

IRRIGATION TECHNIQUES TO GET PER DROP MORE CROP

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Water is the most critical input for crop cultivation and the efficient use of available water resources is vital for sustainable agriculture development. Since more than 80 per cent of available water is used for irrigation, high priority has been given to water conservation and irrigation water management.

Agriculture with allied activities is the single largest use of water in many parts of India. Water is the most critical input for crop cultivation and the efficient use of available water resources is vital for sustainable agriculture development. Since more than 80 per cent of available water is used for irrigation, high priority has been given to water conservation and irrigation water management. Hence, the adoption of precision irrigation and other water saving technologies are essential. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been launched in the year 2015 with the vision of extending the coverage of irrigation 'Har Khet Ko Pani' and improved water use efficiency 'More Crop Per Drop' in a focused manner where Micro Irrigation has been given paramount importance. Micro Irrigation mainly in the form of sprinkler irrigation and drip irrigation has become the fastest growing water saving technology worldwide and has the potential to increase the quality of produce. This will ultimately contribute to improved water use efficiency "More Crop Per Drop".

India's Agricultural Area

The Government classifies agricultural areas as 'rainfed areas' and 'irrigated areas'. Areas where irrigation is less than or equal to 30 per cent of the net sown area are called 'rainfed' and more than 30 per cent of the net sown are known as irrigated

areas. According to NITI Aayog, Government of India statistics, irrigation consumes 84 per cent of water and it is estimated that 52 per cent of cropped areas are without irrigation. India's irrigated agriculture has two parts: (i) Surface (canal) irrigation development due to high public investment by the States and (ii) Over development of groundwater resources due to private tube well development. The share of ground water sources for irrigation has been increased from 28.7 per cent (1950-51) to 62.4 per cent (2012-13) but the share of canal in net irrigated area has been decreased from 39.8 per cent to 23.6 per cent. Ground water sources are over-exploited in many regions and are chronically water stressed in some regions. The country has high dependence on groundwater. The annual utilizable water resources in the country are estimated as 690 Billion Cubic Metre (BCM) from surface water and 447 BCM from groundwater. Augmentation of water supply initiatives may be water control measures, bench marking of irrigation projects, reforms in water harvesting norms, refocusing on tanks and ponds. Demand management initiatives may be Micro irrigation techniques such as drip and sprinkler, improving soil health, weather based crop insurance, market improvement and capacity building. Small water harvesting structures integrated with Micro Irrigation techniques can provide improved water use efficiency in rainfed areas.



Micro Irrigation Technologies

Micro irrigation technologies mainly sprinkler irrigation and drip irrigation not only helps in water saving but also in reduction in fertilizer usage, labour expenses and other inputs and input costs. It enhances crop productivity and improves soil health. The saved water can be used for extended coverage of area under irrigation for a longer duration. All these advantages will ultimately lead to environmental sustainability. Many research studies have shown that Micro irrigation systems can save water up to 40 per cent–50 per cent over conventional flood irrigation methods along with enhanced agricultural productivity.

Improved Irrigation Methods

Since 8th Plan, Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) has been promoting Micro irrigation (MI) methods like drip irrigation and sprinkler irrigation. Later MI was launched as Centrally Sponsored Scheme (CSS) in 2005 -06. It was up-scaled to National Mission on Micro Irrigation (NMMI) in 2010. National Mission for Sustainable Agriculture (NMSA) was formed in the year 2014-15 and Micro irrigation was considered as on-farm water management component of NMSA. It was taken under 'More Crop Per Drop' component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) launched on 1st July, 2015. Micro irrigation is an integral component of PMKSY to maximise water use efficiency at field level.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been launched with the motto of providing 'Har Khet Ko Paani'. The scheme aims at providing end-to-end solutions in irrigation supply chain viz., water resources, distribution network, farm level applications and improved water use efficiency. Both Central and State Governments promote this technology and in the FY 2015-16 the funding pattern under PMKSY has been fixed as 50:50 per cent between Central and State Governments. The main objective of PMKSY is to achieve convergence of investments in irrigation sector at field level.

A Micro irrigation Fund (MIF) with an initial corpus of Rs. 5000 crore was allocated in the Union Budget 2017-18. This budget is to help the States to mobilize additional resources for increasing the coverage under Micro irrigation through special and innovative initiatives by State Governments. As per the data given in the official website of PMKSY, total area covered under Micro irrigation by the year

2018-19 is 11.58 Lakh Ha. The area covered under drip irrigation is 5.75 Lakh Ha and that of sprinkler irrigation is 5.83 Lakh Ha. The other interventions such as the potential created for protective irrigation is 1.30 Lakh Ha.

