

Giuseppe Montanaro – [Università degli Studi della Basilicata](https://sites.google.com/site/gmunibasil/home) (IT)

WEB: <https://sites.google.com/site/gmunibasil/home>

email: giuseppe.montanaro@unibas.it



Scientific background

Plant-Environment interaction This research issue focuses the influences of external (e.g. light, VPD, wind) and internal (e.g. biosynthesis of secondary metabolites, xylem hydraulic resistance) plant factors in determining the accumulation of calcium (Ca) at the scale of individual fruits.

The research includes a range of work with similar objectives but that has employed a diversity of methods to better understand the processes involved in Ca accumulation into kiwifruit. In this species, as in apple, avocado, tomato, capsicum and grape (and most other species), fruit Ca content is a key determinant of fruit quality. A piece of research clearly established that elevated fruit transpiration results in elevated levels of fruit Ca. This paper also models seasonal fruit transpiration based on a set of meteorological measurements.

The idea that Ca is transported mainly via the xylem, has focussed his research interests onto certain secondary metabolites involved in xylogenesis. Part of this work was carried out abroad (TUM, Muenchen Germany) jointly with Prof. Treutter D. and demonstrates a reasonably good relationship between hydroxycinnamic acid and Ca accumulation. The role of the hydraulic resistances in fruit has been also examined.

Water relations in fruit tree In pot and field experiments, the efficiency of water use by plants under various levels of stress was assessed under Mediterranean conditions in autochthonous and non-indigenous species (e.g. kiwifruit and olives). The water relations studies also determined the capacity of these plant tissues to recover following re-watering.

Osmotic regulation in leaves and roots of olives under severe water deficit was also studied. Some experiments have been conducted to investigate water relations under these conditions but as also affected by mycorrhizal symbiosis. The effect of ABA-induced chemical signal on water relations in well irrigated peach trees as been investigated.

Efficiency of the photosynthetic machinery These studies were undertaken to explore the efficiency of photosynthesis in kiwifruit and olives experiencing drought (and subsequent re-watering) and also high irradiance stress (through in vivo fluorescence techniques). Possible interventions to protect the photosynthetic apparatus were also examined. The thresholds of soil water availability and irradiance determining photoinhibition were identified. His special interest in these issues was because of the regular summer droughts prevalent in the Mediterranean areas of southern Europe accompanied by high levels of irradiance.

Carbon budget of orchard and soil fertility remediation As a researcher based in southern Europe, he has often had to deal with the very poor conditions (e.g. ~1% organic carbon) common to most soils in this southern part of Italy. In response, he has participated in studies to collate a portfolio of effective remedial techniques through which to improve the input of carbon to these soils and in turn to increase soil organic

carbon. He focus attention on this issue, also taking into account soil CO₂ emission rates occurring under various management practices. These information are relevant for carbon budget calculation at ecosystem scale.

