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REDUCING IRRIGATION RATES FOR BETTER TOMATO YIELDS

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Irrigation is often essential for vegetable production but too frequently it can result in wasted water and energy, and more importantly reduction in vegetable yield and quality associated to nutrient leaching. How much water does tomato need, and what is the application rate needed to achieve optimum tomato yield and quality while minimizing adverse environmental effects?

To answer these questions, a field experiment was conducted with 4 irrigation set-points, from wet to dry, i.e., 5 cbar (growers' preference), 10, 20, and 30 cbar, monitored through tensiometers installed in the tomato planting beds and controlled by individual irrigation valves. This experiment was conducted at the Tropical Research and Education Center, University of Florida in Homestead, south Florida, for two consecutive years in Krome very gravelly loamy soil. The extremely coarse soil is prone to leaching. Winter fresh tomatoes were transplanted in October, and three harvests were carried out each year starting in January.

When compared with the 5 cbar set-point, irrigation at 10, 20, and 30 cbar resulted in tomato marketable yield increase by 14, 12, and 25% in the first year, and 18, 31, and 34% in the second year, respectively (Fig. 1 A and B). Reducing irrigation not only increased the tomato marketable yield but also improved its quality, i.e. the yields of extra large and large fruits were the highest with 30 cbar in contrast to 5 cbar in both years (Fig. 2).

In addition to improving production, the main reason for reducing irrigation rates is the reduction of nutrient leaching with excess water applications. For instance, the concentration of soil total nitrogen was linearly decreased associated with soil moisture

from dry (30 cbar) to wet (5 cbar). Concentrations of soil extractable potassium, calcium, magnesium, and some micronutrients were obviously lower with wet (5 cbar) versus dry (30 cbar) conditions. Furthermore, our results show that keeping soil moisture at 30 cbar instead of 5 cbar can save 85% of irrigation water, which accounts a substantial reduction of costs for pumping water from the shallow aquifer and will help to preserve the water quality of this environmentally fragile region.

