



# *A new and sustainable approach for truffle management*

**Villa Bolasco, Castelfranco Veneto**  
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# A general overview....

- Truffles are fungi feeding on **carbon exudation**;
- Truffle is one of the most economically important non-wood forest production...the **market is growing** worldwide! (1);
- The **natural truffle production is contracting**, mainly due to land abandonment and climate change (2);
- Climate changes are altering **precipitation patterns** (3);
- Huge impacts on **tree physiology** and on **truffle production**.

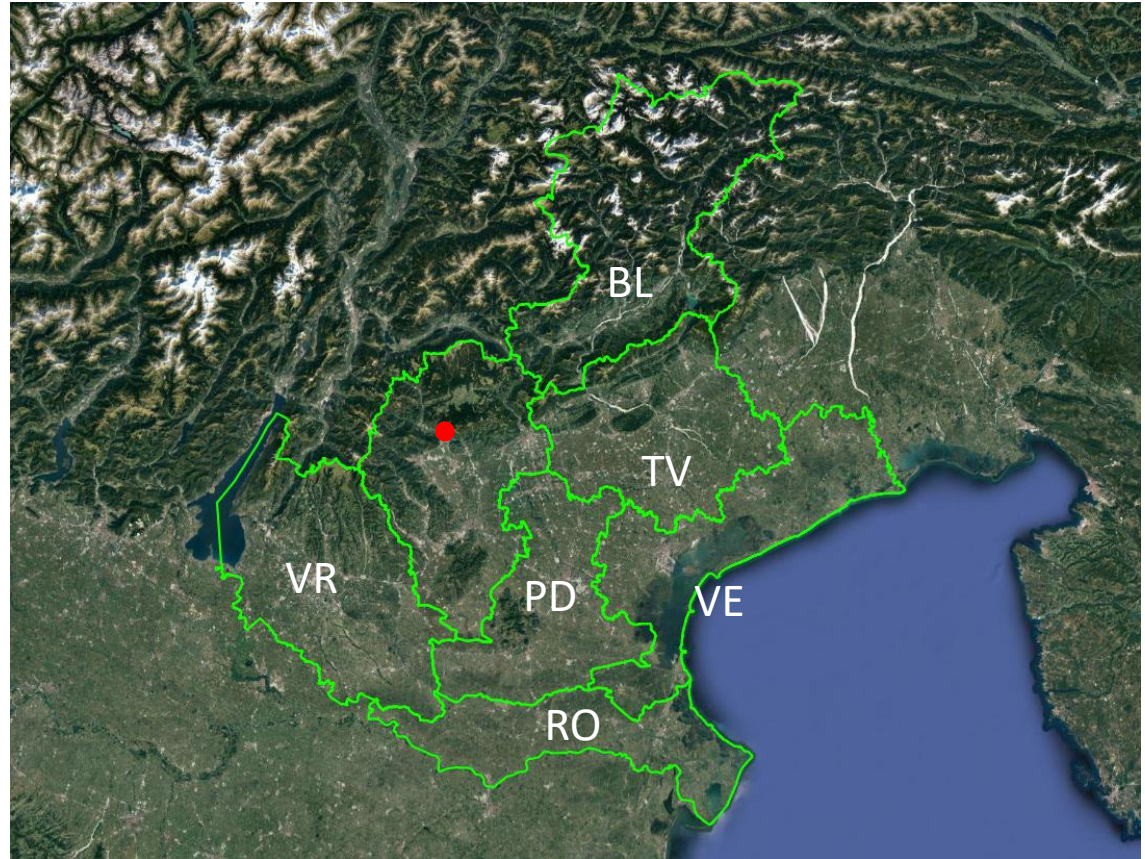
1. Reyna S, Garcia-Barreda S (2014) Black truffle cultivation: A global reality. For Syst 23:317–328.  
<https://doi.org/10.5424/fs/2014232-04771>

2. MiPAAF M delle politiche agricole alimentari e forestali (2018) Piano Nazionale Della Filiera del Tartufo 2017-2020. 1–153

3. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzer

# STUDY AREA

- Veneto Region
- Vicenza Province
- Surface 2428 m<sup>2</sup>
- 500 m a.s.l.
- *Ostrya carpinifolia* Scop. plantation
- *Tuber aestivum* Vitt.
- Productive and non-productive plants





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***The focus of our analyses is on the plant's physiological responses to water availability***

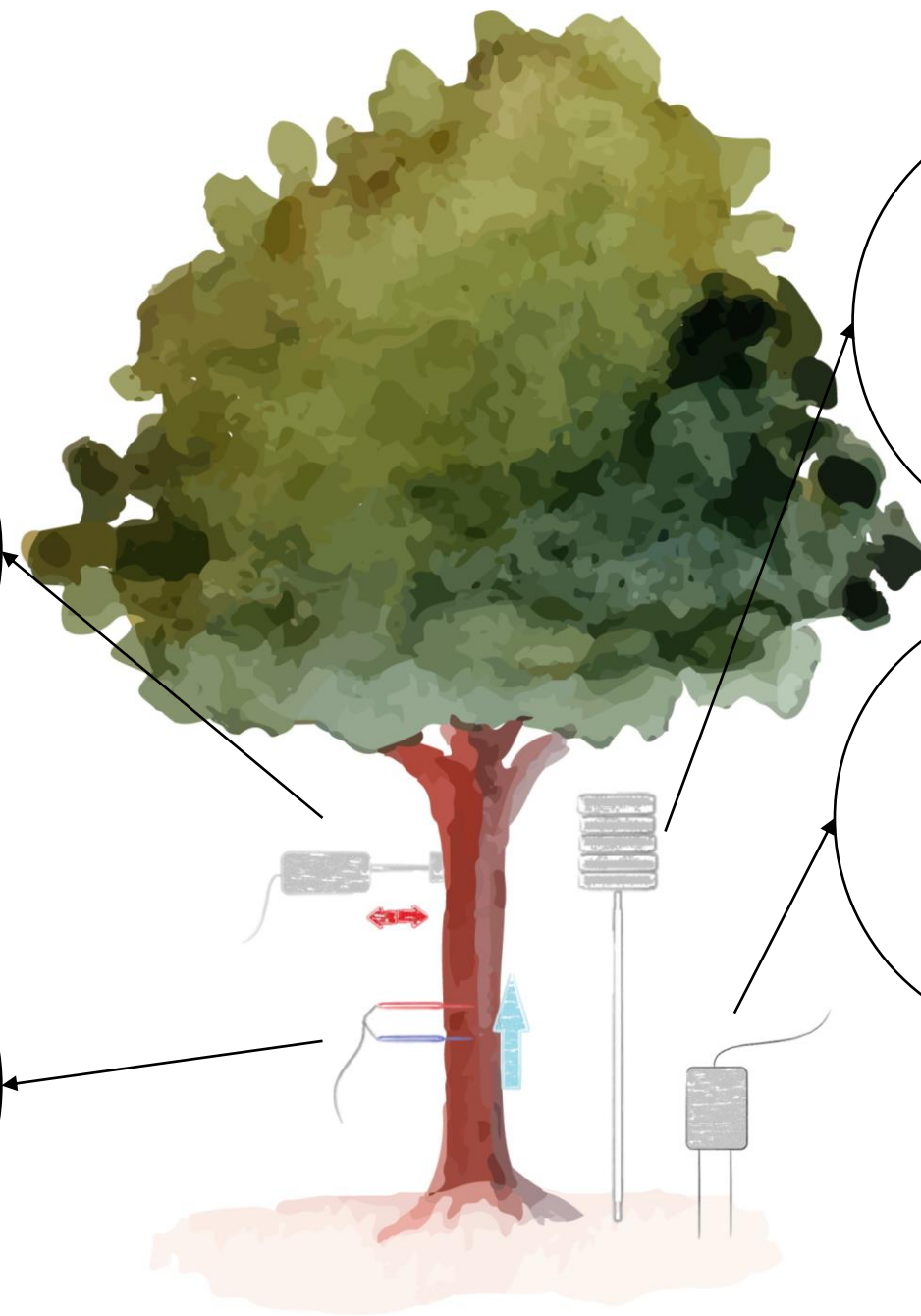
# Methods

Dendrometer:  
growth + bark  
shrinking and  
swelling, due to  
cycles of  
hydration and  
dehydration

