

Precision irrigation in nurseries; toward a more comprehensive approach

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Irrigation in nurseries

- Essential for plant quality
- Irrigation results often in significant water loss
 - Overwatering and leaching
 - Water not reaching the pots
 - Evapotranspiration



Precision irrigation

- Objectives of the project:
 1. Optimize the irrigation management using wireless tensiometers
 2. Establish the best clustering practices for a wide range of plant species based on their water needs.
 3. Compare different strategies for the automation of irrigation

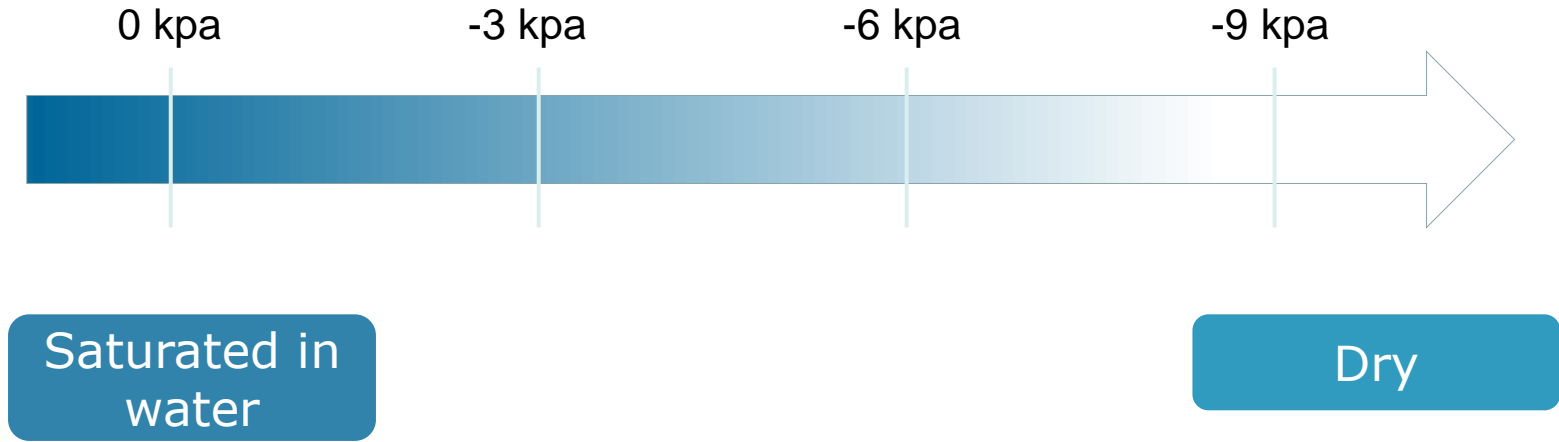
Optimizing irrigation management (2019)

