Towards resilient apple production: Redesigning the agroecosystem as a response to climate change

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XIII 2025
ORCHARD SYSTEMS

Introduction

Climate change

Possible decrease in production

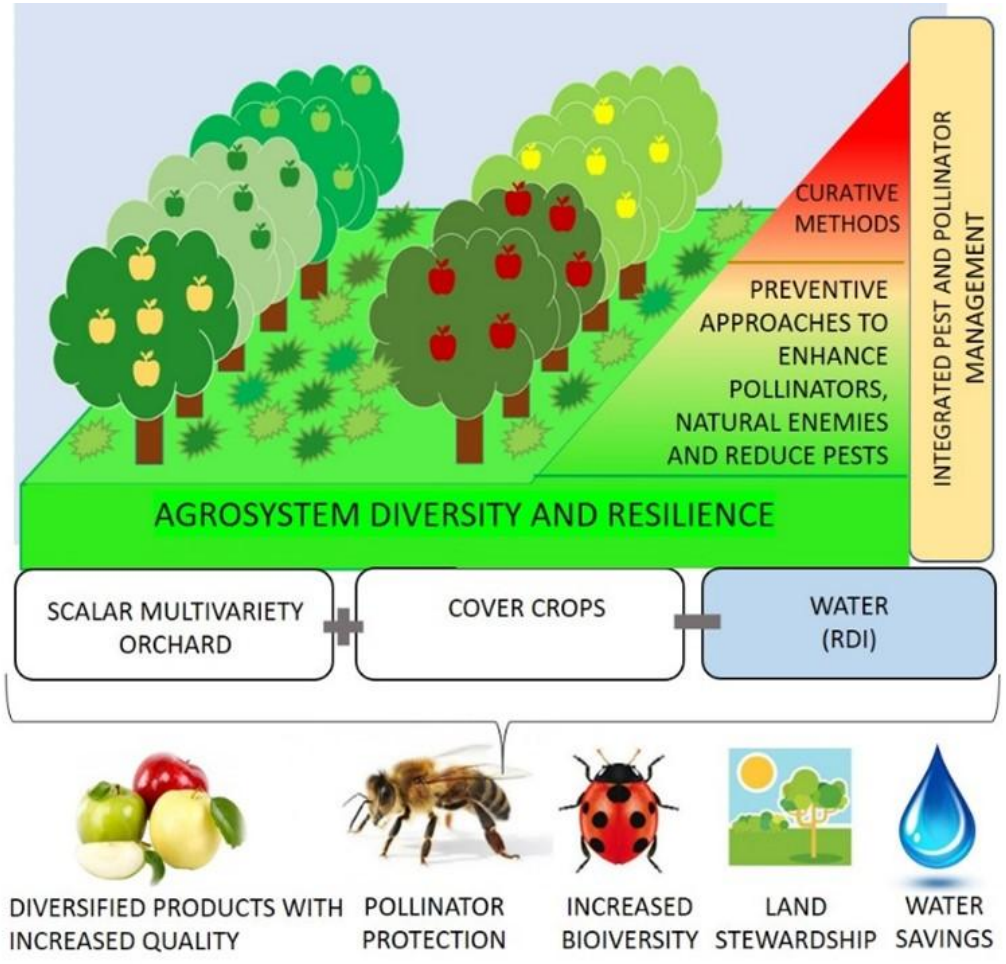
Orchard intensification

Biodiversity reduction

Economic instability, especially for small holdings



Redesigning the agro-ecosystem: DREAM



1. Multivarity apple orchard
2. Selected cover crops in the interrow
3. Regulated deficit irrigation
4. Integrated pest and pollinator management







