Grapevine Tissue Analysis

Bloomtime Petiole Sampling

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Topics

- Tissue sampling
- Vine parts to sample.
- Proper sampling techniques.
- Interpretation of results.
- Fertilization
- Methods of fertilization.
- Confirmation

Tissue sampling

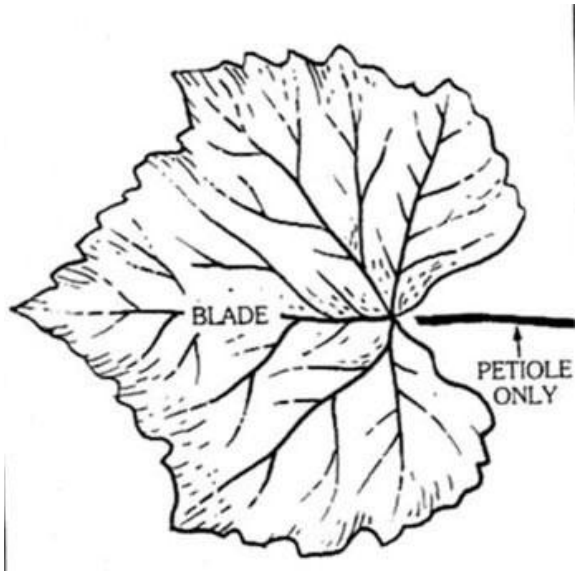
- Performed to determine current tissue levels
- Use of a portion of a plant to analyze.
- Used for planning of future fertilizations.
- Annual assessment of key nutrients.
- Historical account
- Problem areas

Bloomtime Petiole

- Bloomtime.
- 50-100% bloom.
- Petiole
- Highly dynamic portion of the plant.
- Nitrate – N ppm
- Potassium
- Micro nutrients
- Snap shot of nutrient levels at that stage (bloom)
- Documented desired levels
- Confirm problematic areas (cause / i.e. nutrient deficient?)

Why Petioles

- Ulrich, Shaulis and Cook
- Determined that have a great range of value (dynamic) to critical values
- More responsive to deficiencies and to fertilization.
- Represent individual shoots and vines
- Less surface area for contamination (foliar sprays)



- Sample area (block, area within, past problematic area)
- 100-125
- Petiole only
- Petiole opposite lower cluster
- Paper bag
- Document area, date and % bloom
- Place in cool dark area
- Send to lab

Leaf Blades

- Primary use is for determining toxicities.
- No desired levels for bloomtime levels.
- Indicator of what happened.
- Generally taken at mid season period
- Sample first fully expanded leaf

Interpretation of Results

- Compare with desired levels.
- Refer to historical results
- Look for trends based on historical results
- Annual trend (the average Nitrate)
- Regional basis

Nitrate Levels

- Scattered results.
- Site specific / scion & rootstock combination
- Results are influenced by many factors.
- Weather (cool vs warm)
- Conversion of nitrite to nitrate
- Occurs in woody portion of vine
- Can lead to high nitrates or low (changes annually)
- PPM and % Nitrate levels
- Critical levels should different among varieties
- Compare to the mean.

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Bloom Time Petiole Nutritional Analysis

Grapes

10040/ 2015/ 48/ 11

Monday, May 11, 2015

Ranch Manager

Sample Id	Description	Nitrate Nitrogen ppm	Total Nitrogen %	Phosphate Phosphrs ppm	Total Phosphrs %	Pot-assium %	Calcium %	Mag-nesium %	Sodium %	Chloride %	Sulfate Sulfur ppm	Sulfur %	Boron ppm	Zinc ppm	Mang-ansese ppm	Iron ppm	Copper ppm
18262 - 1	**Block 1 CH (Clone 4)**	101	0.98		0.53	2.70	1.64	0.40	0.05				41	77	38	56	23
9262	Chardonnay	Def	Hi		Adq	Adq	Adq	Adq	Adq				Adq	Hi	Adq	Adq	Hi
0	4/29/2015 70% Bloom																
18262 - 2	**Block 2**	312	0.81		0.37	2.14	1.79	0.69	0.04				41	65	39	61	23
1000302	Chardonnay	Def	Mar		Adq	Adq	Adq	Adq	Adq				Adq	Hi	Adq	Adq	Hi
0	4/29/2015 70% Bloom																
18262 - 3	**Block 3**	435	0.93		0.37	2.90	1.80	0.50	0.05				44	71	23	58	29
1000303	Chardonnay	Mar	Hi		Adq	Adq	Adq	Adq	Adq				Adq	Hi	Mar	Adq	Hi
0	4/29/2015 70% Bloom																
18262 - 4	**Block 4**	921	0.95		0.32	3.09	1.72	0.47	0.05				39	59	29	54	25
10038	Chardonnay	Adq	Hi		Adq	Adq	Adq	Adq	Adq				Adq	Hi	Adq	Adq	Hi
0	4/29/2015 70% Bloom																