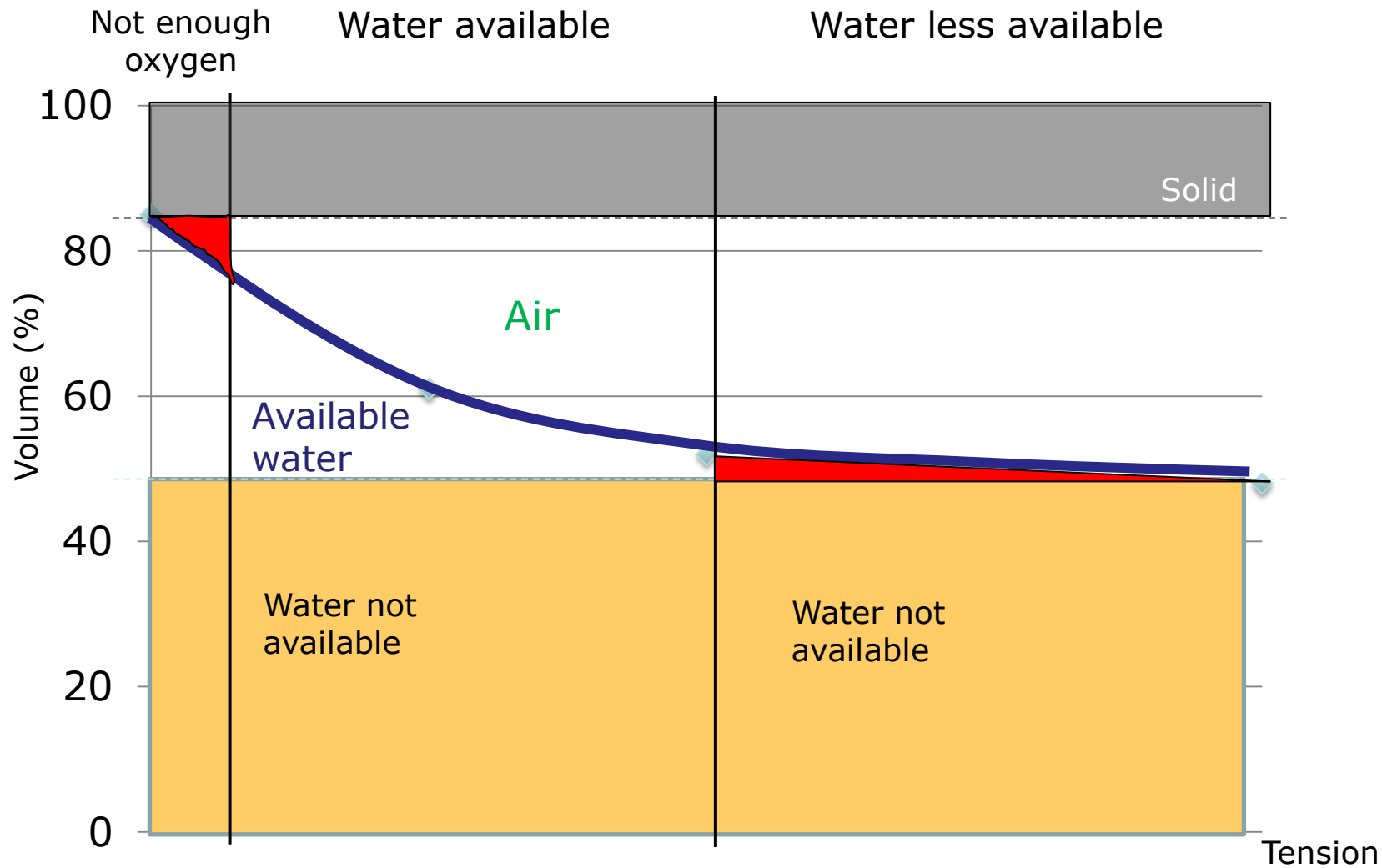
- Reducing fluctuations in soil water content
- Positive or negative effect?
 - Growth
 - Water use

Tensiometer



Matric potential (soil water content)



