Nitrogen Management
What Does Management Mean?

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How Do You, The Crop Advisor, Evaluate Nutrient Needs of a Field?
The person evaluating lab results (Consultant) must have a lot of information if you want an accurate recommendation!
Tissue and soil Analysis provide a lot of information, however more is needed
Does “One Size Fit All”? 

To restate:

Does the same nutrient level, from a lab test, require the same correction?
Interpretation of Results

- Is the Consultant familiar with your:
  - Crop
  - Soil
  - Production
  - Water
  - Weather
  - Etc?
For Example:
How Many Gallons of Gas Do I Need To Drive To L.A.? 

- What Size Vehicle? (Ugo, Kenworth, Harley?)
- Carrying What? (1 person, 45 tons, with trailer?)
- What Route? (via Monterey or direct?)
- Where In L.A.? (North or South?)
- What Speed? (Traveling 55 or 85 mpg?)
- The Engine Efficient (Ever had a tune-up?)
- Fighting A Wind? (40 mph headwind or tailwind?)
- How Big Is The Tank? (12, 31, 400 gal.?)
- How Much Fuel Is Still In The Tank? (1/2 full?)
Phone Call: from John Farmer

How much Nitrogen do I need to apply to my grapes this week?
The tissue test is 2.8% in the leaves (or 700 ppm in the petiole)
Do you use the “One Size Fits All” Text Book Answer?

Let’s Look at the Variables, for Grapes....
What is the Crop?

- Raisins
- Table Grapes
- Cannery Grapes
- Juice Grapes
- Wine Grapes
- Grape Leaves
- Suppressed Crop
- No Crop This Year
- Cover Crop too?!
How Are They Grown?

- Overhead Trellis
- One Wire
- Cross Arm
- Head Pruned
- Girdled
- Flood
- Drip
- Furrow under Vine
- Subsurface Drip
- Sprinkler
Variety?

- Barbera
- Flames
- Muscat
- Tokay
- Gewürztraminer
- Exotics
- Crimson Seedless

…………..
…………
Harvest Date?

- June (Coachella)
- July (Flames)
- August (Thompsons)
- September (Chardonnay)
- November (Crimson)
Soil Analysis
for Nutrients.
What are the Problems?

- Positioning: Where are the roots?
- Positioning: Where is the fertilizer?
- Sampling: The sample represents which area(s)?
- Sampling: Are the nutrients available to the roots?
What we want to AVOID!

Moist + roots

Moist + roots

Wet + roots?

Wet + roots?

Mush

N  N  N  N

N  N  N

N  N

N

N
Root Zone vs. Solute Movement

Lowest Salts and Low Nitrogen (?)

Residual Banded Fertilizer

Salts & Nitrogen move to center of the berm with furrow, away with drip.
Soil Information?

- Sand
- Clay
- Hardpan
- Loam
- Acidic
- Alkali
Where Do You Take The Sample?!

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Roots</th>
</tr>
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<tbody>
<tr>
<td>Top</td>
<td>Many Roots</td>
</tr>
<tr>
<td>2nd</td>
<td>Few Roots</td>
</tr>
<tr>
<td>3rd</td>
<td>No Roots</td>
</tr>
<tr>
<td>4th</td>
<td>No Roots</td>
</tr>
<tr>
<td>5th</td>
<td>No Roots</td>
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</tbody>
</table>

Many Roots | Many Roots | Many Roots | Many Roots | Few Roots
No Roots    | Many Roots | Many Roots | Many Roots | Few Roots
When Is Nutrient Soil Testing Valuable?

- Preplant in row crops
- Preplant in permanent crops
- When searching for nutrient distribution patterns
Types of Tissue Analysis:

- Leaf Blade Analysis
- Petiole Analysis
- Stem Analysis
- Midstem Analysis
- Other.
Analytical Possibilities

- Nitrogen (N, NO3-N)
- Phosphorous (P, PO4-P)
- Potassium (K)
- Calcium (Ca)
- Magnesium (Mg)
- Zinc (Zn)
- Manganese (Mn)
- Copper (Cu)
- Iron (Fe)
- Boron (B)
- Sodium (Na)
- Chloride (Cl)
- Sulfur (S, SO4-S)
- Others
# Grape – Summer Leaf Blade Analysis

## Report of Tissue Analysis

**Example 3b**  
**Pre harv**

**Submitted by** Paso Robles, CA  
**Job/Ranch/Site** 21

**Identification** Wine Grape Leaf  
**Pre-Harvest**

---

### Methods

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>N</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
<th>Na</th>
<th>B</th>
<th>Ca</th>
<th>Mg</th>
<th>Fe</th>
<th>Cu</th>
<th>Cl</th>
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<tbody>
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<td>mg/kg</td>
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<tr>
<td>1</td>
<td>Cabernet East</td>
<td>2.09</td>
<td>0.16</td>
<td>0.38</td>
<td>21</td>
<td>&lt;0.01</td>
<td>172</td>
<td>2.45</td>
<td>0.53</td>
<td>284</td>
<td>13</td>
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<tr>
<td>2</td>
<td>Cabernet West</td>
<td>2.17</td>
<td>0.14</td>
<td>0.39</td>
<td>13</td>
<td>&lt;0.01</td>
<td>172</td>
<td>2.40</td>
<td>0.52</td>
<td>266</td>
<td>10</td>
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</table>

