



HORTAU

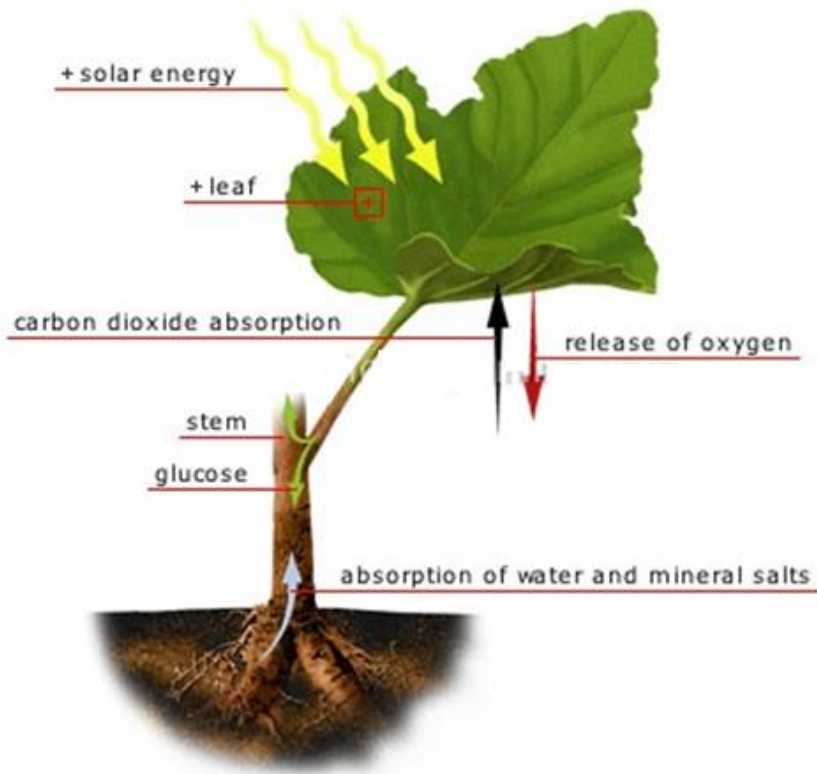
Simplified Irrigation

Irrolis™ - Intelligent Irrigation Management Solution

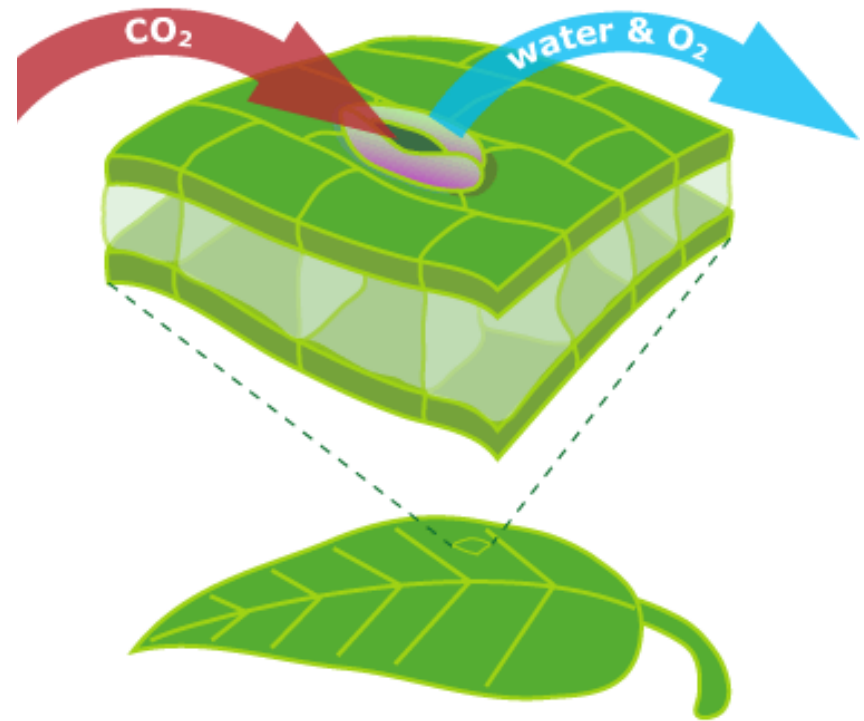
Why Do We Irrigate?

- Produce a crop
- Improve yield
- Improve quality
- Avoid disease and pest pressures
- Avoid plant stress

Plant Water Demand

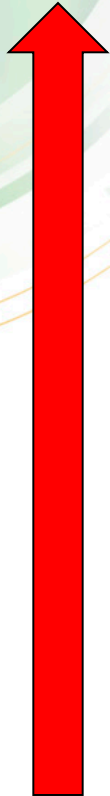


Carbon dioxide enters, while water and oxygen exit, through a leaf's stomata.

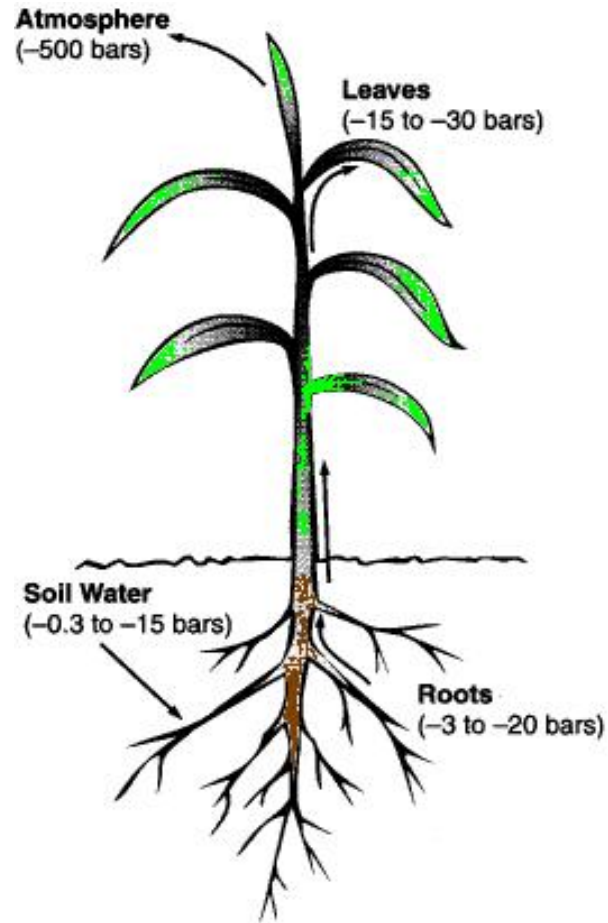


Plant Water Demand

High tension



Low tension





What Is Soil Tension?

