
Crop
Production
Systems

Prosser, WA (worksite)

Julie Tarara, Horticulturist

"Physical Environmen

Corvallis, OR

Paul Schreiner, Plant Physiologist

"Root Physiology"

Davis, CA

Kendra Baumgartner, Plant Pathologist
"non-chemical alternatives"

Kerri Steenwerth, Soil Scientist
"Soil ecosystem"

Andrew McElrone, Plant Physiologist
"Ecohydrology"

Parma, ID (worksite)

Krista Shellie, Horticulturist

"Cultural Practices"

National Grape and Wine Initiative (NGWI)

1. Understanding & Improving Quality

3. Processing and Production Efficiency

4. Sustainable Practices

NGWI: *Understanding and Improving Quality*

1.1.4 Mechanisms that control biochemical synthesis of grape quality components.

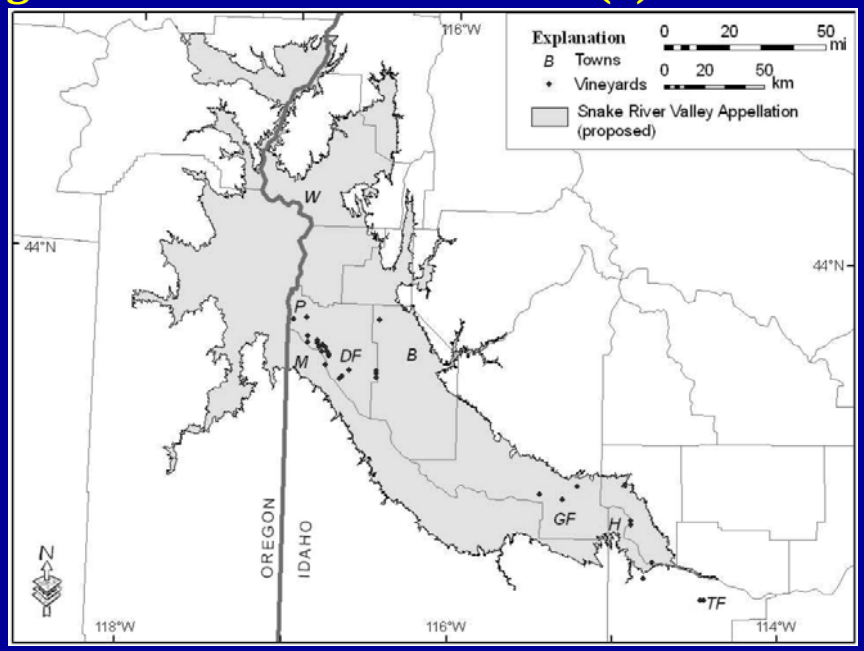
During early stage of berry development in the field, how do changes in **berry temperature** determine accumulation of **tannins?**

Julie Tarara, Prosser, WA

NGWI: *Understanding and Improving Quality*

1.2.1 Evaluate regional suitability & quality attributes of cultivars, clones, and rootstocks.

➢**Published a comparative description of the climate and geology of Idaho grape growing regions. *GeoSceince Canada* 33(1) 37-48. 2006.**



Information used by Idaho Grape Growers and Wine Producers Commission to petition for Idaho's first American Viticultural Area (AVA), Awarded in 2007.

➢**Completed 4 yrs of evaluating viticultural performance: 23 red, 6 white wine grape cultivars. *HortTechnology, 2007.***

➢**Participate in NE 1020: Multi-state Evaluation of Winegrape Cultivars and Clones. Novel regional approach for evaluating viticultural performance of lesser known cultivars & clones.**

Krista Shellie, Parma, ID

NGWI: *Processing and Production Efficiency*

3.2.1 Design vineyard production systems for maximum efficiency- Yield estimation

Trellis Tension Monitor: issued a U.S. patent in 2005

- Provides continuous information about vine growth and crop development to monitor vineyards more efficiently, improve yield estimations between veraison and harvest, and better allocate labor through improved timing of hand sampling.
- Currently being tested by US and Australian Wineries.
- USDA-ARS is open to cooperative development or licensing agreements.