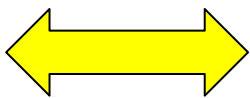




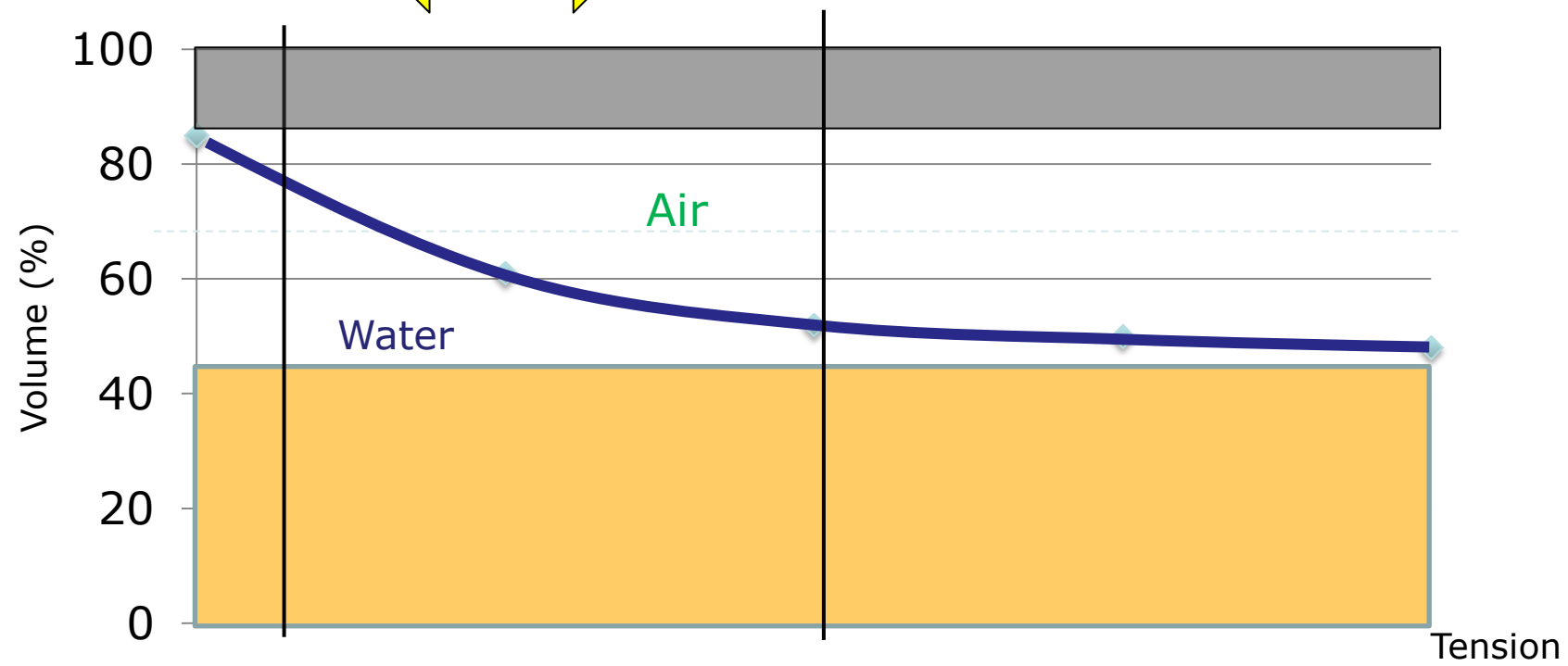
Strong fluctuation



Less fluctuation, dryer



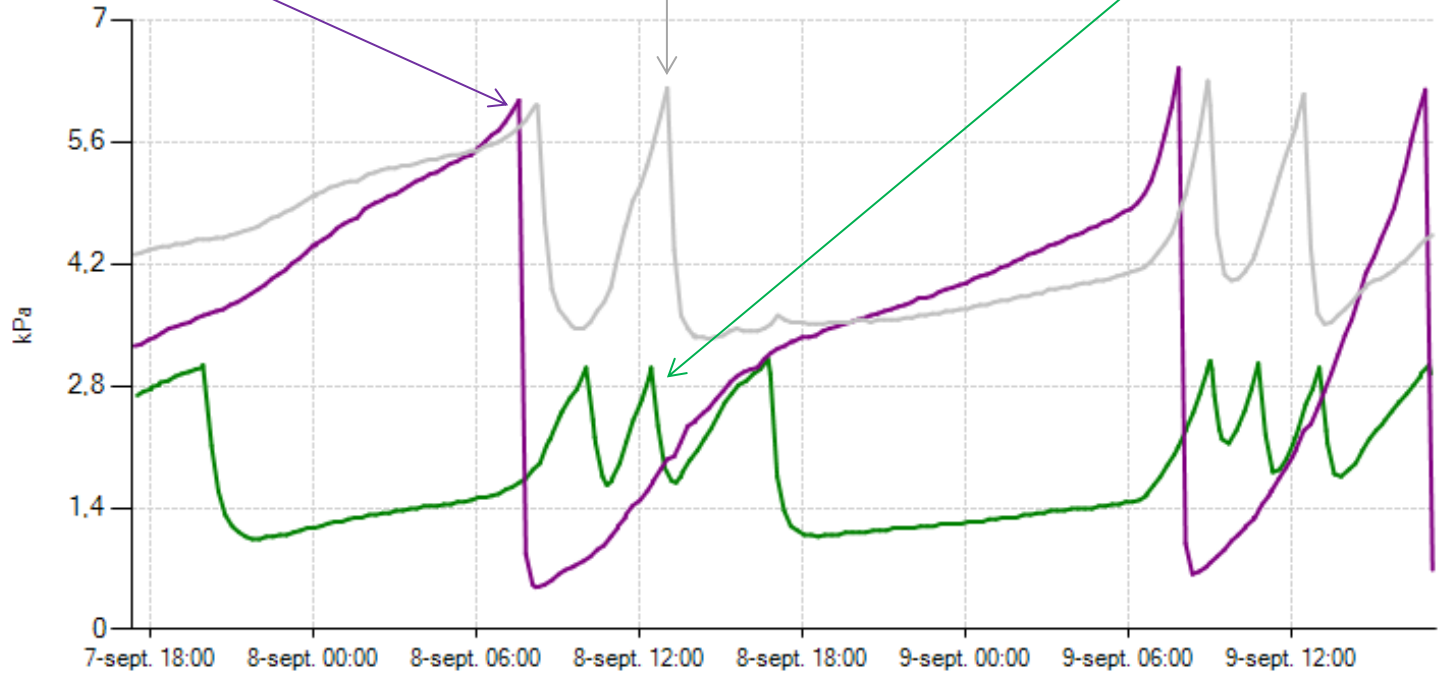
Low fluctuation



Once per day:6
minutes

Twice per day:2,5
minutes

Three times per day:1
minutes



UlaVal nursery



