Welcome to Foothill Grape Day 2018

VINE BALANCE

Lynn R. Wunderlich, Farm Advisor
University of California Cooperative Extension-Central Sierra
Setting the Stage: Factors Affecting Foothill Site Capacities
“Capacity”

**Vine capacity**: total *possible* growth and crop (vegetative and fruit) of which the vine is capable. Winkler, 1962

- Management
- Age of vine
- SITE capacity
The capacity to produce FRUIT depends on the production of WOOD.
“Vigor”
condition expressed in rapid growth of the vine. Rate of growth (related to time). Winkler, 1962

Affected by:
- Scion variety
- Rootstock
- Age
- Management practices
- Weather
- Pests and disease
- Site capacity
SITE capacity: the sum of all environmental aspects that contribute to (or subtracts from) VINE capacity.

Available Water

Soil

Macroclimate

Microclimate
Site Factor: Climate
We now have 7 Powdery Mildew Stations (PMI) up. Thank you to all of the sponsors and hosts:

- Calaveras Wine Alliance-CA. Specialty Crop Grants
- El Dorado Wine Grape Growers
- Fish Friendly Farming-Sierra Nevada Conservancy
- Ironstone
- Lava Cap
- Naylor Vineyards
- Oso Loco Vineyards
- Saureel Vineyards
- Screaming Eagle
- Renwood
- UCIPM
CIMIS station measures reference $E_{to}$ - well watered grass ‘reference’
Average Monthly Maximum Air Temperature 2010-2017: Diamond Springs and Plymouth CIMIS

Diamond Springs CIMIS 228

Plymouth CIMIS 227
Site Factor: Macroclimate

Heat summation in viticulture: Growing Degree Days

Sum of average temperatures above 50°F from April 1 to October 31.

If average daily temperature was 65°F, that day would have accumulated 15 growing degree days (GDD).

Important for variety selection and growth: different varieties require different GDD to adequately mature and ripen.

All varieties require plenty of sunshine!
# Growing Degree Days in Viticulture: Winkler Regions

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<tr>
<th>Region</th>
<th>GDD Range</th>
<th>Grapes</th>
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<tr>
<td>Region I</td>
<td>&lt;2500</td>
<td>Pinot Noir, Pinot Gris, Gewurtraminer, White Riesling</td>
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<td>Cabernet sauvignon, Cabernet franc, Zinfandel, Barbera, Petite Sirah</td>
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<td>Region V</td>
<td>&gt; 4000</td>
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Average Growing Degree Days Measured from Foothill Weather Stations 2015-2017

- Foothill Weather Stations
- Growing Degree Days
- 2015-2017
Measured Precipitation from Foothill Weather Stations Oct. 1 - March 25, 2018
Site capacity factor: SOIL

- Water holding capacity: Depth, Texture, % Rock
- Structure
- Chemistry and Nutrition

UCCE Soil Specialist
Toby O’Geen
http://casoilresource.lawr.ucdavis.edu/
Volcanic Derived Soils: Cohasset, Iron Mountain, Aiken, McCarthy.

Important Properties:
- High water holding capacity
- Phosphorus deficiency
- High Potassium
Granitic Soils: Shenandoah, Auberry, Musick, Holland, Sierra, Ahwanhee, Shaver, Snelling.

Important properties:
- Low water holding capacity
- Potassium deficiency
- Soil depth
Soils formed from granitic parent rock in the Foothills
Metasedimentary Soils: Josephine, Sites, Auburn, Mariposa, Fiddletown.

Important properties:
Moderate water holding capacity
Phosphorus deficiency
Soil depth
Syrah-Mapped to Aiken/Cohasset
Red blotch GRBV Negative
Leafroll 3 Negative
Petioles at 0.3% P
Syrah-Mapped to Aiken/Cohasset
Red blotch GRBV Positive
Leafroll 3 Negative
Site Factor: Available Water
Site Factor: Available Water

How much water do the vines use?

