 2012)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 340 R = 0 T = 340	21.89	16.20	64.38	21.95	92850	19.09	-
Maharashtra (Rahuri, Clay) AER 6	Kufri Jyoti, *Rabi* (1999 to 2000)	Mini-sprinkler with tubewell water	Irrigation depth: 25 mm Irrigation interval: 5-8 days	I = 224 R = 0 T = 224	21.96	83.00	98.04	29.00	59600	72.00	Technology approved in Joint Agresco meet of 4 state agril. universities. Technology passed on to state line department for dissemination to local farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in potato was optimized in four agro-ecological regions of the country *viz.*, 5, 6, 10 and 14 in the states of Rajasthan, Maharashtra, Madhya Pradesh and Jammu & Kashmir. Irrigation scheduling was done for three potato varieties using drip, sprinkler, mini-sprinkler irrigation systems. There was 16-83% higher crop yield, 22-39% water saving and 19-72% higher income through the microirrigation scheduling technologies over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP), extended to line departments and widely adopted by local farmers.

Sweet potato

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Rahuri, Clay loam) AER 6	Local variety, *Rabi* (2004 to 2007)	Sprinkler with tubewell water	Irrigation depth: 35 mm Irrigation interval: 5-8 days	I = 410 R = 200 T = 610	15.08	42.00	24.72	21.00	52420	40.00	Technology approved in Joint Agresco meet of 4 state agriculture universities. Technology passed on to state agriculture department for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sweet potato was optimized in Rahuri region under agro-ecological region 6 of Maharashtra. There was 42% higher crop yield, 21% water saving and 40% higher net profit with sprinkler irrigation over surface irrigation. The technology has been successfully extended to stakeholders and beneficiaries.

Tapioca

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	MVD 1, *Kharif* (1990 to 1991)	Drip with tubewell water	Irrigation depth: 50 mm at IW/CPE 0.6	I = 206 R = 357 T = 563	33.52	12.54	59.54	43.80	68130	14.00	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in tapioca was optimized in Bhavanisagar region of Tamil Nadu under agro-ecological region 8. There was 13% higher crop yield, 44% water saving and 14% higher net profit with drip irrigation.

Tomato

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	Hybrid SHS, *Rabi* (2014 to 2017)	Drip with tubewell water	Irrigation depth: 60% ETc Irrigation interval: 3 days	I = 298 R = 55 T = 353	32.92	23.76	93.26	53.41	283180	41.06	-
Chhattisgarh (Bilaspur, clay loam) AER 11	Pusa Ruby, *Rabi* (2000 to 2003)	Drip with tubewell water	Irrigation depth: 60% PE Irrigation interval: Alternate day	I = 409 R = 18 T = 427	34.55	79.04	80.91	41.40	135600	65.00	-
Tamil Nadu (Madurai, Sandy clay loam) AER 8	PKM 1, *Kharif* (1994 to 1997)	Sprinkler with tubewell water	Irrigation depth: 100% PE No. of irrigations: 7	I = 220 R = 304 T = 524	30.15	11.00	57.54	31.00	105500	15.00	-
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	Co 3, *Kharif* (2011 to 2012)	Micro-sprinkler with tubewell water	Irrigation depth: 60% PE Irrigation interval: 2 days	I = 289 R = 284 T = 573	31.24	20.10	54.52	48.00	249940	21.00	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in tomato was optimized in three agro-ecological regions of the country *viz.*, 8, 9 and 11 in the states of Tamil Nadu, Uttar Pradesh and Chhattisgarh. Irrigation scheduling was done for four tomato varieties using drip, sprinkler and micro-sprinkler irrigation systems. There was 11-79% higher crop yield, 31-53% water saving and 15-65% higher income through the microirrigation scheduling technologies over farmers' practice.

Irrigation Scheduling in Fruits

Aonla

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	Narendra Aonla 7 (2005 to 2013)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 346 R = 390 T = 736	13.31	74.90	18.08	33.00	89700	63.50	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in aonla was optimized in agro-ecological region 9 in Uttar Pradesh. Irrigation scheduling was done for aonla variety Narendra Aonla 7 using drip irrigation. There was 75% higher crop yield, 33% water saving and 64% higher profit through drip irrigation scheduling over farmers' practice.