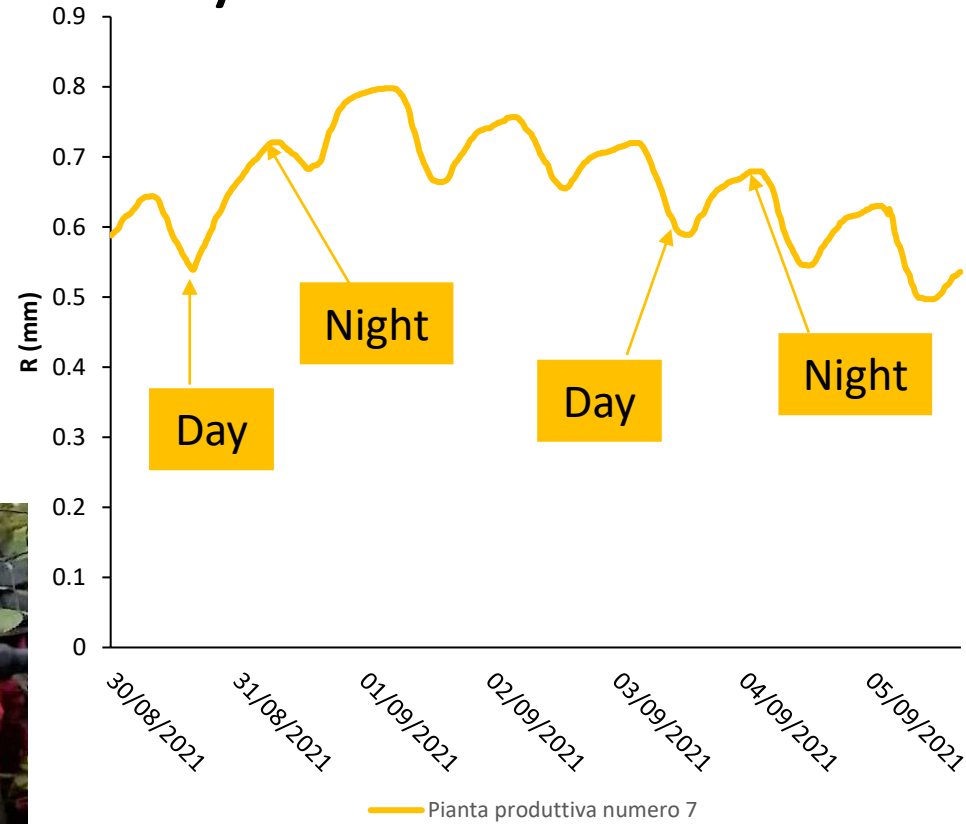
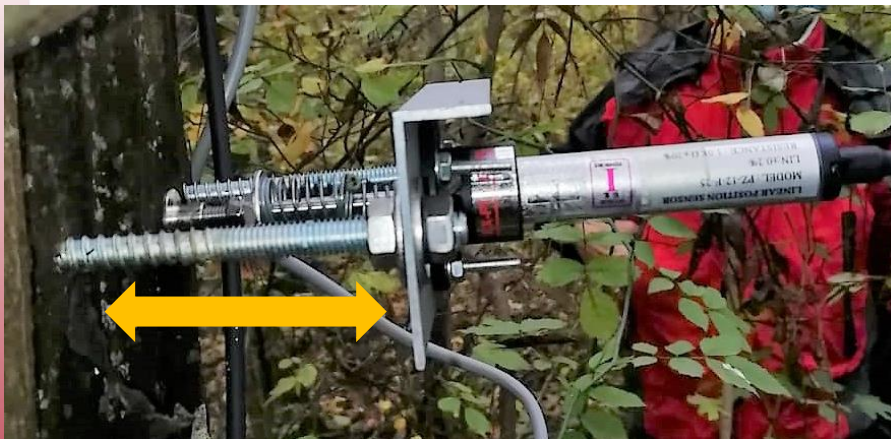
Granier sensors:  
they measure sap-  
flow, due to  
stomatal closing  
and opening

