Vineyard Irrigation with a Limited Supply of Water

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UCCE

Mendocino and Lake Counties

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Thanks in Advance to the Land Down Under

- Michael McCarthy, PIRSA-SARDI, Barossa Valley, SA
- Chris Penfold, U. of Adelaida, Roseworthy, SA
- Glyn Ward, Dept. of Food and Agriculture, WA
- Ian Goodwin, Dept. of Environment and Primary Industries, VA

Confirm your irrigation water amount and availability

- Pond levels, well levels, will you be allowed to pump from other surface sources?

Be Sure Your Irrigation System is Working Properly

- Check filters
- Check emitter output
- Flush end of lines
- Fix leaks
- Check pressure
- Need help? UCCE, NRCS

Greywater or Recycled Water

- If you have access to recycled water, get a complete chemical analysis before using it. Recycled winery waste water may have high sodium from caustic used in cleaning
- Consult with a knowledgeable person about the water quality before using
- Avoid saline water (EC>3.0 mmh/cm) “Salty water is worse than no water”
- Bicarbonates can precipitate phosphorus in drip emitters, so check fertilizers for compatibility before injecting anything

Plan On A Smaller Crop If Water is Inadequate

- Prune to fewer buds
- Drop fruit
- Smaller Canopy

How Much Water In Your Soil?

Texture	Inches/Foot	Inches/3 Feet	Inches/4 Feet	Inches/6 Feet
Sand	<0.6	1.8	2.4	3.6
Sandy loam	0.8	2.4	3.2	4.8
Loam	1.5	4.5	6.0	9.0
Clay	>2.0	6.0	8.0	12.0

Manage Water For Growth Stage: Assume 46 inches Eto, Etc Range .3 -.6 (14-28 inches)

Growth Stage	Water Management	Percentage of Total Water Used *	Range, Inland Mendocino Co.
Dormant	Rainfall, light irrigation	?	
Bud break to flowering	Light to moderate irrigation, if no rain	9%	.12-.24 in.
Flowering to fruit set	Irrigation critical for fruit set	6%	.85-1.7 in.
Fruit set to veraison	Hold back: practice RDI	35%	4.9-8.8 in. (start irrigating)
Veraison to harvest	Irrigate to keep the leaves on, ripen fruit	36%	5.0-10.0 in.
Harvest to leaf fall	Nice to irrigate if you can	14%	2.0-4.0 in.

**Source*: Clare Regional Winegrape Growers Association, South Australia, 2002

Pre Bud Break Water Use

Pre Bud Break Irrigation

- Australian research suggests that it is very difficult to compensate for an entire wetted root zone with drip irrigation
- Vines are much more tolerant of reduced irrigation than many thought possible for one season
- Two seasons in a row becomes problematic

Pruning Strategies

- Prune to normal bud number and see what happens with rain
- Reduce buds by limiting a percentage of spurs to one bud
- Long prune, then adjust at bud break. You can also wait until after frost and remove shoots during suckering pass