Banana

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	G 9 (2008 to 2012)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 665 R = 856 T = 1521	36.00	35.00	23.67	29.00	265300	34.44	-
Kerala (Chalakudy, Sandy loam) AER 19	Nendran (2009 to 2014)	Drip with farm pond water	Irrigation depth: 75% PE Irrigation interval: 2 days	I = 638 R = 795 T = 1433	27.34	16.00	19.08	16.00	246800	16.00	Technology adopted by state agriculture department and recommended to the farmers
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	Kathali (2002 to 2003)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 1027 R = 693 T = 1720	21.00	48.90	12.21	22.90	157500	45.60	Technology adopted in 600 hectare area

Assam (Jorhat, Sandy loam) AER 15	Medium Cavendish (Barjahaji) (2006 to 2008)	Drip with tubewell water	Irrigation depth: 75% PE Irrigation interval: 2 days	I = 632 R = 937 T = 1569	46.11	24.00	29.39	20.40	360000	35.00	Technology approved for recommendation through state POP. Technology given to state horticulture department under NMMI
Odisha (Chiplima, Sandy loam) AER 12	Gajabanthal (2013 to 2016)	Drip with pond water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 907 R = 258 T = 1165	35.83	22.75	30.76	24.54	260810	32.93	Technology transferred to state government and KVKs through ZREAC and SLREC meetings

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in banana was optimized in five agro-ecological regions of the country *viz.*, 8, 11, 12, 15 and 19 in the states of Tamil Nadu, Chhattisgarh, Odisha, Assam and Kerala. Five banana varieties under drip irrigation showed 16-49% higher fruit yield, 16-29% water saving and 16-46% higher income through the microirrigation scheduling technologies over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP) and extended to line departments and farmers with wide adoption by local farmers.

Indian jujube (Ber)

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Gujarat (Navsari, Sandy loam) AER 19	Gola (1993 to 1999)	Drip with borewell water	Irrigation depth: 60% PE Irrigation interval: Alternate day	I = 465 R = 243 T = 708	10.20	17.00	14.41	12.00	82000	12.00	Technology adopted by 5% of local farmers

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in ber was optimized in agro-ecological regions 19 in Navsari region of Gujarat. There was 17% higher fruit yield,12% water saving and 12% higher income through drip irrigation scheduling over farmers' practice.

Cashew

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Dapoli, Sandy clay loam) AER 19	Vengurla 4 (2010 to 2020)	Drip with open well water	Irrigation depth: 60% PE Irrigation interval: Alternate day	I = 234 R = 500 T = 734	1.99	55.30	2.71	22.00	116060	46.10	Recommendations are provided through state agriculture department

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cashew was optimized for Konkan region of Maharashtra falling under agro-ecological region 19. There was 55% higher cashew yield, 22% water saving and 46% higher income through drip irrigation over farmers' practice. The technology recommendation has been provided to the agriculture department of Maharashtra.

Coconut

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (nuts/ ha)	Yield increase (%)	WUE (nuts/ ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Kerala (Chalakudy, Sandy clay loam) AER 19	WCT (2003 to 2009)	KAU micro sprinkler with farm pond water	Irrigation depth: 50% PE Irrigation interval: Alternate day	I = 400 R = 1080 T = 1480	6475	18.00	4.37	50.00	63960	18.00	-
Kerala (Chalakudy, Sandy loam) AER 19	WCT (2004 to 2012)	Drip with farm pond water	Irrigation depth: 75% PE Irrigation interval: 2 days	I = 525 R = 825 T = 1350	7218	14.80	5.35	32.00	72180	14.80	Technology adopted by state agriculture department and recommended to farmers
Tamil Nadu (Madurai, Silty clay loam) AER 8	Local variety (Tall) (1996 to 1999)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 784 R = 507 T = 1291	6825	41.60	5.29	21.00	58000	54.00	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in coconut was optimized in two agro-ecological regions of the country *viz.*, 8 and 19 in the states of Tamil Nadu and Kerala. There was 15-42% higher nut yield, 21-50% water saving and 15-54% higher profit from the coconut plantation through the microirrigation scheduling technologies over farmers' conventional practice. One of the technologies has been successfully extended to line departments in Kerala and recommended to the local farmers.