Selected publications

- Montanaro G., Xiloyannis C., Nuzzo V., Dichio B., 2017. Orchard management, soil organic carbon and ecosystem services in Mediterranean fruit tree crops. *Scientia Horticulturae*, 217: 92-101, DOI: 10.1016/j.scienta.2017.01.012
- Montanaro G., Tuzio A.C., Xylogiannis E., Kolimenakis A., Dichio B., 2016. Carbon budget in a Mediterranean peach orchard under different management practices. *Agriculture, Ecosystems and Environment*, in press, DOI: 10.1016/j.agee.2016.05.031
- Montanaro G., Dichio B., Lang A., Mininni A. N., Xiloyannis C., 2015. Fruit calcium accumulation coupled and uncoupled from its transpiration in kiwifruit. *J. Plant Physiol.* 181: 67-74, DOI: 10.1016/j.jplph.2015.04.004
- Montanaro G., Dichio B., Lang A., Mininni A. N., Nuzzo V., Clearwater M. J., Xiloyannis C., 2014. Internal versus external control of calcium nutrition in kiwifruit. *J. Plant Nutr. Soil Sci.* 177: 819–830, DOI: 10.1002/jpln.201400396.
- Mazzeo M., Dichio B., Clearwater M.J., Montanaro G., Xiloyannis C., 2013. Hydraulic resistance of developing Actinidia fruit. *Annals of Botany*, 112 (1): 197-205, ISSN: 0305-7364, DOI: 10.1093/aob/mct101 (PubMed ID: 23658370).
- Dichio B., Montanaro G., Sofo A., Xiloyannis C., 2013. Stem and whole-plant hydraulics in olive (*Olea europaea*) and kiwifruit (*Actinidia deliciosa*). *Trees - Structure and Function*, 27(1): 183-191, DOI: 10.1007/s00468-012-0787-3.
- Montanaro G., Dichio B., Xiloyannis C., Lang A. 2012. Fruit transpiration in kiwifruit: environmental drivers and predictive model. *Annals of Botany PLANTS* (2012) : pls036; DOI: 10.1093/aobpla/ pls036 (PubMed ID: 23136639) WOS: 000325264100020.
- Montanaro G., Dichio B., Briccoli Bati C., Xiloyannis C., 2012. Soil management affects carbon dynamics and yield in a Mediterranean peach orchard. *Agriculture, Ecosystems and Environment*, 161: 46-54, DOI: 10.1016/j.agee.2012.07.020.
- Sorce C., L. Lombardi, D. Remorini, Montanaro G., 2011. Occurrence of natural auxin and accumulation of calcium during early fruit development in kiwifruit. *Australian Journal of Crop Science*, 5(7): 895-898.
- Montanaro G., Dichio B., Xiloyannis C., 2010. Significance of fruit transpiration on calcium nutrition in developing apricot fruit. *Journal of Plant Nutrition Soil Science* 173: 618–622. DOI: 10.1002/jpln.200900376
- Montanaro G., Celano G., Dichio B., Xiloyannis C., 2010. Effects of soil-protecting agricultural practices on soil organic carbon and productivity in fruit tree orchards. *Land Degradation and Development*, 21(2): 132–138. First published online 31 MAR 2009 DOI: 10.1002/ldr.917
- Sofo A., Dichio B., Montanaro G., Xiloyannis C., 2009. Photosynthetic performance and light response of two Italian olive cultivars under different water and light regimes. *Photosynthetica*, 47 (4): 602-608.
- Montanaro G., Dichio B., Xiloyannis C., 2009. Shade mitigates photoinhibition and enhances water use efficiency in kiwifruit under drought. *Photosynthetica* 47 (3): 363-371.
- Sofo A., Montanaro G., Dichio B., Xiloyannis C., 2009. Shade effect on photosynthesis and photoinhibition in olive during drought and rewatering. *Agricultural, Water Management*, 96: 1201–1206.
- Montanaro G., Treutter D., Xiloyannis C., 2007. Phenolic compounds in young developing kiwifruit in relation to light exposure: implications for fruit calcium accumulation. *Journal of Plant Interactions*, 2(1): 63-69.
- Montanaro G., Dichio B., Xiloyannis C., 2007. Response of photosynthetic machinery of field-grown kiwifruit under Mediterranean conditions during drought and rewatering. *Photosynthetica*, 45(4): 533-540.
- Dichio B., Xiloyannis C., Sofo A., Montanaro G., 2007. Effects of post-harvest regulated deficit irrigation on carbohydrate and nitrogen partitioning, yield quality and vegetative growth of peach trees. *Plant and Soil*, 290: 127-137.
- Xiloyannis C., Montanaro G., Celano G., Dichio B., 2010. Climate changes and sustainable management of orchard resources. *Italian Journal of Agronomy* (ISSN 1125-4718) vol 5(4): 69-72. (in Italian).
- Montanaro G., Dichio B., Xiloyannis C., G. Celano, 2006. Light influences transpiration and calcium accumulation in fruit of kiwifruit plants (*Actinidia deliciosa* var. *deliciosa*). *Plant Science*, 170, 520-527.
- Dichio B., Xiloyannis C., Sofo A., Montanaro G., 2006. Osmotic regulation in leaves and roots of olive tree (*Olea europaea* L.) during water deficit and rewatering. *Tree Physiology*, 26:179–185.

Editorial and reviewer activities

Associate Editor of the Springer journal [Acta Physiologiae Plantarum](#)

Editor of the volume "[ISHS VIII International Peach Symposium](#)", ISBN 978-94-62610-79-8, ISSN 0567-7572 (print) 2406-6168 (electronic);

Member of the editorial board of the Acta Horticulturae [volume 862](#) and [volume 1084](#).

Editor of the volume [Advances editor in Selected Aspects Plant Physiology](#), Dr. G. Montanaro (Ed.), ISBN: 978-953-51-0557-2, InTech;

Referee for the following international journals indexed by Scopus / ISI-Thomson:

Acta Physiologiae Plantarum	Journal Of Irrig. & Drainage Engineering
Agriculture Water Management	Journal Of Plant Interactions
Annals Of Botany	Journal of Renewable and Sust. Energy
Archives Of Agronomy And Soil Science	Philippine Agricultural Scientist
Australian Journal Of Crop Science	Plant Growth Regulator
Functional Plant Biology	PLOS one
Geoderma	Photosynthetica
Hortscience	Scientia Horticulturae
Journal Of Agricultural Science	Trees, Structure And Function

Recent oral communications in international conferences

2017 INFLUENCE OF GROWING ENVIRONMENT ON FRUIT MINERAL COMPOSITION AND STORAGE IN KIWIFRUIT. IX International Kiwifruit Symposium, Porto, Portugal, 6-9 September.

2017 MANAGING CARBON FLUXES IN A PEACH ORCHARD (invited speaker). IX International Peach Symposium, Bucharest, Rumania, 2-7 July.

2014 SUSTAINABLE ORCHARDS AS AN ATMOSPHERIC CO₂ OFFSET TOOL - ELS2014 The Earth Living Skin, Soil, Life and Climatic Changes (Session ELS03 - Sustainable orchard management to face climatic changes), Bari (Italy), 24 September.

2014 CALCIUM NUTRITION IN KIWIFRUIT BERRY: FACTS AND AUGMENTING STRATEGIES VIII International Symposium on Kiwifruit, Duijiangyan, Chengdu Province (China), 18-22 September.

2012 CANOPY ENVIRONMENT AND FRUIT TRANSPIRATION: IMPLICATIONS FOR SOME FRUIT QUALITY TRAITS VII International Symposium on Irrigation of Horticultural Crops, Geisenheim (Germany), 16-20 July.