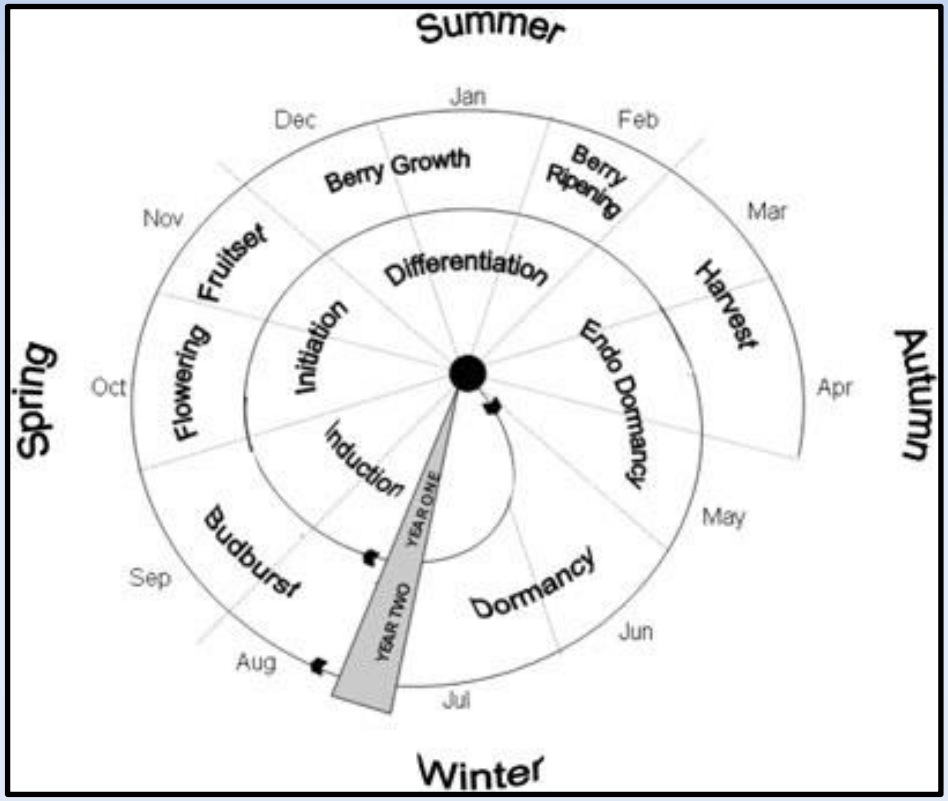
Bud Break

Water Status at Bud Break

- Make sure that you have enough water to wet at least the first two feet of soil
- Most of the North Coast is probably okay this year
- Since we have had at least 8 inches of rain in most regions, there is probably adequate moisture down at least 3 feet
- Verify! Either instrumentation or soil auger

Bud Break to Flowering/ Fruit Set Water Management

The Cycle of Berry and Fruit Development for Grape Vines: 2 Years from Start to Finish



Glynn Ward, Western Australia Dept. of Agriculture and Food

Irrigation Strategy

- Practice Regulated Deficit Irrigation (RDI) so as not to promote a large canopy
- If it is warm and dry, irrigate before bloom. Dryness at bloom will almost certainly result in a poor crop for both this season and next season. Check soil moisture before you irrigate.
- Try to manage water so that you have enough to keep leaves on plant all the way until harvest

Canopy Management

- Do not promote a large canopy with water and fertilizer early in the season if you have limited water.
- Shoots about 3.5 feet long are ideal, with 8 leaves
- Avoid sun burn by light leaf removal in the fruit zone

Thin Shoots (early)

Two Shoots/Spur, Two Clusters/Shoot

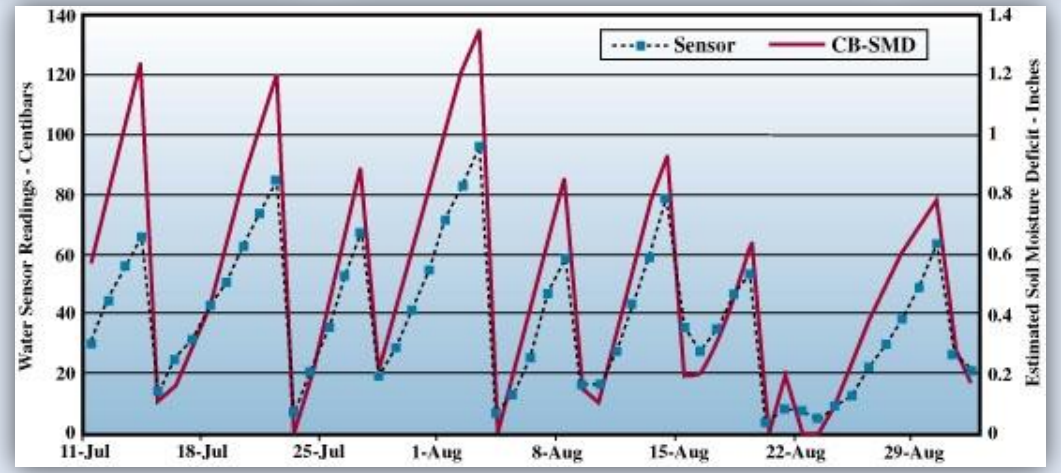
Smaller Canopy, Delayed Maturity?

Fruit Set to Veraison Water Management

Fruit Set to Veraison: RDI

- Limit water to control fruit size, advance maturity and color
- Australians like to use soil moisture measurements, either C probes or water marks
- Visual vine conditions, pressure bombs, stomatal conductance (porometers) also possible

Gypsum Block/ Water Mark



Suggested Soil Water Tensions (kPa) in Three Soil Types* To Start Irrigation

Irrigation	Sand (or shallow roots, hot climate)	Loam (or medium depth roots, cool climate)	Clay (or deep roots, cool climate)
Full ET	40	50	60
RDI	100	200	400

*Ian Goodwin, Department of Environment and Primary Industries, Victoria

Crop Load

- The more fruit, the more water you will need
- If you have no water, consider removing all fruit by machine or urea sprays
- Australians have found that blocks recover best from dry conditions during the next season when fruit has been completely removed
- Consider not irrigating low value blocks if you don't have enough water

Vineyard Floor Management

- Mow or spray out cover crops early to reduce competition for moisture between vines and cover crop
- Australians claim that the residual of dried out cover crop is cooler in the vineyard compared to disked soil (they have less humidity than us, too)
- 12 ounces per acre of glyphosate early will work for chemical mowing of weeds (annuals)
- Disking can be used, too, but erosion and dust are potential problems

