

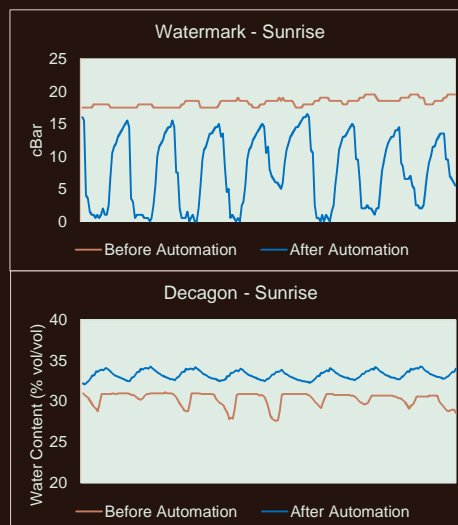
Precision management in the orchard

- 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

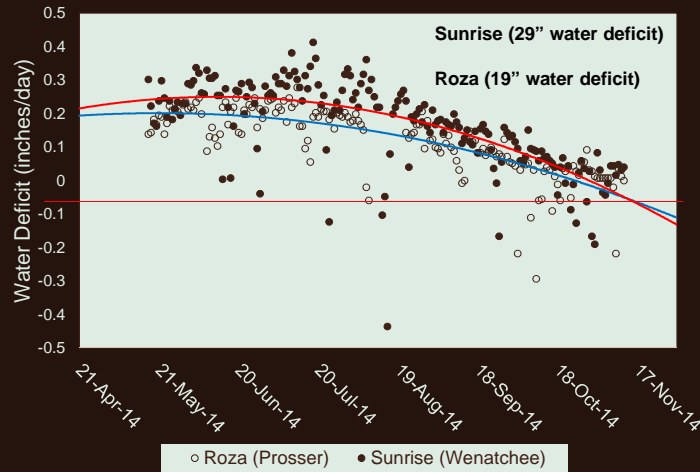
- Installation of environmental monitoring on site
 - Soil moisture, temperature, EC
 - Temperature
 - Humidity
 - Wind Speed
 - Precipitation

Automation of water application



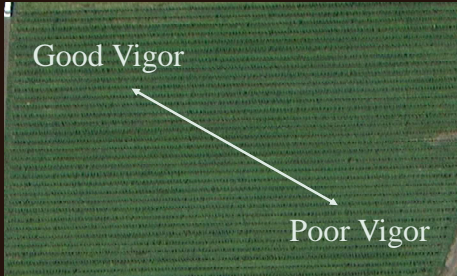
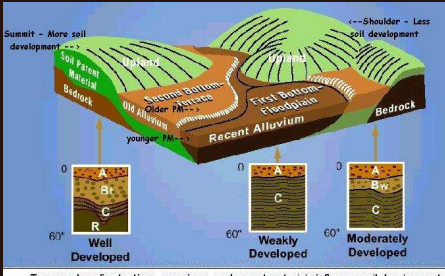
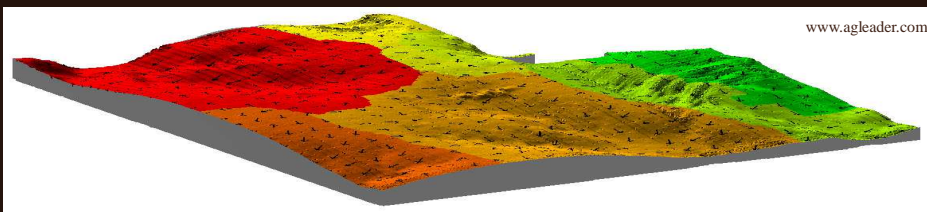
Precision Water and Nutrition Management