Hygrometer: air  
temperature and  
humidity

TDR sensor (Time  
Domain  
Reflectometry):  
soil temperature  
and humidity

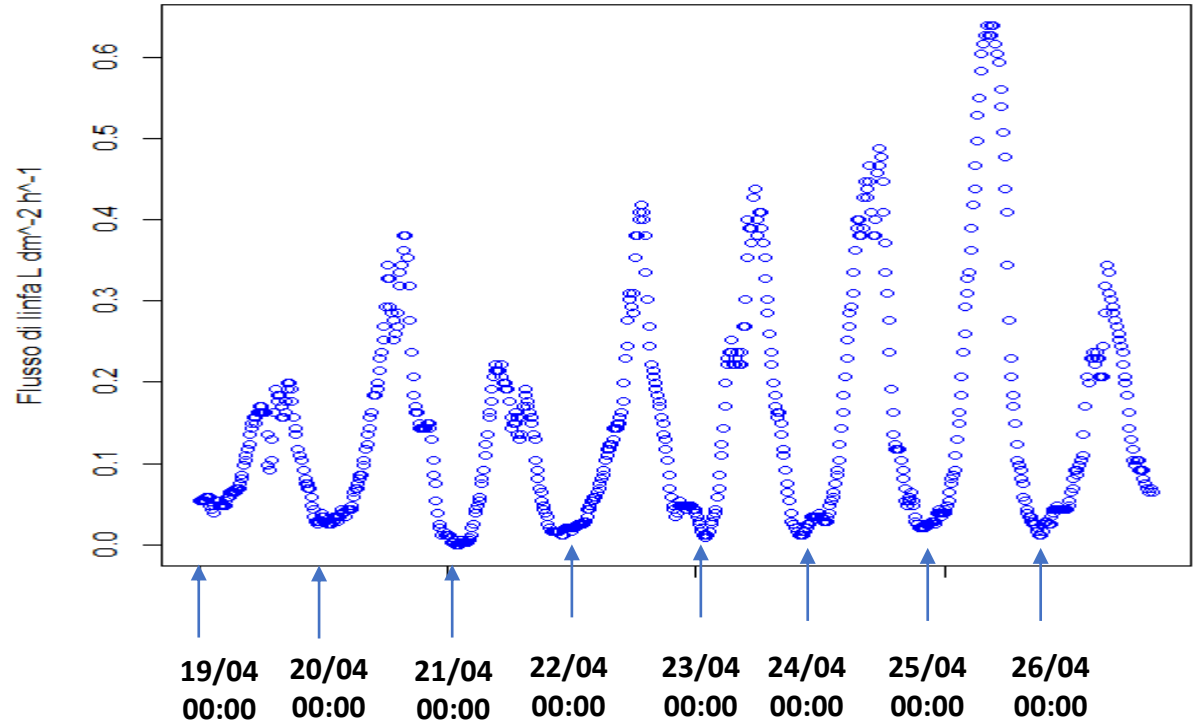


# Sensors...how do they work?





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Hygrometer: air  
temperature and  
humidity

