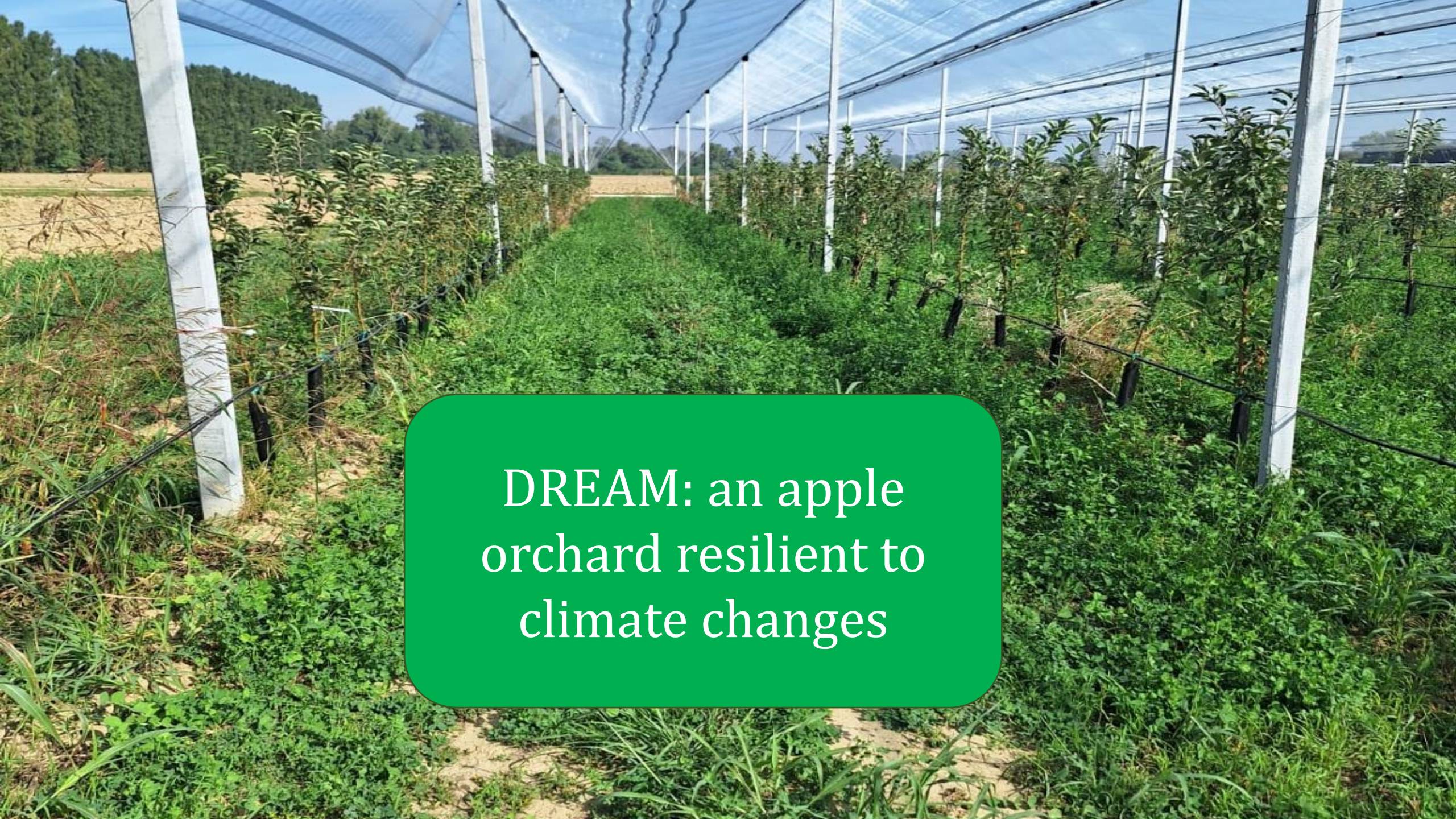


DREAM: an apple orchard resilient to climate changes

Introduction

Climate change

Possible decrease in production

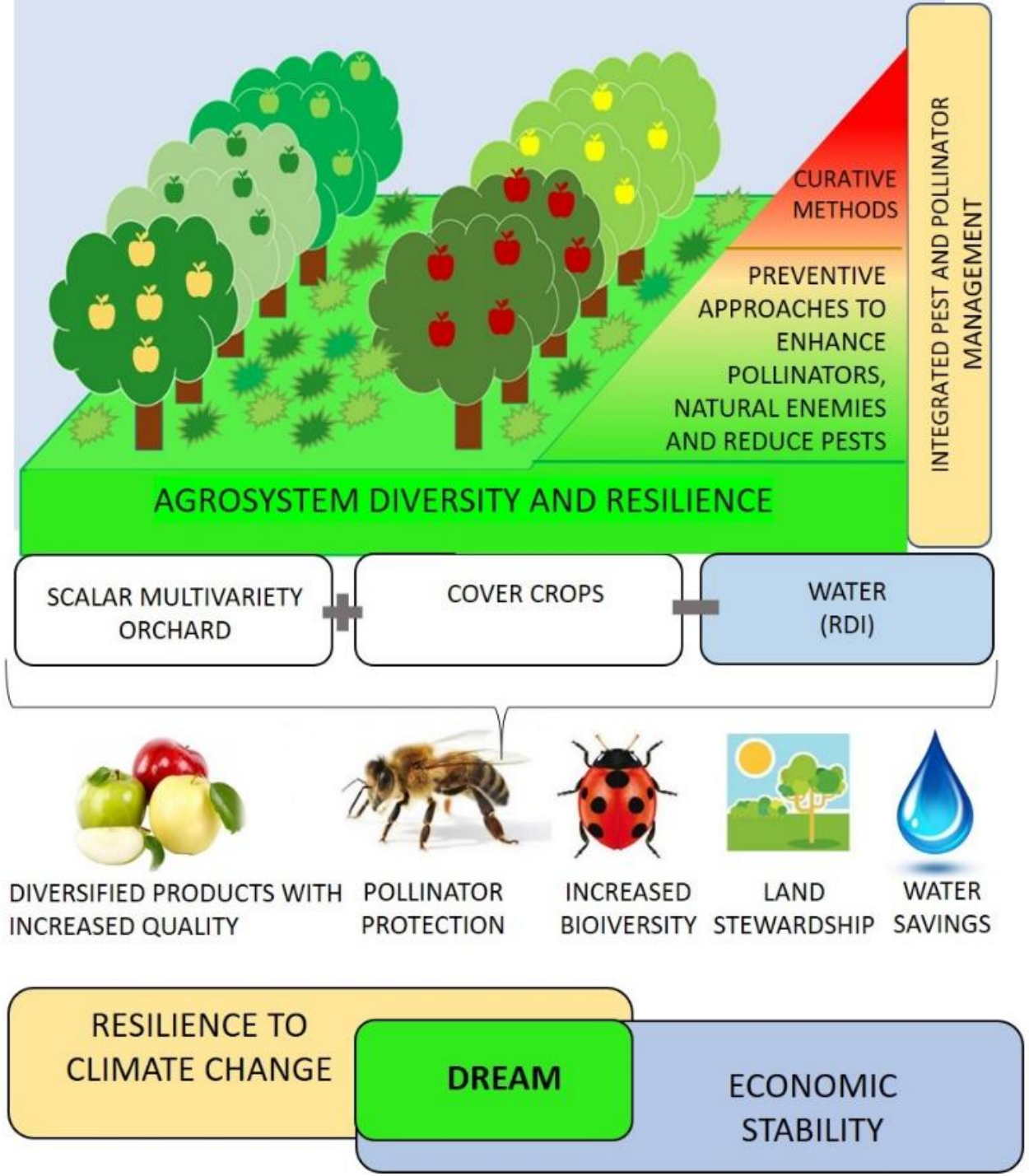
Orchard intensification

Biodiversity reduction

Economic instability, especially for small holdings



Diversified orchard for resilient and sustainable Mediterranean farming systems



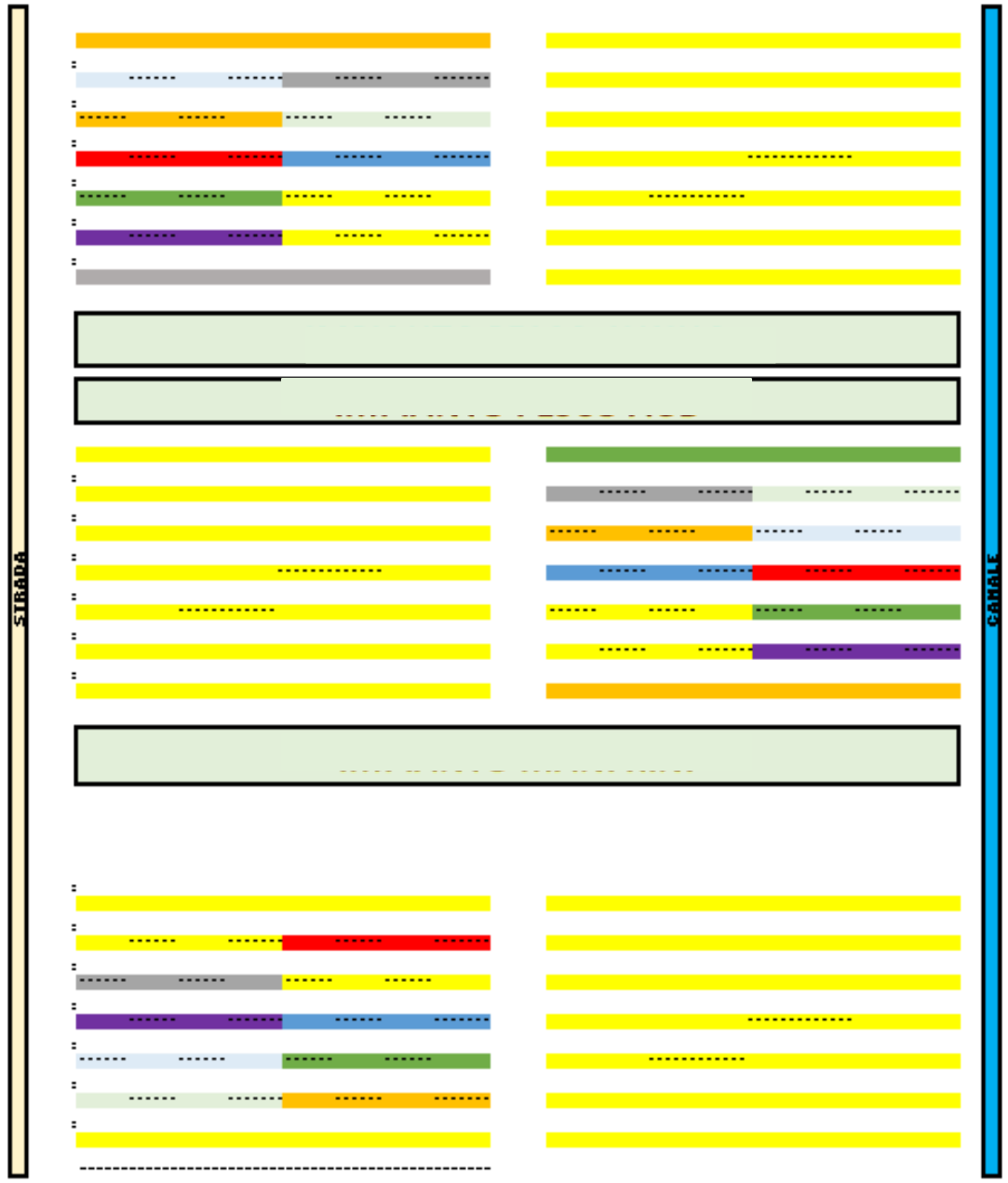
The blooming period

DREAM Blooming dates													
Variety	Blooming (April)												
Pink lady®	2	4	7	9	11	14	16	18	21	23	25	28	31
Red Pulp UNIBO	■	■											
Early Red UNIBO					■	■	■	■					
RED UNIBO		■	■	■									
Gala 049									■	■	■		
Smeralda					■	■	■						
Abbonadanza						■	■						
Campanino												■	■
RENETTA Grigia di Torriana											■	■	■

The harvest window

DREAM harvest dates											
		July		August		September			October		
Variety	**Harvest**	11-20	21-31	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-30
Pink lady®	**End of October**										
Red Pulp UNIBO	Beginning of October										
Early Red UNIBO	Late August										
RED UNIBO	Mid-late September										
Gala 049	Late July										
Smeralda	Mid August										
Abbonadanza	Mid August										
Campanino	Mid August										
RENETTA Grigia di Torriana	Mid August										

Experimental plots in Cadriano, Bologna









Materials and methods

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















Materials and methods

Canopeo (app) was used to assess soil cover by cover crops, both in DREAM and in the conventional system

The number of botanical species was determined to assess biodiversity in both systems: 54 metal squares (20x20cm) were placed in the field to determine the number and type of cover crops.