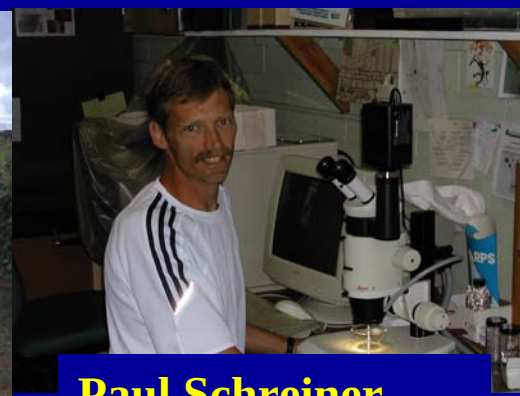
Julie Tarara, Prosser, WA

NGWI: *Processing and Production Efficiency*

3.2.1 Production systems for maximum efficiency- Fertilization & Design

- **Determined whole vine nutrient uptake/partitioning in Pinot noir in a red-hill soil.**

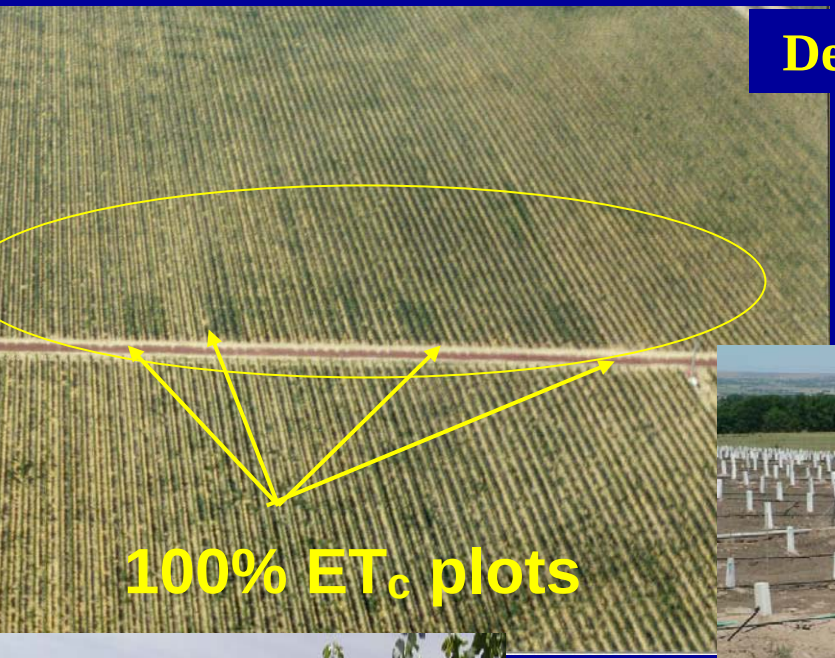
- **Determined that alleyway cover crops did not compete with grapevines for water or nutrients in Willamette Valley vineyards.**



Paul Schreiner
Plant Physiologist

NGWI: *Processing and Production Efficiency*

3.2.1 Design vineyard production systems for maximum efficiency- Irrigation



Deficit Irrigation: Timing and Severity

- Alleviating water stress after veraison:
  consumed 30% less water
  similar yield and quality as 70% ET_c.
  Am. J. Enol. Vitic. 57:4 (2006)

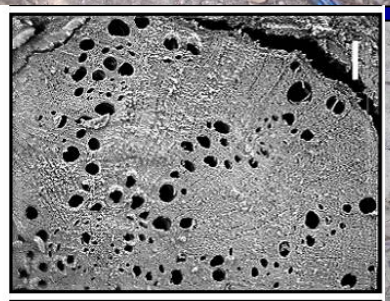
- **Kaolin Particle Film under deficit irrigation**
  - **No increase in water use efficiency**
  - **Did not prevent visible berry solar/heat injury**

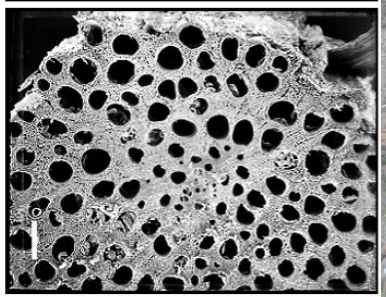
Krista Shellie, Parma, ID

NGWI: *Processing and Production Efficiency*

3.2.1 Design vineyard production systems for maximum efficiency- Water Budget

- **Promote efficient production & sustainable water use.**
  - **Sap flow techniques to quantify whole vine water use**
  - **Grapevine water demand (short-term, long-term)**
  - **Balancing grapevine water budget**
  - **Rootstock variability in aquaporin activity**



