

2008

Research Update Meeting 2008 - Cranberry Physiology Research Agenda

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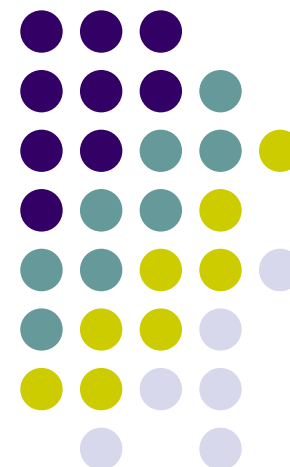
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Cranberry Physiology Research Agenda

Peter Jeranyama



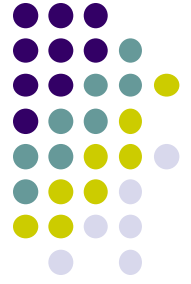
University of
Massachusetts
Amherst



Agenda



1. Irrigation water management
2. Temperature effect on antioxidant content
3. Monitoring pollen viability
4. Salt or dodder stress on chlorophyll & photosynthesis
5. Monitoring the yellow vine syndrome



Irrigation Water Management

1. Better manage water resources
 - ✓ limit waste
 - ✓ reduce costs
 - ✓ increase yield & maximize profits
2. Reduce risk of leaching chemicals to unintended targets
3. Increase use of technology- save energy & reduce labor demands

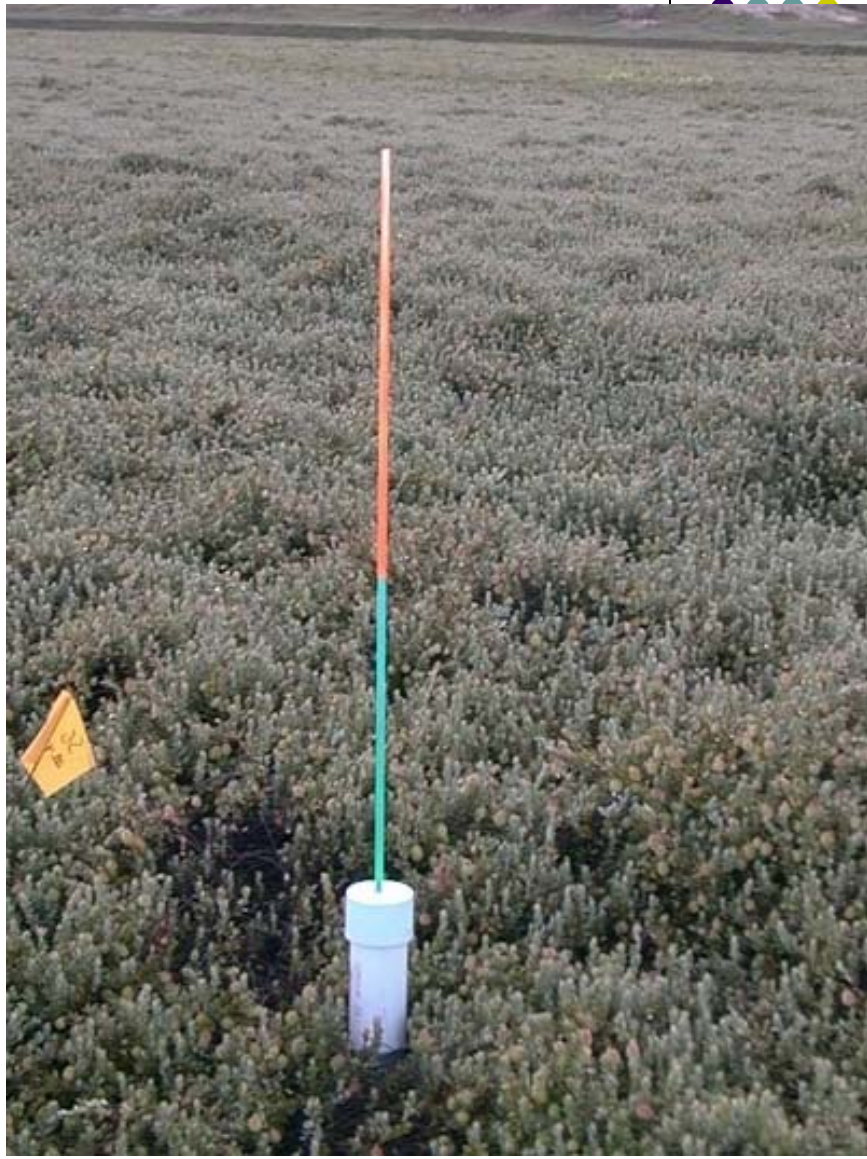


How much water is too much?

