Precision Water and Nutrition Management

Precision management in the orchard

• Manage an orchard according to variability in soil or tree performance
  – Manage vigor within an orchard block to maintain a consistent canopy and fruit load

• As initial orchard establishment costs increase, maximizing efficiency within the orchard is important
Environmental Monitoring

- Installation of environmental monitoring on site
  - Soil moisture, temperature, EC
  - Temperature
  - Humidity
  - Wind Speed
  - Precipitation

Precision Water and Nutrition Management

Automation of water application

Watermark - Sunrise

Decagon - Sunrise

Before Automation  After Automation
Evapotranspiration

Precision Water and Nutrition Management

Topography

www.agleader.com

Good Vigor
Poor Vigor

swac.umn.edu
Precision Water and Nutrition Management

Know your soil

Precision Water and Nutrition Management

Accounting for variability in water management of orchards

Sandy Soil

Clay Soil
Understand your variability in nutrition

Anion PRS Probe
- absorbs: $\text{NO}_3^-$, $\text{H}_2\text{PO}_4^-$, $\text{SO}_4^{2-}$, micros, etc.
- Anion Resin Quaternary R-$\text{NH}_2^+$

Cation PRS Probe
- absorbs: $\text{NH}_3^+$, K+, Ca++, Mg++, etc.
- Cation Resin sul- fonic acid R-$\text{SO}_3^-$

Understand variation of soil within the field

Figure courtesy of David Brown, WSU Crop and Soil Sciences
Precision Water and Nutrition Management

Correcting for variation in nutrition

• Preplanting evaluation
  – Variable rate fertilizer application

• Leaf and fruitlet testing postplanting
  – Fertigation
  – Variable rate foliar fertilizers

 precision Water and Nutrition Management

Conclusion

• Higher costs → greater need for optimization of yields

• As automation and mechanization increases, uniformity of a block is critical.

• Understand the variability that exists in your soil and understand the nutrient and water demands of your site

• How does that variation contribute to tree performance