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Effect of Irrigation Scheduling on Moisture and Salt Distribution and Growth of Kagji Lime under Drip Irrigation in Arid Rajasthan

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Abstract: A field experiment was conducted in an Aridisol on Kagji lime (*Citrus aurantifolia*) plants during 2001-2002 to study the effect of drip irrigation levels (Evapotranspiration coefficient (ETc) = 1.00, 0.70 ands 0.40) on spatial distribution of soil moisture, salts and plant growth. The results revealed that soil moisture decreased laterally, but increased vertically at each irrigation level. Comparatively lower soil moisture was recorded in surface soil layers during summer months. Minimum salt content was observed near the emitters and it increased laterally. Salt spreading was more in 1.00 ETc with maximum value near periphery of the wetted zone. At each lateral distance, higher salt concentration was observed at surface soil layers as compared to lower depths. Canopy diameter, number of branches and relative increase in girth were significantly affected by irrigation levels showing minimum values at 0.40 ETc. Irrigation at 0.70 ETc levels was better over 1.00 and 0.40 in terms of increasing plant growth and saving water.

Key words: Drip irrigation, growth, irrigation scheduling, Kagji lime, moisture, salt distribution

The Indian hot arid zone covers about 10% (31.7 m ha) of the country's geographical area. It is characterized by high temperature, low and erratic rainfall, high potential evapotranspiration, low relative humidity and high wind velocity. Water is the scarest commodity limiting the agricultural production of this ecosystem. The prevailing soil and climatic conditions of this zone are not congenial for the surface irrigation system. Studies conducted by Water and Power Commission have shown that 71% of irrigation water is lost during conveyance and actual utilization is only 29%. Considering the climate, soil and water resources, the arid ecosystem is more suitable for the plantations of fruit and other multipurpose trees (MPTs). Citrus plants, well adapted to arid and semi-arid ecosystems, are commonly grown with surface irrigation, which results in sizeable water loss, and reduced water-use efficiency. Drip irrigation, discharging the water in root zone of the plant, results in efficient utilization of water (Shirgure *et al.*, 2001). It economizes the water use and can double the irrigated area with the same quantity of available water. Drip irrigation can solve the problem of water shortage, increase the productivity and bring more income to the farming community (Sivanappan, 1998). It can be a promising technology in the desert having undulating topography, poor soil water retention capacity and lack of good quality ground water. Limited information is available on the growth of citrus under drip irrigation in arid ecosystem. The present investigation was, therefore, conducted to study the spatial distribution