Soil tension is defined as the suction exerted by soil particles on the water they hold.

To extract water from the soil, plants must exert suction on that water. As the soil dries, its tension increases, and it becomes harder for plants to extract water from the soil. The amount of energy a plant must spend to extract water from the soil is directly linked to soil tension.

What Is Soil Tension?



Gravitational Water - All capillary pores are full.



Capillary pore with adhesion and cohesion water.

Field Capacity - Capillary pores are full - macro pores have air.



Wilt Point - Water films are thin around soil particles.

Plant Stress

- Plants and trees can adjust their own water use based on soil tension
- The root system can command the leaves to stop the photosynthesis activity to preserve water.
- There is no visible evidences of this stress – it has to be very severe before it becomes visible
- In crop production, this mechanism is very costly as it translates into a succession of yield losses
- To maximize yields and profitability, tension must be managed within a narrow bandwidth



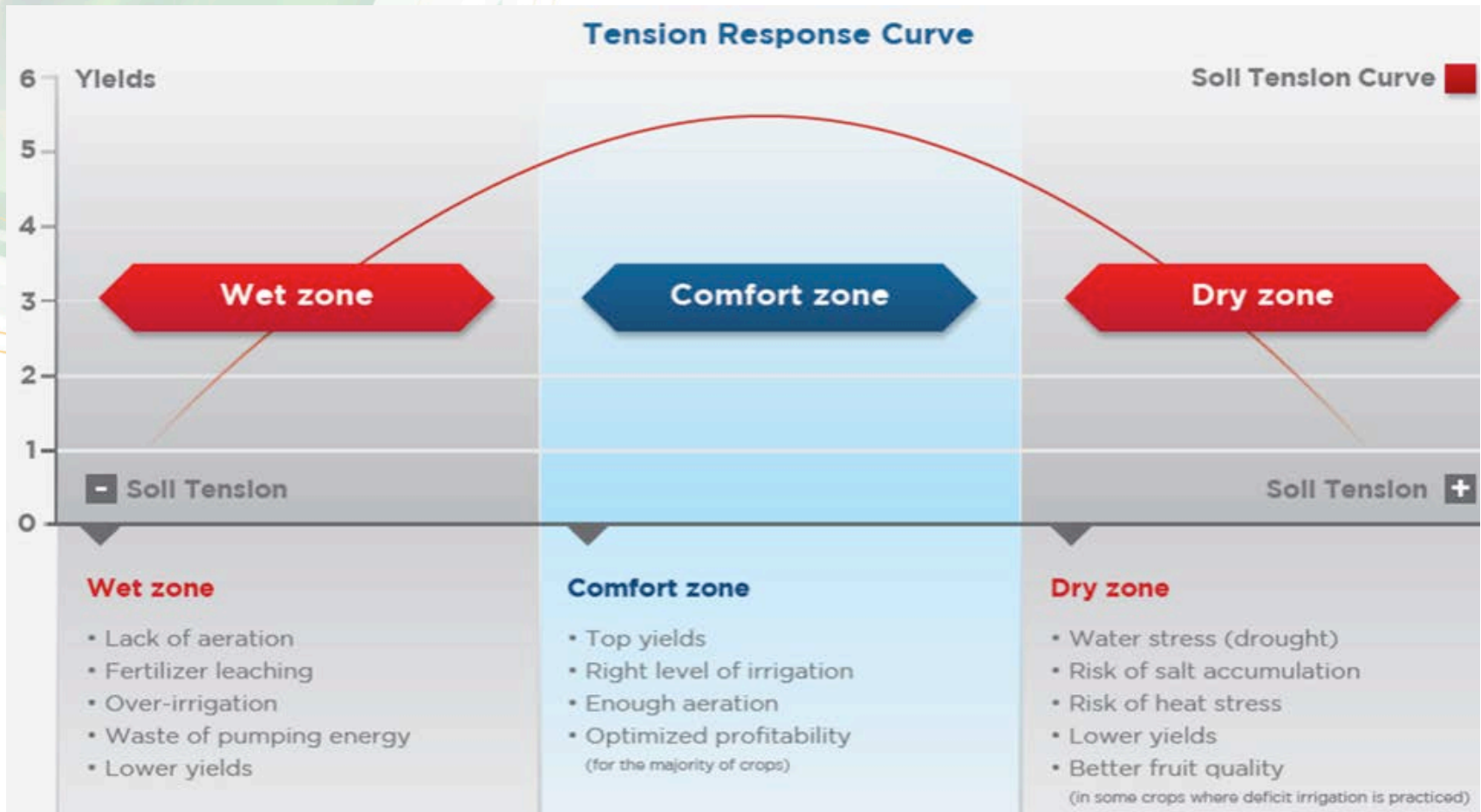
Benefits of Soil Tension for Irrigation Management

- Exact Measurement
- Directly linked to plant stress and/or plant needs
- Tensiometer (tool used to measure soil tension) acts like a mechanical root
- Proven technology dating back to the 1950's