Guava

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Rahuri, Clay) AER 6	Sardar (2018 to 2022)	Drip with tubewell/ farm pond water	Irrigation depth: 80% ETc Irrigation interval: Daily	I = 406 R = 120 T = 526	10.45	16.45	19.87	13.97	197500	26.88	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in guava var. Sardar was optimized for Rahuri region of Maharashtra under the agro-ecological region 6. There was 16% higher fruit yield, 14% water saving and 27% higher income through drip irrigation scheduling over farmers' practice. The technology is recommended for medium deep soils of western Maharashtra for obtaining higher monetary returns and resource use efficiency by the local farmers.

Papaya

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Bihar (Pusa, Sandy loam) AER 13	Red Lady (2011 to 2017)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 7 days	I = 407 R = 442 T = 849	35.32	27.79	41.60	28.00	279270	30.17	-
Odisha (Chiplima, Clay loam) AER 12	CO 2 (2010 to 2013)	Drip with pond water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 511 R = 443 T = 954	23.17	26.13	24.29	18.93	162190	26.13	Technology transferred to state government and KVKs through ZREAC and SLREC meetings

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in papaya was optimized in agro-ecological regions 12 and 13 in the states of Odisha and Bihar. There was 26-28% higher fruit yield, 19-28% water saving and 26-30% higher income through drip irrigation scheduling technology over farmers' practice.

Pineapple

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
West Bengal (Gayeshpur, Sandy loam) AER 15	Kew (2004 to 2007)	Microsprinkler with tubewell water	Irrigation depth: 60% PE Irrigation interval: 3 days	I = 215 R = 420 T = 635	46.98	14.00	73.98	33.20	82890	16.00	-
West Bengal (Gayeshpur, Sandy loam) AER 15	Kew (2004 to 2007)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 296 R = 420 T = 716	54.60	19.50	76.26	23.20	100210	22.80	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in pineapple was optimized for agro-ecological region 15 in the state of West Bengal. There was about 14-20% higher fruit yield, 23-33% water saving and 16-23% higher profit through micro-sprinkler and drip irrigation technology over farmers' practice.

Pomegranate

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Chhattisgarh (Bilaspur, Clay loam) AER 11	Ganesh 4 (1996 to 1998)	Drip with tubewell water	Irrigation depth: 40% PE Irrigation interval: 3 days	I = 237 R = 364 T = 601	12.67	14.30	21.08	50.00	153400	12.20	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in pomegranate was optimized for agro-ecological region 11 in Chhattisgarh. Pomegranate variety Ganesh 4 showed about 14% higher fruit yield, 50% water saving and 12% increase in income through drip irrigation technology over farmers' practice.

Sweet orange

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Parbhani, Clay) AER 6	Mrig Bahar (2004 to 2007)	Inline ring drip with open well water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 489 R = 662 T = 1151	37.40	55.44	32.49	19.44	560950	55.38	Technology disseminated by state line department and adopted by Marathwada farmers
Maharashtra (Rahuri, Clay) AER 6	Nucellar (2004 to 2007)	Drip with tubewell water	Irrigation depth: 25 mm Irrigation interval: Alternate day	I = 330 R = 440 T = 770	15.41	42.00	20.01	55.13	245130	36.00	Technology approved in Joint Agresco meet of 4 state agril. universities. Technology passed on to state line dept for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sweet orange was optimized for agro-ecological region 6 in Maharashtra. There was 42-55% higher fruit yield, 19-55% water saving and 36-55% increase in income through the drip irrigation scheduling technologies over farmers' practice. The technology has been approved by competent authorities and extended to line department and farmers.

Watermelon

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Parbhani, Clay) AER 6	Kiran, *Zaid* (2013 to 2017)	Drip with open well water	Irrigation depth: 100% PE Irrigation interval: Alternate day	I = 522 R = 82 T = 604	20.89	35.56	34.59	20.00	138010	34.56	Technology disseminated by state line department and adopted by farmers of Marathwada region

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in watermelon was optimized for Parbhani region of Maharashtra under agro-ecological region 6. Watermelon variety Kiran showed 36% higher fruit yield, 20% water saving and 35% higher income through drip irrigation technology over farmers' practice. The technology has been succesfully extended to line department and local farmers of Marathwada region.