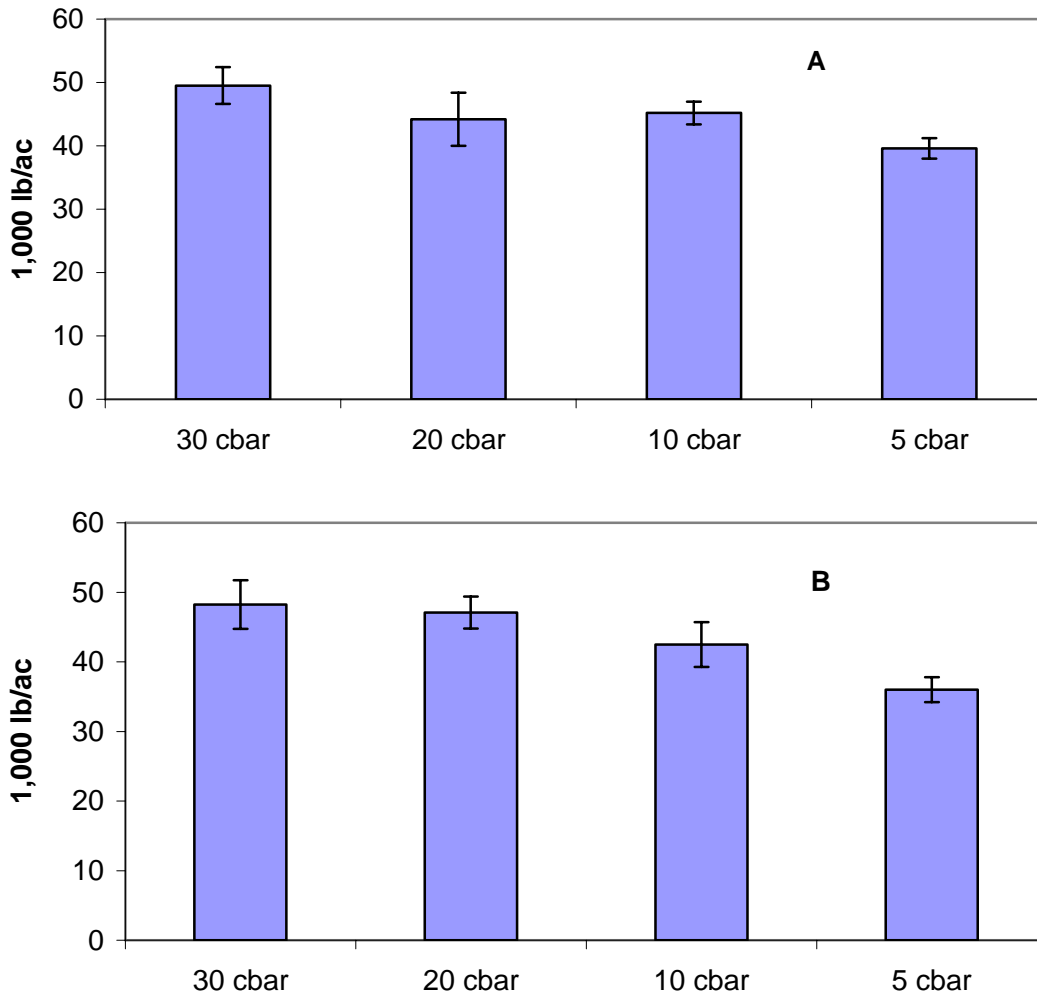


Fig. 1. Tomato marketable yields with soil moisture from dry (30 cbar) to wet (5 cbar) in the first (A) and the second (B) years.

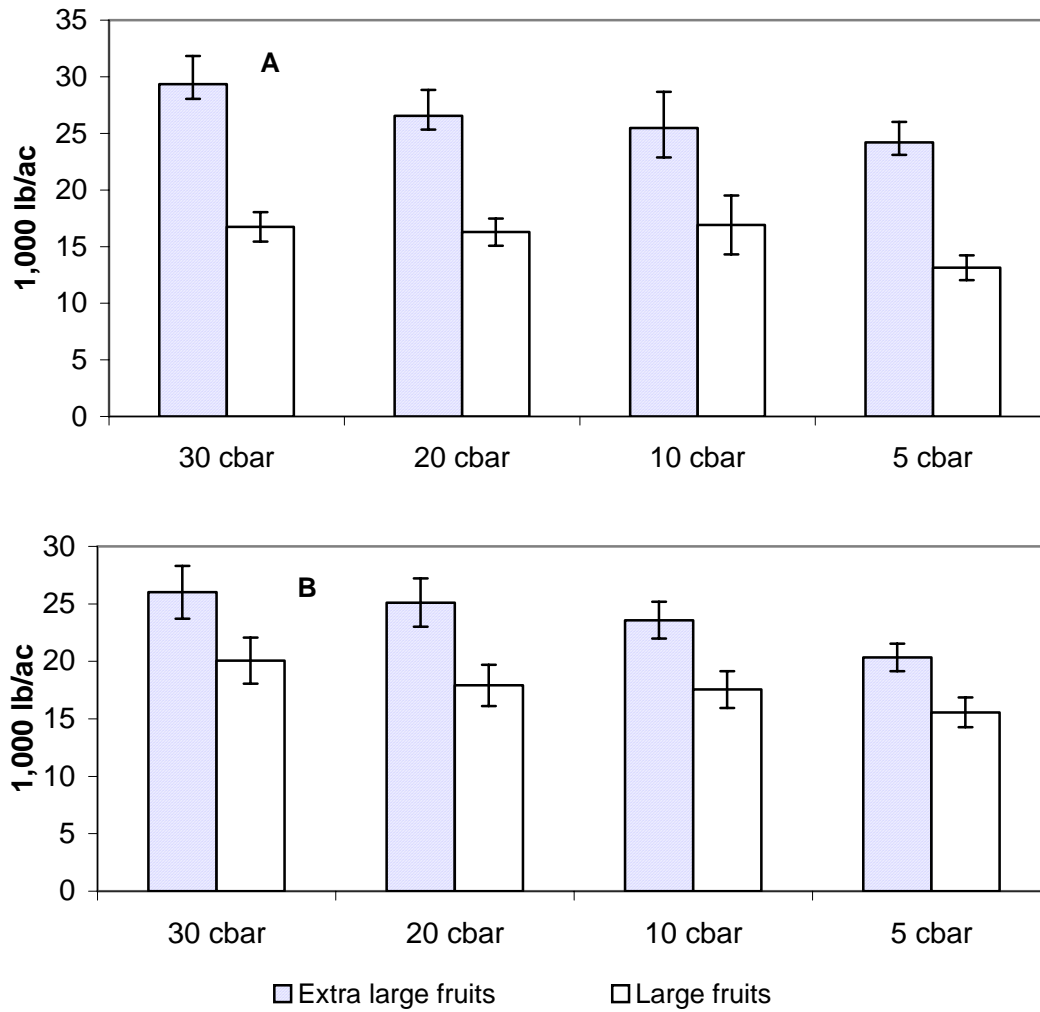


Fig. 2. Tomato extra large and large fruit yields influenced by soil moisture from dry (30 cbar) to wet (5 cbar) in the first (A) and the second (B) years.