Grapevine Anatomy and Function

Dr. Jodi E. Creasap Gee

January 21, 2014

MSU Wine Grape Conference
Grapevine Anatomy

- Scion – above-graft part of vine; e.g., ‘Cabernet Sauvignon’ or ‘Riesling’
- Rootstock – root system for grafted vine
- Roots:
  - Nutrient and water absorption
  - No roots = no grapes!
Grapevine Roots

- Tap root
  - Main root
- Branches
- Root hairs
  - Increase surface area

Grapes, Creasy and Creasy 2009
(Originally from Pratt 1974)

Not a grape seed...
Grapevine Roots

VAM – Vesicular-Arbuscular Mycorrhizae

Grapes, Creasy and Creasy 2009

Shoot Dry Weight

Root Dry Weight

Grapes, Creasy and Creasy 2009
Grapevine Roots

VAM – Vesicular-Arbuscular Mycorrhizae
Soils & Root Nutrition

Nutrition Pyramid for Grapevines

1) Soils: Character, Content, Variation
2) Soil Amendments: %OM, pH, Functional Depth
3) Roots: Physical, Biological, and Chemical Differences
4) Shoots and Fruit: Demand and Measurement
5) Supplemental Fertilizers: Efficiency

Soil pH

Nitrogen
Phosphorus
Potassium
Sulphur
Calcium
Magnesium
Iron
Manganese
Boron
Copper and Zinc

6.0 – 6.5
Grapevine Anatomy

- **Scion** – above-graft part of vine; e.g., ‘Cabernet Sauvignon’ or ‘Riesling’
- **Rootstock** – root system for grafted vine
- **Roots:**
  - Nutrient and water absorption
  - No roots = no grapes!
Grapevine Anatomy

Shoots

Fruiting Zone

Trunks

Cordon/Arm

Vegetative Growth vs. Reproductive Growth
Vine Anatomy

1st year wood

Spur

Node

Internode
Bud Anatomy

- **Primary bud** – largest bud in center; full crop potential
- **Secondary bud** – 2\textsuperscript{nd} smallest bud to one side; \(~2/3\) crop potential
- **Tertiary bud** – smallest bud tucked in side opposite 2\textdegree\ bud; usually no crop potential
Bud/Shoot Development

Eichhorn-Lorenz Phenological Stages
Bud/Shoot Development

Eichhorn-Lorenz Phenological Stages
Bud Development and Sunlight Interception

Adapted from Goffinet, Wine East 2001

http://lergp.cce.cornell.edu/timeline.php?id=15
Shoot Anatomy

Shoot/Cane
- Petiole
- Leaf Blade
- Inflorescences

Flowers
Shoot Anatomy

Tendrils
Grapevine Function

Photosynthesis
- Carbohydrate production for roots and fruit

Fruit Production
- Sugar accumulation and seed ripening

Water and nutrient transport
1) Carbohydrates to roots
2) Water, nutrients, PGRs to shoots
Berry Anatomy

Skin  Seeds  Flesh  Berry #4
Berry Anatomy

Figure 1: Structure of a ripe grape berry partially sectioned on the long and central axis to show internal parts. Illustration by Jordan Koutroumanidis, Winetitles.

http://www.practicalwinery.com/julyaugust02/julaug02p14.htm
Self Quiz

Vitis vinifera ‘Cabernet Franc’

#12. What’s missing?
Thank You!