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## **Sustainable orchards as an atmospheric CO<sub>2</sub> offset tool**

Giuseppe Montanaro, Cristos Xiloyannis, Alba N. Mininni, and Bartolomeo Dichio

Università degli Studi della Basilicata, Potenza, Italy (giuseppe.montanaro@unibas.it)

Agriculture is responsible for almost 14% of equivalent CO<sub>2</sub> emissions, but it has a potential role in mitigating climate changes, with the identification of alternative management practices aimed to reduce CO<sub>2</sub> emissions and increase CO<sub>2</sub> capture.

Climate changes (mainly increased temperature and precipitation changes) will have agricultural consequences due to the interrelations between climate and soil degradation, land and water use.

This paper reports results on the effects of changed soil management practices from conventional (soil tillage, mineral fertilisers, burning of pruning residues) to sustainable (no-tillage, pruning residues and cover crop retention, compost application) on carbon pools.

Results show that a 7-year period of changed practices (including carbon input at a mean rate of 8-9 t/ha C per year) significantly increased SOC concentration (from 1.3% up to 1.8%, upper 0.1 m) and carbon litter. Considering the various carbon pools, it has been preliminary estimated that approx. 50 t/ha CO<sub>2</sub> were stored (0.4 m soil depth) at the end of the experimental period at the sustainable plot. By contrast, the conventional plot continued to be a CO<sub>2</sub> source mainly because of tillage and burning of prunings.

The paper shows the beneficial effects of sustainable practices on yield which was improved by 30-50% as compared with conventional managed orchards. The effects of carbon addition on reserves of soil nutrients (N, P, K, Ca, Mg) and on CO<sub>2</sub> soil emission are discussed.