WildFood

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WP2: PILOT PROJECTS FACT SHEETS (7/8)

Elaborating a monitoring protocol for truffle production

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Location: Caltrano (VI) and Carlino (UD), Italy

Context:

Truffle is a wild food whose production is difficult to control. The management in forest, or the cultivation of truffle in croplands has become common in remote rural areas in different countries. However, low levels of truffle productivity is typically reported for both natural forests and plantations. This is likely associated to the limited knowledge currently available on the physiological bases of the interaction between plants and fungi (Reyna & Garcia-Barreda, 2014). In truffles market, 40-50 % of the processed/ commercialized raw material is currently imported in Italy. This is mainly due to the decrease in the wild production, determined by several factors, among which climate change and land abandonment are the main ones (MiPAAF, 2018). Natural forests management and plantations oriented to the truffle production can have positive feedbacks on rural economy and on the resistance/resilience of vegetation to climate change.

For this study we set up two experimental sites in Caltrano (Vicenza, Italy) and Carlino (Udine, Italy) to investigate the physiology of the target tree species in relation to the surrounding environmental conditions and to their truffle productivity. The site in Caltrano is a mixed forest plantation with predominance of *Ostrya carpinifolia* Scop. with stable production of *Tuber aestivum* Vittad. The site in Carlino is a relict lowland mixed forest, with predominance of *Carpinus betulus* L., associated to different species of genus *Tuber*.

Objective:

The aim of the study is to identify low-cost indicators to characterize the physiological predisposition of the plant in the establishment and maintenance of symbiotic relations with truffles as well monitoring the effect of climatic change. The physiology of the target trees will be investigated in relation to the surrounding environmental conditions in two different classes of high and low truffle productivity. The final objective is to use the identified indicators to facilitate the forest management oriented to truffle production and increasing climatic change resilience.

At each site, we chose four target trees in a representative truffle-productive and a non-productive area.

On each tree we installed a sap flow sensor and a stem dendrometer.

The sapflow sensor (Granier type) allows the continuous rate measurement of the sap flowing along the stem at an interval of 15 minutes, during the whole growing season.

The stem dendrometer allows the continuous variation of the stem diameter at an interval of 15 minutes, accounting for the actual growth, but also for the bark shrinking and swelling following the tissue dehydration and rehydration, respectively.

In each area we installed 1-2 TDR (Time-Domain Reflectometry) soil sensors for the measurement of the soil water content at an interval of 15 minutes, indicating the availability of soil water, but also its continuous variation due to plant uptake and evaporation to the atmosphere. Furthermore, we installed in each area a hygrometer providing measurements of air temperature and relative humidity.

Figure 1. Granier sensors in the sites of Caltrano (on *Ostrya carpinifolia*) and Carlino (on *Carpinus betulus*). Credits: Alessia Sartori.

Figure 2. In the first picture, dendrometer on hop hornbeam in Caltrano. In the second one, dendrometer on *Carpinus betulus* in Carlino, covered with a plastic bag to prevent moisture damage. Credits: Enrico Vidale and Alessia Sartori.

Figure 3. Hygrometer in the sites of Caltrano (left) and Carlino (right). Credits: Alessia Sartori.

Expected Results:

We expect to observe daily and seasonal variations in the consumption of water (sap flow) and in the shrinkage/swelling of the bark tissue, as response of the monitored environmental parameters. In particular, we expect significant differences between the productive and non-productive trees in the monitored physiological parameters, which thus could be used as indicators to be applied for forest interventions aimed at increasing the truffle productivity.

References:

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