Impact of Micro Irrigation

Global agriculture System has conducted an impact study in the year 2014 on NMMI and the adoption of MI and the following benefits were reported. MI offers enhancement of crop productivity due to judicious use of water and other inputs. Sampled beneficiaries in 13 States were studied. The benefits are noticed in terms of (i) Increase in irrigated area 8.41 per cent from the same source of water, (ii) Crop productivity was increased in fruits and vegetables 42.3 per cent and 52.8 per cent respectively, (iii) Reduction in irrigation cost by 20 per cent -50 per cent with an average 32.3 per cent, (iv) Reduction in energy consumption by about 31 per cent, (v) Reduction in the use of chemical fertilizers by 7 per cent- 42 per cent with an average 28 per cent. Overall Farmers income was increased by 20 per cent-68 per cent with an average increase of 48.5 per cent. Benefit-cost ratio was greater than one across the states. It also ensures additional benefits like non-exploitation of groundwater, reduction in the cost of weeding and relief from water scarcity induced labour migration.

Micro Irrigation methods reduce conveyance losses, evaporation, runoff, deep percolation losses. Another advantage of this technology is that it will be functional with small water wells also. Due to focussed water application, the overall efficiency of water in drip irrigation and sprinkler irrigation are 80-90 per cent and 50 -70 per cent respectively. This is much higher than that of surface flooding (30-40 per cent). Water application efficiency was reported as 30-70 per cent for flooding, 60-80 per cent for sprinkler and 90 per cent for drip irrigation. Surface water moisture evaporation is same for sprinkler and flooding (30-40 per cent) whereas the same is only 20-25 per cent in drip irrigation.

PMKSY has major strengths such as focus on sustainable growth concept, convergence of various schemes and removal of redundancies, greater responsibility and accountability at district level. But the major shortcomings are lower fund allocation than previous year, delay in fund disbursement, area ceiling limit and difficulty in district level implementation. As per the Census 2011, there are 640 districts in India and hence, there should be 640 district plans are to be approved and the total allocation of 1075 crores is to be distributed within these districts.

Large and medium farmers in India comprises only 15 per cent but they hold more than 55 per cent of the land. Small and marginal farmers are entitled to obtain a subsidy up to 55 per cent of the total cost of the system and for other farmers up to 45 per cent. Tribal farmers and area in dark zones are entitled for additional benefits. It has been observed that highest adoption of this technology is in medium category farms (2-10 Ha), and the next is from small farms (1-2 Ha). Farmers of marginal farms (less than 1 Ha) and large farms (>10 Ha) have so far not appreciated it due to subsidy regulations. Two States Andhra Pradesh (AP) and Gujarat have set up their own ways to implement MI. AP has set up Andhra Pradesh Micro Irrigation Project prior to Centrally Sponsored Scheme with dedicated team working with Directorate of Horticulture. The project was launched with the objectives of water conservation, additional area under cultivation with existing water resources, enhancing crop production, productivity and quality, judicious use of ground water, saving in power consumption and cost of cultivation. The area under cultivation has seen a steady rise after the implementation of the programme. States AP, Maharashtra and Gujarat top in the list of area coverage and total subsidy advanced. Gujarat is one of the high performing states in India and this State has established 'Gujarat Green Revolution Company (GGRC) Limited' in 2005 for successful implementation of Government schemes for MI. GGRC provides all necessary infrastructures for crop cultivation, facilitates cultivation under adverse climatic conditions, helps to develop market linkage for the produces and to enhance economic conditions of the small and marginal farmers. Prior to the establishment of GGRC, the average annual achievement were 0.015Mha/year (1991-2005) and is increased to 0.128 Mha/year recently.

Micro Irrigation is suitable for any farmable land slopes and generally for all kind of soils. It is widely used for vegetables and horticultural crops. It has many advantages if managed properly: (i) High water application efficiency (ii) Easily implement even if the fields are irregular shapes (iii) Uniform application of fertilizers (iv) Reduction in weed growth and cost of cultivation (v) Reduction in energy consumption and (vi) Operational at low pressures. A study conducted by Namara, et al., (2005) in Gujarat and Maharashtra shows that Micro Irrigation is justified technically and economically for the cultivation of cotton, Banana and groundnut. The study shows that all the socioeconomic variables such as membership in a high caste group, poverty index, and share of income from off farm and non-farm activities had significant impact on the decision to adopt MI and well to

farmers were most likely to adopt this technology.

Conclusion

Water scarcity in various parts of the country has created awareness about Micro Irrigation systems and its implementation results in significant economic and social benefits in the country. Since water being a critical resource for agriculture, every drop of it is significant for overall farm efficiency. Micro Irrigation is a proven water conservation technology practised all over the world. Economic return is very important for the adoption of any new technology. Since soils are not rich in nutrients, required nutrients to the soil through integrated Nutrient Management will enhance soil health and the yield of the crops. Farmers are convinced to adopt this technology due to enhanced production & productivity of different crops, reduction in inputs costs and flexibility to introduce new crops. The saved water can be used to increase the area under irrigation or for the reclamation of degraded / waste land. All the positive outcomes contribute to food security in the country. Hence, Micro Irrigation Technology should be popularized with adequate credit facilities and support from the Government.

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