ASSESSING TREE WATER STATUS FOR IRRIGATION SCHEDULING: VARIOUS METHODS AND TOOLS

Advances in citrus water use workshop and field day

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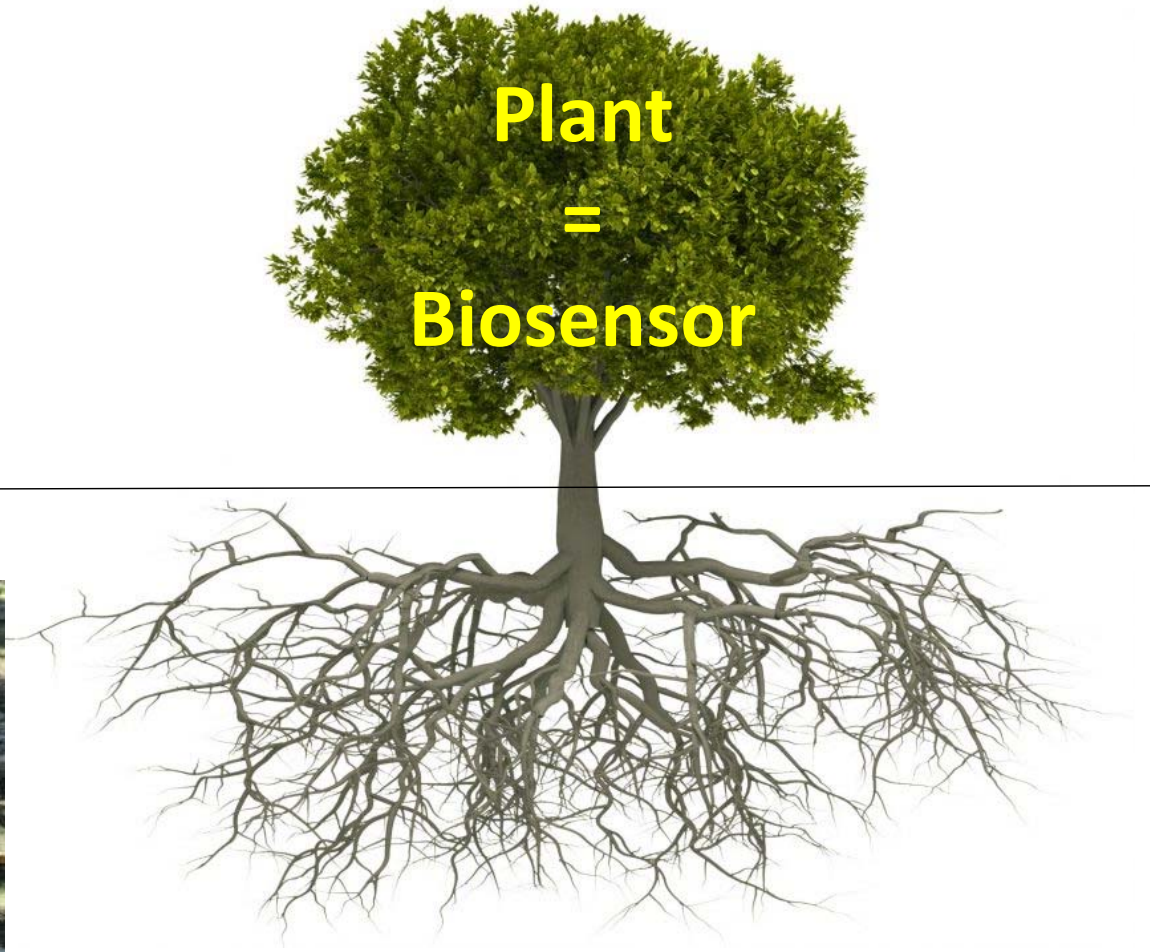
PLANT BASED IRRIGATION MANAGEMENT

- **Why asking to the plants**
- How to ask to plants
- Interpreting plant response