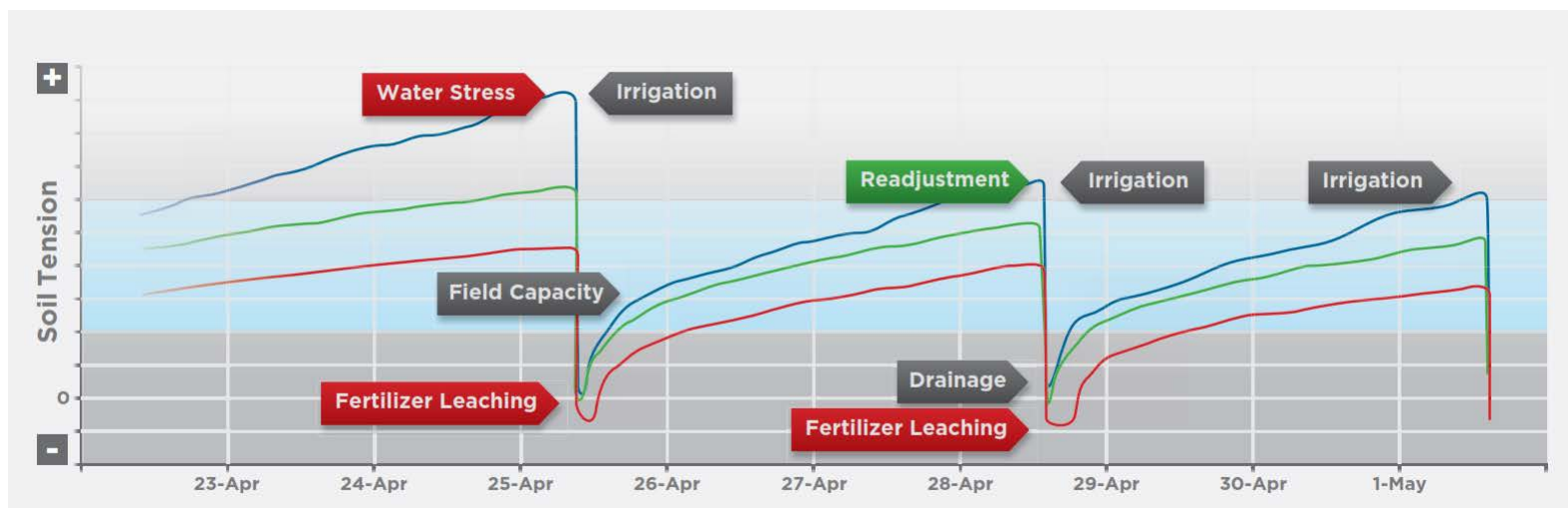
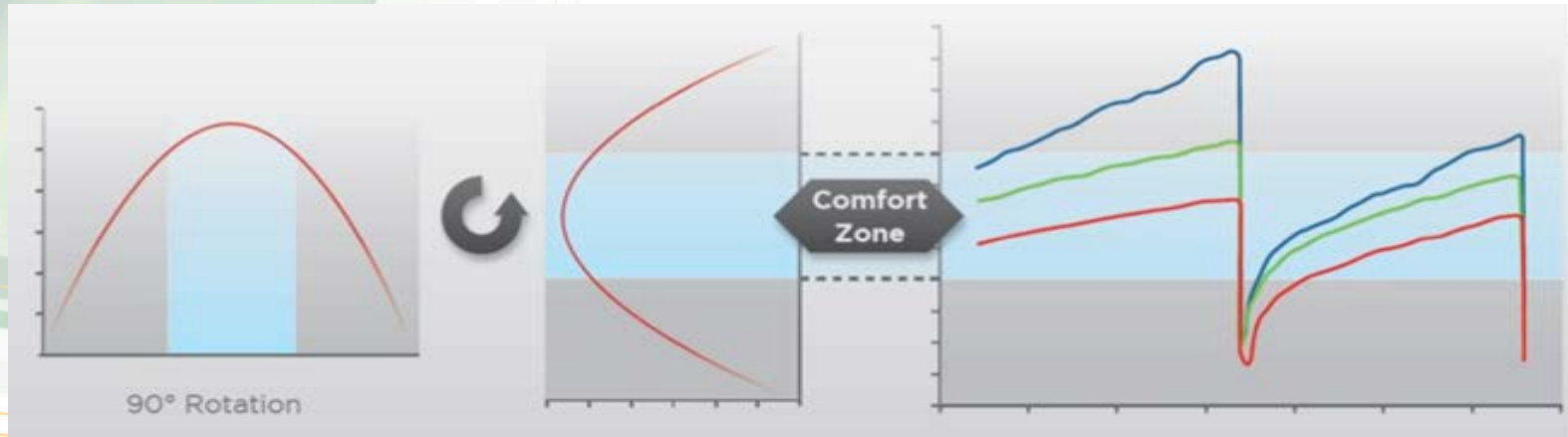
How our system works