Spirea



Astilbe



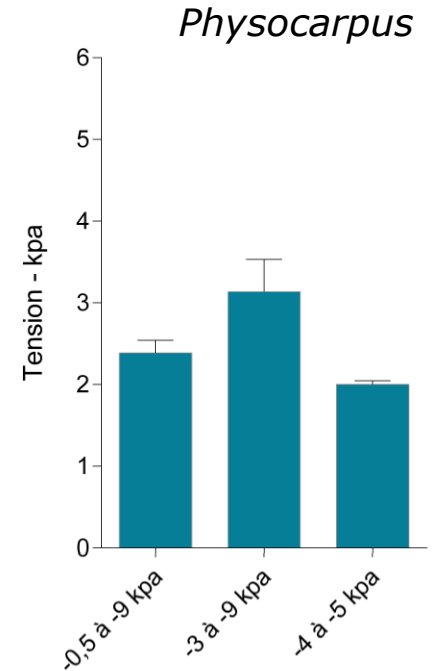
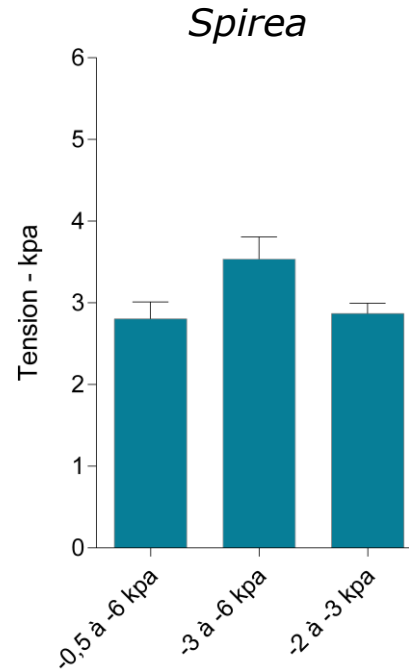
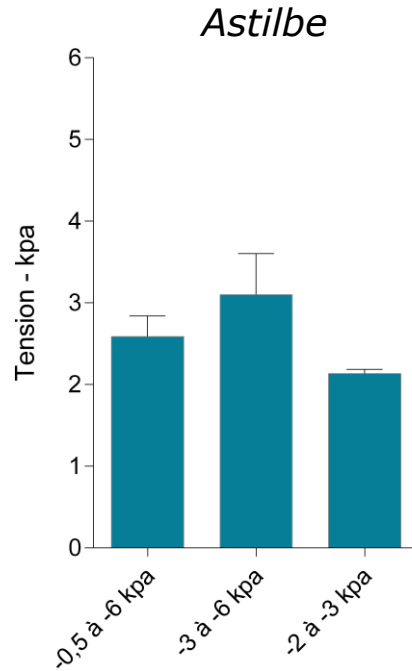
Physocarpus



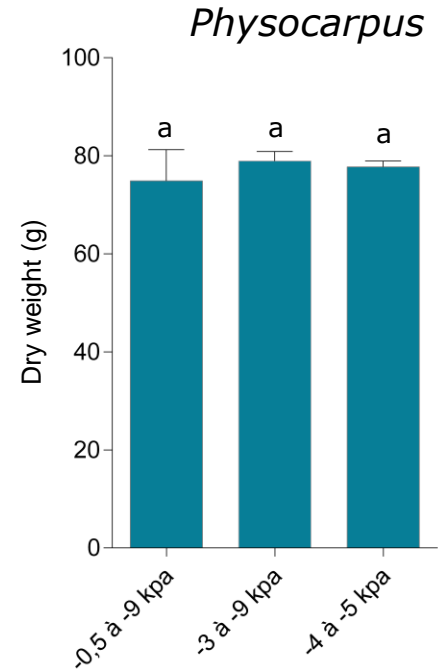
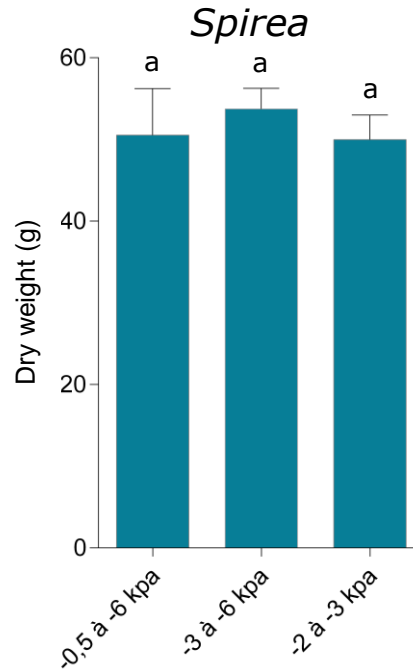
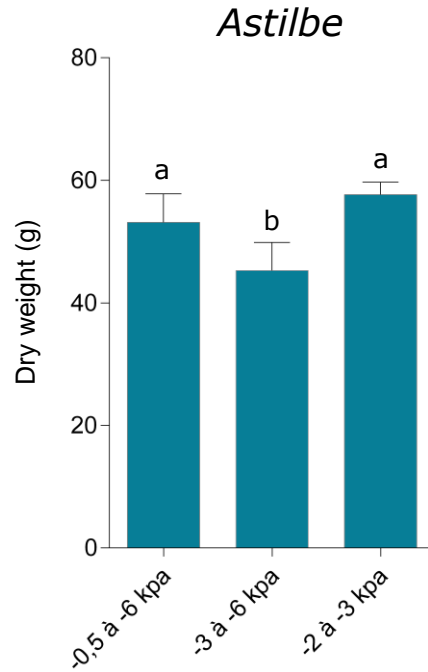
Ulaval nursery



