Wine Grape Production Cutting Costs, Nutrients and Quality

Quality versus Costs

“Less can mean More”

- Irrigation
- Nitrogen
- Crop
- Growth

Factors to Consider

- Variety/Rootstock
- Production
- Past Inputs
- Soil Type
- Water Source
- System
- Cover Crop
- Other “Cuts”

Vine Nutrition

- Less nitrogen, especially with drip irrigation
- Moderate to Low Potassium
- Soil applied micro-nutrients versus foliar

Quality Demands

Vine Balance

Fruit : Vegetative Growth

Production

- Nitrogen 2.9 lb per ton
- Potassium 4.9 lb
- Phosphorus 0.56 lb
- Calcium 1.0 lb
- Magnesium 0.20 lb

Vineyard Design

Establishment Decisions affecting Management

- Spacing
- Rootstock
- Trellis System
- Variety (Clone)


Standard “T”


VSP


Quadrilateral

Vineyard Management

- Crop Load
  - Pruning
  - Variety
  - Vigor
  - Use and Style (Intensity/Complexity)
- Vegetative Growth
  - Irrigation
    - Available water and ET demand
  - Vine Nutrition
    - Vine needs vs. Availability

Canopy Management

- Pruning Level
- Leaf Removal
- Shoot Thinning
- Cluster Thinning

Crop Level Costs

- In addition to pruning setting the potential:
- Shoot Thinning
- Leaf Removal
- Cluster thinning, cost increase for significant quality increase

- Timing is very important in all cases

Deficit Irrigation
Regulated Deficit Irrigation

What is it?

The controlled application of supplemental water below full use levels for seasonal total, i.e., a percentage of full seasonal evapo-transpirational use (100% Et_c).

Irrigation

Deficit Irrigation at 70% Vine ET

Full Water use	25 acre inches per year
70% ET	17.5 acre inches

Probably the most important consideration of all
Early deficits important (budbreak through bloom)
Variety, wine style and nerve affect deficit levels

Why Use Deficits ?

- To control excessive (and unnecessary) vegetative growth while maintaining economic crop production, maximing quality and minimizing disease or pest problems

- To maintain a vine balanced in growth and production with maximum quality

When ?

Early	*Stage I*	bud break to flower set
Mid		flower set to 30 days post
	Stage II	30-40 days post bloom
Late	*Stage III*	veraison to harvest
Postharvest		no stress

How ?

- Minimize early season applied water
- Monitor soil and/or vine water status (stress)
- Irrigate on a schedule based on a percent of vine ET_c for the season
- Induce a moderate stress prior to veraison
- Use caution during hot spells

Interactions with Water

- Past Inputs
  - Organic vs Synthetic
  - Amount
  - Previous crops
- Soil Type
  - Texture
  - Depth
  - Clay type
- Drip vs Furrow
- Cover Crop
- Other Cuts (Robbing Peter to Pay Paul)

Water Source

- Surface Water
- Well Waters *NO3-N*

  pH

1ppm NO3-N = 2.2 lbs N per 12 inches of water

pH can affect nutrient availability and formulation choice to be applied

Nitrogen

- Positives
  - + Growth
  - + Productivity
  - + Fruit development
- Negatives
  - – Excess vigor
  - – Fruit maturity
  - – Rot, , juice pH, color

Potassium

- Positives
  - + Water Relations
  - + Productivity
  - + Acid balance
  - + Ripening
- Negatives
  - – pH
  - – Total acids
  - – Rot, , juice pH, color

Micro-Nutrients

- Zinc (Zn)
  - Sandy soils; historical problem
  - Manure use; negative effect
- Boron (B)
  - Becoming more common, especially sandy soils
  - Optimum range very narrow (0.5 to 1.5ppm)
- Cu, Mn, Fe, Mo
  - Questionable response

Balance of Nutrient Inputs

- N is enhanced by adequate Phosphorus (P) and Potassium (K)
- Magnesium (Mg) competitive
- Sulfur (S)
- Chlorides (Cl) not all bad, but caution needed
  - Consider past crops
  - Review past inputs
  - Petiole tissue samples
  - Source of irrigation water (NO3-N)

Nutrient Analysis

- Soil samples versus Petioles
- Petioles vs Blades
- Number of samples
  - One to two vs monthly or weekly
- Timing
  - Bloom
  - Veraison

Timing of Application(s)

- Nitrogen
  - Post Harvest
  - Mid May (bloom) to Late June (Bunch Closure)
- Potassium
  - Any time, but…
  - Not July through Harvest
    - KCl early vs late
    - KSO4 safer, but more costly
    - KTS very effective, costly (availability?)
    - KMP less used or needed

Foliar vs Soil

- N-P-K less efficient; more costly per pound
- Micro-nutrients very efficient pre-bloom
- Caution on mixing any nutrients
- Recent trends of natural extracts & growth enhancers
  - Can be helpful, but…
- Urea and/or Potassium nitrate KNO3

Chelates & Sequestered

- Plants don’t care about formulation
- More costly per pound

- Drip applied formulations may benefit
- Foliar sprays less important & low concentration more quickly absorbed

Liquid vs Dry Formulations

- Do your own
- Don’t pay for water, but…
- May require more time and labor
- Make some test batches

- Use solutionizer or
- CLEAN spray rig

Pounds K2SO4 per Gallon of Water

	ºF	50	68	86
• K2SO4		0.77	0.92	1.08
• K2O		0.42	0.50	0.58
• K		0.35	0.41	0.48

Vegetation Management

Cover Crops
Cultivation
and Weeds

Pest Management

	Savings for nutrients:
Weed Control	Residual herbicides at ½ to ¼ label rates
Insects/Mites	Low label rates, tolerate some late buildup. Less water stress
Disease	Use of sulfur and nor bunch rot sprays.

Resources

- California Agriculture Special Issue on Sustainable Viticulture
- Lodi Winegrape Commission Grower Assessment Work Book II
- iv.ucdavis.edu
- cesanjoaquin.ucdavis.edu
- lawr.ucdavis.edu

Summary

- Variety and Rootstock
- Water source
- Soil
- Crop Load - previous year (two years)
- Tissue analysis (N less reliable)
- Cover crop competition for nutrients and water vs cultivation
- Maintain leaf area
- Reductions in other practices


"You been
farming
long?"

Remember Those Who Serve