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# Respiration Dynamic During Transition From Conventional To Organic Management In Globe Artichoke Mediterranean Cropping Systems

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## Introduction

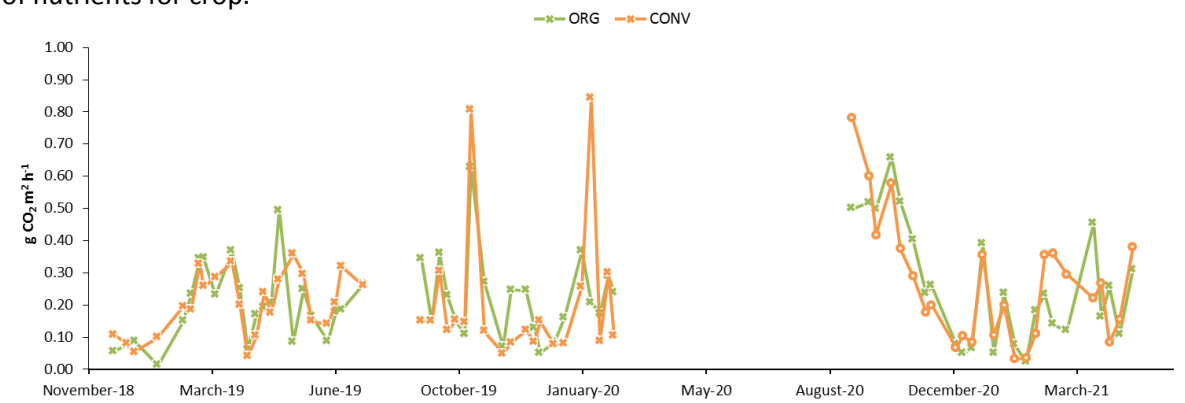
In Mediterranean agroecosystems, climatic conditions, intensive agricultural practices, and soil fertility loss are critical elements for sustainable and resilient agriculture development. Organic farming is a strategy to produce quality food reducing the synthetic chemicals use and promote the agro-ecological processes in cropping systems (Tu et al. 2006). The nutrients availability to meet the crop need is affected by the trend of soil organic matter mineralization and its synchronization to the crop nutrients demand (Berry et al. 2002). To understand the effects of agro-ecological management application on soil organic matter dynamics during the transition period from conventional to an organic system may be provide a useful guidance for designing the best conversion strategy to minimize yield loss.

## Materials and Methods

Two full-scale experimental fields were compared during three growing seasons (from 2018-2019 to 2020-2021) at two globe artichoke private farms: "Sarciofo" and “Az. Mureddu” in Uri, Sassari (Italy, 40.62° N, 8.47° E). A conventional forcing technique (CONV) (Ledda et al. 2013) and an alternative organic (ORG) managements were compared. In CONV management globe artichoke was planted in June, mineral fertiliser was distributed before planting and crop residues were buried into the soil at the dry stage at the end of the crop cycle in June. In ORG management a cover crop of *Pisum sativum* L. was sowed in inter-row space of globe artichoke, and incorporation of fresh residues occurred in April when C:N ratio of crop residues was low. Soil respiration was monitored along with measurements of soil temperature and moisture.

## Results

Soil respiration efflux systems showed a reduction in winter and summer due to limitation by soil temperature and moisture in both management. In CONV system, the mean annual rate ranged between 0.20 g $CO_2$ $m^2$ $h^{-1}$ (2018-19) and 0.27 g $CO_2$ $m^2$ $h^{-1}$ of the 2020-21 whereas in the ORG management the mean of annual flux has reached 0.19 g $CO_2$ $m^2$ $h^{-1}$ in 2018-19 and 0.26 g $CO_2$ $m^2$ $h^{-1}$ in 2020-21 with no statistical differences between years.
The increment in soil respiration rate in April in ORG was due to the incorporation and degradation of fresh residues that have likely met the nutrient demand for microbial activity resulting in nutrient release, available for crop uptake. The quality of crop residues (i.e., C:N ratio) and the soil management played a key role in nutrient release especially in ORG in order to ensure the availability of nutrients for crop.




## Conclusions

The performance observed in the ORG management underlined that the application of agro-ecological strategies in horticultural systems may provide available nutrient from mineralization processes able to meet crop demand without the addition of synthetic fertilisers. Furthermore, the adoption of organic practices combined with a correct management of the crop residues represents a win-win strategy to regulate soil C and N cycling, promotes nutrient availability and consequently crop growth, increases soil organic matter content, improves the efficiency of a horticultural cropping system in productive terms and reduces environmental impacts.

**References**

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