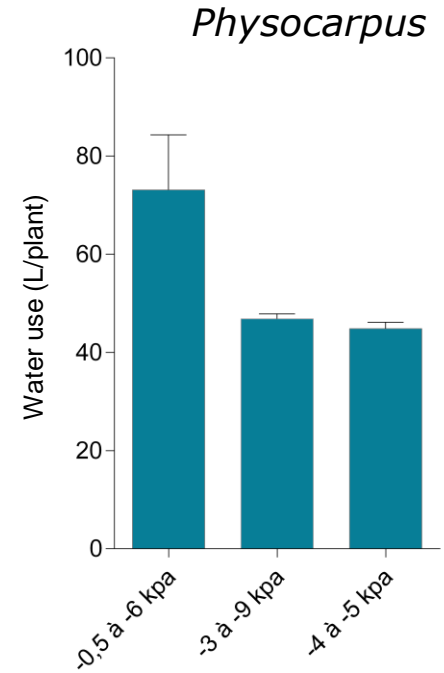
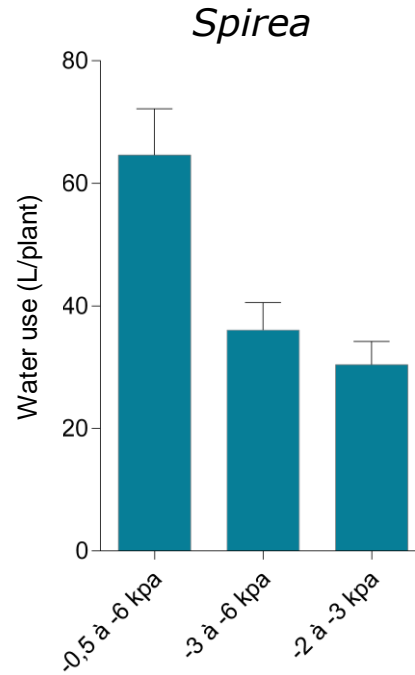
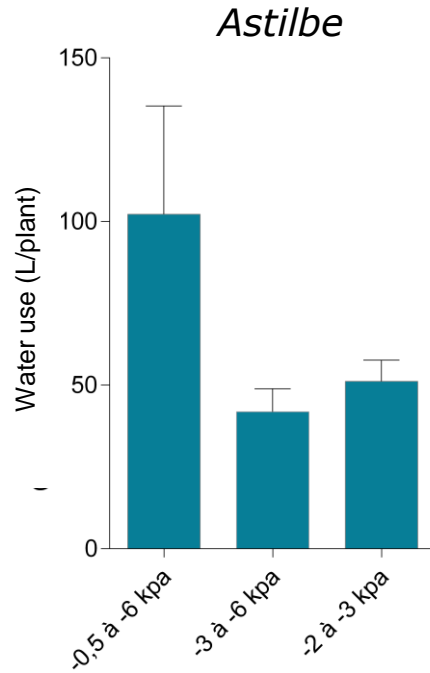
Median tension