Petiole Desirable	Deficient		<0.65		<0.1	<1.0		<0.2	0.5+	0.01-0.5			<25	<15	<20	30-300	6.5-11.0
Levels at Bloom Time	Marginal		0.65-0.90		0.1-0.15	1.0-1.5		0.2-0.3					25-30	15-26	20-25		
	Adequate				0.15+	1.5+		0.3+					30-60	26+	25+		
	High		0.90-1.20							0.5-1.0							
	Excessive		>1.20							1.0+			150+		200+		

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5/11/2015
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Bloom Time Petiole Nutritional Analysis

History Summary For

Grapes

Description	Year	Nitrate Nitrogen ppm	Total Nitrogen %	Phosphate Phosphrs ppm	Total Phosphrs ppm	Pot-assium %	Calcium %	Mag-nesium %	Sodium %	Chloride %	Sulfate Sulfur ppm	Sulfur %	Boron ppm	Zinc ppm	Man-ganese ppm	Iron ppm	Copper ppm
Blk 1 CH (Clone) 17		127 D	1.02 H		0.85 H	3.05 A	2.28 A	0.33 A	0.09 A				45 A	74 H	37 A	75 A	16 H
		151 D	0.79 M		57. A	2.08 A	2.36 A	0.42 A	0.04 A				41	72	49	92	16 H
Chardonnay	**2009**	189 D	1.06 H		58. A	2.36 A	2.31 A	0.33 A	0.07 A				45 A	78 H	39 A	71 A	15 H
	2010	123 D	0.95 H		0.57 A	1.93 A	2.04 A	0.38 A	0.05 A				37	58	37	64	13 H
	2011	1,971 H			0.67 H	2.77 A	2.00 A	0.32 A	0.04 A				34 A	48 H	36 A	56 A	6 M
	2012	1,534 H	1.40 E		0.42 A	1.84 A	1.83 A	0.29 M	0.05 A				31	36	28	95	38 H
	2001	94 D	1.26 E		0.55 A	2.44 A	1.72 A	0.40	0.04 A				36 A	55 H	64 A	52 A	5 M
C17	**2003**	801 A	1.08 H		0.48 A	3.22 A	1.58 A	0.29 A	0.03 A				48	43	38	29	13 H
Go	**2004**							M					A	H	A	A	
od	**2005**																
Go													A	A	A	A	
od																	
Go													A	H	H	A	
od																	
Go													A	H	A	A	
od																	
Blk 1-2 CH	**2008**	410 D	1.07 H		0.60 A	3.19 A	2.04 A	0.40 A	0.08 A				37 A	82 H	37 A	42 A	9 A
Chardonnay	**2009**	97 D	0.69 M		0.72 H	2.86 A	2.24 A	0.36 A	0.08 A				43	76	46 A	107	14 H
	2010	101 D	0.71 M		0.44 A	2.09 A	1.95 A	0.52 A	0.04 A				39 A	60 H	48 A	299 A	12 H
	2011	60 D	0.67 M		0.53 A	2.16 A	2.75 A	0.36 A	0.07 A				49	86	52 H	81	15 H
	2012	264 D			0.40 A	2.02 A	1.75 A	0.59 A	0.03 A				39 A	63 H	32 A	39 A	8 A
	2001	3,961 E	0.83 M		0.57 A	3.51 A	1.83 A	0.38 A	0.04 A				35	29	30 A	44	6 M
	2003	177 D	0.79 M		0.34 A	2.52 A	1.95 A	0.38 A	0.05 A				38 A	34 H	57 H	104 A	29 H
	2004	305 D	1.70 E		0.60 H	3.36 A	2.01 A	0.59 A	0.07 A				44	65	76 H	84	8 A
Go	**2005**	620 A			0.38 A	3.44 A	1.54 A	0.28 M	0.04 A				48 A	46 H	24 M	41 A	15 H
od																	
Go													A	A		A	
od																	
Go													A	A		A	
od																	
Petiole Desirable Levels at Bloom Time	Deficient		<0.65		<0.1	<1.0		<0.2	0.5+	0.01-0.5			<25 A	<15 H	<20	30-300 A	6.5-11.0
	Marginal		0.65-0.90		0.1-0.15	1.0-1.5		0.2-0.3					25-30	15-26	20-25		
	Adequate				**0.15+**	**1.5+**		**0.3+**					**30-60** A	**26+** H	**25+**	A	
Blk 3 Block 3 CH (Sand)	**2001**	2,527 E	0.90-1.20		0.18 A	3.69 A	1.54 A	0.25 M	0.05 A	0.5-1.0			39 A	29 A	15 D	44 A	7 A
Chardonnay	Excessive		>1.20							1.0+			150+		200+		

Fertilization plan

- Review results
- Fertilization records (historical with future needs)
- Soil results (uptake availability)
- VISUAL OBSERVATIONS!!!!!!
- Confirm that a deficient is occurring.
- Continually deficient (B)
- Nutritional levels are a moving target.
- Adjust annually (small or large).
- Season long monitoring
- Plan for next year.