Sainfoin



Sulla coronaria



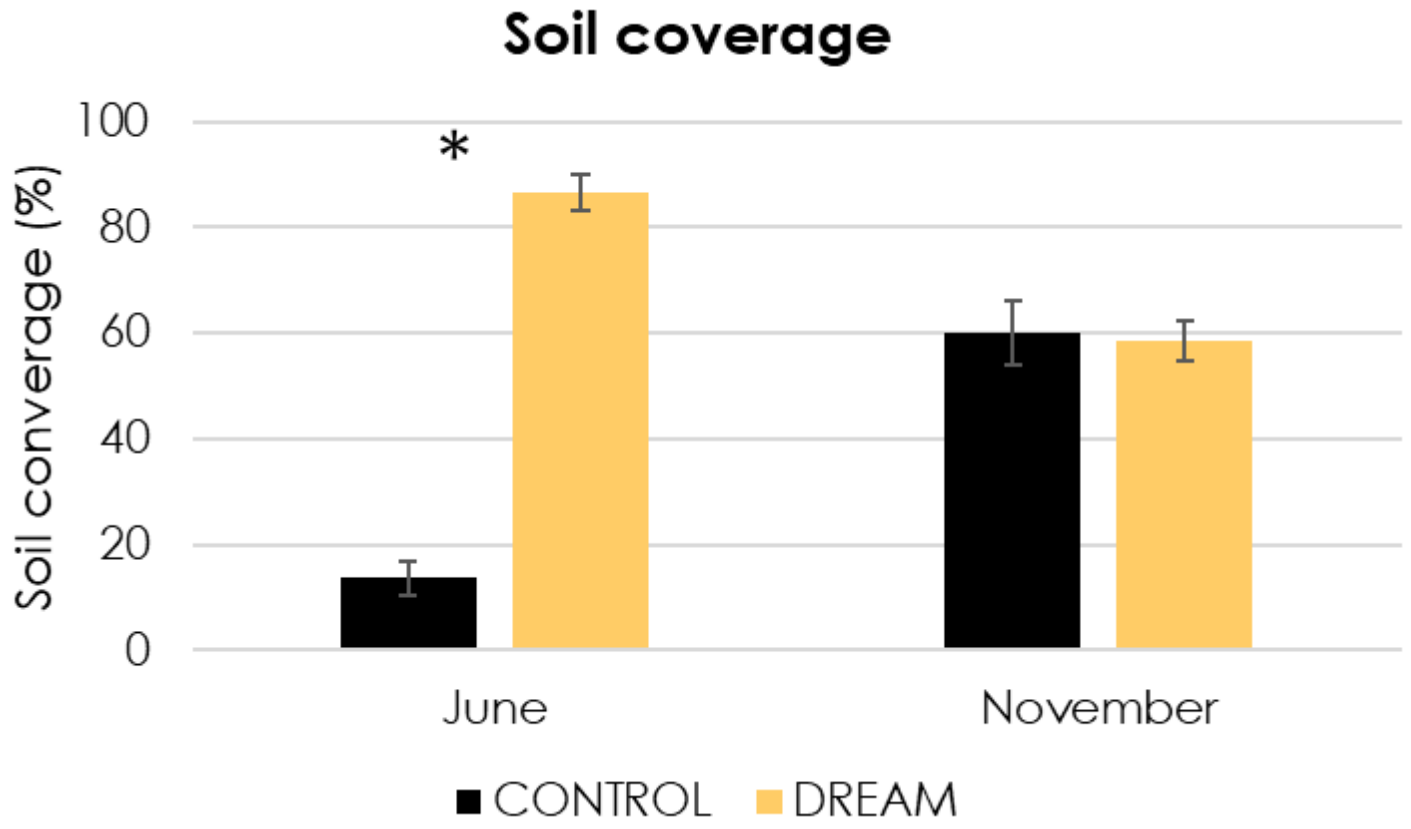
Trifoglio

Interrow soil coverage





Interrow soil coverage





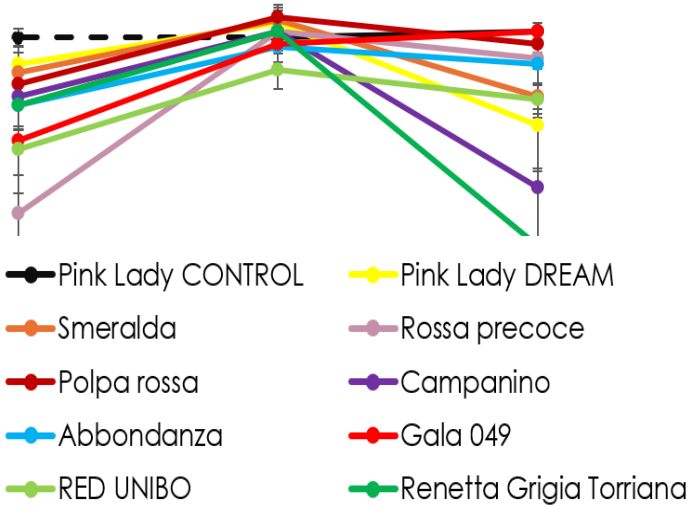




Objectives

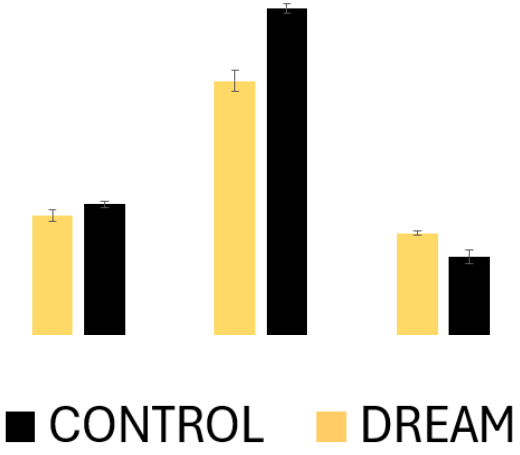
1

Compare the physiological performances of the different cultivar