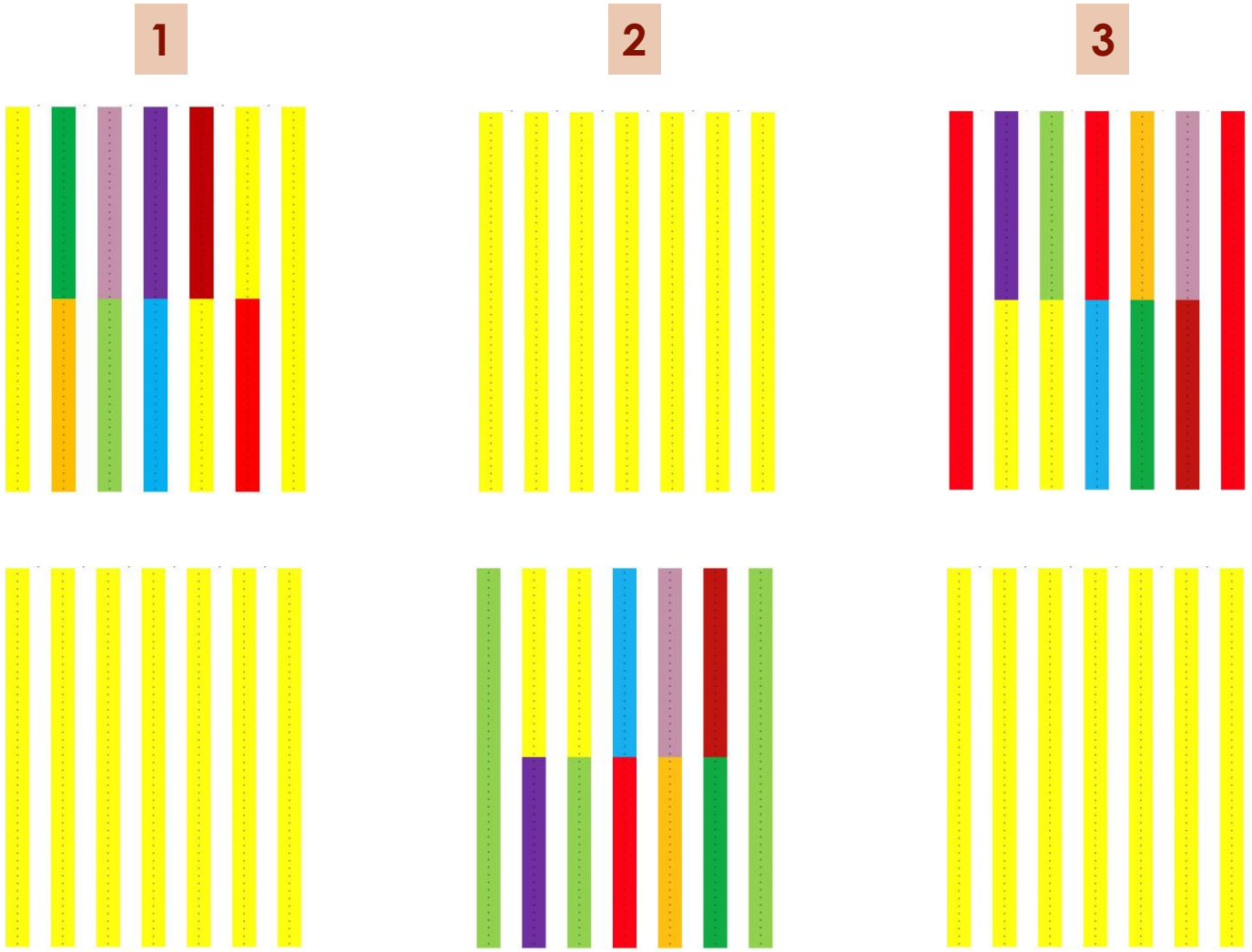


Materials and methods

The experimental site in Bologna, Italy



Materials and methods



Selected apple cultivars:

- Early Red Unibo, Red Unibo → Resistant to aphids and scab
- Gala 049, Smeralda → Resistant to scab and powdery mildew
- Pink Lady, Red Pulp Unibo → Commercial varieties
- Abbondanza, Campanino → Old local varieties
- Renetta Grigia di Torriana → Old local variety, resistant to scab

Materials and methods

- Cover crop coverage
- Seasonal shoot growth
- Water potentials and leaf gas exchanges
- Predators presence











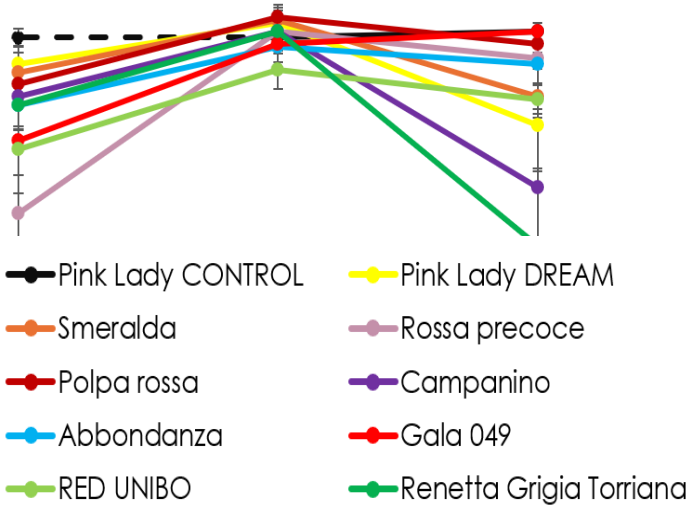




Objectives

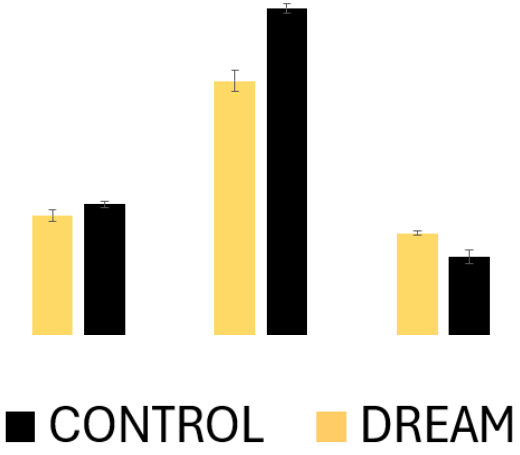
1

Compare the physiological performances of the different cultivar



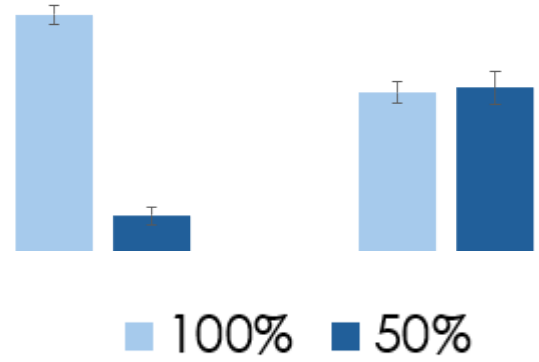
2

Compare the two agro-ecosystems in terms of soil coverage, predators presence and plant physiology



