Drought Management Strategies for Grapes

Janet Caprile
Farm Advisor
UC Cooperative Extension
Contra Costa & Alameda Counties
jlcaprile@ucdavis.edu

Lamorinda Winegrape Growers
Captain Vineyards – June 16, 2015

Not Enough Water

Make every drop count!

1. Control weeds
2. Improve irrigation efficiency
   - System maintenance
   - Irrigation management
3. Improve vineyard management

Not Enough Water

1. Control weeds

   & cover crop

They increase water use by 20-30%

- Winter annuals:
  - terminate early
- Permanent:
  - eliminate & renew in fall

Not Enough Water

2. Improve irrigation efficiency

System evaluation & maintenance

- Know the application rate
- Maximize the uniformity
- Maintain the system

Improving Efficiency:

- Know your application rate
  - Measure emitter flow rates
  - Install flow meter
- How uniform is it?
  - Maximize uniformity!

Improving Efficiency:

Causes of non-uniformity

- Poor design

Improving Efficiency:

Causes of non-uniformity

- Leaks & Breaks

Improving Efficiency:

- Causes of non-uniformity
  - Emitters with variable flows

Variable flow rate: clogging

Improving Efficiency:

- Causes of non-uniformity
  - To prevent clogging
    - Clean & flush lines
    - Clean & flush filters
    - Chemical – acid for HCO3
    - Biological –acid, chlorine, Cu

http://micromaintain.ucanr.edu

Not Enough Water

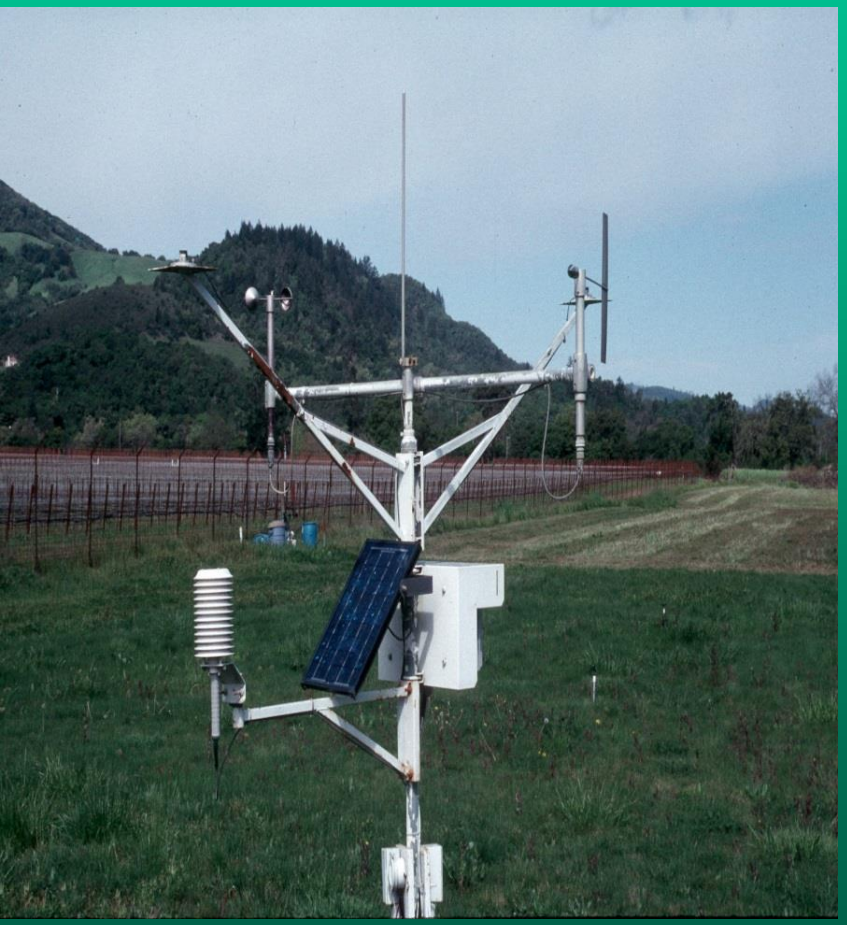
Make every drop count!

- ✓Control weeds
- ✓Improve irrigation efficiency
  - ✓System maintenance
  - – Irrigation management
    - How much to put on?
    - When to do it?

Evapotranspiration

CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
DEPARTMENT OF WATER RESOURCES
OFFICE OF WATER USE EFFICIENCY



ETo is available from local CIMIS weather stations:

- Pleasanton (CIMIS # 191)
- Tracy (CIMIS # 167)
- Brentwood (CIMIS # 47)
- Moraga (CIMIS # 178)
- Union City (CIMIS # 171)

www.cimis.water.ca.gov

Calculating Crop ET (ETc)

To convert Reference ET (ETo) to Crop ET (ETc):

1. Calculate the crop coefficient (Kc) for your own vineyard

   Kc = % shaded area midday x .017

2. Calculate Crop ET

   ETo x Kc = ETc

3. Add a deficit amount

   ETc x RDI = Irrigation

Regulated Deficit Irrigation (RDI)

- Reduce the ETc by a certain amount to:
  - Increase quality
  - Reduce excessive vine growth
  - Save water
- Impose a set RDI throughout the season
  - Moderate stress ~ 50-60% ETc
- Irrigation amount => ETc x RDI

Weekly Irrigation Spreadsheet

DATE	ETo (in/wk)	Kc	ETc (in/wk)	RDI	Irrigation Amount	
					(in/wk)	(gal/vine/wk) *
Jul 8-14	1.5	0.51	.78	.5	.39	12
Jul 15-21	1.4	0.51	.72	.5	.36	11
Jul 22-28	1.4	0.51	.70	.5	.35	11
Jul 29-Aug 4	1.4	0.51	.72	.5	.36	11
Aug 5-11	1.3	0.51	.68	.5	.34	11
Aug 12-18	1.4	0.51	.70	.5	.35	11
Aug 19-25	1.3	0.51	.66	.5	.33	10
Aug 26-Sept 1	1.2	0.51	.62	.5	.31	10
Sept 2-8	1.2	0.51	.62	.5	.31	10

* Gal/vine/wk = inches/wk x .622 x vine spacing (ft^2)

When do you begin?

- Let the vines dry down until they show moderate stress:
  - The vines have stopped growing
  - 50% of available water in the root zone is used
  - Leaf water potential hits target (10-16 bars)
- Once you begin irrigating
  - Apply the calculated ETc x RDI amount for the week
  - The vines should NOT start growing again

Plant Stress Monitoring

- Visual Stress cues

Plant Stress Monitoring

- Pressure Chamber thresholds
  - White Varieties ~ 10-13 bars
  - Red varieties ~13-16 bars
- Stress tolerance varies among varieties:
  - Merlot < Cab Sav < Zinfindel

Soil Moisture Monitoring

There are numerous techniques, devices, and monitoring services available

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Not Enough Water

What if you need to reduce more?

Plan for more stress than usual

- Apply an even deficit all season
- Minimize leaf pulling
- Minimize tucking in divided canopies
- Prune out extra canes, spurs
- Drop excess crop ASAP
- Drop sunburn late to protect remaining

Web Resources

UC Drought Management website

http://ucmanageddrought.ucdavis.edu/

Best Practices for Vineyard Water Management

UCDavis Workshop – 2/20/14:

http://wineserver.ucdavis.edu/content.php?category=VENSource&id=1012

Integrated Viticulture website:

http://iv.ucdavis.edu/Viticultural_Information/