Sustainable irrigation strategy in kiwifruit orchard under semi-arid conditions

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Italy is the second top kiwifruit producing country, with an overall production of 555 Ktons and an export of 289 Ktons (13% and 21% of global production, respectively). In the last years, the cultivation area has been spread also in the regions of southern Italy, where the water deficit is approx. 800 mm.

Drought and waterlogging are abiotic stresses causing yield uncertainty in various crops including kiwifruit. Kiwifruit water requirements depend on various site-specific conditions (e.g., evapotranspiration demand, cropping system, cultivar, soil water holding capacity). An optimum irrigation strategy is desirable in kiwifruit to promote root turnover and encourage the uptake of essential mineral elements from the soil, in order to positively affect fruit development and fruit quality, especially in summer-dry climates such as south Italy. The aim of this study was to define a sustainable irrigation strategy based on daily soil water balance of the soil volume wetted by irrigation ensuring soil moisture ranging within RAW and FC interval. Experimental trial was conducted at a kiwifruit orchard in Metapontino area. Soil water content was measured at two depths (030 and 30-60 cm) by soil moisture sensors. Soil water contents in the top 30 cm of soil was maintained at 60-90% of field water capacity (FWC) in order to avoid drought or waterlogging stress. Values of the crop coefficient (Kc), that relates vine transpiration (ETc) to the prevailing atmospheric conditions (ETo) was adjusted on a 7-10-day interval according to water deficits indicated by soil moisture sensors.

The daily soil water balance was computed based on ET0 measured by atmometer installed into the kiwifruit orchard and Kc for environmental conditions ranging from 0.95 (initial growth stage) to 0.83 (late season). The sustainable irrigation strategy integrated the daily soil water balance with soil moisture measurements. The irrigation volumes were computed considering the amount of water required to recover soil moisture up to the upper threshold. Irrigation water volumes supplied reached approx. 8,000 m3 ha-1 at the end of season compared to ETc volumes higher of 9,000 m3 ha-1. Results revealed that a timely soil water content monitoring is needed in order to support the sustainable irrigation strategy in order to meet irrigation and crop water requirements. Application of the right amount of irrigation water at the right time is essential in kiwifruit orchards to improve the yield and fruit quality.

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