Irrigation Sceduling in Flowers

Marigold

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	Pusa Narangi, *Rabi* (2011 to 2014)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 180 R = 70 T = 250	21.23	32.28	84.92	48.28	155320	40.55	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in marigold was optimized for agro-ecological region 9 in Uttar Pradesh. Marigold variety Pusa Narangi showed 33% higher flower yield, 48% water saving and 41% higher income through drip irrigation technology over farmers' practice.

Tuberose

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (spikes/ ha)	Yield increase (%)	WUE (spikes/ ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
West Bengal (Gayeshpur, Sandy loam) AER 15	Calcutta Double, *Zaid* (2017 to 2020)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 207 R = 274 T = 481	249140	11.50	518.00	25.28	363210	19.90	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in tuberose was optimized for agro-ecological region 15 in West Bengal. Tuberose variety Calcutta Double showed 12% higher flower yield, 25% water saving and 20% higher income through drip irrigation technology over farmers' practice.

Irrigation Sceduling in Medicinal Plants

Ashwagandha

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Root yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharashtra (Rahuri, Clay) AER 6	Local variety, *Rabi* (2009 to 2012)	Drip with tubewell/ farm pond water	Irrigation depth: 10 mm Irrigation interval: Alternate day	I = 708 R = 30 T = 738	0.82	64.00	1.11	35.22	205750	53.00	Technology approved in Joint Agresco meet of 4 state agril. universities. Technology passed on to state line department for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in Ashwagandha was optimized for agro-ecological region 6 in Maharashtra. Local variety of Ashwagandha showed 64% higher flower yield, 35% water saving and 53% higher income through the drip irrigation technology over farmers' practice.

Mentha

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Oil yield (t/ha)	Yield increase (%)	WUE of oil (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttarakhand (Pantnagar, Sandy loam) AER 9	CIM Kranti, *Spring* (2016 to 2018)	Drip with tubewell water	Irrigation depth: 100% CPE Irrigation interval: 2 days	I = 480 R = 60 T = 540	0.28	37.50	0.52	26.90	248620	49.80	-
Uttarakhand (Pantnagar, Sandy loam) AER 9	CIM Kranti, *Spring* (2022 to 2024)	Drip with tubewell water	Irrigation depth: 100% ETc Irrigation interval: 2 days	I = 711 R = 48 T = 759	0.26	18.00	0.34	11.10	207090	18.90	-

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in mentha was optimized in agro-ecological region 9 in Uttarakhand. Irrigation scheduling was done for mentha variety CIM Kranti using drip irrigation. This showed 18-38% higher crop yield, 11-27% water saving and 19-50% higher profit through drip irrigation scheduling over farmers' practice.

Turmeric

State (Centre, soil texture) AER	Variety, season (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Rhizome yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	BSR 2, *Kharif* (2012 to 2014)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 574 R = 487 T = 1061	37.50	18.12	35.35	28.00	231240	24.00	-
Rajasthan (Kota, Clay loam) AER 5	Azad, *Kharif* (2016 to 2019)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 720 R = 216 T = 936	18.90	18.10	20.19	24.00	158570	23.23	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Rajasthan (Kota, Clay loam) AER 5	Azad, *Kharif* (2010 to 2013)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 480 R = 430 T = 910	23.99	63.53	26.36	22.70	144450	52.00	Technology included in *kharif* crops POP for ACZ V of Rajasthan
Maharashtra (Parbhani, Clay) AER 6	Selam, *Kharif* (2013 to 2017)	Drip with open dugwell water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 454 R = 458 T = 912	32.98	23.80	36.16	20.00	204410	23.77	Technology disseminated by state line department & adopted by farmers of Marathwada

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in turmeric was optimized in three agro-ecological regions of the country *viz.*, 5, 6 and 8 in the states of Rajasthan, Maharashtra and Tamil Nadu. Three varieties put under trial showed 18-63% higher rhizome yield, 20-28% water saving and 23-52% higher income through drip irrigation scheduling over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP) and extended to line departments and farmers with wide adoption by local farmers.