3

Compare the response of each cultivar to different irrigation regimes

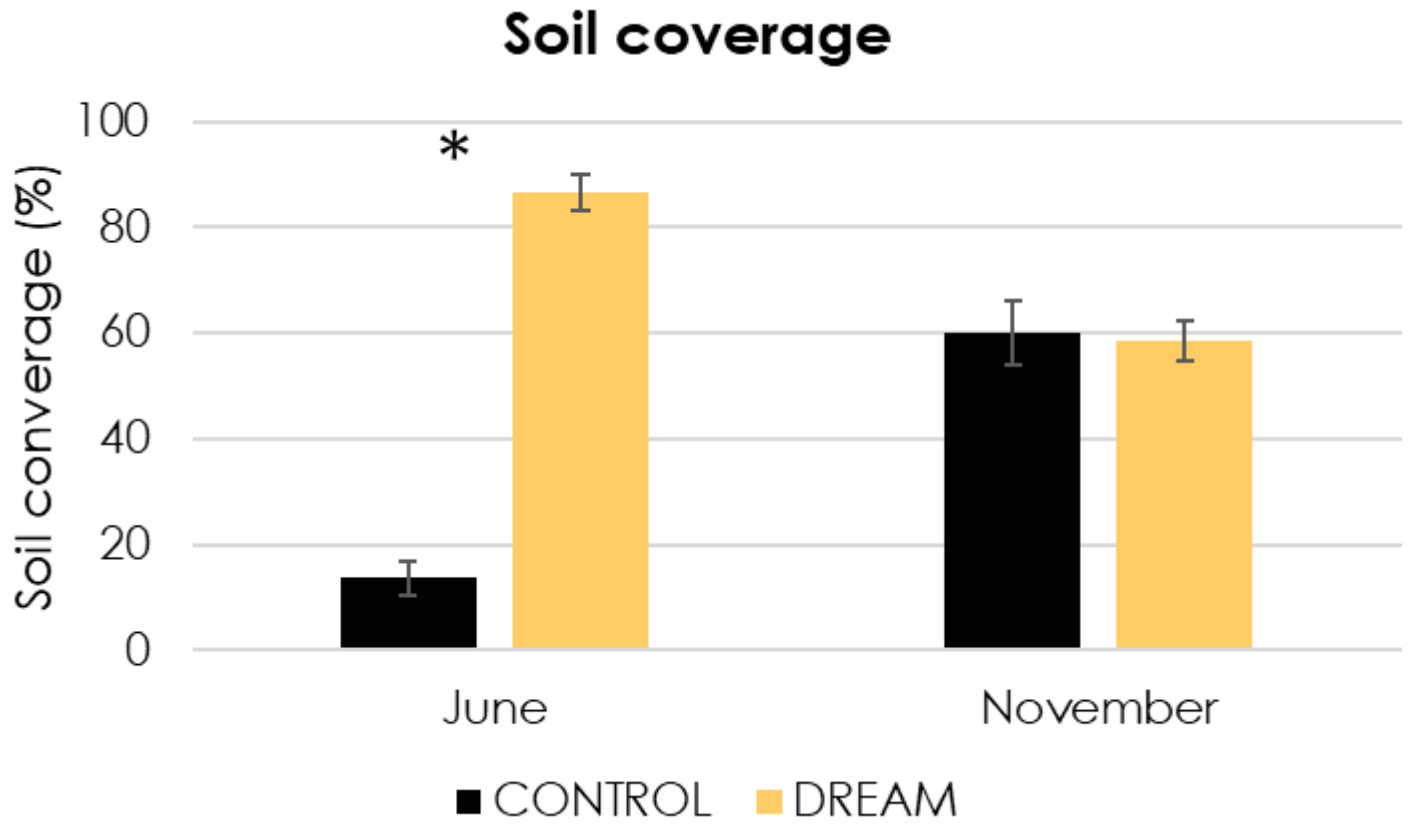


Interrow soil coverage





Interrow soil coverage

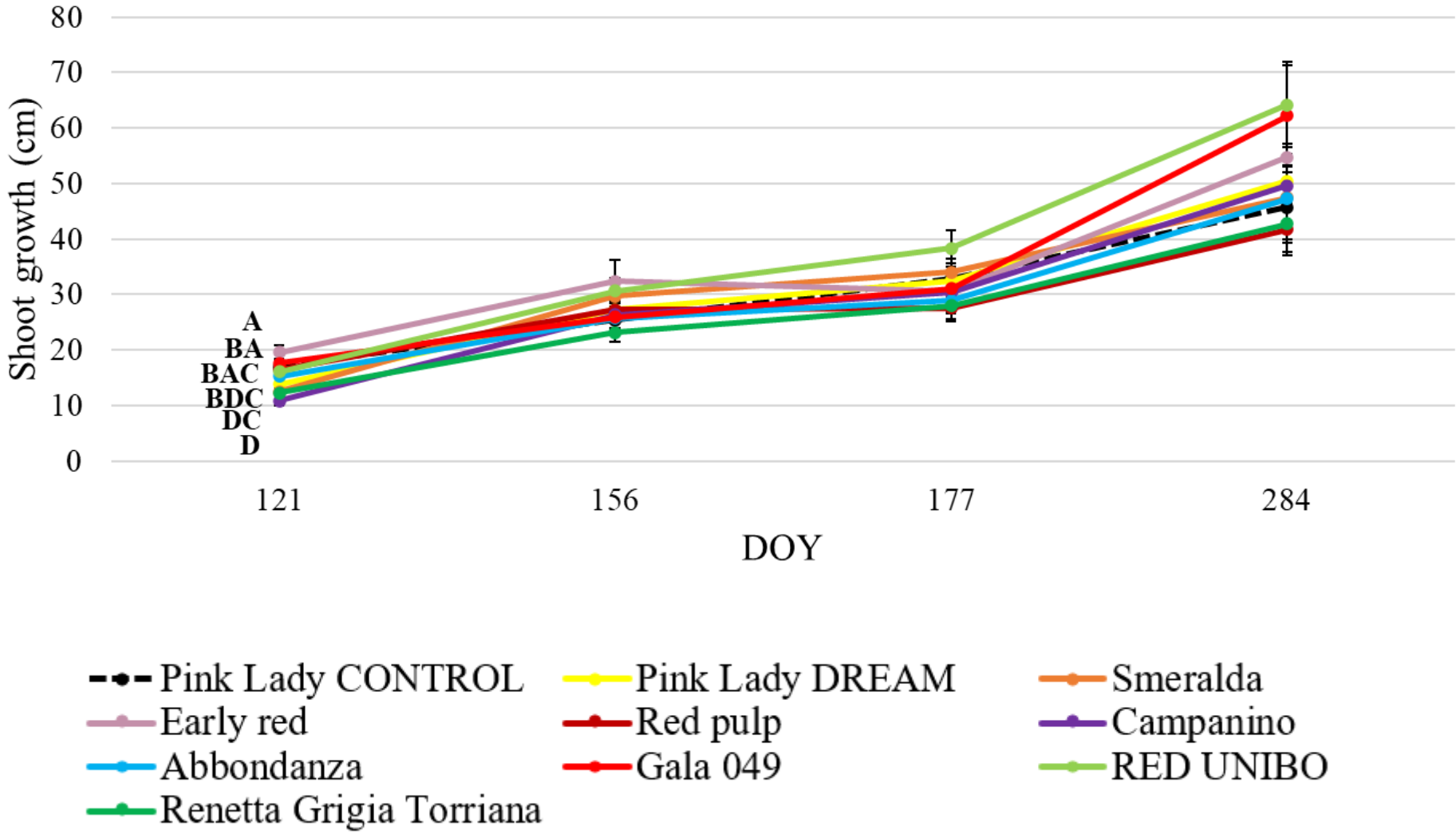




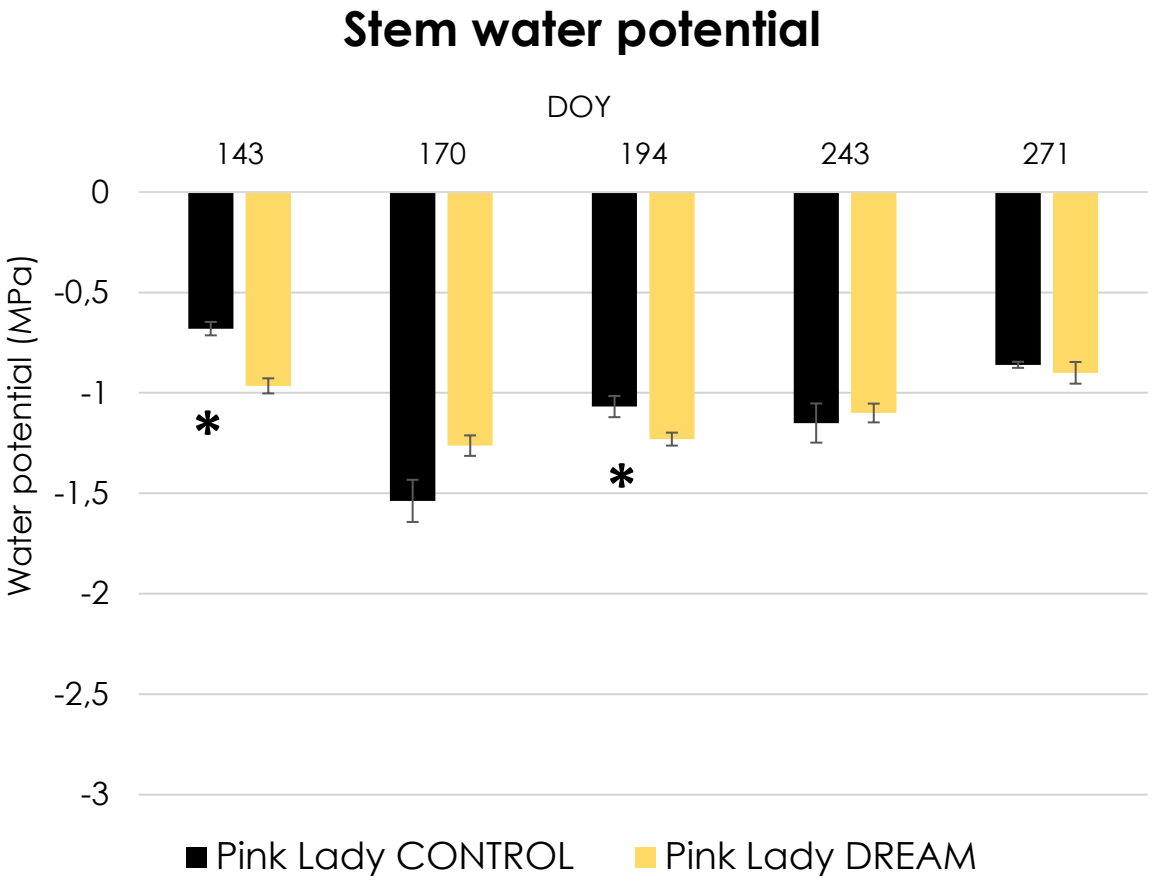