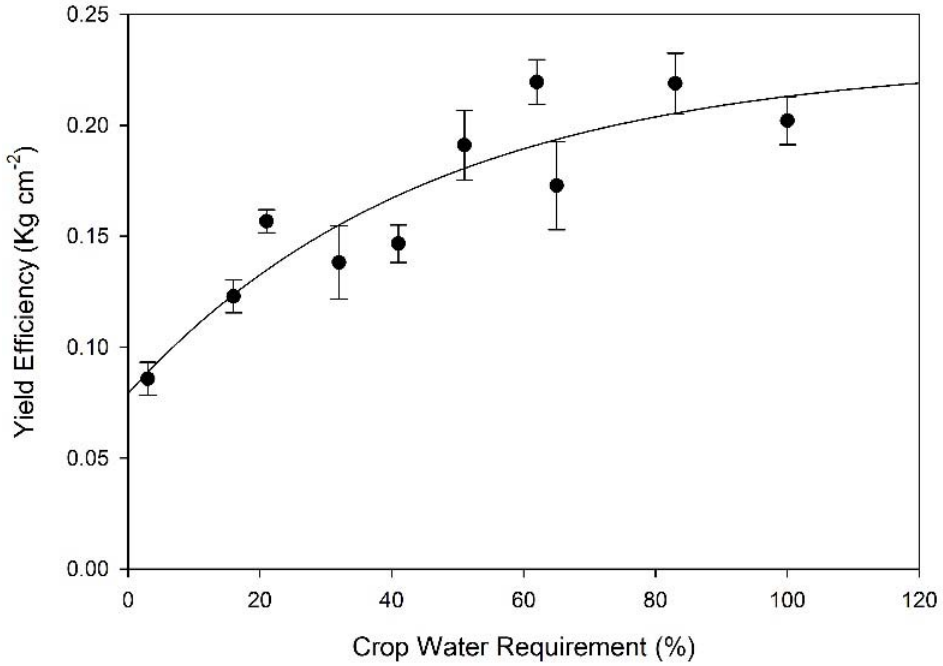
PLANT BASED IRRIGATION MANAGEMENT

Integrates soil and atmosphere



Precise

INCREASE WATER PRODUCTIVITY



Water applied

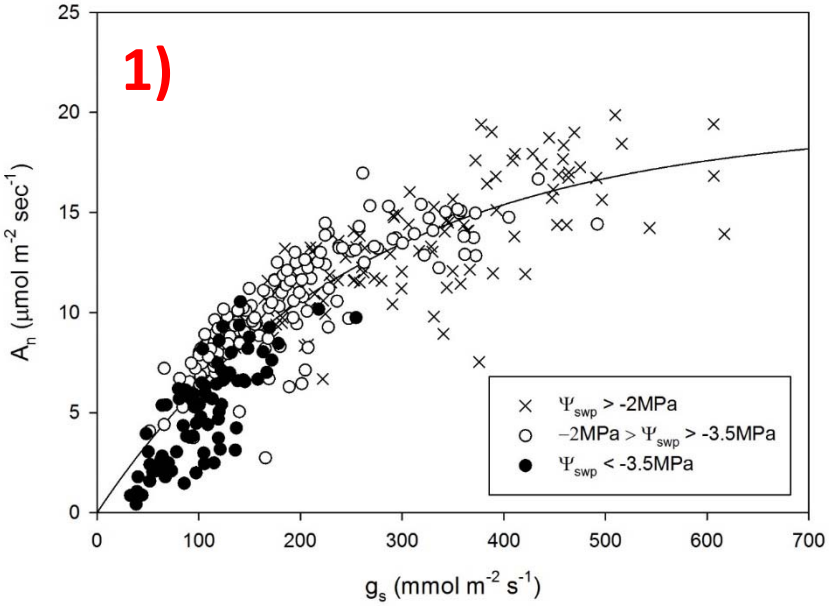
Runoff, leaching
Evaporation

Transpiration

Avoid to give water that do not increase yield

INCREASE WATER PRODUCTIVITY

1)



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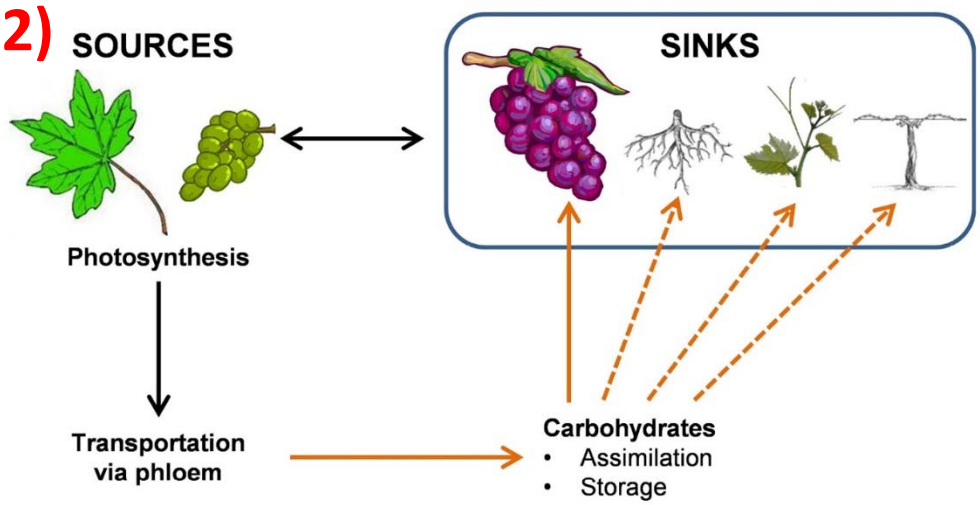