How our system works



How our system works



How our system works

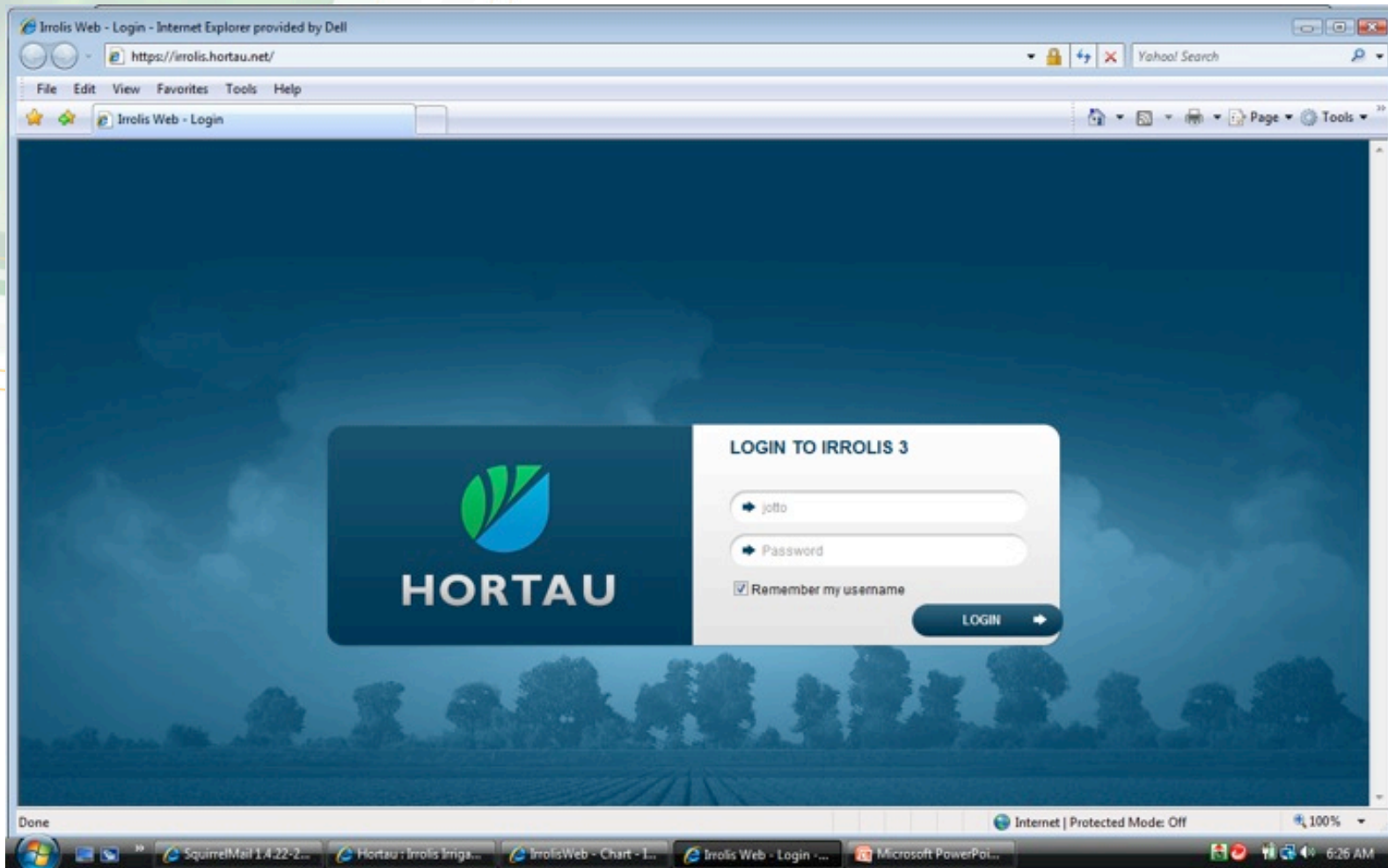


Irrolis™ Web Tx³



Data Sent to Internet

How our system works



Irrolis™ - Intelligent Irrigation Management Solution

How our system works



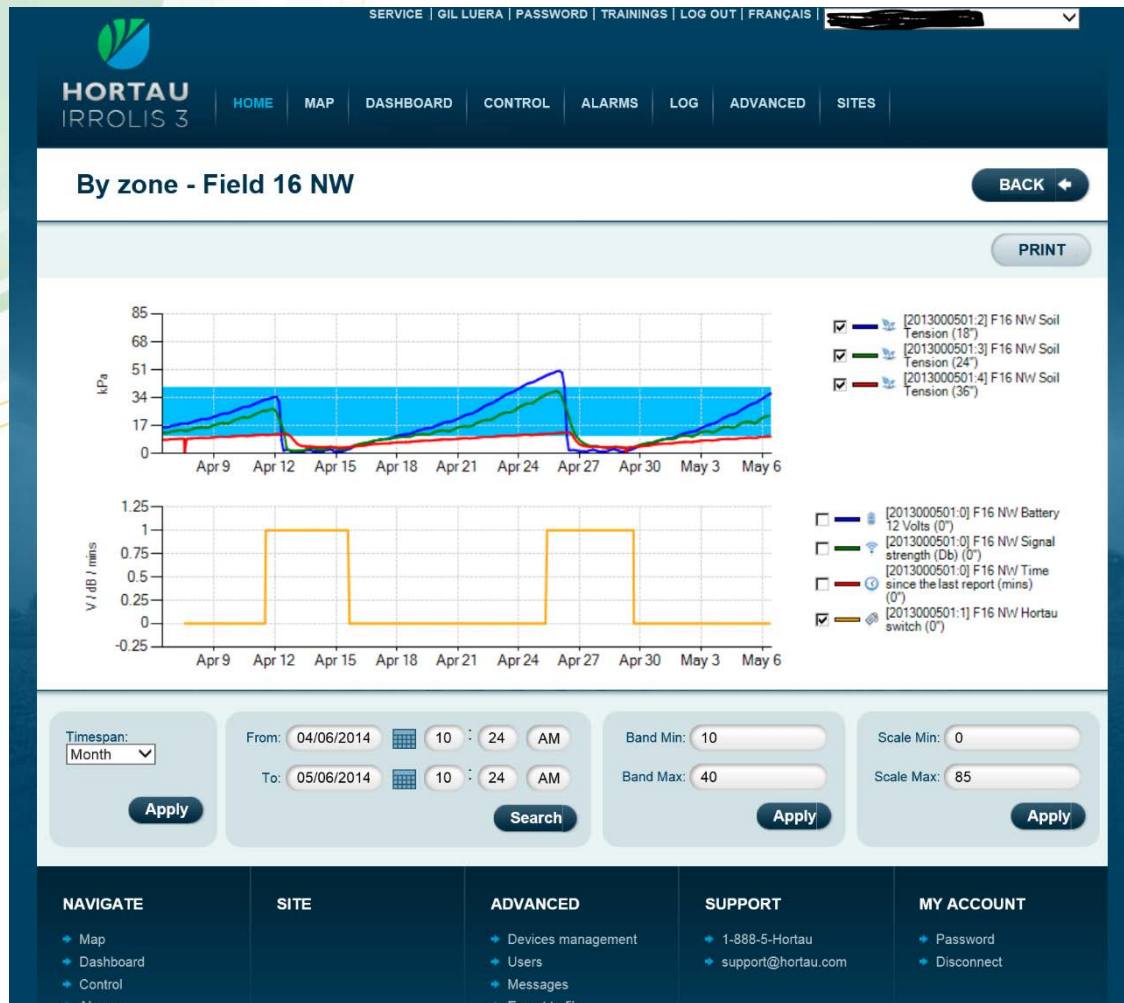
The screenshot shows the Irrolis3 web dashboard in Internet Explorer. The browser address bar displays "https://irrolis.hortau.net/FrmAccueil.aspx". The page header includes the HORTAU logo and the text "JEREMY OTTO | ROSEDALE | PASSWORD | DISCONNECT". A navigation menu contains links for HOME, MAP, DASHBOARD, CONTROL, ALARMS, LOG, ADVANCED, and SITE CONFIGURATION. The main content area is titled "ROSEDALE" and features three large buttons: MAP (with a globe icon), DASHBOARD (with a speedometer icon showing 25), and ALARMS (with a warning triangle icon). Below these are sections for "IRROLIS 3", "ALARM SEQUENCE" (with a note about delay between calls), and "SYSTEM STATUS" (listing three communication events). The footer contains links for NAVIGATE, SITE, ADVANCED, SUPPORT, and MY ACCOUNT. The Windows taskbar at the bottom shows the time as 6:29 AM.