### Wine Grapes - Aug & Sept

<table>
<thead>
<tr>
<th>Deficient</th>
<th>Normal Range</th>
<th>Excess</th>
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<tbody>
<tr>
<td>Nitrogen</td>
<td>1.8 - 2.1%</td>
<td>2.1 - 2.5%</td>
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<tr>
<td>Phos.</td>
<td>&lt;0.10</td>
<td>&lt;1.2 - 0.40</td>
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<tr>
<td>Potassium</td>
<td>&lt;0.5</td>
<td>&lt;6.1 - 1.1</td>
</tr>
<tr>
<td>Zinc</td>
<td>&lt;23</td>
<td>&lt;28 - 125</td>
</tr>
<tr>
<td>Manganese</td>
<td>&lt;24</td>
<td>&lt;32 - 90</td>
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<tr>
<td>Sodium</td>
<td>&lt;4</td>
<td>&lt;30 - 250</td>
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<tr>
<td>Boron</td>
<td>&lt;0.7</td>
<td>&lt;0.8 - 2.0</td>
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<tr>
<td>Calcium</td>
<td>&lt;0.15</td>
<td>&lt;0.2 - 0.4</td>
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<tr>
<td>Magnesium</td>
<td>&lt;70</td>
<td>&lt;0.8 - 2.0</td>
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<tr>
<td>Iron</td>
<td>&lt;4</td>
<td>&lt;0.2 - 0.4</td>
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<td>Copper</td>
<td>&lt;0.3</td>
<td>&lt;1.5 +</td>
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<tr>
<td>Chloride</td>
<td>&lt;0.3</td>
<td>&lt;250 +</td>
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*High and low levels may change based on the consultant’s impression of the variety, root stock, age, harvest date, weather, and soil conditions.

**Low levels of N (1.9 - 2.1%) are often best for high maturity grapes at harvest.**

Slightly high or slightly low N are used to direct growth form conservative to vigorous.

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Carryover Nutrients

- Field _ N Deficient in the Fall
- Field _ Too High in N in the Fall
- Field _ Just Right in the Fall
- Or .............one of each

- The annual N applications were modified accordingly, RIGHT!?
Complications?

- Nematodes
- Water Table
- Slope
- Excess Water Nitrogen
- Phylloxera
- Abused
- Changing Crops
- Changing Irrigations Systems
Fertilizer Choices

- Leachable
- Slowly Available
- Volatile
- Acidic
- Organic
- Low % Nutrient
- High % Nutrient
Fertilizer History?

- Manure/Compost
- Ammonia, Nitrate, Urea?
- Foliar
- Fertigated
- Well Water N
- Carryover
- Deficient Soil
What is the Current Time of Year?

- Spring
- 2 weeks before harvest
- 2 months after harvest
How Old Are The Vines?

- First Year
- 3 year old
- 50 year old
- Recently Grafted?
Phone Call: from John Farmer, to you as an Advisor...

“Now that you know a little about my vineyard and that I’m a little low in N, ..... how much N should I apply this week?”

Actually, We Need to Know More....
Irrigation History

What is the “Right Amount of Water?”

- What the vines use?
- What worked last year?
- Enough to wet to 5 feet?
- A 12 hour set?
- Irrigate every seven days?
- The same amount as in May?
- What works for other varieties?
- What the newspaper suggests?
- The Coffee Shop Consensus
Climate .. Grown Where?

- San Diego
- Napa
- Arvin
- Selma
- Coachella
- New York State
- Washington State
Designing an N Program for Grapes.

Goals:

- Quick & Uniform Bud Break
- Vigorous Early Shoot Growth
- Slowing Shoot Growth when Foliage is Adequate
- Borderline N “Deficiency” Prior to Harvest, to Promote Early Color, Sugar, & Harvest
- Late Season Rebuilding of Shoots, Roots, & Buds
- Enter Dormancy with Adequate Nutrients for Spring Growth, Avoiding Excess.
Sample Timing

- Early Season
- Pre bloom
- Bloom
- Mid season
- Pre harvest
- Harvest
- Post harvest
Grape Nitrogen Chart
Leaf Blade data

- April
- May
- June
- July
- Aug
- Sept
- Oct

- July Harv
- Oct Harv
Keep Records and Do The Math
<table>
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<tr>
<th>Vine Nitrogen Sources</th>
<th>Calc or Est. Lbs per Acre</th>
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<tr>
<td><strong>Prev Yr</strong></td>
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<tr>
<td>Fall Commercial N</td>
<td>20</td>
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<td>Compost/Manure - Prev Year</td>
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<td><strong>Spring</strong></td>
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<td>Compost/Manure - This Year</td>
<td>20</td>
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<td>Anticipated from Water</td>
<td>6</td>
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<tr>
<td>Foliar N</td>
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<td>Spring Commercial N</td>
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<td><strong>Summer</strong></td>
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<td>Early Summer Com. N</td>
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<td>Water Supplement N</td>
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**Running total** 126

Crop: Merlot
2011 Crop
Age: 2002
Block: 2 South
Target N Availability: 45
Prev Quality: Late/Poor color
To Fine Tune Your Crop:

- Find an experienced consultant to get started
- Study available information
- Take tissue samples at specific points in the season to manage and evaluate growth
- Keep records regarding what you have done and what you have achieved
Attention to Detail
Brings in the Best Crop Quality

- Isn’t that what you would expect from your:
  - Lawyer?
  - Caterpillar Mechanic?
  - Pest Control Advisor?
Changes Are Part of Agriculture

Bad Water, Leaching, Crop Load, Chilling, Rain, Frost, Heat, Pruning, Gophers, Irrigation Mgt., Tractor Blight, Bad Fertilizer Application, Pushy Salesmen, Bad Seed, Water Tables, Erosion, Dumb Ideas, etc., etc…..

Learn to Watch!
Advantages of an Accurate Program for All Nutrients

- Crop Quality
- Crop Size
- Environmental Management
- A Proactive Program Prevents Deficiencies and wasteful applications
- You Control Plant Growth
- Keep the Farmer’s Profitably where it needs to be!
Remember…
You Can Never Step Into The Same Field Twice!

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