- We don't know
- Lack of scientific data on moisture levels optimum for local conditions
- Variations from bog to bog, soil types, cultivar grown
- Bruce Lampinen – water level float
- Evaporative demand study
- Beds wetter than required
- Cranberry might need less than 1-inch/week



Too wet

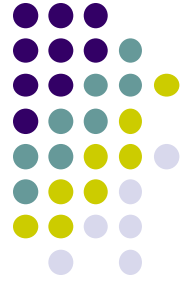


Adequate range

Irrigation Management Tools



Measurement type	Plant	Atmosphere	Soil
Direct	Photosynthesis		Tension
	Transpiration		
	Xylem potential		
Indirect	Leaf temperature	Evapotranspirative demand	Water content
	Flourescence		

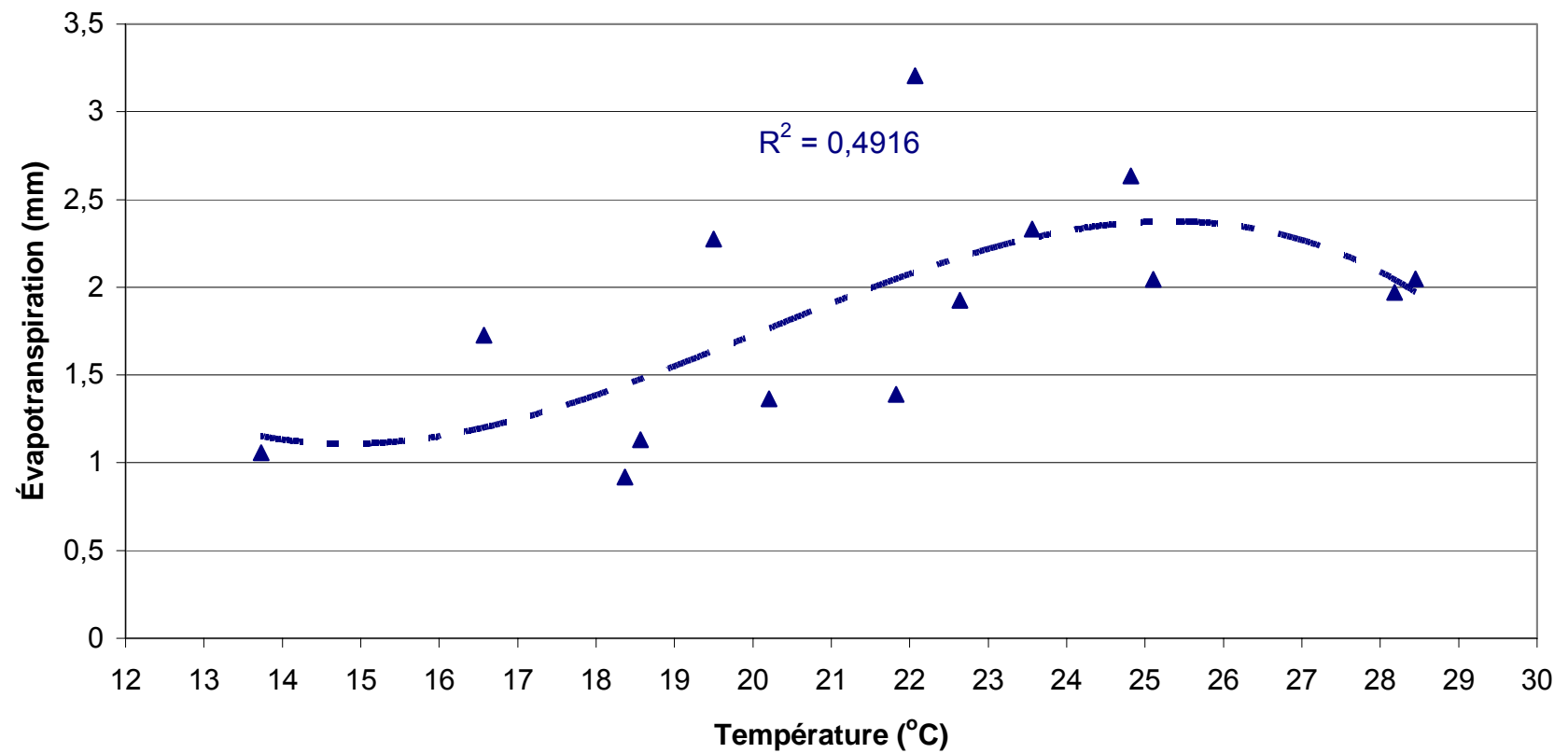


Cranberry Irrigation Sensors

- Ability to detect when crop is under stress
- Determine severity of stress
- Using IRt/c (model IRt/c-K-0F/27C, Exergen Corp)
- What is the critical temperature in cranberry?
- Tc is responsive to physiological & environmental stimuli