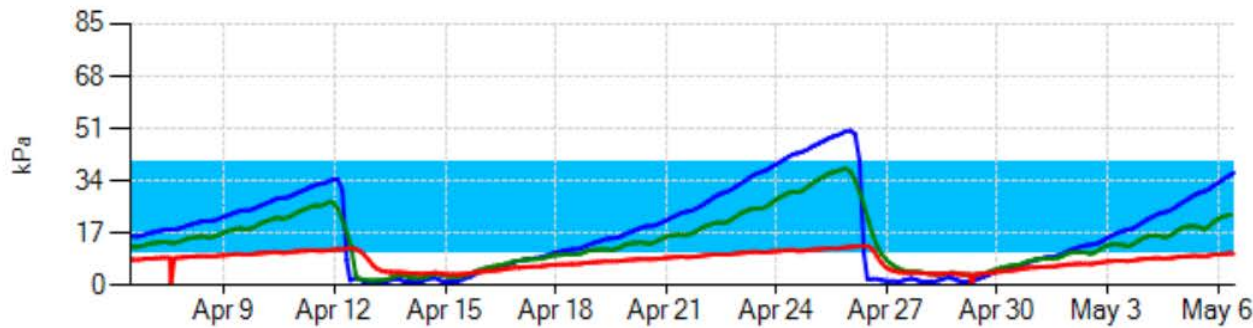
How our system works



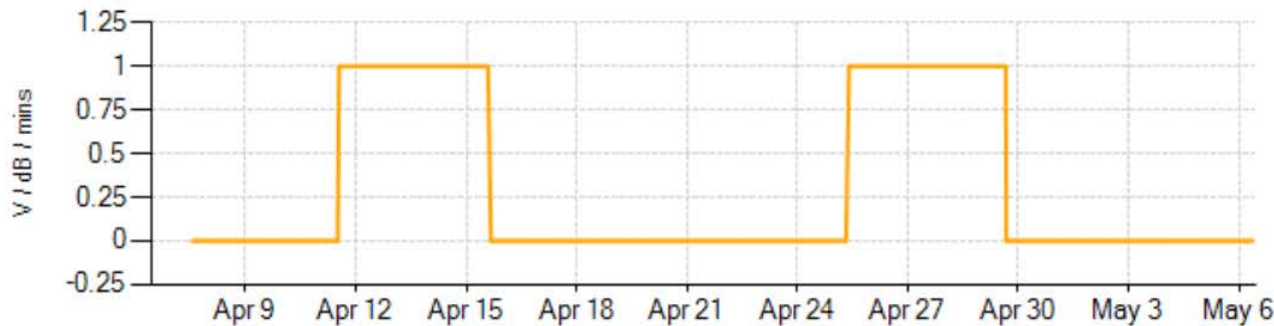
How our system works



How our system works



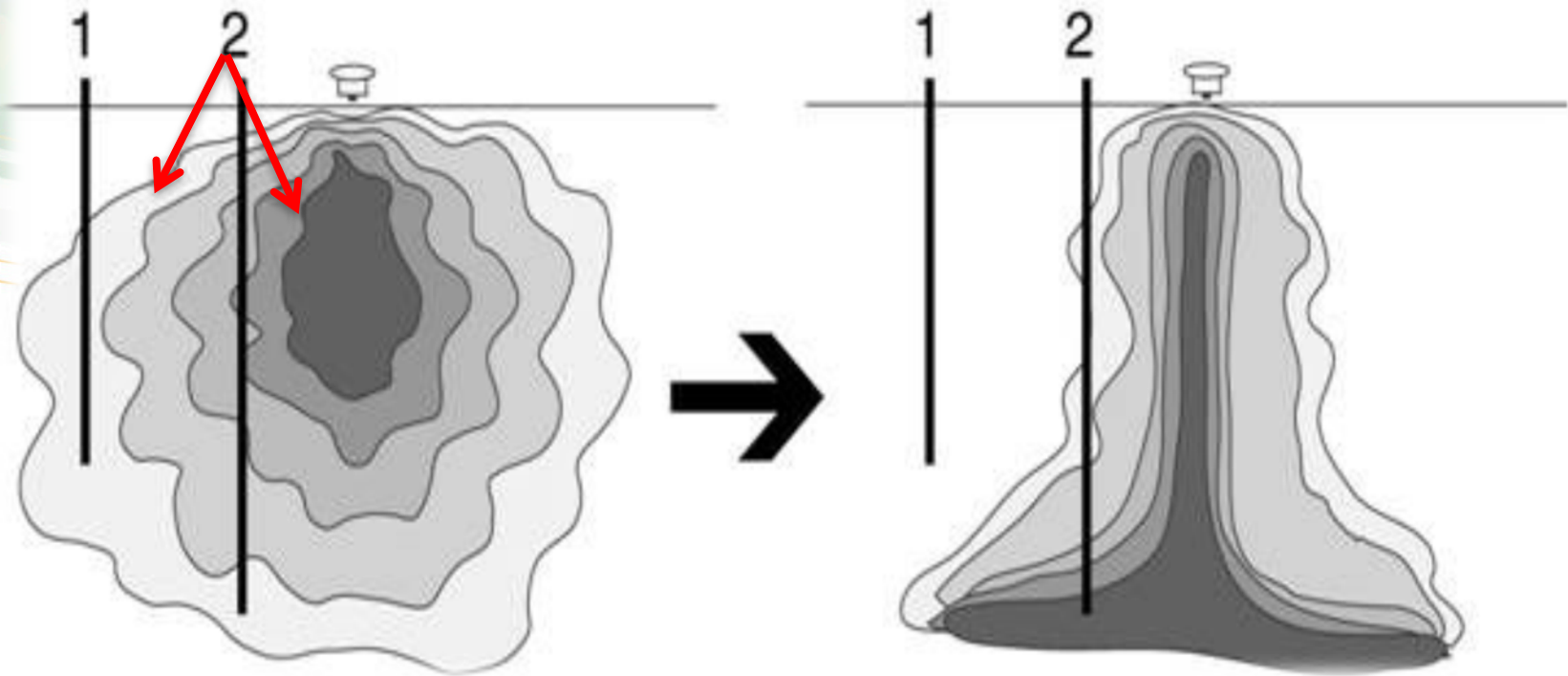
- [2013000501:2] F16 NW Soil Tension (18")
- [2013000501:3] F16 NW Soil Tension (24")
- [2013000501:4] F16 NW Soil Tension (36")



- [2013000501:0] F16 NW Battery 12 Volts (0")
- [2013000501:0] F16 NW Signal strength (Db) (0")
- [2013000501:0] F16 NW Time since the last report (mins) (0")
- [2013000501:1] F16 NW Hortau switch (0")

