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PROMOÇÃO:



Effects of girdling on photochemical efficiency and soil CO₂ efflux in apple trees

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The carbon (C) balance of tree fruit crops is the net result of photosynthetic CO₂ fixation and the release of C as CO₂ by all tissues, including the below-ground respiratory activities of plant roots, their symbiotic mycorrhizal fungi and the free-living microbial and faunal populations of the soil. Girdling stops the flow of carbohydrates to the belowground portion of the ecosystem, which should slow respiration by roots and mycorrhizae while heterotrophic respiration should remain constant. In this research we tested the effects of reduced carbohydrate flow to the root system (using girdling) on soil CO₂ efflux and photochemical efficiency of the photosystem II (PSII) in apple trees. In a field study, 12 apple trees, 10-year-old 'Ginger Gold', were girdled (30cm from soil) and 12 trees were used as control in a randomized block design. The soil CO₂ efflux was monitored pre-girdling, 1, 2, 4 and 8 weeks after girdling (august 20 to november 11) using an automated soil respiration system. Chlorophyll fluorescence (F₀, F_v, F_m, F_v/F_m) and photoinhibition were determined pre-girdling, 1, 2 and 3 weeks after girdling using a Fluorescence Monitoring System (Hansatech, England). In conclusion, CO₂ efflux from girdled trees initially increased about 50%, likely due to microbial decomposition of dead roots, and then resumed CO₂ efflux rates approximately 10% below the control until heavy rains stimulated microbial activity and the girdling treatment again had increased CO₂ efflux compared to the control. Photoinhibition increased from 4 to 10% in 3 weeks after girdling.

Keywords: *Carica papaya* L., growth characteristics, photochemical efficiency

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