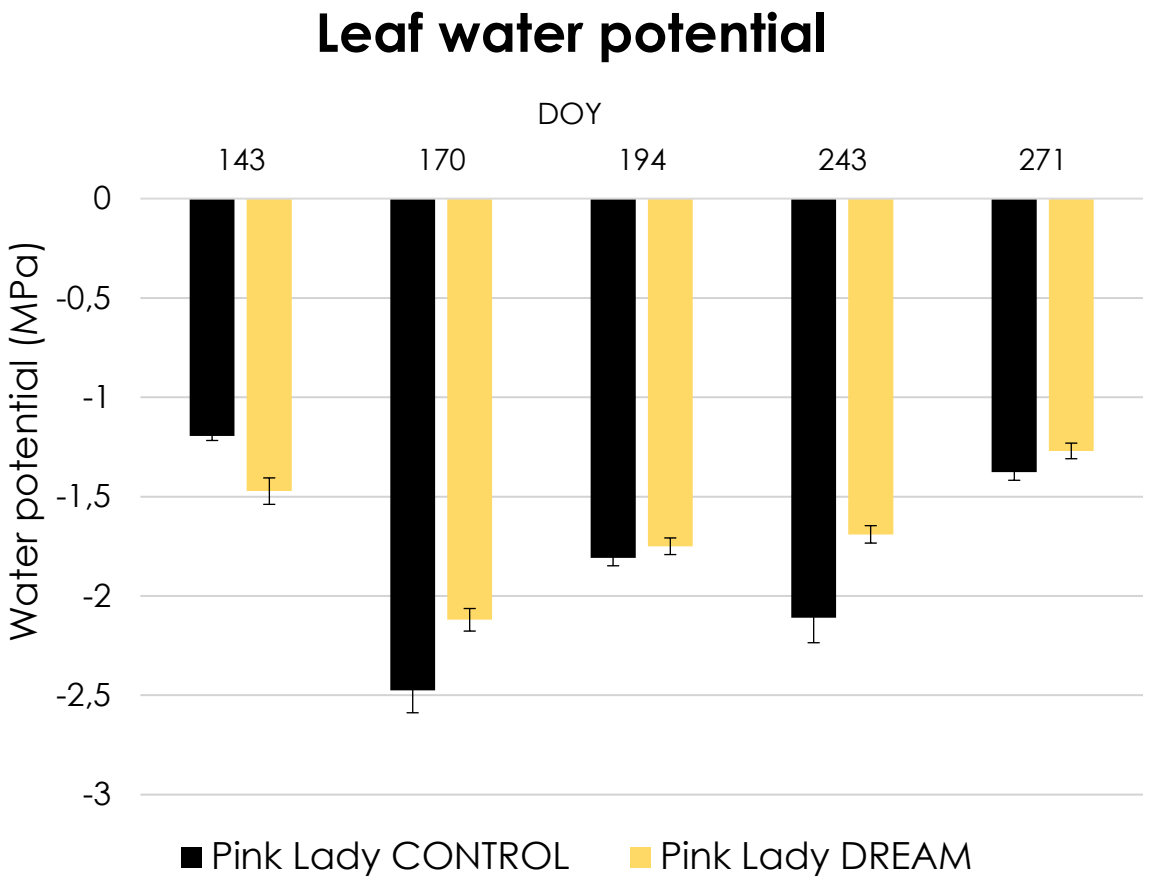


Seasonal shoot growth

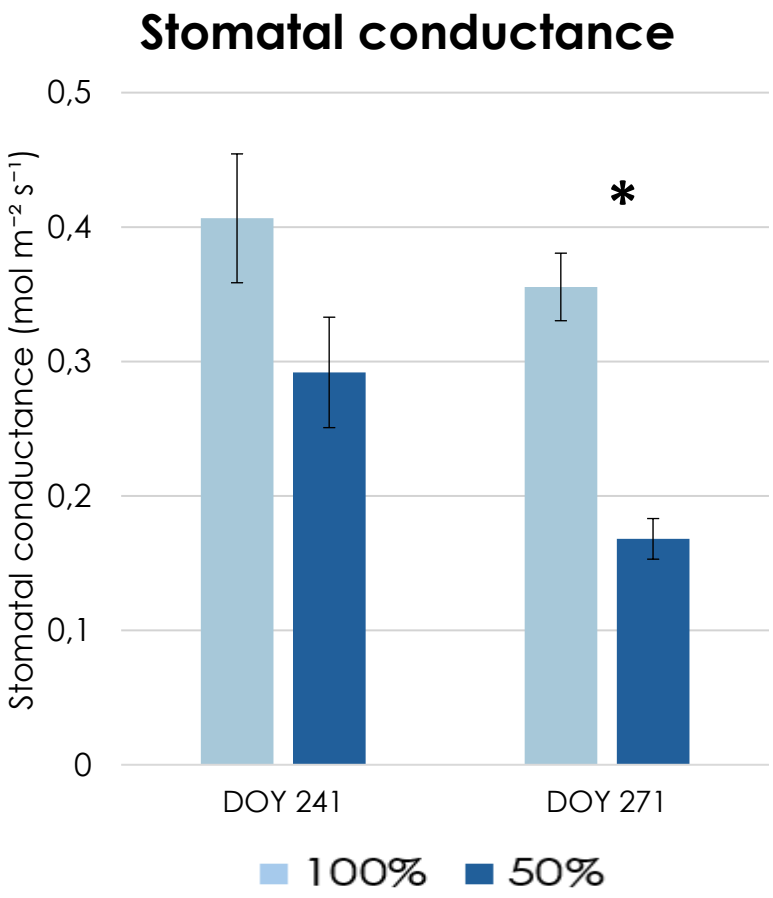


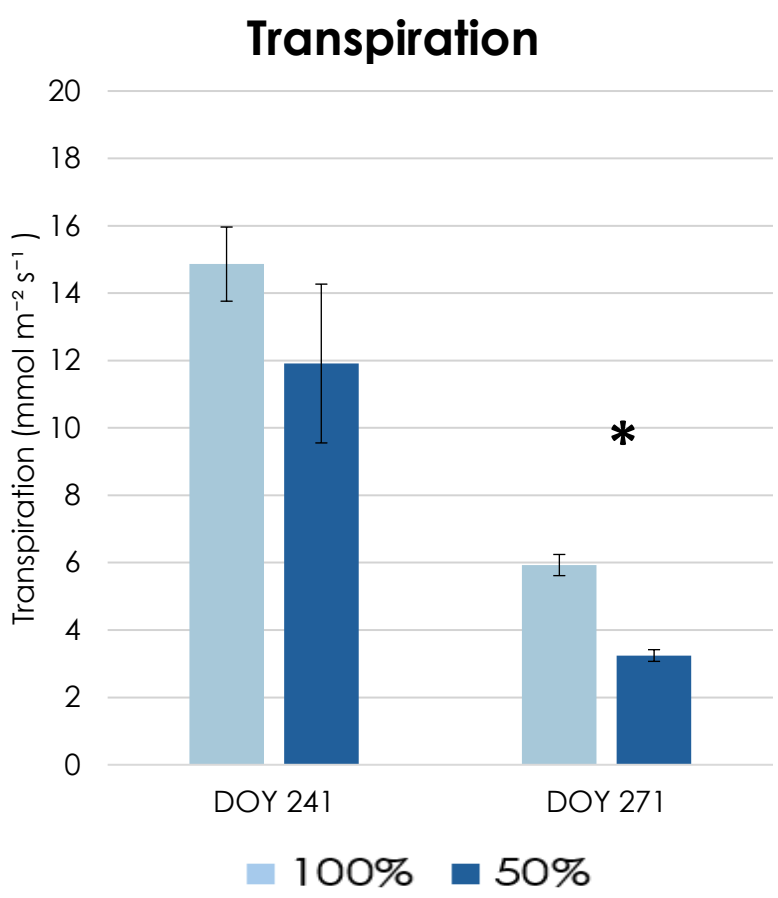
Seasonal water potentials

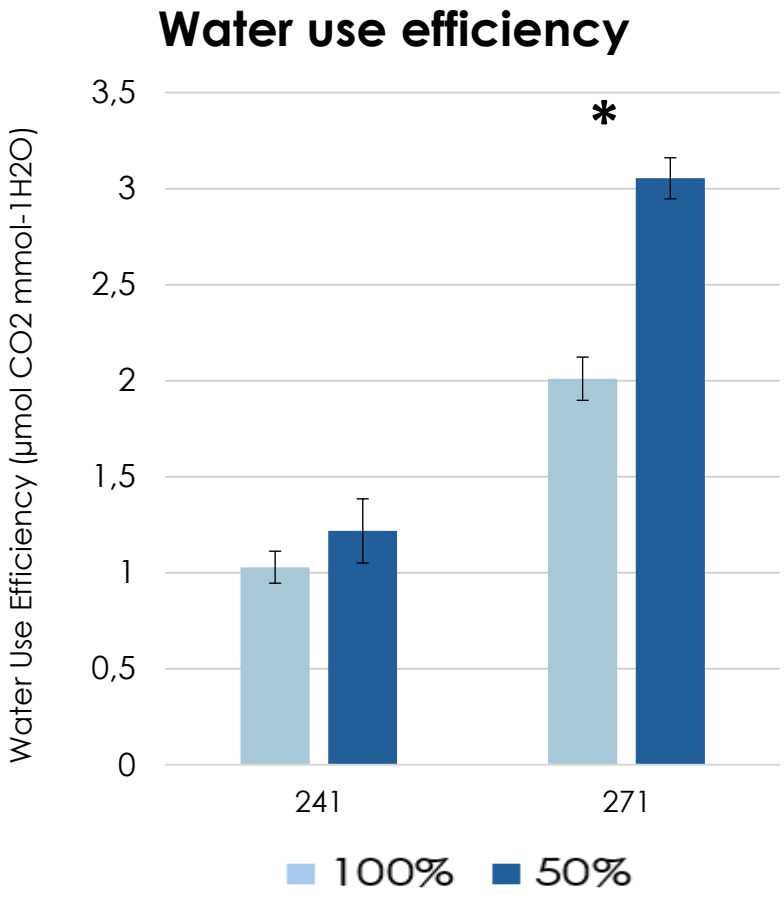




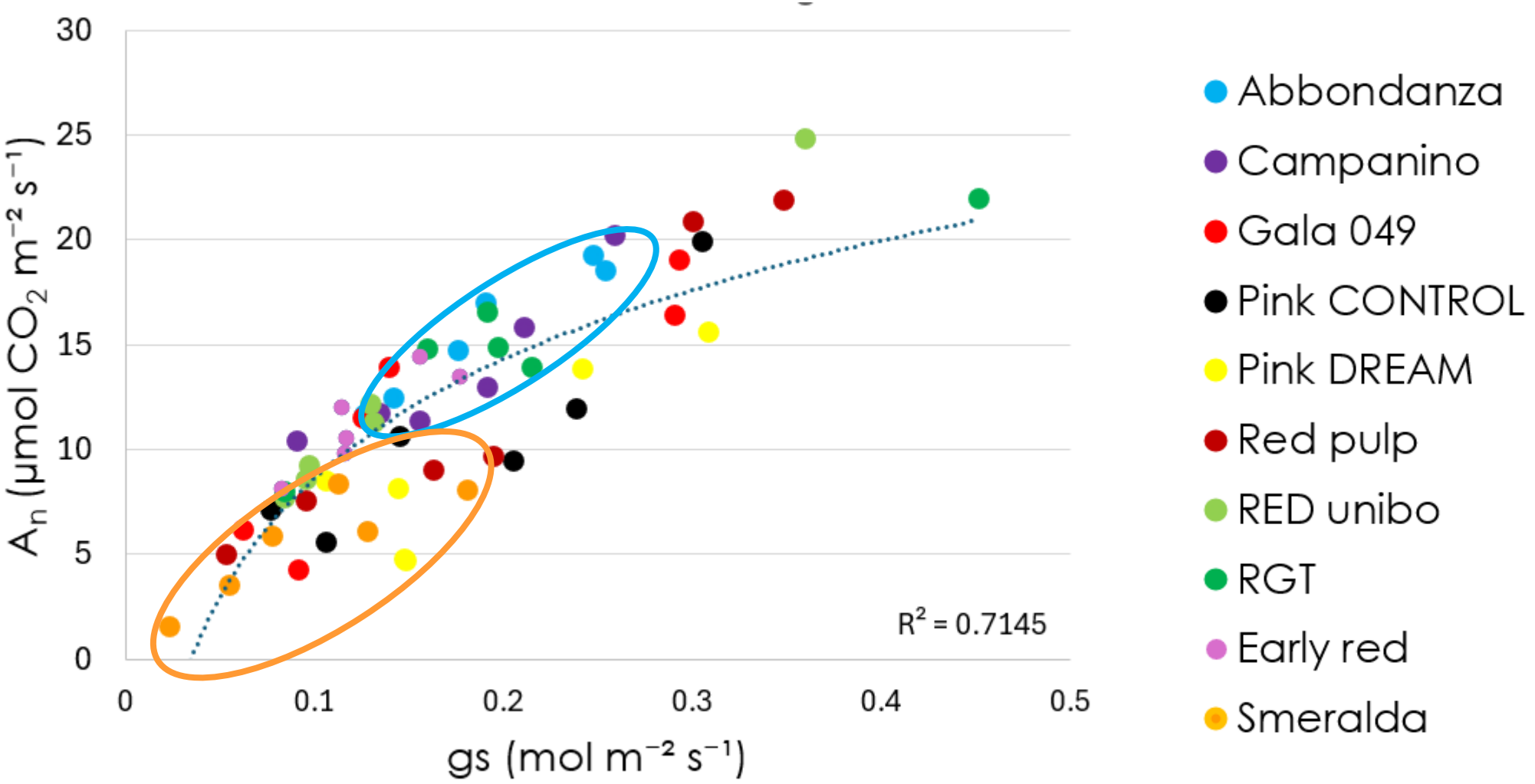