3)

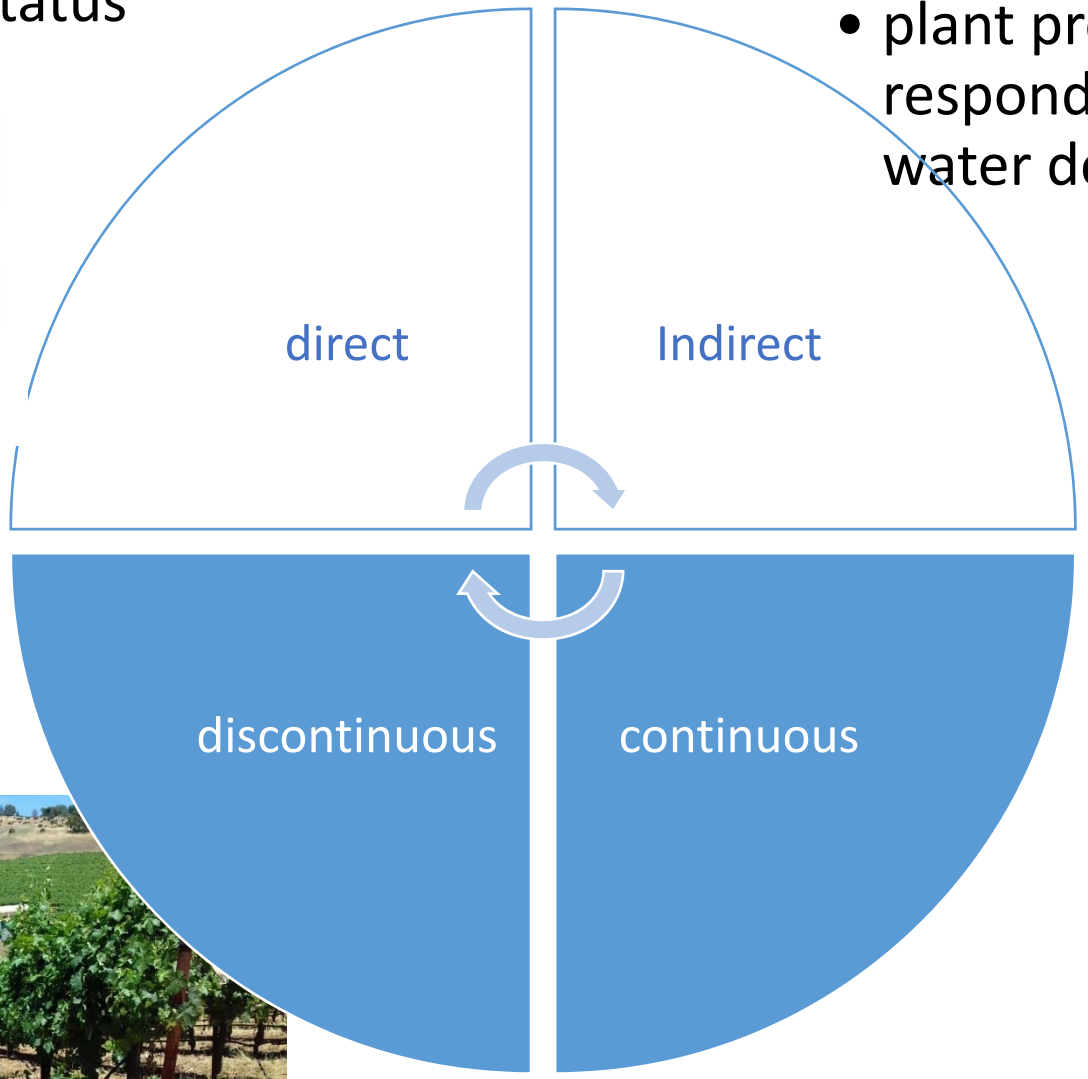
PLANT BASED IRRIGATION MANAGEMENT

- Why asking to the plants
- **How to ask to a plant**
- Interpreting plant response