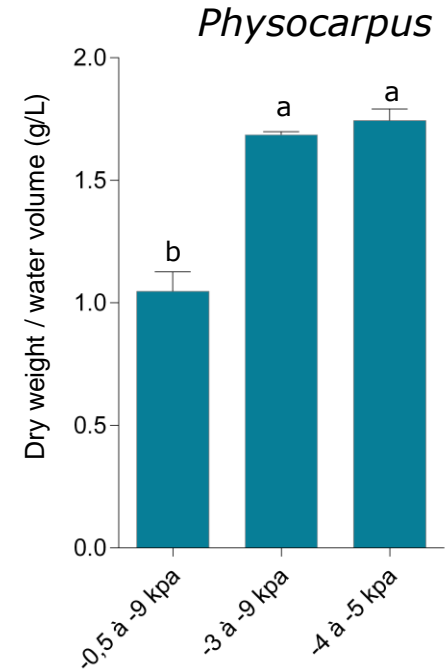
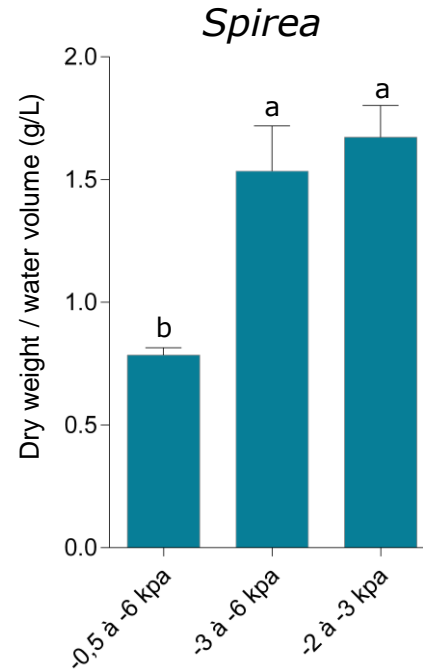
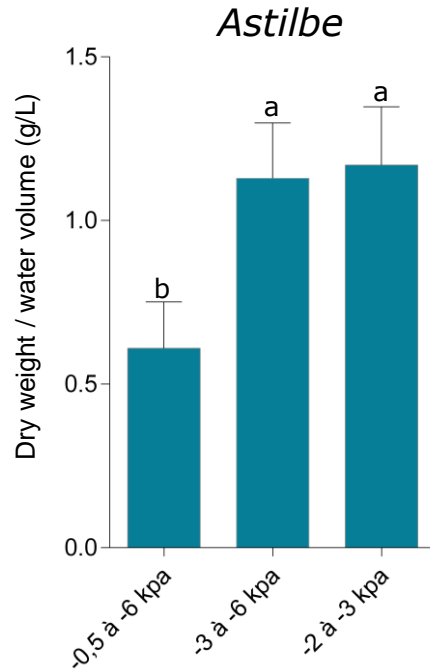
Growth



Water use



Growth per volume of water



Takeaways

- Changing irrigation amplitude:
 - Little effect on growth
 - Allows a decrease in water use
 - Optimisation of growth per volume of water

Takeaways

- Low fluctuation is better
- Why?
 - No leaching
 - Change in evapotranspiration?
 - Soil surface
 - Plant transpiration

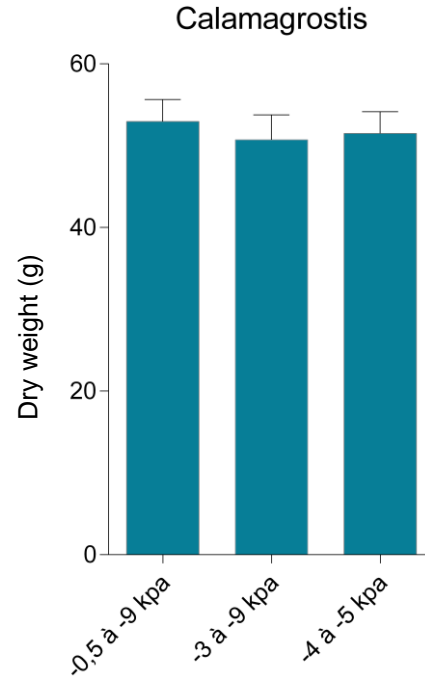
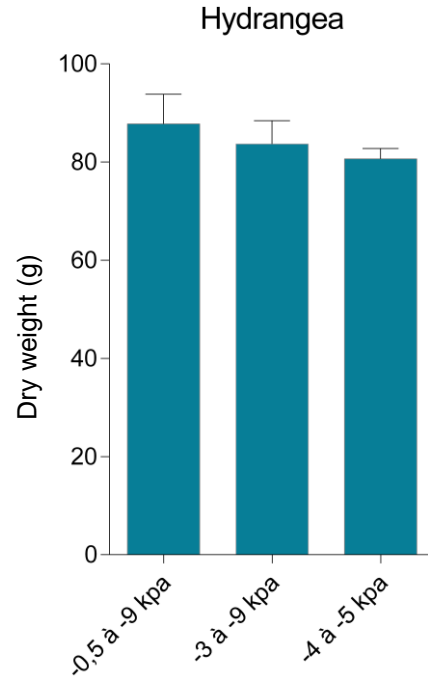
Transferability in other systems

- Is it possible with sprinklers?
- Assay with a clustering of two species
 - *Calamagrostis*
 - *Hydrangea*

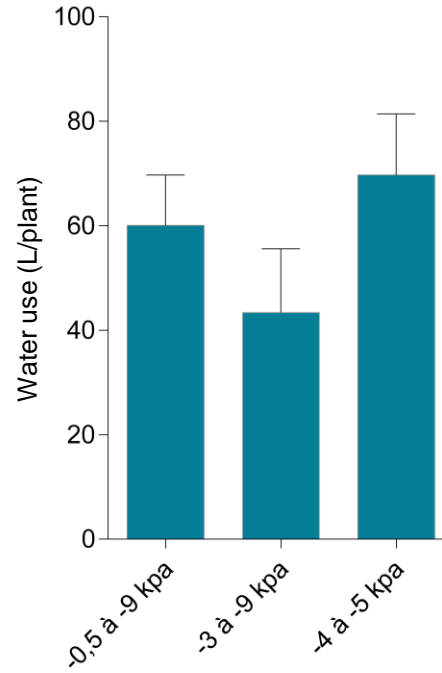
Sprinklers

- Uniformity problem with our new sprinklers...
 - Damages on some plants
 - More variability