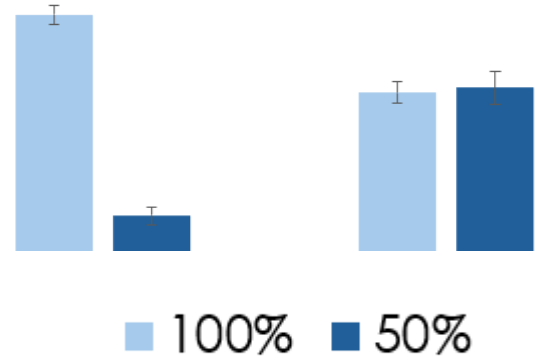
2

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

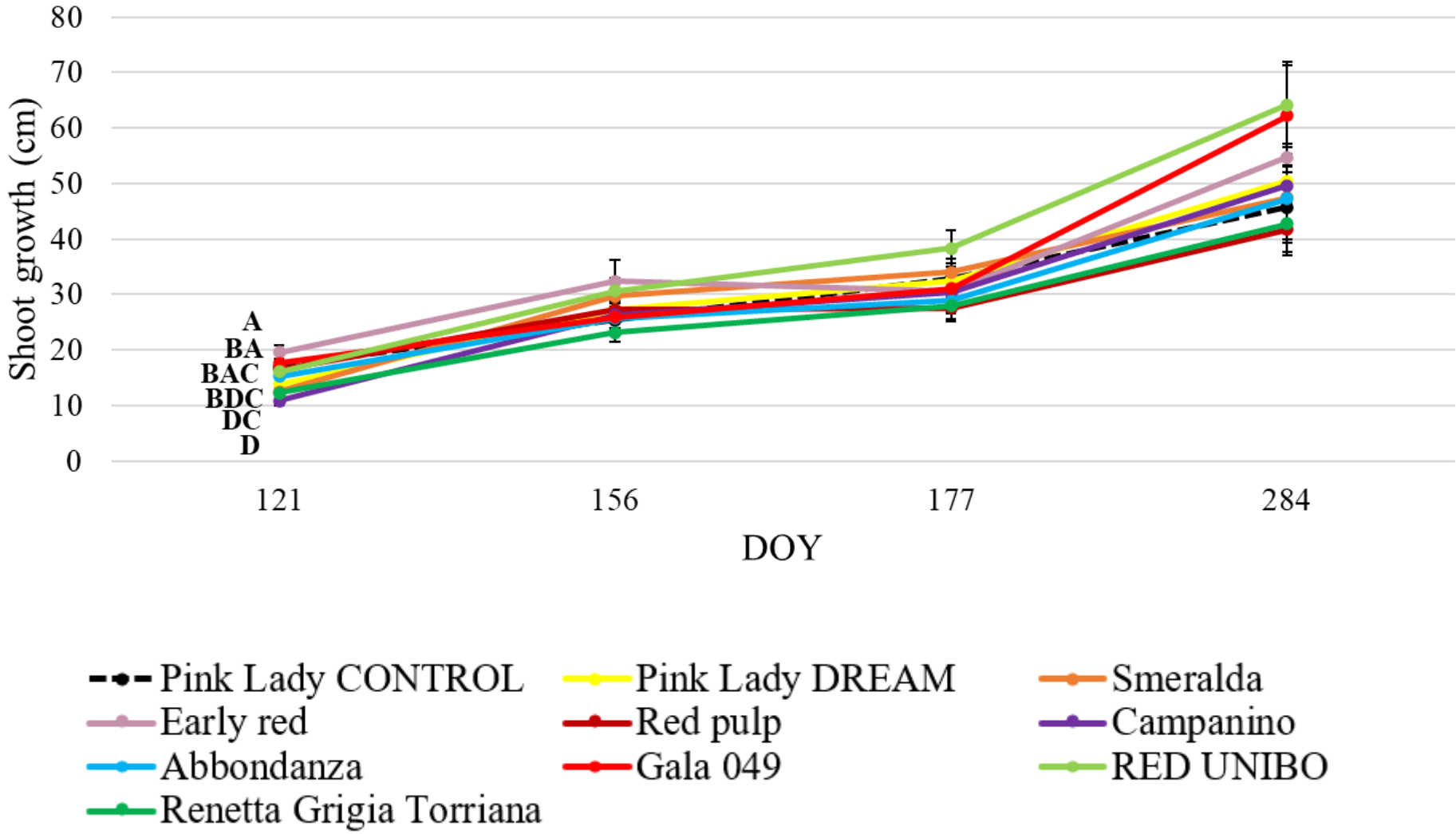


3

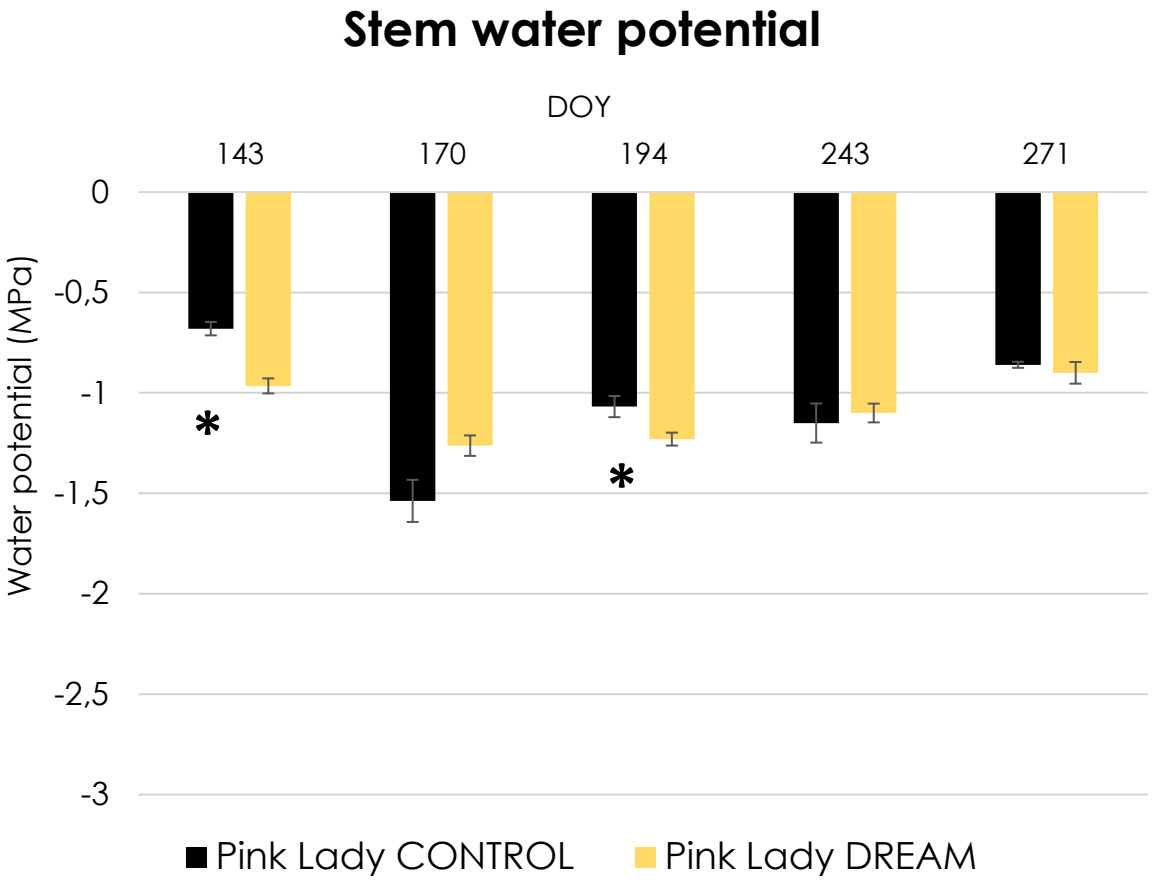
Compare the response of each cultivar to different irrigation regimes