SENSORS, INDICATORS AND SERVICES

- Plant water status

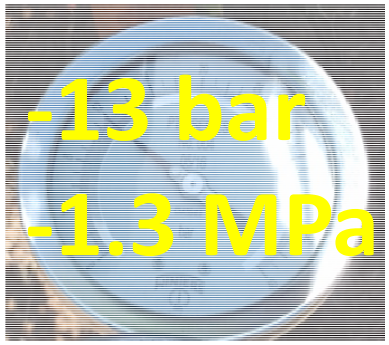
- plant processes that respond sensitively to water deficits



PLANT WATER POTENTIAL:THEORY

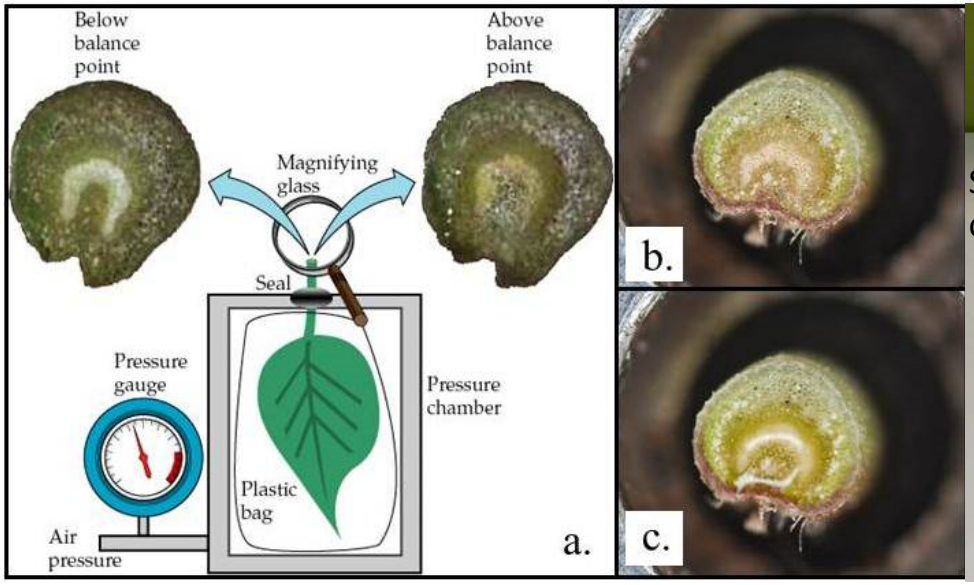
- Most widely accepted indicator for plant water status
- Threshold values are available for several species
- It is simple to perform and to interpret

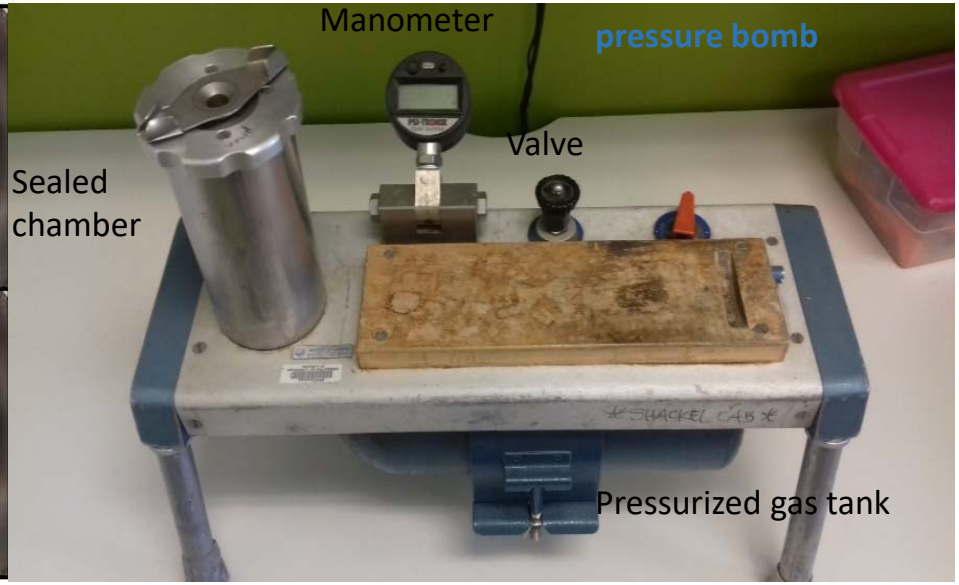
- Discontinuous and time consuming



Pressure is equal and opposite to the water potential of the sample

Water of sample is forced out of the xylem





< water in the plant = > energy needed to force it outside = > the pressure in the chamber