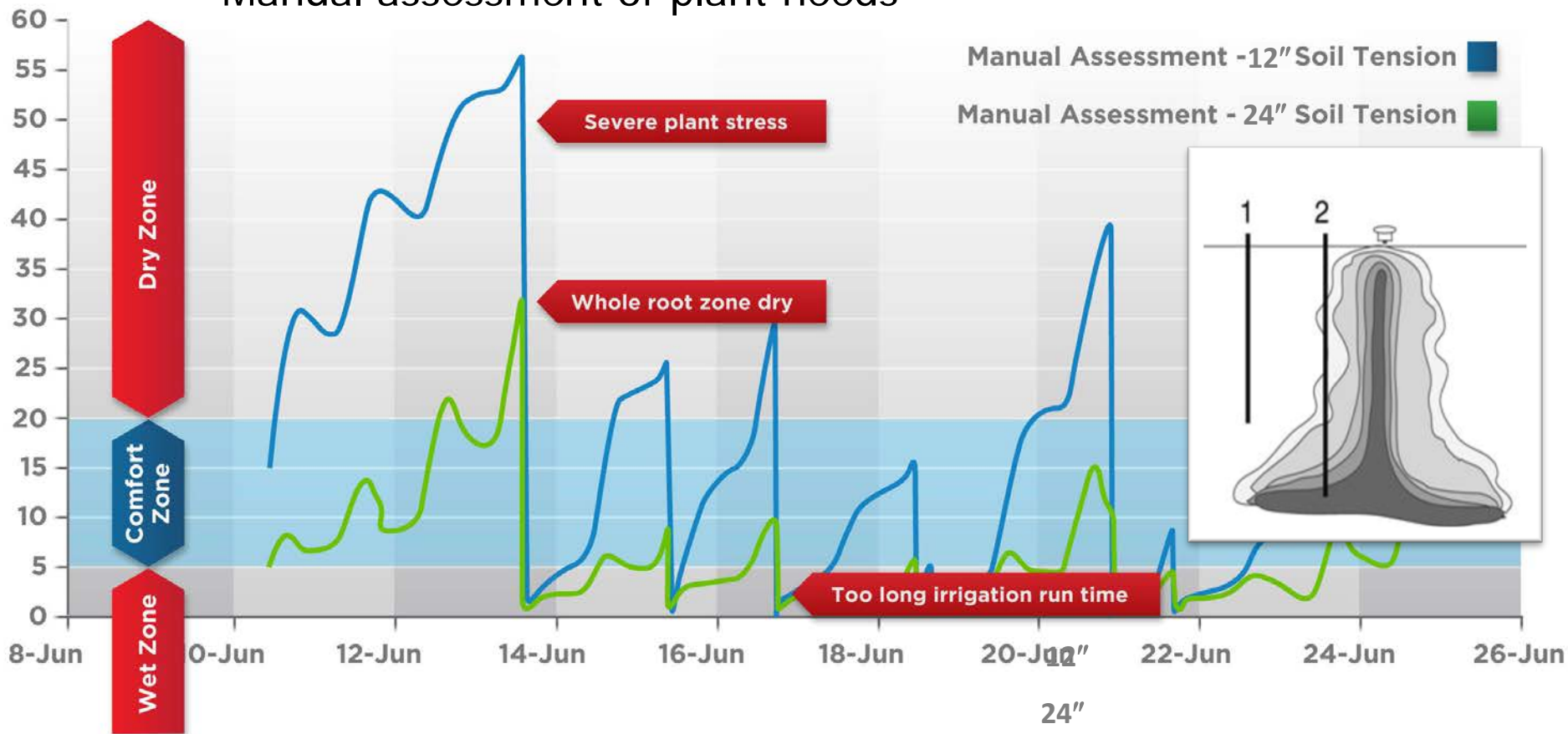
How Real Time Data is Used

Soil Tension Probes



Irrigation Management

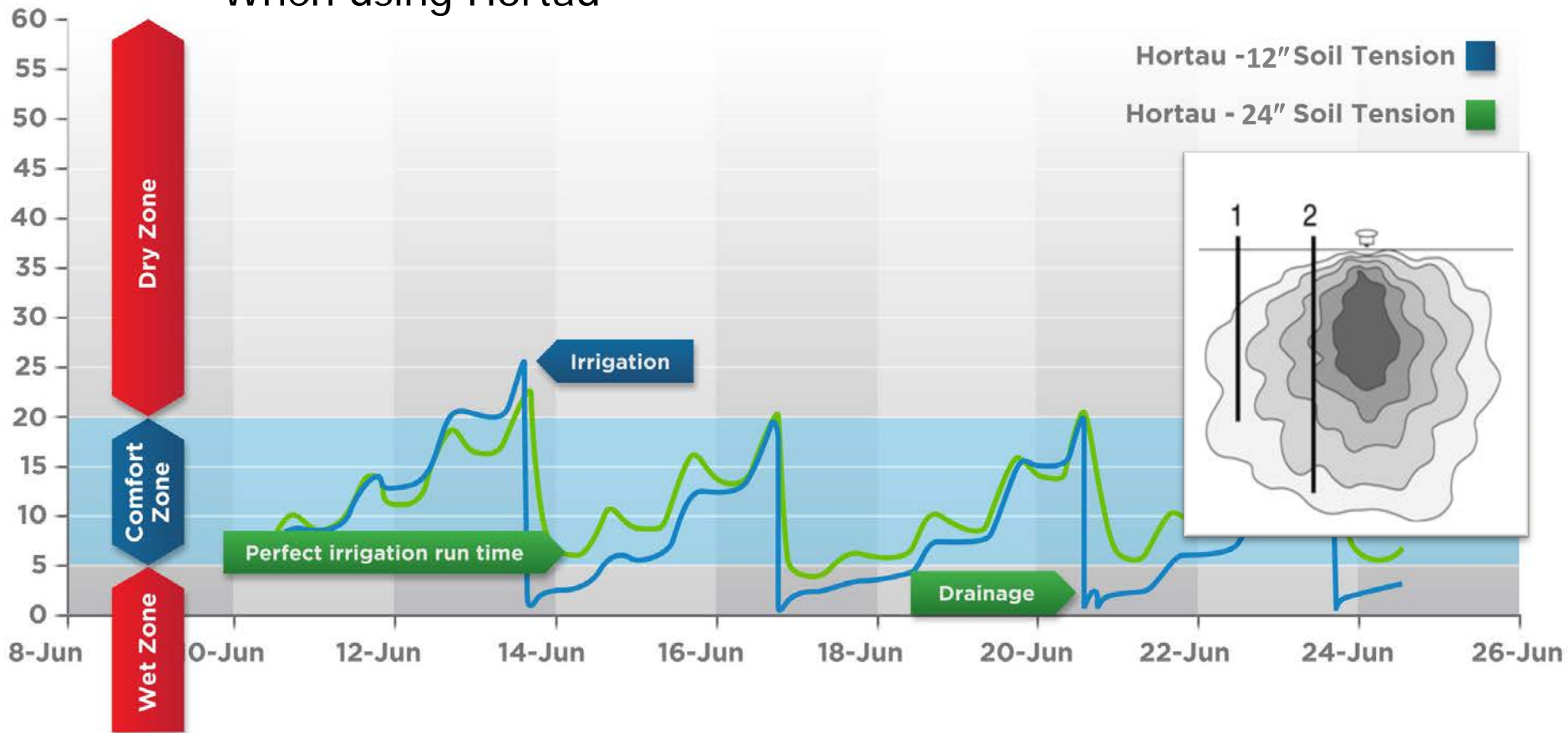
Manual assessment of plant needs



Irrigation Management



When using Hortau



Grapes



Strawberry



Raspberry



System Options





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Comparison



The diagram illustrates two scenarios of plant stress. On the left, a healthy, green plant is shown in sandy soil. A gauge above it shows a needle in the green zone, indicating low soil tension. On the right, a wilted, yellowish plant is shown in clay soil. A gauge above it shows a needle in the red zone, indicating high soil tension. Both scenarios have a water content of 20% and use an Irrolis irrigation device. A large arrow at the bottom points from left to right, containing the text 'Same water content, two different stress situations'.