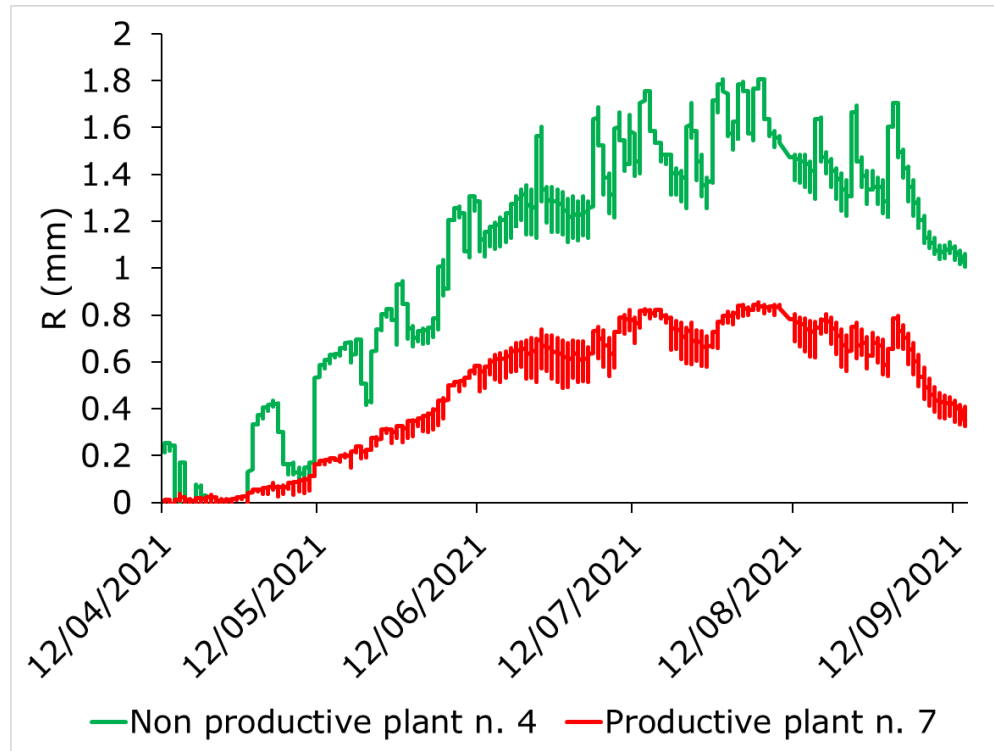
TDR: soil temperature  
and humidity



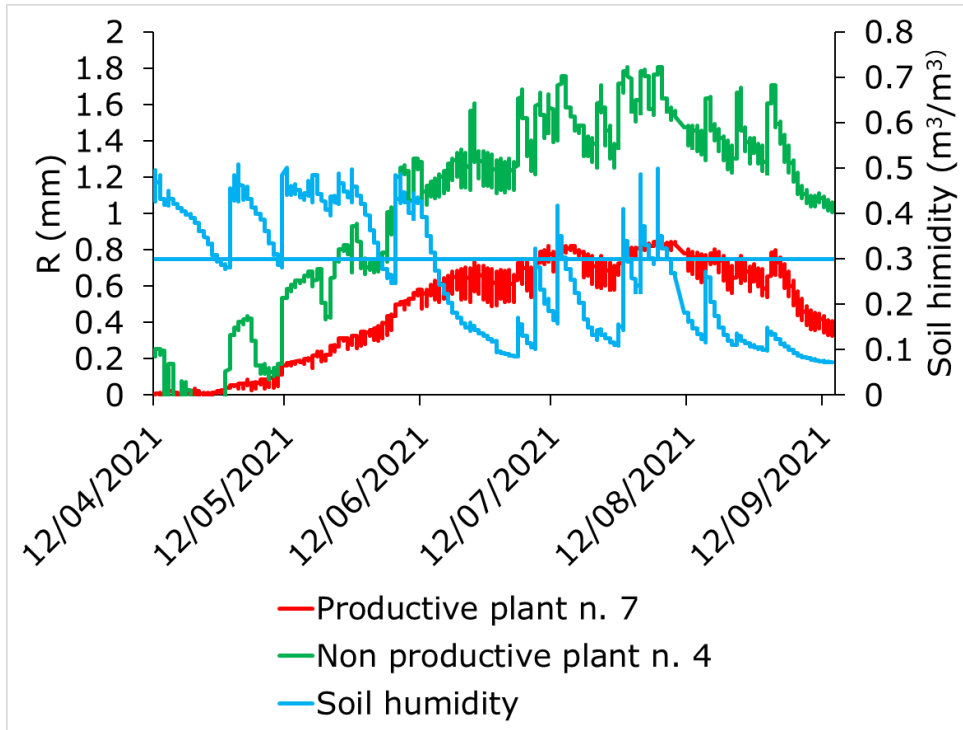


# Results

Differences between productive and non-productive plants: non-productive plants have strong periodic fluctuations, compared to productive plants