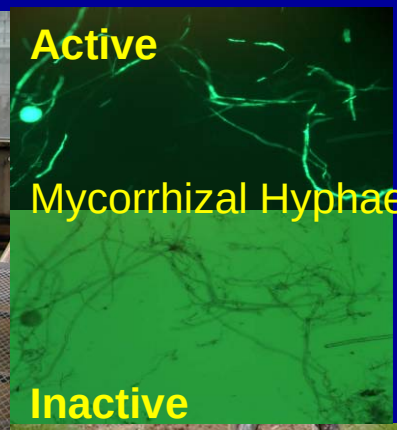


Andrew McElrone,
Davis, CA

NGWI: *Sustainable Practices*

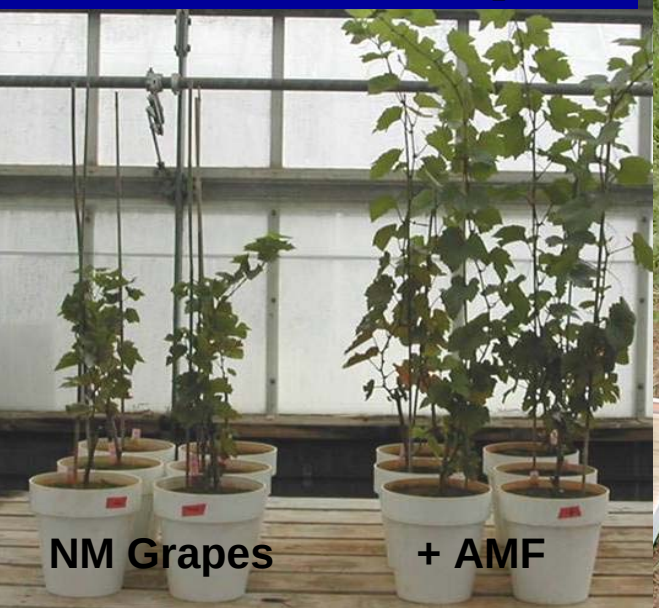
4.5 Understand and enhance the Vineyard Ecosystem

Arbuscular mycorrhizal fungi (AMF):



- AMF responsiveness varied by soil type
- Deficit irrigation reduced fine root biomass, enhanced reliance on AMF
- Ring nematode reduced active AMF via CHO limitation

Effects of Mycorrhizal Fungi and Nematodes on Grape




Use of Rhizoboxes in Vineyards

Paul Schreiner
Plant Physiologist

NGWI: *Sustainable Practices*

4.5 Understand and enhance the Vineyard Ecosystem

Arbuscular mycorrhizal fungi (AMF)

- External hyphae contributed to N capture
- N capture was highest under low soil fertility
- AMF support soil biota involved with nutrient cycling

Kendra Baumgartner
Davis, CA

National Grape and Wine Initiative: *Sustainable Practices*

4.5 Understand & enhance the vineyard ecosystem: VINEYARD FLOOR MANAGEMENT

Cover crop versus tillage:

- **Cover crop had:**
  - **Higher soil biological activity**
  - **Greater soil C availability**
  - **Higher potential soil N availability**

Kerri Steenwerth
Davis, CA

National Grape and Wine Initiative: *Sustainable Practices*

4.5.2 Decrease pesticide use through advanced management practices: WEED CONTROL

Cultivation versus herbicide impacted N leaching

- Leached soil nitrate was greater under herbicide weed control than under cultivation
  - N retention associated with increased weed biomass
  - In-vine row plant biomass may have hidden benefits

Kerri Steenwerth
Davis, CA

National Grape and Wine Initiative: *Sustainable Practices*

4.6 Integrated pest/pathogen management practices

Pierce's disease

- Riparian host: *Vinca major* (periwinkle)
  - ✓ single most persistent riparian host for *Xyllella fastidiosa*
  - ✓ novel, field-based technique.

Kendra Baumgartner
Davis, CA

Armillaria root disease (*Armillaria mellea*).

- Developed non-chemical control methods
  - ✓ root collar excavation
  - ✓ soil inoculant 'Vesta'