Evapotranspiration of cranberry at different temperatures

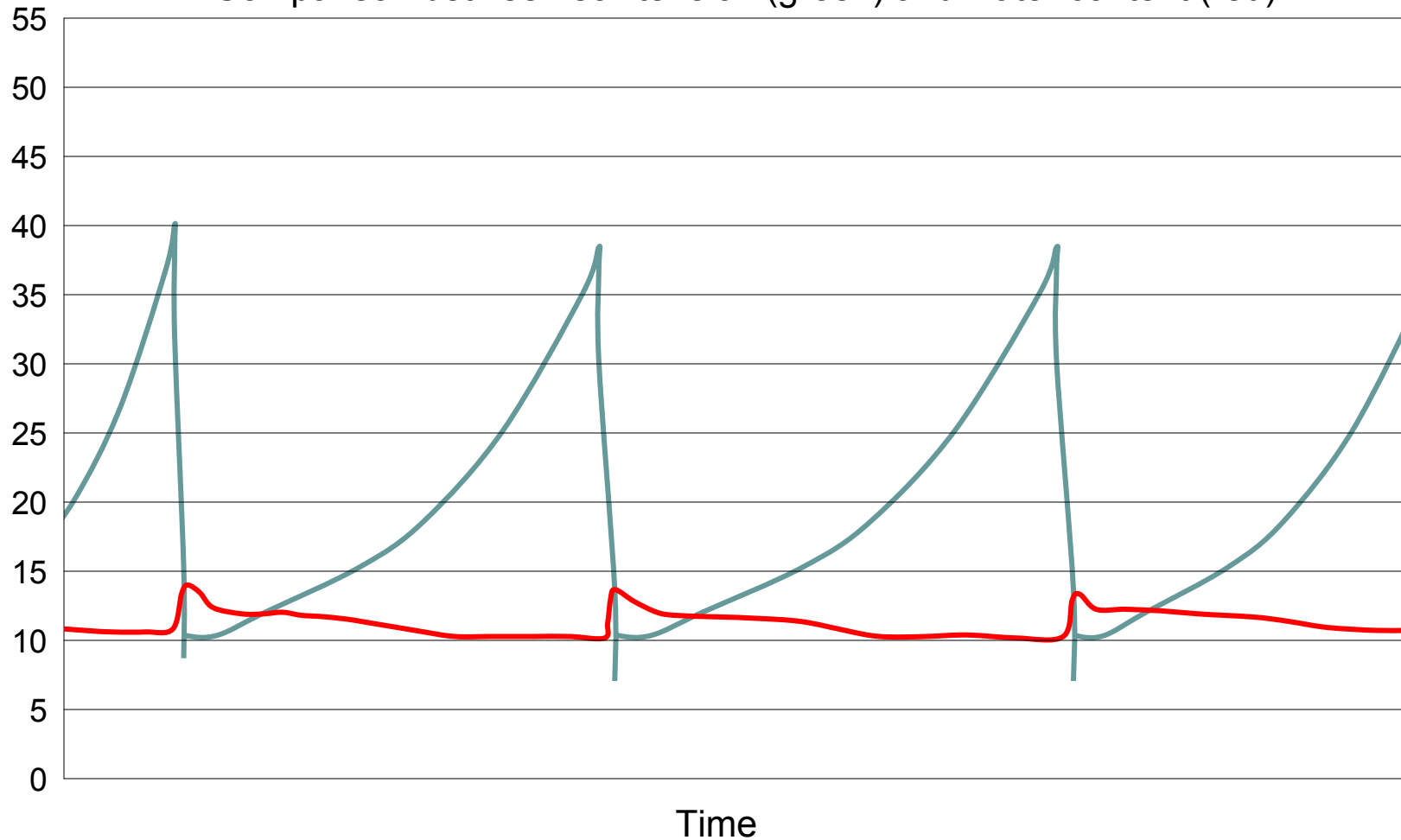


Source: Jean Caron, U of Laval

Measuring Soil Tension and water