Short Term Needs

- Bloomtime
- Zinc, Boron, Moly????
- Nitrogen???
- Anticipatory application
- Potassium (historically low). Mitigation application
- High clay content in soil.
- Wine quality issues (lack of color)
- Vine pathogens

Long Term Needs

- Building up a specific nutrient.
- Potassium (soil application).
- Organic matter (composting) effectiveness.
- Nitrate management
- Run off and into water ways.
- Possible increase of soil salinity.
- Fertilizers are made from salts… K^2SO4 vs KCl
- Salt - Any chemical compound formed from the reaction of an acid with a base, with all or part of the hydrogen of the acid replaced by a metal or other cation.
- Over fertilization can cause increase in soil salinity.

Soil Application -Fertilization

- Performed as a long term solution
- Macro nutrients more than likely to be amended (NPK).
- Tons per acre rates
- Soil sample reviewed
- Followed with confirmation with tissue analysis.
- Availability based on
  - pH
  - Soil Texture
  - Irrigation amounts

Foliar application - Fertilization

- Short term need
- Specific time of plant growth (i.e. Zinc pollination).
- PPM
- Liquid foliar that are compatible with fungicide program.
- Lbs. / gallon
- Absorbed into tissue.
- Not all nutrients are effectively utilized as a foliar.
- Mitigate an uptake problem (Iron, calcareous soils).

Post Harvest Fertilization

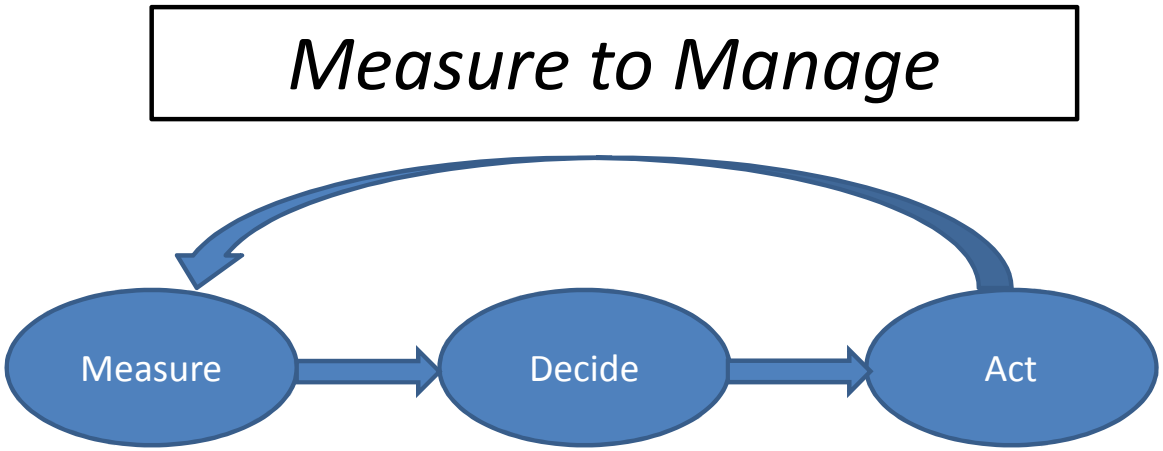
- Most opportune period to store needed Nitrogen.
- Store Potassium.
- Needed nutrients for upcoming season.
- Actively growing plants,
- Rates should be based on soil, tissue and visual observations.
- Be aware of mobility of certain nutrients (Nitrogen vs. Potassium)
- Hold off for springtime. Adjust application timings and rates.

Confirmation

- Visual observations.
- Follow up tissue analysis (mid season).
- Wine quality
- Future tissue analysis

Bringing it all together

- Nitrogen budgeting and tracking
- Soil analysis
- Tissue sampling
- Fertilizer decision



Resources

- YARA app
- UC Publications
  - Mineral Nutrition and Fertilization (Christensen & Peacock)
  - Use of Tissue Analysis in Viticulture (Christensen)
- Grapevine Nutrition (Christensen) out of print