

Regulated Deficit Irrigation to Boost Processing Tomato Sustainability in Mediterranean Environment.

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Abstract

One strategy to improve the efficiency of irrigation water is regulated deficit irrigation (RDI), which consists of reducing water supplies, in some phenological phases, in relation to the water needs of crops.

An experiment was conducted on processed tomatoes (cv: Tayson F1) to evaluate the effect of deficit irrigation practice on the quantity and quality of tomato production in order to reduce the irrigation water volumes of this crop. The test was carried out in 2022 in the Sicily region (Italy) under open field conditions. Four plots (40 m x 40 m) were created to compare two irrigation systems: complete restoration of crop water requirements (100% CWR) and regulated deficit irrigation (70% RDI during the phenological phases: transplantation - first flower release; swelling fruits - harvesting). In the comparison theses, the same cultivation practices were carried out and the same micro-irrigation system was used, managed through continuous monitoring of the water balance of the soil using capacitive probes and tensiometers. The cumulative water volume (irrigation + rain) administered to the tomato was 4552.87 m³ (RDI) and 4807.47 m³ (100% CWR).

The two different irrigation regimes significantly influenced both the yield (98.83 t ha⁻¹ for the RDI and 126.65 t ha⁻¹ for the 100% CWR) and the quality parameters. Fruit brightness (L*), firmness (N), °Brix and dry matter content (%) were significantly higher in the RDI treatment compared to the 100% CWR treatment.

Despite the deeper research that is necessary, the results suggest that for the processed tomato the practice of irrigation in deficit is able to save water without adversely affecting the yield and quality, while preserving farmers' incomes and increasing the sustainability of production.