content (Madramottoo, 2007, courtesy of McGill university)



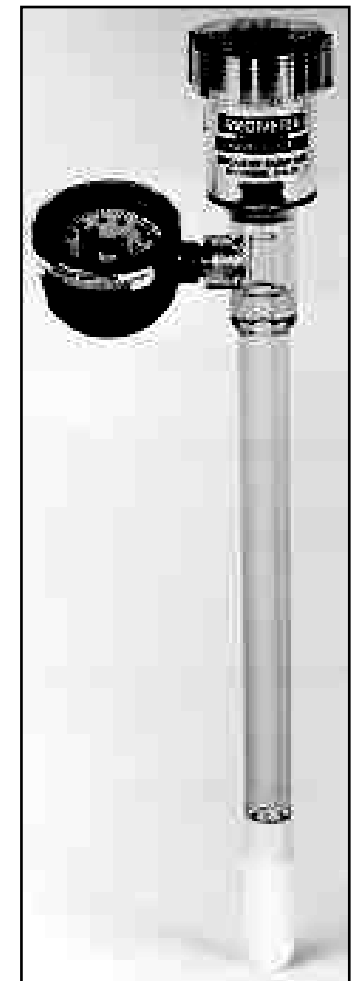
Comparison between soil tension (green) and water content (red)