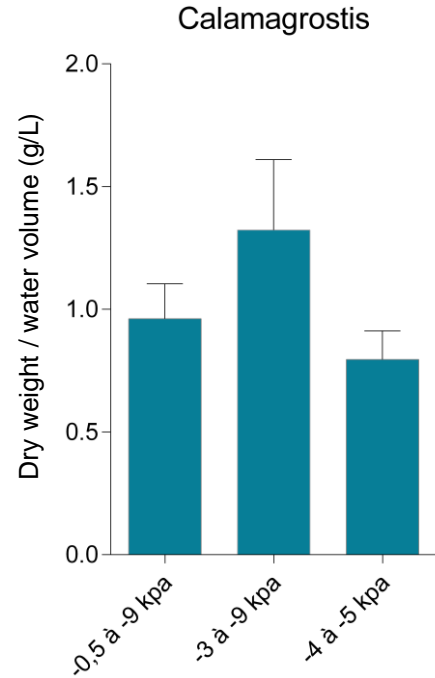
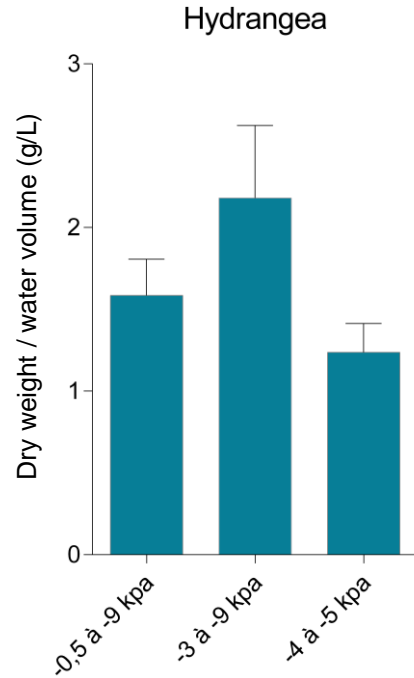
Growth



Water use



Growth per volume



Sprinklers

- Less impressive results
 - Why?
 - Only part of the water reaches the pots
 - Harder to maintain low amplitude
 - Wind drift, evaporation, etc.

Takeways

- Drip irrigation
 - Low amplitude allows reduction of water use
- Sprinklers
 - Less applicable

