

Lessons from physiological monitoring of truffle productive vs. non-productive plants.

EURAF 2022
Agroforestry for the Green Deal transition.
Research and innovation towards the
sustainable development of agriculture and
forestry
Abstract

Corresponding Author:

alessia.sartori.2@phd.unipd.it
enrico.vidale@unipd.it

Alessia Sartori¹, Enrico Vidale¹, Davide Pettenella¹, Gaii Petit¹

¹ University of Padova, Department of Land, Environment, Agriculture and Forestry

Topic: Quality, safety and sustainability of agroforestry productions (processes and products)

Subtopic: Timber, energy and non-wood forest productions

Keywords: Climate change, truffle production, soil water availability, environmental sensors, plant sensors, tree physiology

Type of presentation (oral or poster): oral

Abstract

Lessons from physiological monitoring of truffle productive vs. non-productive plants

The ongoing climate changes are altering precipitation patterns, causing the increase in the frequency and intensity of extreme events, such as droughts (IPCC, 2014). Such climate changes have huge impacts on the productivity and health of plants and forests, and on the agroforestry production dependent on them. One of the most economically important non-wood forest production is truffle production: the market is growing worldwide, and attempts to spread and increase the cultivation of this product have been carried out in every continent (Reyna and Garcia-Barreda 2014). While the demand of raw material in this growing market is increasing, the natural truffle production is contracting (MiPAAF 2018). Climate change, along with land abandonment, are recognised as the main factors causing the decrease in truffle production.

To test the effect of water stress on truffle productivity we monitored trees in a hop-hornbeam plantation, which is producing *Tuber aestivum* Vitt.. The trees follow a precise planting scheme, and they all have almost the same age. We monitored 4 plants which are truffle-productive and 4 plants that are not productive. The monitored parameters are stem diameter variation (daily and seasonal), sap flow, soil and air temperature and humidity. The sensors used to monitor plants were Granier sensors (to measure sap flow), stem dendrometers (to measure continuous variation of stem diameter and bark shrinking and swelling), hygrometers, air temperature sensors, soil temperature and moisture sensors.

We observed a difference between productive and non-productive plants: the cycles of diameter variation are different between the two groups (productive and not productive). The bark shrinkage and swelling are linked with the cycle of hydration and dehydration, and thus this suggests that there's a different response to variation in water availability between the two groups.

We believe that it is possible to improve the productivity of plants by applying a management model that considers the stress and recovery cycles of the plant, and therefore its physiology.

Monitoring the plant means being able to choose when it is necessary to intervene. For example, it would be possible to choose irrigation only when certain conditions occur (soil moisture level that drops below a critical threshold, suspension of transpiration due to water stress...). This new approach could save useful resources and make truffle cultivation more sustainable.

□ References

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