ABSTRACT

Microirrigation is defined as the frequent application of small quantities of water on or below the soil surface as drops, tiny streams or miniature sprays through emitters or applicators placed along a water delivery lateral line. Microirrigation technologies today world wide including India are adopting in wide variety of crops viz, fruit and orchard crops, vegetables, flowers, commercial field crops, tuber & bulb crops, plantation crops, spices & condiments, forestry, nurseries, landscape etc. and under diverse situations such as arid, semi-arid, desert climates; problem soils etc. Marginal quality waters like saline water and agro industry effluents’ are also being used today successfully with drip irrigation for raising several crops.
Recognizing the benefits of microirrigation technologies to farming community the Government of Andhra Pradesh has launched a large scale microirrigation project known as “Andhra Pradesh Microirrigation Project” (APMIP) on 3rd November 2003 with an initial target of 0.247 million hectares and a financial out lay of Rs.1187 crores.

Since it’s commissioning in November 2003, the area coverage up to March’ 2010 under APMIP summed up to 0.420 million ha. Further APMIP being the first mega project in the world in terms of size involving small & marginal farmers with a land holding size of as low as 0.5 ha to 2 ha, it was intended to assess the impact of adoption of microirrigation technologies such as drip by beneficiary farmers in the state of Andhra Pradesh, India.

The study revealed that in farmers fields adopting drip irrigation crops experienced favourable soil water balance in the crop root zone resulting in optimal soil water plant relations, nutrient availability, improved weed control etc., and in turn contributed to higher yield in different crops (21% to 60%) over conventional surface irrigated (non-drip irrigated) farmers field. The yield increase varied from 21 – 60% in fruit crops, 58% in sugarcane and 25 – 33% in vegetable crops. The controlled precise delivery of water and nutrients to the crop root zone through drip system according to crops daily water needs lead to substantial reduction in water losses by evaporation, seepage, runoff and deep percolation as compared to conventional surface irrigated (non-drip irrigated) farmers fields resulting in significant savings in
water (49% to 54%) in different crops. The water savings amounted to 51 – 53% in fruit crops, 54% in sugarcane and 49 – 54% in vegetable crops.

Significant saving in applied water to crops in drip irrigated farmers fields substantially reduced the working hours of pump set consequently leading to less electricity consumption per ha in comparison to conventional surface irrigated (non-drip irrigated) farmers fields. Net saving in energy by adoption of drip varied from 557 to 1532 kWh/ha in different crops. This amounted to an energy conservation of 51 – 53% in fruit crops, 54% in sugarcane and 49 – 54% in vegetables as compared to conventional surface irrigated (non-drip irrigated) farmers fields. Further application of fertilizers via drip fertigation subsequently reduced the dosage of nutrients / ha applied in all crops i.e., fertigation ensured 110% higher fertilizer use efficiency in sugarcane, 28 to 94% in fruit crops and 48 to 74% in vegetables in comparison to conventional surface irrigated (non-drip irrigated) farmers fields.

The salinity profiles in the crop root zone depth for different crops indicated that drip irrigation of crops lead to reduced electrical conductivity in comparison to conventional surface irrigated (non-drip irrigated) farmers fields. Nitrates are soluble and mobile in soil and move with the leaching water. Thus mean residual nitrate nitrogen distribution in the soil profile indicated that frequent drip irrigation & fertigation of crops in precise quantities resulted in less movement of nitrates to deeper layers 2.08 ppm to 4.82 ppm in comparison to
conventional surface irrigated (non-drip irrigated) farmers fields at longer intervals with more depth of water. The results further demonstrate that the NO$_3$-N concentrations exceeded the threshold limit (i.e. 10 mg/L set by EPA) under conventional irrigation method but remained below the threshold limit in all the crops in the present study under drip irrigation in deeper soil layers.