PLANT WATER STATUS:METHODOLOGY

1) **Leaf selection**

- Shaded mature leaf
- Internal main branch
- Mature and healthy
- Representative

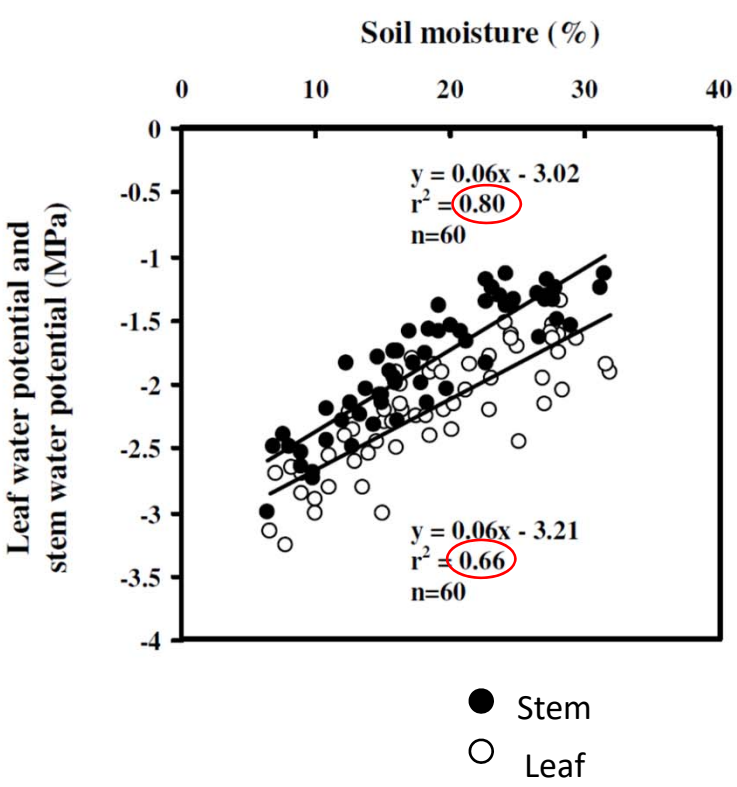
2) **Bagging=** Leaf in equilibrium with the branch beneath

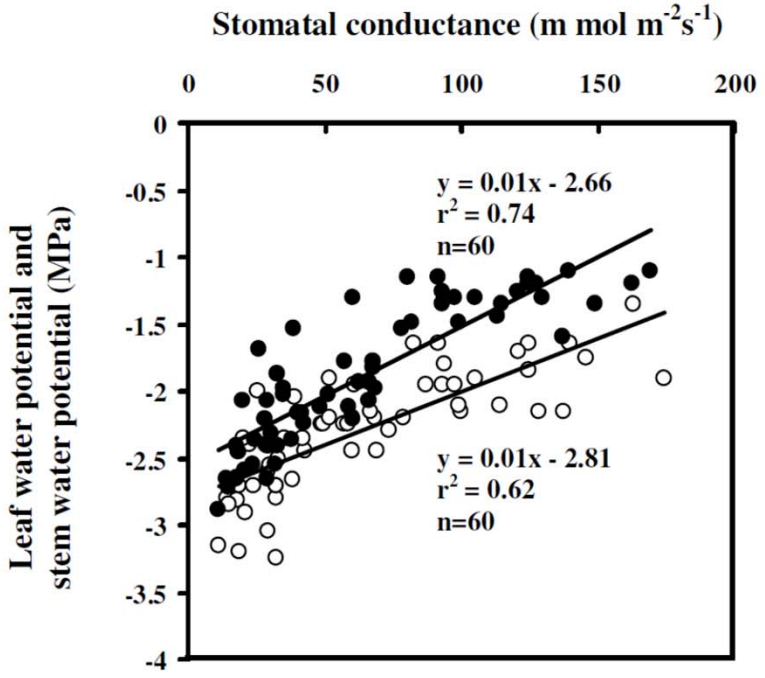
3) ……**Waiting** at least 15 min……

4) **Cutting** neat cut with a sharp razor blade

5) **Measuring**

PLANT WATER POTENTIAL: LEAF OR STEM?





