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Regulated deficit irrigation can decrease soil CO_2 emissions in fruit orchards

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Irrigation water restrictions in the Mediterranean area have created a growing interest in water conservation. Apart from environmental and economic benefits by water savings, regulated deficit irrigation (RDI) may contribute to reduce soil CO_2 emissions and enhance C sequestration in soils, by decreasing microbial and root activity in response to decreased soil moisture levels. An experiment was established in four orchards (peach, apricot, Saturn peach and grape) to investigate the effects of regulated deficit irrigation (RDI) on soil CO_2 emissions. Two irrigation treatments were assayed: full irrigation (FI), and RDI, irrigated as FI except for postharvest period (peach, apricot, Saturn peach) or post-veraison period (grape) were 50% of FI was applied. The application of deficit caused a significant decrease in CO_2 emission rates, with rates in average of 90 mg CO_2-C m-2 h-1, 120 mg CO_2-C m-2 h-1, 60 mg CO_2-C m-2 h-1 and 60 mg CO_2-C m-2 h-1 lower than FI during the period when deficit was applied for peach, apricot, Saturn peach and grape. This confirms the high effectiveness of the RDI strategies not only to save water consumption but also to decrease soil CO_2 emissions. However, monitoring during longer periods is needed to verify that this trend is long-term maintained, and assess if soil carbon stocks are increase or most CO_2 emissions derive from root respiration.

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