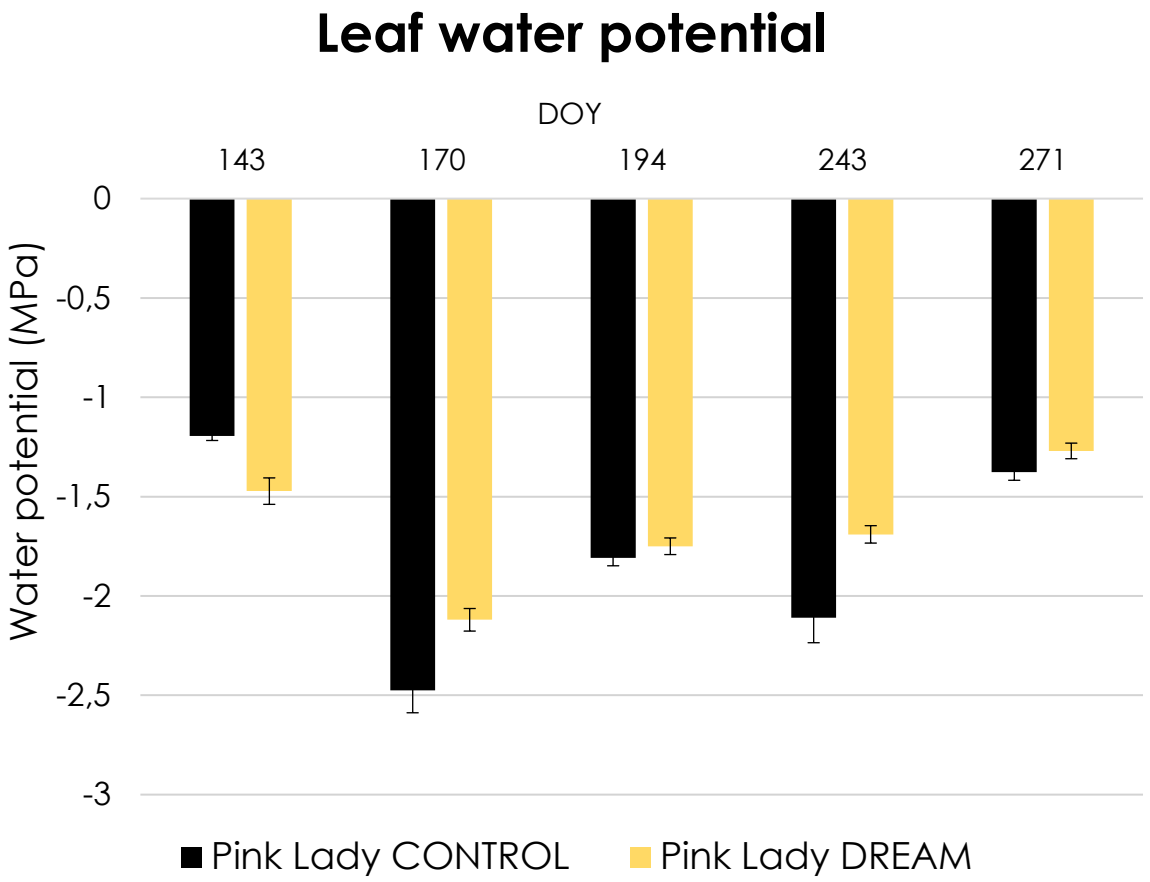


Seasonal shoot growth

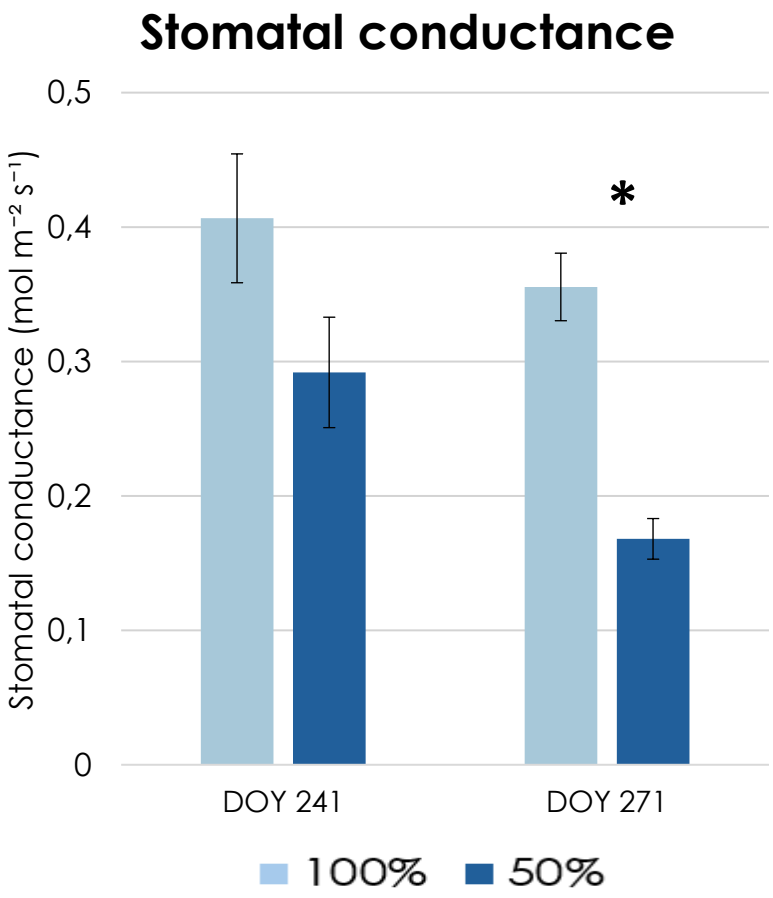


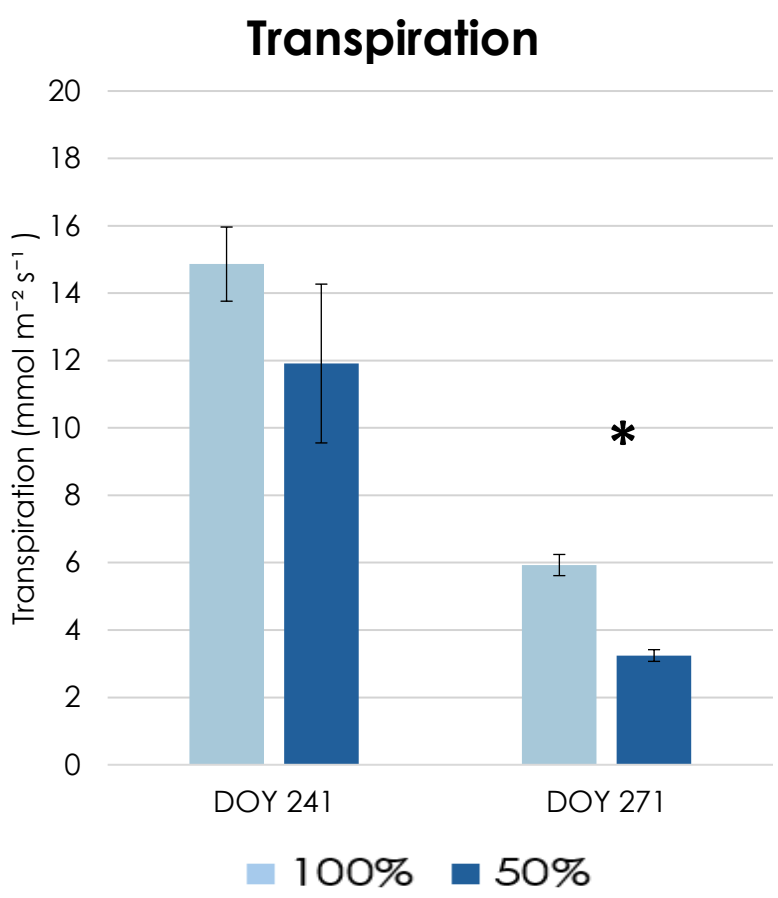
Seasonal water potentials

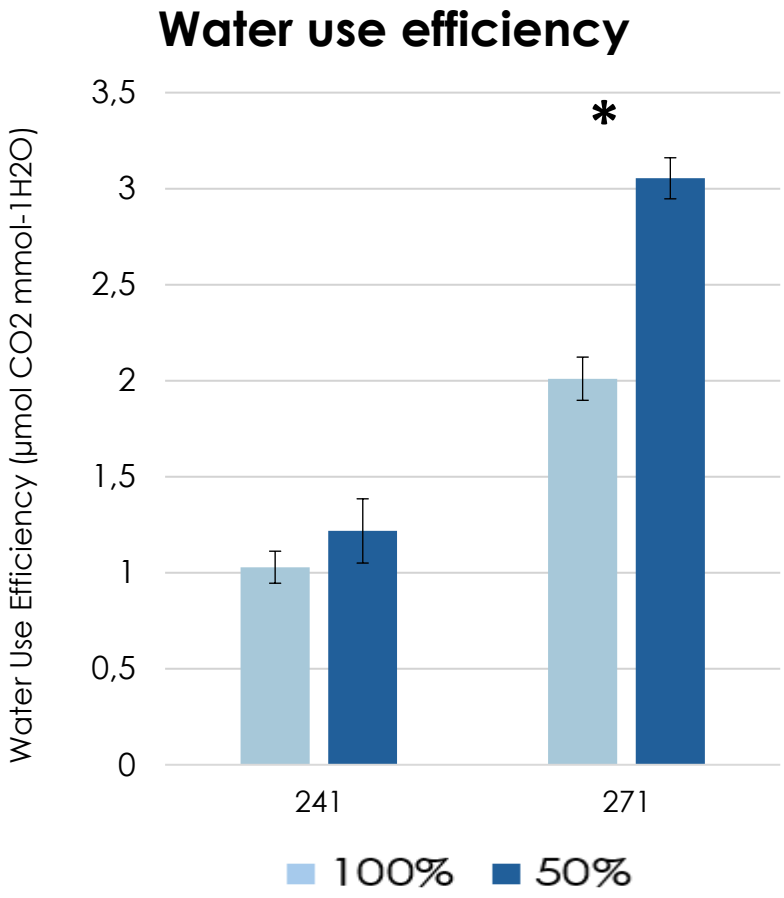




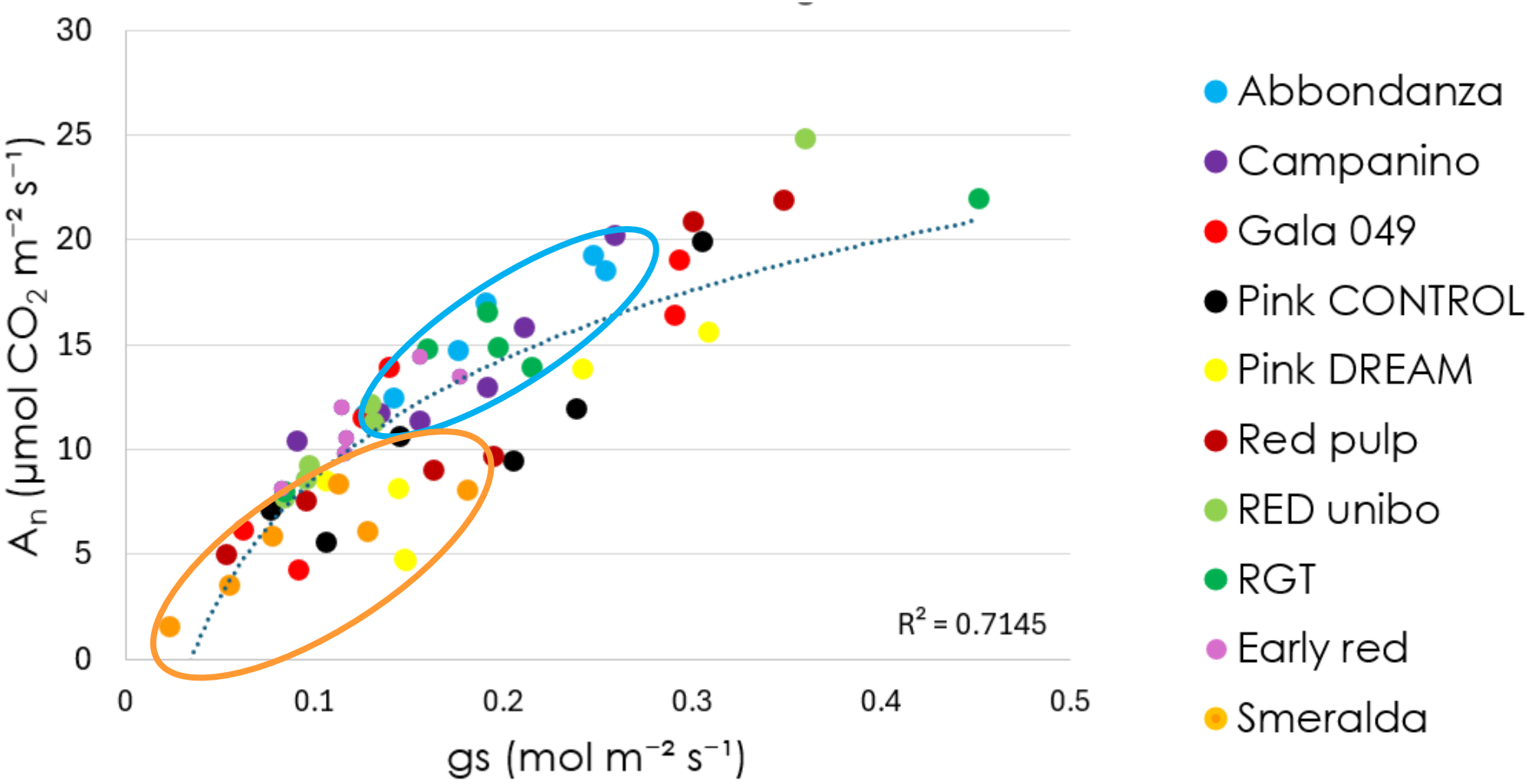
Deficit irrigation in Pink Lady DREAM

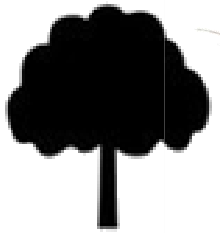