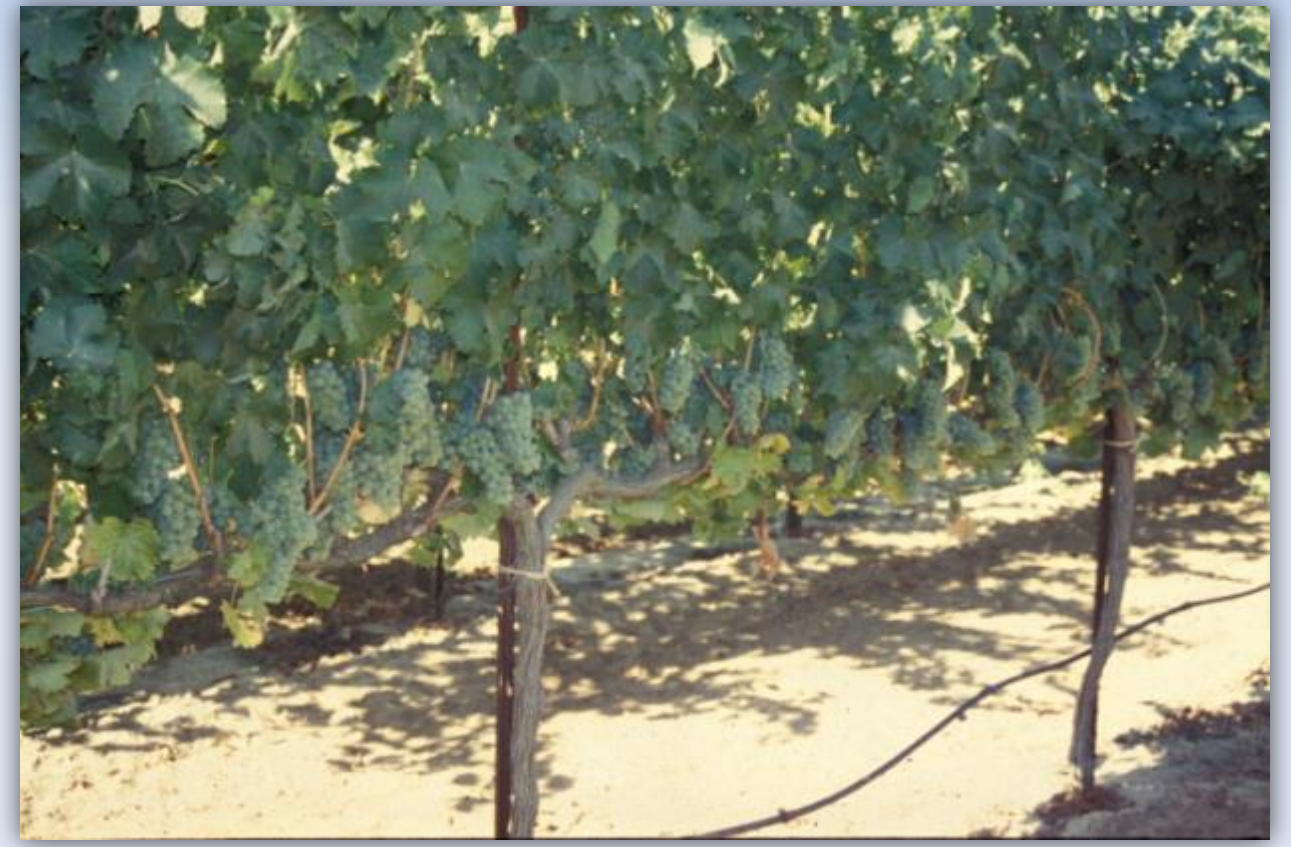
Low Growing Annuals vs. Plow Down Mixes

Summer Vineyard Floor Management

Under the Vine Weed Control Is Critical

Straw Mulching in Australia

Leaf Pulling: Go Light



Know What Your Customer Wants

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Veraison to Harvest Water Management

Veraison to Harvest Irrigation

- Stretch your water as best you can to keep leaves on the vines
- Soil moisture monitoring is really helpful to schedule irrigation
- Short intervals probably best—make sure that you are hitting the roots, and not leaching water through the root zone (6-10 hours depending on soil texture)

Harvest Considerations

- Work closely with the wine maker to check fruit chemistry. Dryer conditions will no doubt affect ripening, especially pH and TA.
- Fruit might ripen at lower sugars—taste, check seed maturity, and fruit chemistry
- If you run out of water, you will ripen by dehydration– low pH, high TA, high % brix sugar. More challenging in the winery

Post Harvest Irrigation

Post Harvest Irrigation

- Very helpful if you are in an area where you expect cold winters (temperatures below 20 degrees F)—less likely to receive winter injury assuming vines are hardened off at harvest
- Hard to call—if you have limited water left and the weather is dry, ????

Final Thoughts

- Australians have accepted climate change
- They irrigate less than we do (always have, always will)
- They don’t use root stocks in many places (own rooted vines)
- Where they use rootstocks, they have eliminated most with Vitis riparia parentage (101-14, SO4, 5C)
- High vigor rootstocks are preferred (Ramsey, 1103 Paulsen, 110 R, 140 RU)

Good Luck for the 2014 Vintage!

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