Sdoodee and Somjun 2008

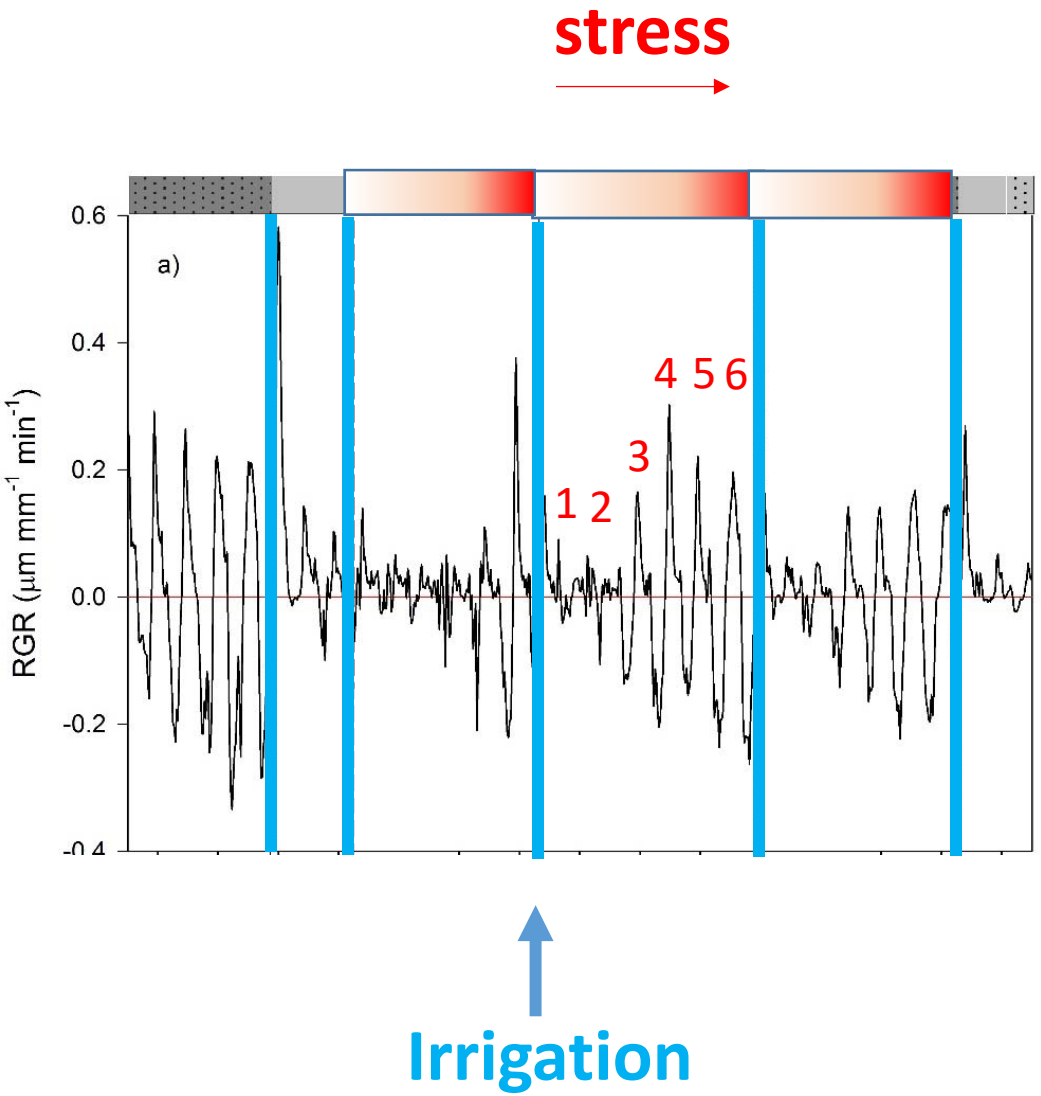
Leaf water potential depends more on local micro environmental condition hence is more variable

