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Influence of fertigation on fruit yield, water use and distribution efficiency and economics of guava (*Psidium guajava* L.)

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ABSTRACT

A field experiment was conducted during 2009-2010 and 2010-2011 on a sandy loam soil to assess the fertigation levels on fruit yield, water use and water distribution efficiency and economics of guava *(Psidium guajava L.)*. The treatments consisted of four irrigation levels (i.e. 1.0 IW/CPE, and 0.60, 0.80 and 1.00 ET_C) and three nitrogen fertigation levels (0.80, 1.00 and 1.20 of recommended dose of N) was laid out in a split plot design (SPD) with three replications. The results showed that fruit yield increased significantly with increase in application of irrigation water and nitrogen fertilizer. However, maximum fruit yield, higher water use efficiency, net return and B: C ratio was registered from drip irrigation at 1.00 ET_C. Full recommended dose of nitrogen fertilizer was found to be optimal for maximum fruit yield. The water distribution efficiency in drip irrigation system was uniform and higher near the dripper and then decreased consistently with increase in distance both horizontally and vertically. Thus drip irrigation at 1.00 ET_C with recommended dose of N-fertigation could be recommended for higher fruit yield and economics of guava in the lower Gangetic plain of West Bengal, India. Alternatively, surface irrigation scheduling at 1.0 IW/CPE could be advocated if the initial investment for laying the drip irrigation system is an impediment for the guava growers in this region.

Key words: Guava, drip fertigation, surface irrigation, water use efficiency, distribution efficiency, fruit yield

INTRODUCTION

Water is the vital natural resource for sustainable crop production and also the most limiting factor in Indian agriculture in view of unscientific utilization and competitive demands from other sectors. In the Gangetic plain of West Bengal, the resource poor farmers generally follow the conventional surface irrigation method in guava cultivation. This practice is quite inefficient and causes excessive wastage of water and nutrients in deep percolation below the root zone. It also contributes various problems relating to water logging, soil salinity, poor soil aeration, contamination of water bodies and weed infestation (Veeraputhiram *et al.*, 2005). Therefore, some innovative possible approaches are needed for more effective and rational use of limited supplies of water. Drip irrigation is a relatively new technology of irrigation in India and has gained widespread acceptance as an efficient and economically viable method adaptable even in the water-scarce areas. The method has proved its superiority over other traditional methods of irrigation owing to precise amounts of water and nutrients application in right time directly in the vicinity of crop root zone matching with the water and nutrients requirements of crop (Dudey *et al.*, 2002; Mohammad and Said, 2003; Hebbar *et al.*, 2004; Patel and Rajput, 2004). Fertigation under drip irrigation is being used commonly for the application of nitrogenous fertilizers especially in fruit and vegetable crops. This approach could save about 12 - 84 % of water and increase crop productivity by 10 - 55 % depending upon the crop, soil and climate conditions (Berad *et al.*, 1999; Deshmukh and Sen, 2000; Sharma and Kumar,

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