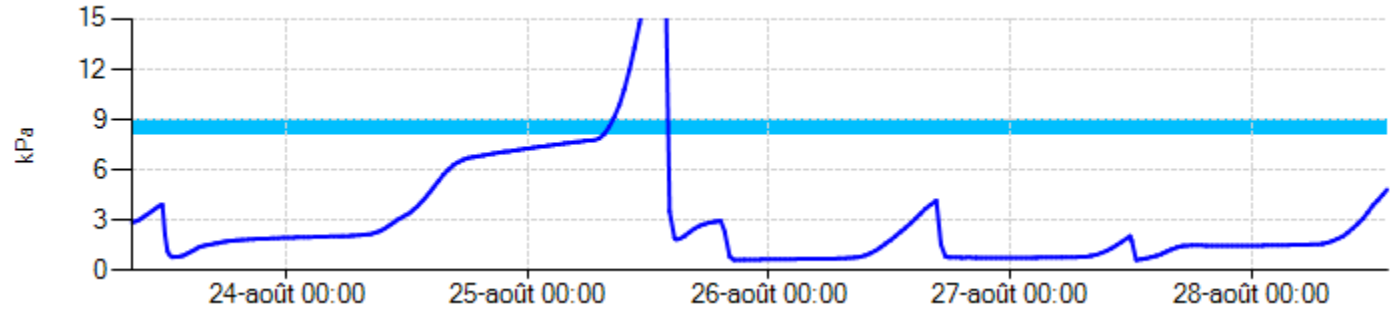
Comparison



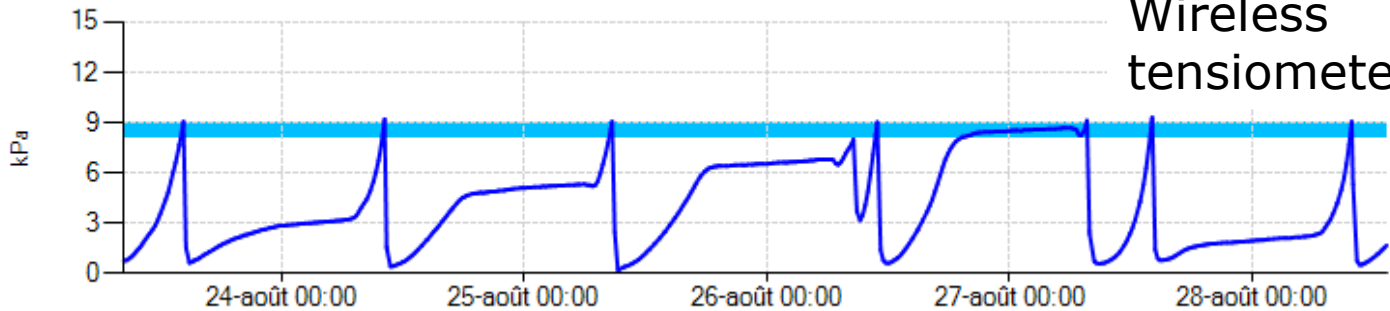
Nursery bed

Comparison

Nursery bed

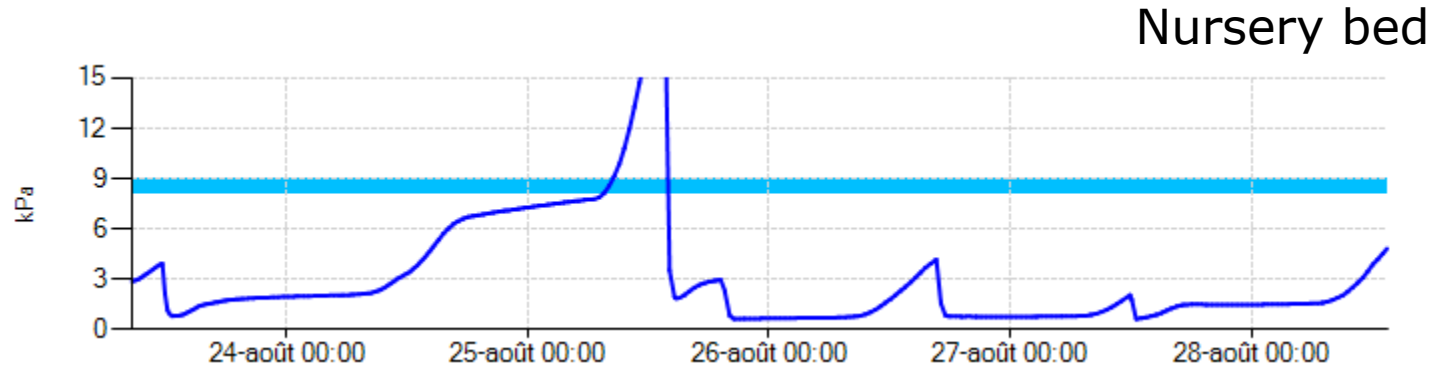


Wireless
tensiometers

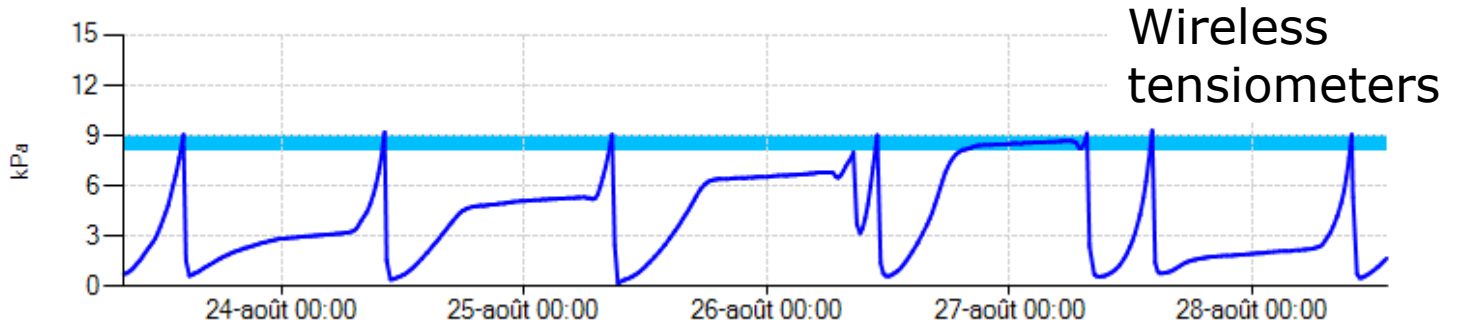


Comparison

-5 irrigation
-Wetter



-8 irrigation
-Dryer



What's to come

- Clustering experiments
 - Best association for irrigation
 - 50 new species



What's to come

- Automation of irrigation
 - Evapotranspiration, weather data, tensiometers, etc.



Thanks to all our partners



HORTAU