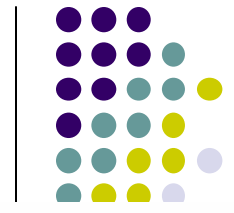


Known Tensiometer Threshold Values to initiate irrigation

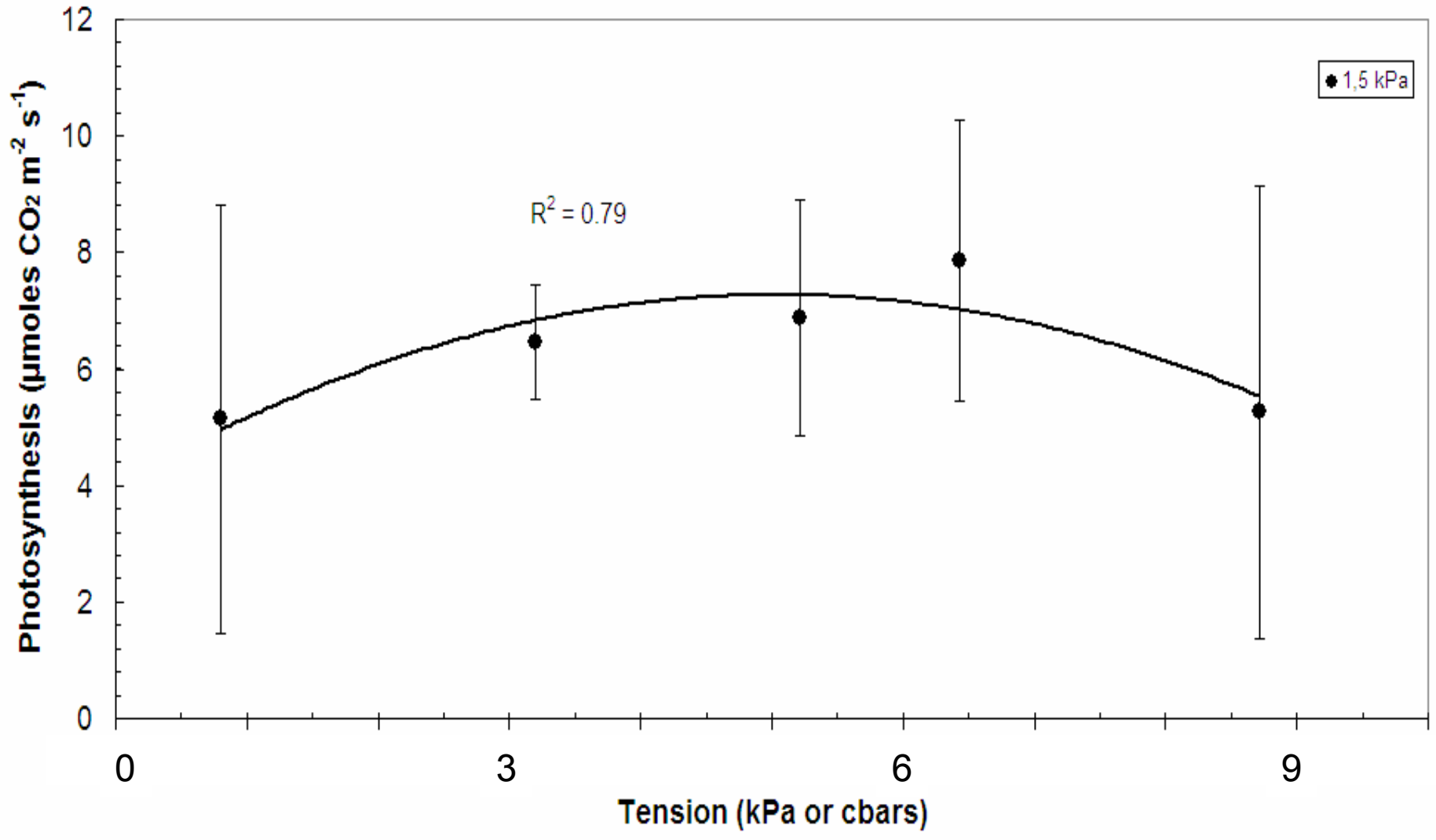


Crop	Soil Type	Tension
Vegetables/Fruit in open field	Sandy & Loamy Soil	-15 to -36 kPa
Vegetables/Fruit in open field	Clay Soil	-30 to -60 kPa
Greenhouse Vegetables	Rockwool (dry type)	-1.0 to 1.5 kPa (Day) ~ -2.5 kPa (Night)
Greenhouse Vegetables	Rockwool (wet type) Sawdust; Coarse Coir	-1.5 to 2.0 kPa (Day) ~ -3.0 kPa (Night)
Greenhouse Vegetables	Peat-Based Substrates Fine Coir	-2 to -3 kPa ~ -4 kPa (Night)
Nursery	Peat/Bark Mix	-3 to -10 kPa
Potted Plants	Peat-Lite Mix	-3 to -10 kPa