Sandy Soil Scenario:

- Soil: Sandy Soil
- Water Content: 20%
- Soil Tension: 5 cbar
- Result: **Non-stressed Plant**

Clay Soil Scenario:

- Soil: Clay Soil
- Water Content: 20%
- Soil Tension: 60 cbar
- Result: **Stressed Plant**

Same water content, two different stress situations



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Benefits of Managing Soil Tension in Real Time

Increased Water Efficiency

Increased Fertilizer Efficiency

Better Crop Uniformity season to season

Maintain consistent crop quality

Lower Production Costs

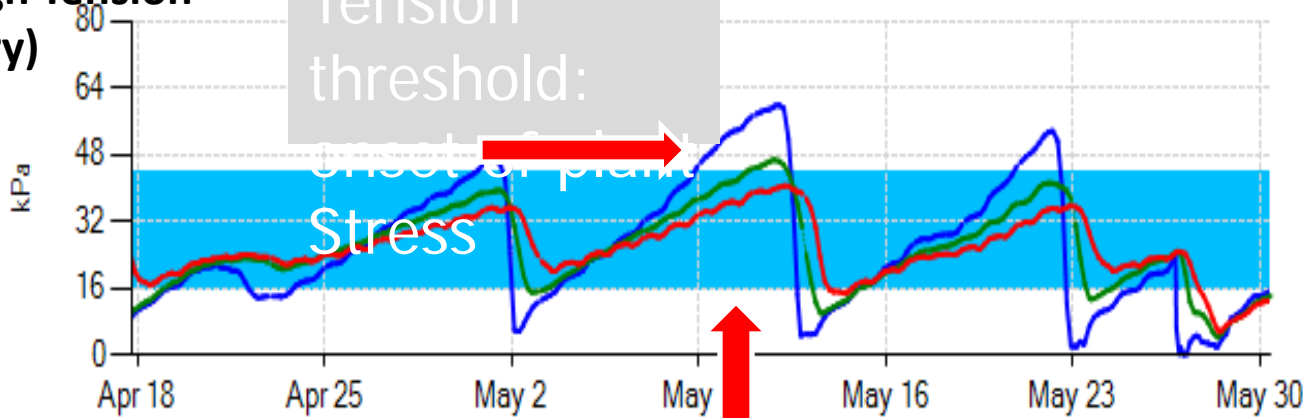


HORTAU

Research Goal:

Determine exact "blue zone" for maximum productivity in almonds

**High Tension
(Dry)**



- 2000003870:1:D7NW- 18" Soil Tension
- 2000003870:2:D7NW- 24" Soil Tension
- 2000003870:3:D7NW- 36" Soil Tension

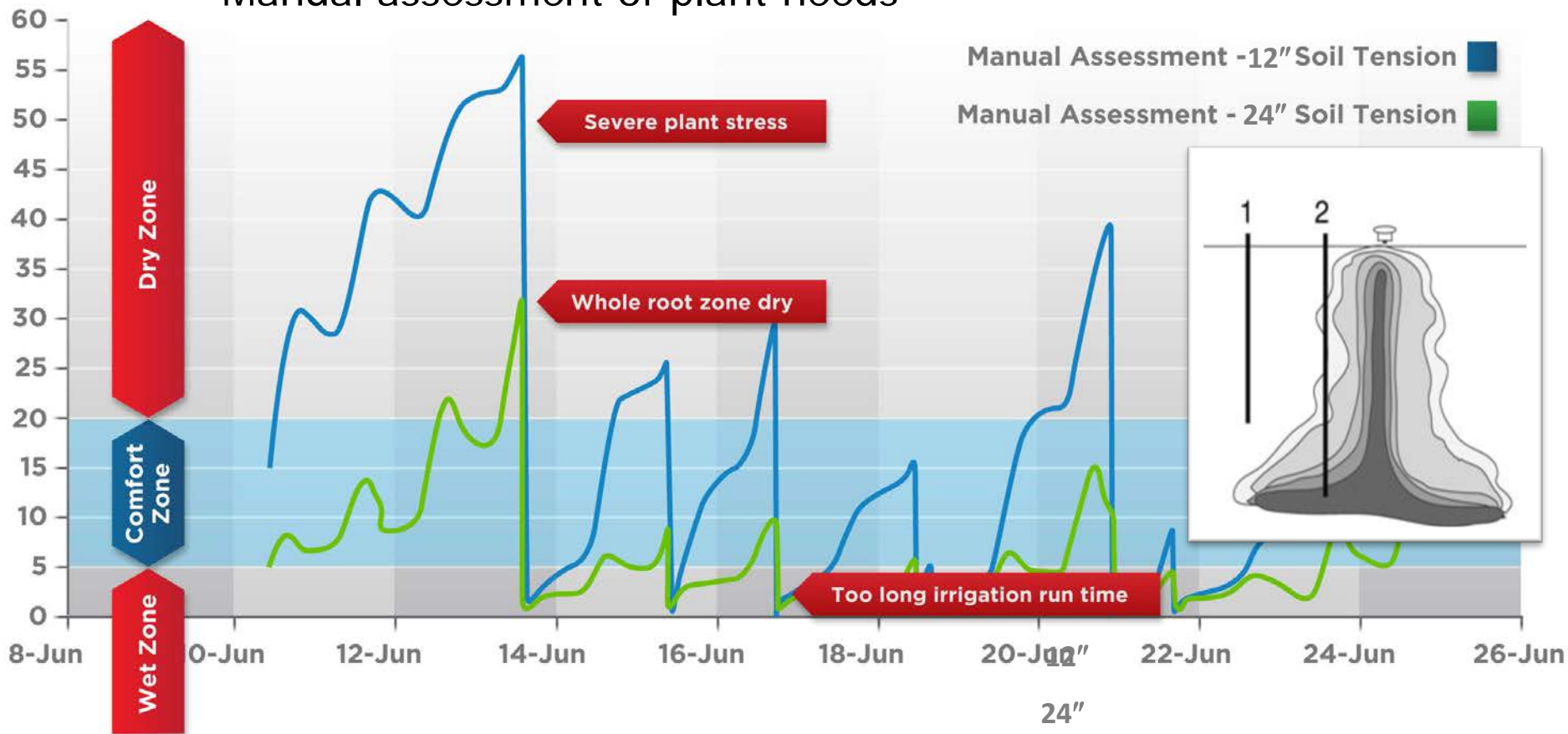
**Low Tension
(Wet)**

Blue band defines optimal growing conditions for yield

- 2000003870:0:---Probe Battery
- 2000003870:11:---RF Success Rate

Irrigation Management

Manual assessment of plant needs



Irrigation Management



When using Hortau