Deficit irrigation in Pink Lady DREAM





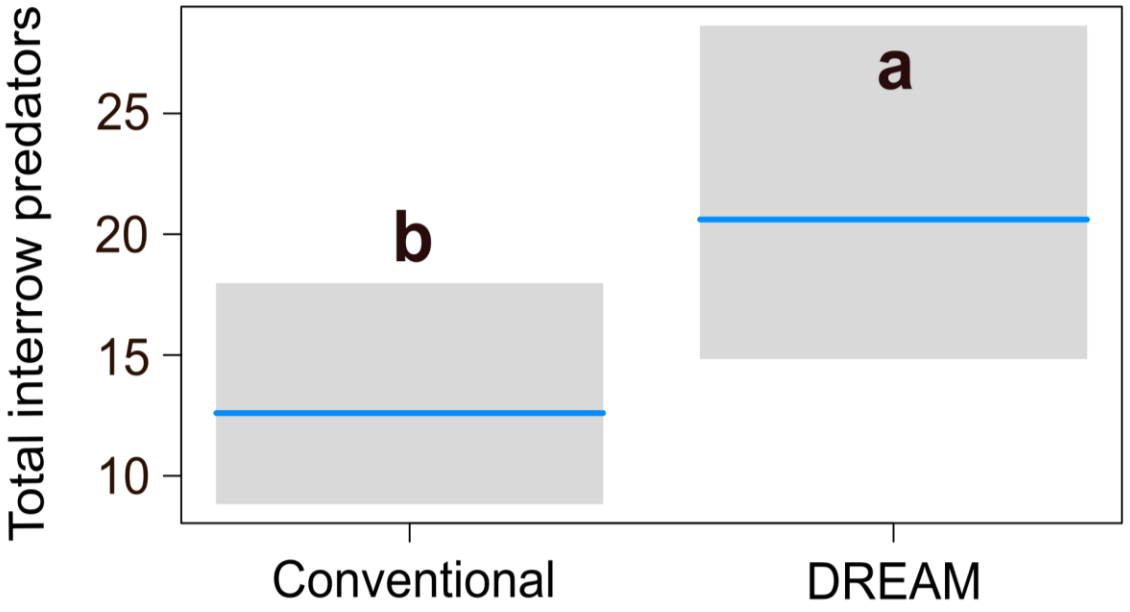


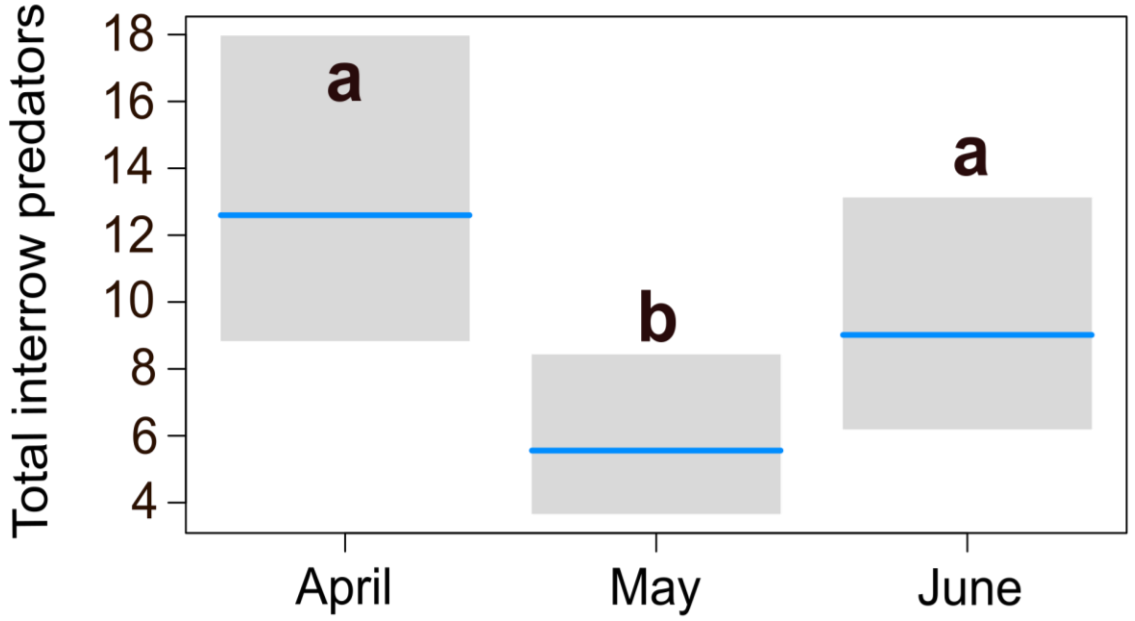
Different cultivars…different responses



Predators presence







Conclusions





- Cover crops did not negatively affect growth and development of young apple trees



- Deficit irrigation reduced transpiration and g_s only in Pink Lady DREAM, increasing its water use efficiency

- DREAM had a positive effect on the number of predators



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Field trials to enhance kiwifruit production using *Osmia bicornis* and supplementary flowering plants

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PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

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Notes

- No differences in shoot growth between RDI e 100%
- WP: differences between DREAM and CONTROL but NO differences at the end of the season between RDI e 100% etc
- Transpiration and gs were lower in Pink Lady DREAM RDI but same photosynthesis -> higher WUE!