Evapotranspiration



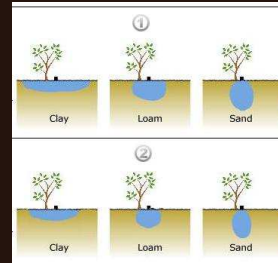
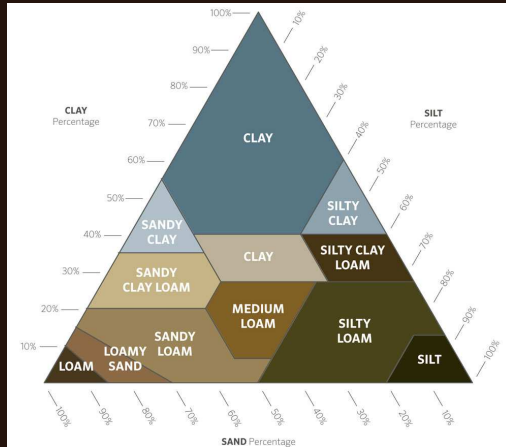
Precision Water and Nutrition Management

Topography

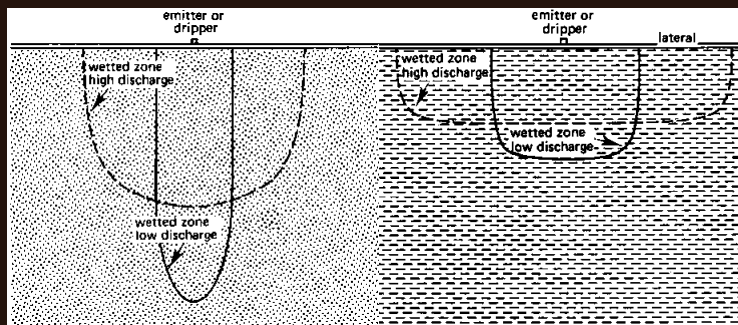


Topography, climate, time, organisms, and parent materials influence soil development.
swac.umn.edu

Know your soil



Accounting for variability in water management of orchards





Sandy Soil

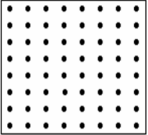
Clay Soil

Precision Water and Nutrition Management

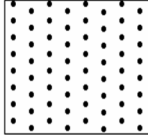
Understand your variability in nutrition

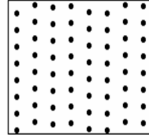
REGULAR



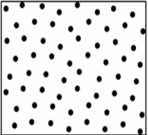
STAGGERED START



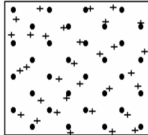
RANDOM START




SYSTEMATIC UNALIGNED



RANDOM CLUSTER




SIMPLE RANDOM



Anion PRS Probe

absorbs:
 NO_3^- , H_2PO_4^- , SO_4^{2-} ,
micros, etc.


Anion Resin Quaternary R-NH_4^+




Cation PRS Probe

absorbs:
 NH_4^+ , K^+ , Ca^{2+} ,
 Mg^{2+} , etc.

Cation Resin sulfonic acid R-SO_3^-





Precision Water and Nutrition Management

Understand variation of soil within the field

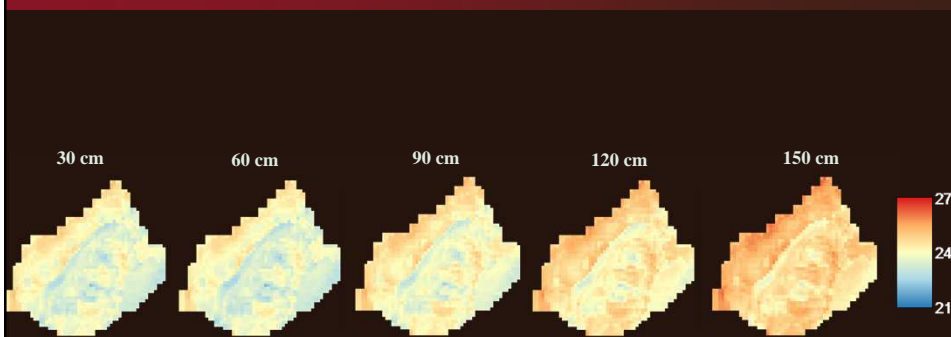


Figure courtesy of David Brown, WSU Crop and Soil Sciences

Correcting for variation in nutrition

- Preplanting evaluation
 - Variable rate fertilizer application
- Leaf and fruitlet testing postplanting
 - Fertigation
 - Variable rate foliar fertilizers

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