Irrigation Sceduling in Cash Crops

Cotton

State (Centre, soil texture) AER	Crop (Variety, season) (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Maharash-tra (Par-bhani, Clay) AER 6	*Bt* cotton (Bunny, *Kharif*) (2007 to 2010)	Drip with dugwell water	Irrigation depth: 50% PE Irrigation interval: Alternate day	I = 398 R = 429 T = 827	3.76	62.77	4.54	28.00	112680	52.73	Technology disseminated by line department and adopted by farmers of Marathwada region
Maharash-tra (Rahuri, Clay) AER 6	*Bt* cotton (Mal-lika, *Zaid*) (2012 to 2014)	Drip with tubewell/ pond water	Irrigation depth: 100% ETc Irrigation interval: Alternate day	I = 470 R = 229 T = 699	2.40	16.00	3.43	30.00	96400	15.00	Technology approved in Joint Agresco meet of 4 state agricultural universities. Technology passed on to line dept for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in cotton was optimized in agro-ecological region 6 in the state of Maharashtra. *Bt* cotton varieties Bunny and Mallika showed 16-63% higher cotton yield, 28-30% water saving and 15-53% higher income through drip irrigation scheduling over farmers' practice. Both the technologies have been successfully extended to state line departments as well as farmers with wide adoption in local areas.

Sugarcane

State (Centre, soil texture) AER	Variety (Year of trial)	Irrigation and source	Recommended irrigation schedule	Water applied (mm) T=I+R	Yield (t/ha)	Yield increase (%)	WUE (kg/ha-mm)	Water saving (%)	Net income (₹/ha)	Income increase (%)	Extension
Uttar Pradesh (Ayodhya, Silty clay loam) AER 9	COS 1169 (2012 to 2014)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 3 days	I = 452 R = 433 T = 885	100.43	60.65	113.48	44.88	182000	67.38	Technology adopted by sugarcane farmers of the region
Chhattisgarh (Bilaspur, Clay loam) AER 11	Co 1305 (2003 to 2005)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: Alternate day	I = 486 R = 982 T = 1468	130.80	28.44	89.10	35.31	135440	24.40	-

Tamil Nadu (Madurai, Silty clay loam) AER 8	Co 86032 (1996 to 1999)	Drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 3 days	I = 1205 R = 433 T = 1638	155.0	18.00	94.63	25.00	136000	19.00	-
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	Co 8021 (2012 to 2013)	Drip with tubewell water	Irrigation depth: 80% PE Irrigation interval: 2 days	I = 1185 R = 346 T = 1531	150.20	46.67	98.10	20.00	260780	42.00	-
Tamil Nadu (Bhavanisagar, Sandy loam) AER 8	Co 86032 (2014 to 2015)	Subsurface drip with tubewell water	Irrigation depth: 100% PE Irrigation interval: 2 days	I = 1240 R = 380 T = 1620	127.83	28.00	78.91	25.00	199990	31.60	Technology adopted in 300 hectare area
Maharashtra (Rahuri, Clay) AER 6	CoM 265 (preseasonal sugarcane) (1999 to 2003)	Drip with tubewell water	Irrigation depth: 10 mm Irrigation interval: Alternate day	I = 1176 R = 230 T = 1406	141.85	29.00	100.90	31.82	146740	27.00	Technology approved in Joint Agresco meet of 4 state agricultural universities. The technology is passed on to line department for dissemination to farmers.
Maharashtra (Rahuri, Clay) AER 6	Co 94012 (preseasonal sugarcane) (2007 to 2009)	Drip with tubewell water	Irrigation depth: 10 mm Irrigation interval: Alternate day	I = 928 R = 108 T = 1036	113.90	12.80	109.94	30.00	106760	22.80	Technology approved in Joint Agresco meet of 4 state agricultural universities. The technology is passed on to line department for dissemination to farmers.

Note: I, Irrigation water applied; R, Effective rainfall during crop growth period; T, Total water applied to crop (I+R)

Irrigation scheduling in sugarcane was optimized in four agro-ecological regions of the country *viz.*, 6, 8, 9 and 11 in the states of Maharashtra, Tamil Nadu, Uttar Pradesh and Chhattisgarh. There was 13-61% higher cane yield, 20-45% water saving and 19-67% higher income through surface and subsurface drip irrigation scheduling over farmers' practice. Most of the technologies have been successfully included in Package of Practice (POP), extended to state line departments and widely adopted by local farmers.