INDIRECT AND CONTINUOUS MONITORING

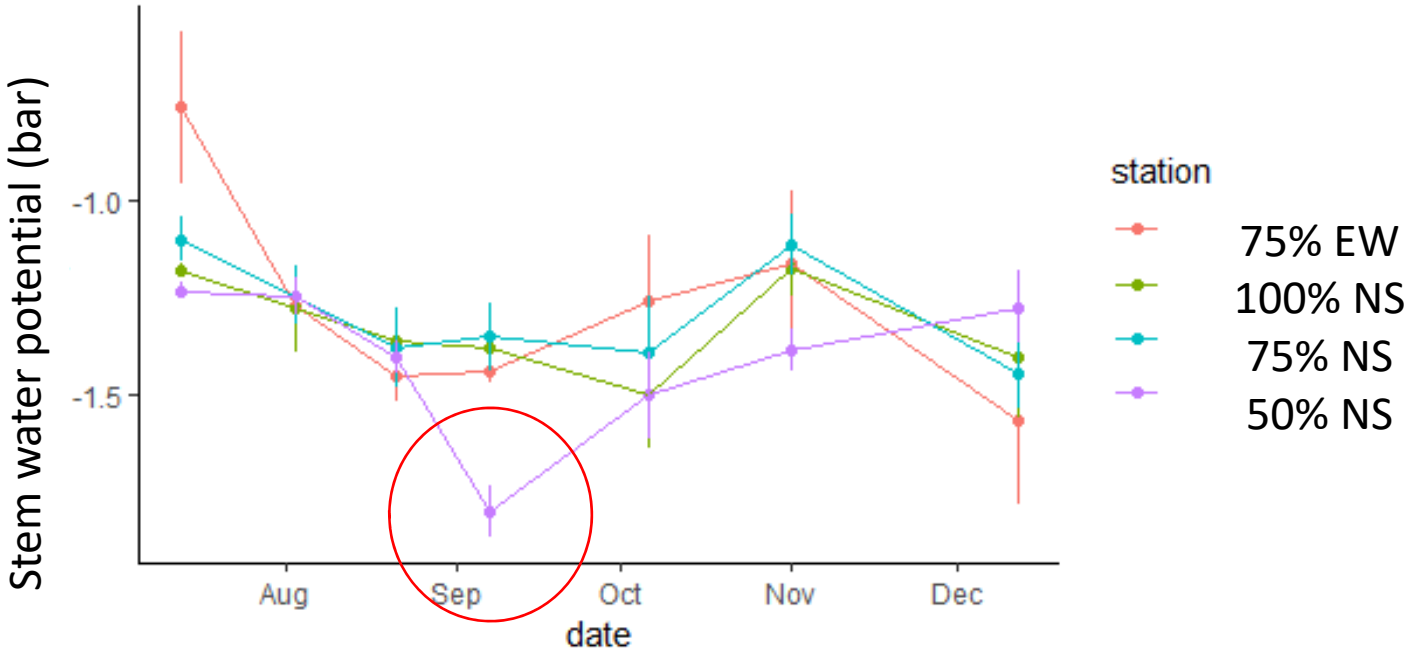
Measures physiological processes affected by plant water status

GROWTH ANT TISSUE SHRINKAGE

FRUITS SHRINKAGE INCREASE WITH STRESS



BOTH INDICATORS SHOW STRESS



		Trunk Growth	Fruits Growth	Stress Days
		micron	mm	Yel/Orn/Red
	Blk	7/13-3/12	7/13-10/4	7/13-11/13
	4 NS Full	1295	23.86	2
	7 EW Full	1598	22.42	1
100% ET	**5 N Lite**	938	20.01	2
50% ET	**5 S Lite**	488	21.12	16