Different cultivars…different responses





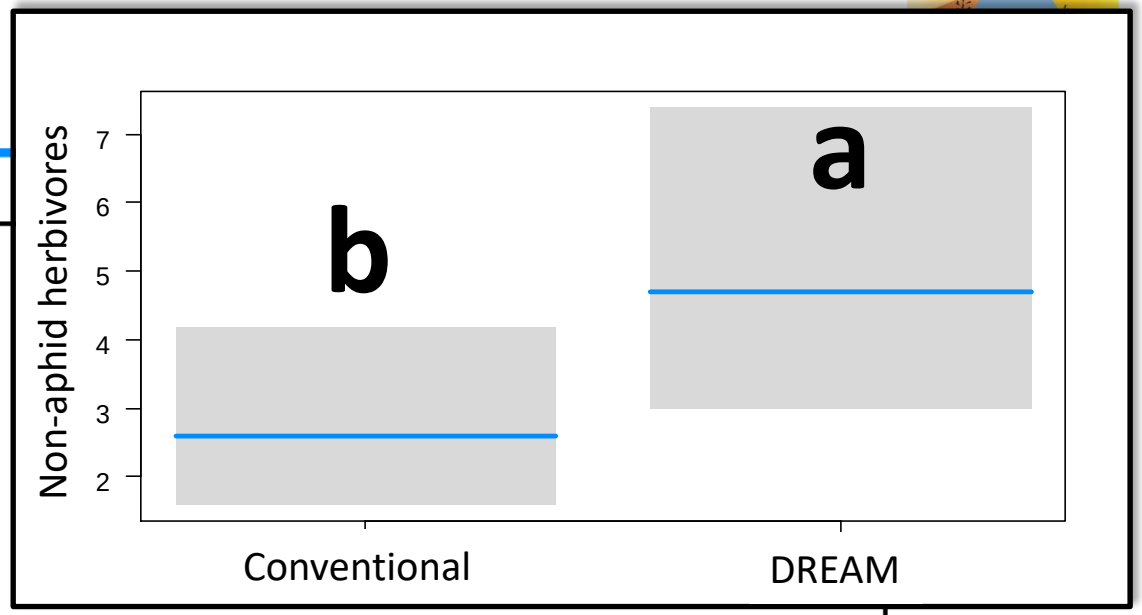


Tree-dwelling herbivores



Aphids: No difference

Conventional



Total herbivores on trees

200
150
100
50
0

a a

c c

*

c c

b b

April
May
June
July







Interrow-dwelling herbivores



Conventional DREAM

Total herbivores in interrow

100
80
60
40
20

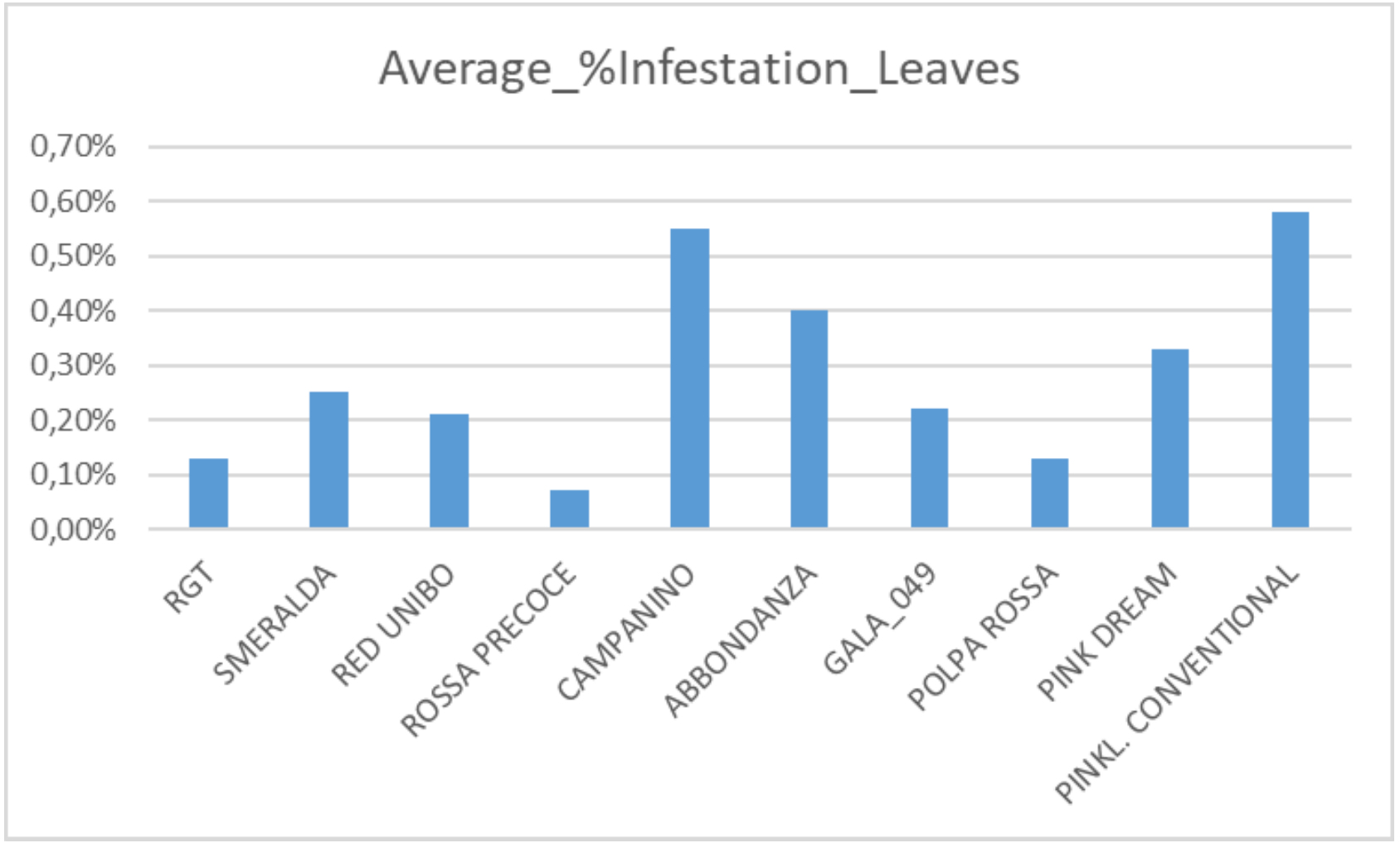