Conclusion

Pressurized irrigation system, commonly known as microrrigation (MI) has been the prime focus under Per Drop More Crop of PMKSY scheme. MI is an integral component of the scheme to maximize water use efficiency at farm level, increase productivity of crops and income of farmers through precision water management. Research done by AICRP on IWM is fully in line with the objectives of Per Drop More Crop. The bulletin documents the MI schedules developed for 54 crops including a wide range of field, horticultural and cash crops under different agro-ecological conditions. Sprinkler irrigation system involving micro-sprinkler, mini-sprinkler, microjet sprinkler and KAU micro-sprinkler led to 8-85% higher crop yield, 9-69% water saving, and 8-76% higher profit compared to conventional surface irrigation. Similarly, drip irrigation led to 6-94% more crop yield, 11-73% water saving, and 5-85% more profit over farmers' conventional practice. The technologies have been developed considering water scarce, water stressed and critical groundwater blocks/district. The centres of AICRP on IWM have been instrumental in extending many of the technologies among the local farmers by improving the technical know-how of KVK extension workers, line departments and farmers through trainings, workshops and on-farm demonstrations. The AICRP on IWM scheme has also made potential use of MI systems for promoting fertigation.

The MI technologies provided in the bulletin may be included in annual action plans for Per Drop More Crop, that will be drawn from district irrigation plans and implemented in conjunction with water sources created under PMKSY. This may help in raising area under MI in India. There is scope of conducting more research on developing common layouts of the MI systems for popular cropping systems in different agroecological regions of the country for greater acceptance by farmers.

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ABBREVIATIONS

ACZ - Agro-climatic zone

AER - Agroeclogical region

ATC - Adaptive Trial Centre

CPE - Cumulative pan evaporation

CSS - Centrally Sponsored Scheme

DA&FW - Department of Agriculture & Farmers Welfare

IW - Irrigation water

IWRD - Irrigation and Water Resources Department

KVK - Krishi Vigyan Kendra

MI - Microirrigation

NMMI - National Mission on Micro Irrigation

NMSA - National Mission for Sustainable Agriculture

OFWM - On Farm Water Management

PDMC - Per Drop More Crop

PMKSY - Pradhan Mantri Krishi Sinchayee Yojana

POP - Package of Practices

RKVY - Rashtriya Krishi Vikas Yojana

RRA - Rapid Rural Appraisal

SAC - Scientific Advisory Committee

SLREC - State Level Research and Extension Council

WUE - Water use efficiency

ZREAC - Zonal Research and Extension Advisory Council

Photographs

Drip in rice (Pantnagar centre)

Drip in wheat (Morena centre)

Sprinkler in wheat (Sriganganagar centre)

Sprinkler in wheat (Kota centre)

Drip in maize (Parbhani centre)

Drip in maize (Hisar centre)

Drip in sweetcorn (Pantnagar centre)

Raingun in finger millet (Madurai centre)

Drip in sorghum (Parbhani centre)

Drip in groundnut (Belavatagi centre)

Sprinkler in groundnut (Chiplima centre)

Drip in mustard (Bilaspur centre)

Sprinkler in chickpea (Rahuri centre)

Micro-sprinkler in chickpea (Pantanagar centre)

Sprinkler in greengram (Kota centre)

Micro-sprinkler in lentil (Pantnagar centre)

Drip in pea (Pantnagar centre)

Drip in pigeonpea (Bilaspur centre)

Drip in rajma (Ayodhya centre)

Drip in brinjal (Bathinda centre)

Drip in brinjal (Kota centre)

Drip in cabbage (Kota centre)

Drip in cabbage (Parbhani centre)

Drip in clusterbean (Parbhani centre)

Sprinkler in coriander (Kota centre)

Drip in cowpea (Chalakudy centre)

Drip in garlic (Jorhat centre)

Drip in ginger (Dapoli centre)

Drip in okra (Parbhani centre)

Drip in okra (Chalakudy centre)

Drip in onion (Parbhani centre)

Drip in tapioca (Bhavanisagar centre)

Drip in banana (Chalakudy centre)

Drip in papaya (Rahuri centre)

Drip in guava (Rahuri centre)

Drip in mentha (Pantnagar centre)

Drip in turmeric (Kota centre)

Drip in turmeric (Parbhani centre)

Drip in cotton (Sriganganagar centre)

Subsurface drip in sugarcane (Coimbatore centre)

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