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
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Mandarin Yield Response to Partial Root Drying and Conventional Deficit Irrigation

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Abstract: Fruit yield response of a mandarin (*Citrus reticulata* cv. Marisol) orchard to deficit irrigation, which was imposed either through conventional deficit irrigation (DI) or a newly evolving irrigation technique, called partial root drying (PRD), was investigated. The PRD practice simply requires wetting of one half of the rooting zone and leaving the other half dry, thereby utilising reduced amount of irrigation water applied. The wetted and dry sides are interchanged in the subsequent irrigations. Six irrigation treatments were tested: (1) TR, traditional farmers' method of irrigation where irrigation management was left to the full control of a grower; (2) FULL irrigation where the full amount of irrigation water (60% Class-A pan evaporation) was applied to the both halves of tree-root zone; (3) 1PRD30 and (4) 1PRD50, 30 and 50% reduced amount of irrigation water, compared respectively to FULL irrigation, was applied alternately on each half side of the tree rows, and the irrigated side was changed every irrigation; (5) 2PRD50, 50% reduced amount of irrigation water was applied on each half side of the tree rows, and the irrigated side was changed every other irrigation; (6) DI50, conventional deficit irrigation where 50% reduced amount of irrigation water, compared to FULL irrigation, was applied to the both halves of the tree-root zone, similar to FULL irrigation. A randomised complete block experiment design with 6 replicates, 4 trees each, was used. The orchard had 6-year-old trees, planted in 5-m rows of a parallelogram arrangement. A drip irrigation system with 2 laterals, laid along the tree rows with trees located 1.2 m midway between the laterals, was used. The drippers with 4 l h⁻¹ discharge rate and 75-cm spacing formed 50-cm wide wet bands during irrigation, along the laterals underneath the tree rows. The yield within the range of 36 to 37 tons ha⁻¹ was the highest and obtained under the traditional practice (TR) of irrigation where, however, more than double the amount of irrigation water was applied, compared to the control, FULL irrigation. The yield reduction under FULL irrigation was only marginal (10% to 14%), with, however, more than a 2-fold increase of irrigation water use efficiency (IWUE), compared to TR. The treatment 1PRD30 yielded 30.6 and 27.7 tons ha⁻¹ in 2001 and 2002, respectively, and followed the yield of control, FULL irrigation treatment. No yield benefit was obtained with the treatment of 2PRD50, which produced the lowest fruit yield, next to the conventional deficit irrigation treatment (DI50). The ranking of fruit-yields, TR>FULL>1PRD30>1PRD50, was maintained over the 2 seasons, 2001 and 2002, although the differences were marginal and not statistically significant (P ≤ 0.01). However, the IWUE under PRD increased significantly (P ≤ 0.01) to nearly 3 times that of the TR treatment.

Key Words: Citrus, fruit quality, partial rootzone irrigation, PRD, water use efficiency

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