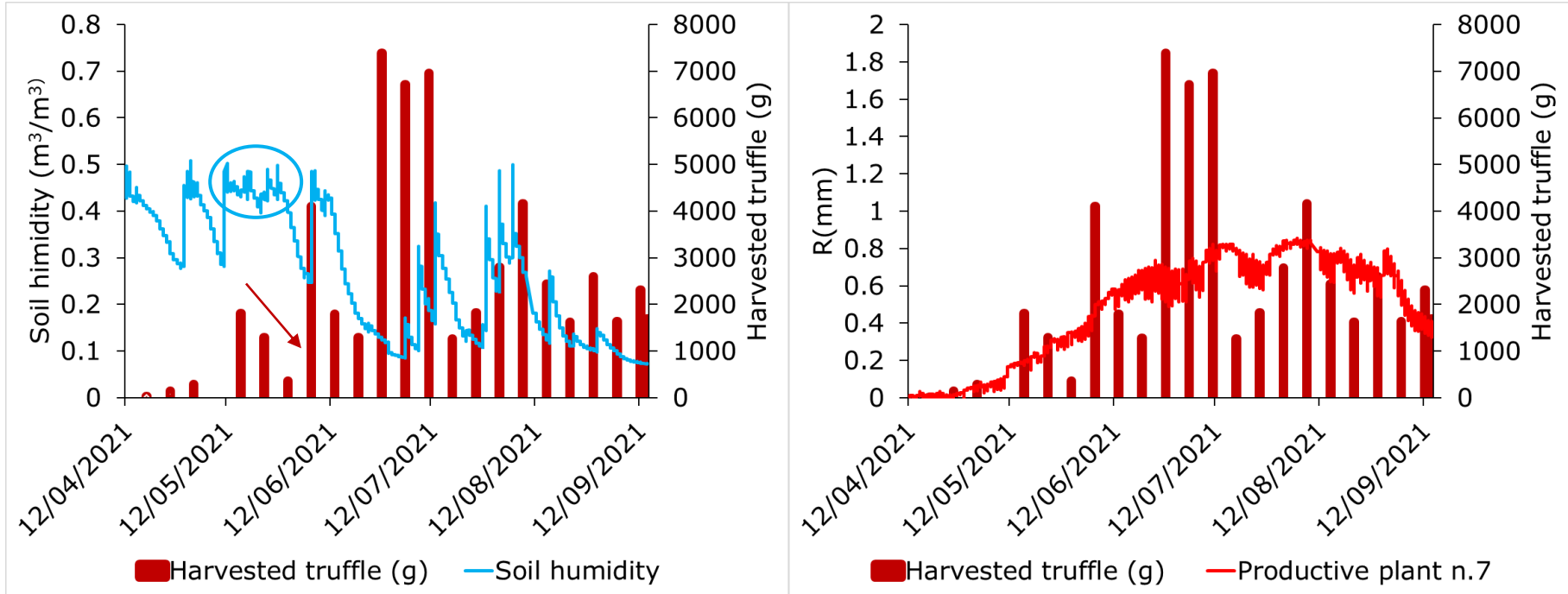
# Results



In non-productive plants, periodic fluctuations are strongly linked to soil moisture. The plant undergoes dehydration (wider fluctuations indicate greater dehydration, **and less osmoregulation**).

In productive plants, the amplitude of daily fluctuations is reduced at the beginning of the season, while it increases in the second part of the season. Soil humidity goes down **under a certain threshold**.

# Results



- High production after high water stress and recovery
- High production in June (maximum light)



# Conclusions

- Truffle productivity is linked both with **environmental parameters** and **plant's physiological parameters**;
- It is possible to improve the productivity of plants and truffles by applying a management model that considers the **water stress and recovery cycles**;
- Monitoring the plant means being able **to choose when it is necessary to intervene (not always!)**;
- This new approach could save useful resources (like water) and make truffle cultivation **more sustainable (smart use of irrigation and thinning treatment)**.

Thank  
you for  
attention!