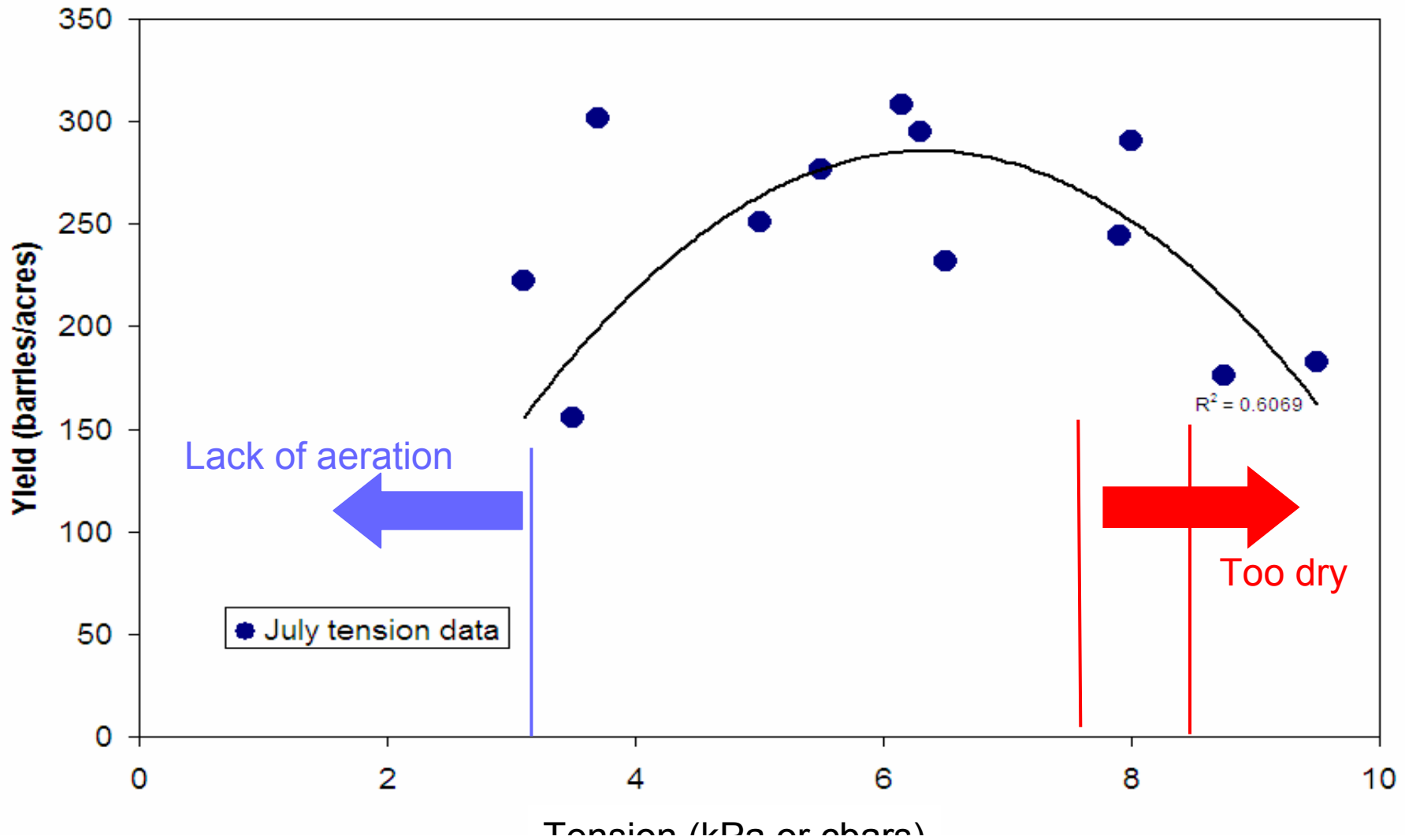
Photosynthesis of fruiting shoots at different tensions





Yield measurements

Yield and tension in Wisconsin (Kummer, 2004)

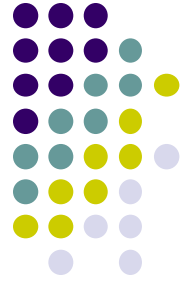




Embedded Research

Water use efficiency (WUE)

- $\Delta^{13}\text{C}$ – carbon isotope discrimination
- Correlation between $\Delta^{13}\text{C}$ with fruit yield
- Correlation between $\Delta^{13}\text{C}$ with phenolic compounds
- Stomatal conductance under different water regimes



Others areas of interest

- Fruit yield – enhancers & limiters
- Cold acclimation – proteins synthesized
- Dormancy factors – what happens
- Winter survival – perenniality



Thank you for attending