a
*
a
*
*
b
bc
ab
c

April May June



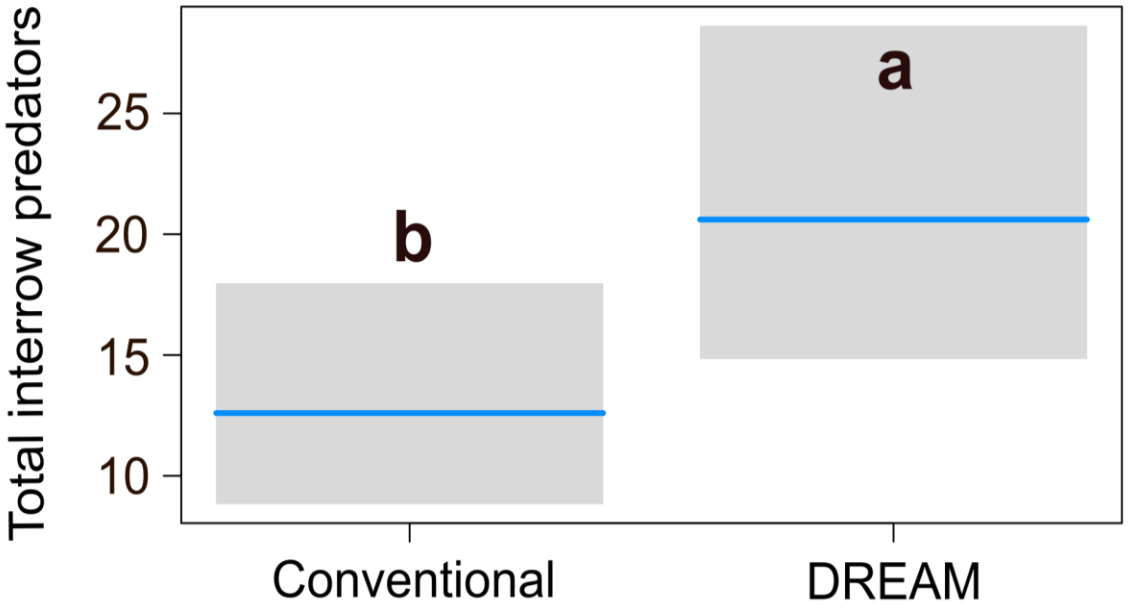
Aphids on different cultivars

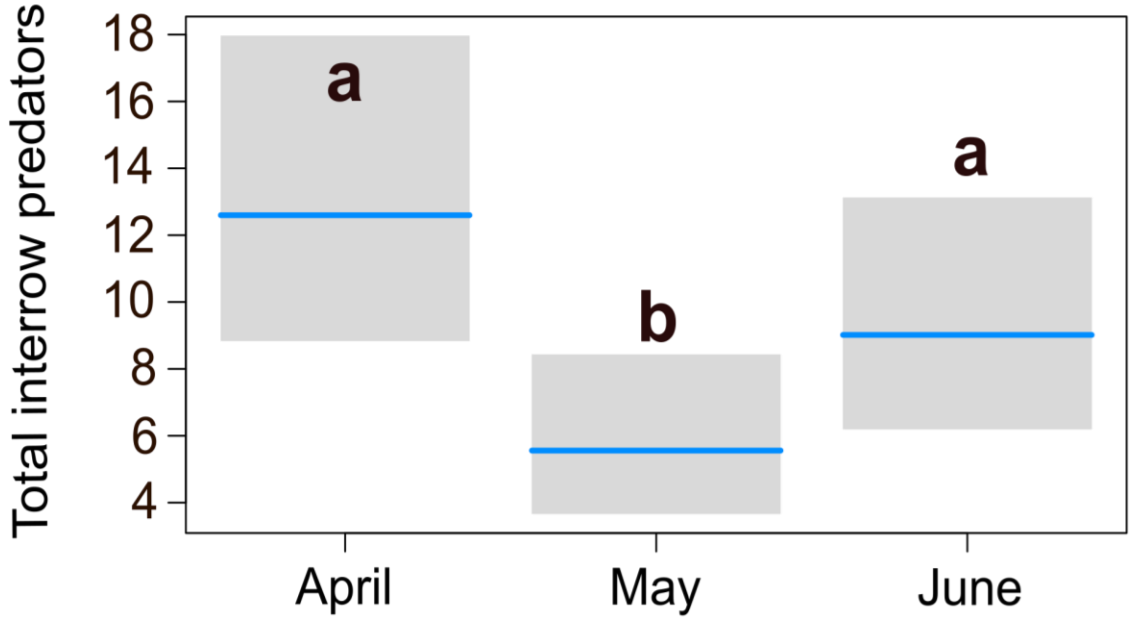
VERY LOW NUMBERS – NO STATISTICAL ANALYSIS



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

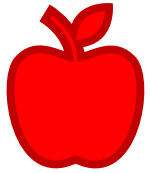
- DREAM had a positive effect on the number of predators



The project continues…

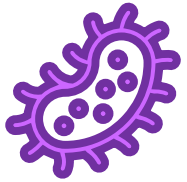


Deficit irrigation



Fruit specialized metabolites





Soil microbiome



Cover crops biodiversity



Beneficial insects and biological control



Contacts

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PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

Funded by the European Union