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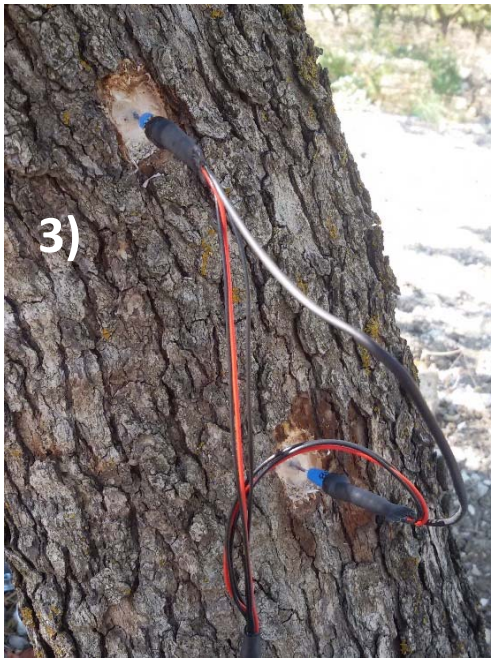
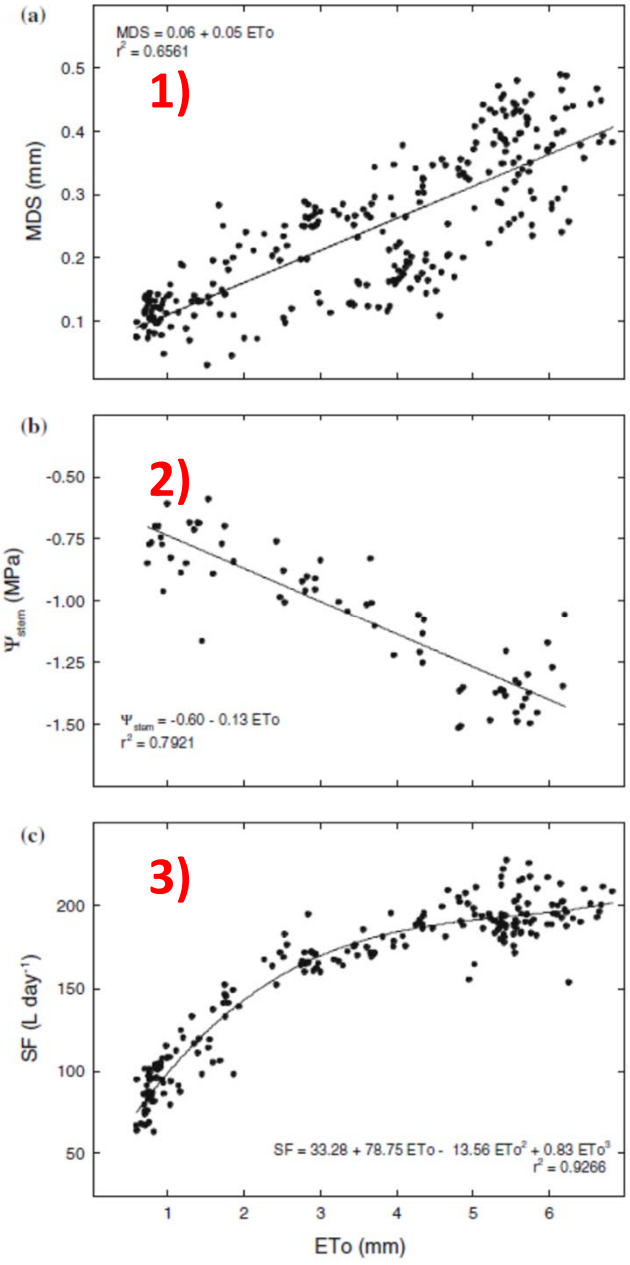
BASELINE EQUATIONS



Under no-stress condition environment is the main driver of water use

Adjust your threshold on environmental parameters

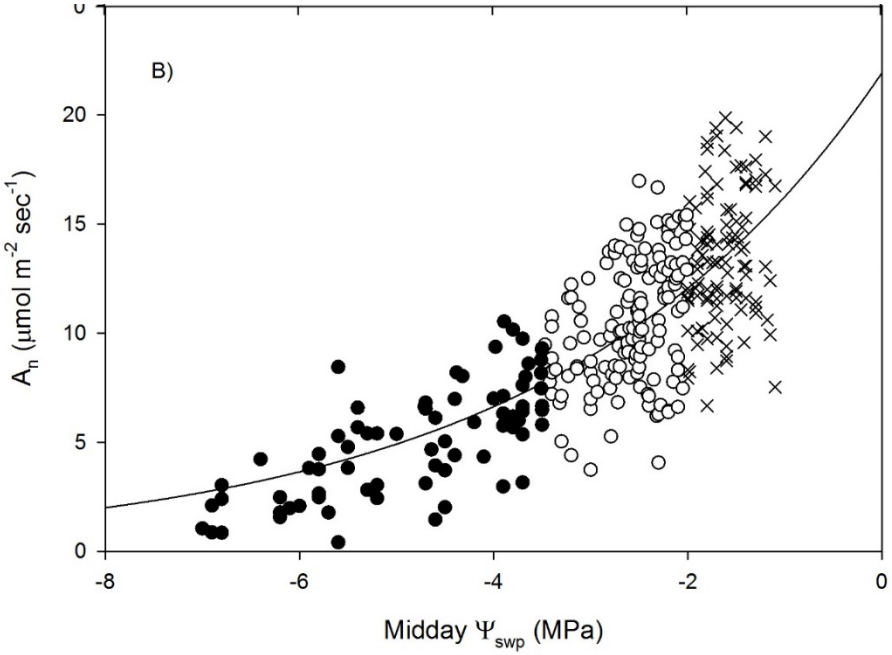


STRESS THRESHOLD

well-irrigated citrus	Ψ_X ~ −0.8 MPa
moderate stress	Ψ_X ~ −1.0 MPa
medium stress	Ψ_X ~ −1.2 MPa
severe stress	Ψ_X ~ −1.4 MPa

(García-Tejero, 2010)

Associated to a variable of economic importance



The best stress indicator

depends on orchard condition

AND YOUR SPECIFIC production target

THANKS