• Available water:
  • precipitation
  • irrigation
  • groundwater

• Soil texture, depth,
  • % rock: PAW

• Microclimate:
  • temp
  • RH
  • radiation
  • wind

• Root growth
• Rootstock
• Variety
• Canopy size, trellis
• Vine age and health
• Cover crop
Reference EvapoTranspiration (ETo) Zones

1. COASTAL PLAINS HEAVY FOG BELT
   - Lowest ETo in California. Characterized by dense fog.

2. COASTAL MIXED FOG AREA
   - Less fog and higher ETo than zone 1.

3. COASTAL VALLEYS AND PLAINS AND NORTH COAST MOUNTAINS
   - More sun than zone 2.

4. SOUTH COAST ISLAND PLAINS AND MOUNTAINS NORTH OF SAN FRANCISCO
   - More sun and higher summer ETo than zone 3.

5. NORTHERN ISLAND VALLEYS
   - Valleys north of San Francisco, higher elevation coastal areas.

6. UPLAND CENTRAL COAST AND LOS ANGELES BASIN
   - High summer sun and wind in some locations.

7. NORTHEASTERN PLAINS

8. ISLAND AREA OF SAN FRANCISCO BAY AREA
   - Island area near San Francisco with some marine influence.

9. SOUTH COAST MARINE TO DESERT TRANSITION
   - Island area between marine and desert climates.

10. NORTH CENTRAL PLATEAU & CENTRAL COAST RANGE
    - Zone 10.

11. CENTRAL SIERRA NEVADA
    - Sierra Nevada Mountain valleys east of Sacramento, with some influence from the delta breeze in summer.

12. EAST SIDE SACRAMENTO-SAN JOAQUIN VALLEY
    - Low winter and high summer ETo with slightly lower ETo than zone 14.

13. NORTHERN SIERRA NEVADA
    - Northern Sierra Nevada mountain valleys with less marine influence than zone 11.

14. MIDDLE VALLEY, SOUTHERN SIERRA NEVADA, TEHACHAPI & HIGH DESERT MOUNTAINS
    - High summer sun and wind in some locations.

15. NORTHERN & SOUTHERN SAN JOAQUIN VALLEY
    - Slightly lower winter ETo due to fog and slightly higher spring ETo than zone 12 & 14.

16. WESTSIDE SAN JOAQUIN VALLEY & MOUNTAINS EAST & WEST OF IMPERIAL VALLEY

17. HIGH DESERT VALLEYS
    - Valleys in the north and some in the southern part of the state.

18. IMPERIAL VALLEY, DEATH VALLEY & PALO VERDE
    - Low desert areas with high sun and considerable heat advection.

Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)

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Variability between stations within single zones is as high as 0.02 inches per day for zone 1 and during winter months in zone 13. The average standard deviation of the ETo between estimation sites within a zone for all months is about 0.01 inches per day for all 200 sites.

Diamond Springs ave. ET0 April-Oct: 44 ac-in

Plymouth ave. ET0 April-Oct: 40 ac-in
Converting $E_{To}$ to crop ET ($E_{Tc}$) and actual ET ($E_{Ta}$)

$E_{Tc} = E_{To} \times K_c$

$E_{Tc} = 40 \text{ ac-in} \times K_c$

$E_{Tc}^{\text{(grape, no stress)}} = E_{To} \times (\% \text{ shaded area}) \times 0.017$

$E_{Tc}^{\text{(grape, no stress)}} = (40) \times (25) \times 0.017 = 17 \text{ acre-inches}$

$E_{Ta}^{\text{(grape actual, RDI)}} = E_{Tc} \times \text{“management factor”}$

$E_{Ta}^{\text{(grape actual, RDI)}} = 17 \times 0.5 = 8.5 \text{ ac-inches} \times (27,154 \text{ gallons/ac-in}) = 230,809 \text{ gallons/acre}$

Vines spaced 6 x 10 = 726 vines/acre, 317 gallons of water used per vine

http://cecentralsierra.ucanr.edu/Agriculture/Workshop_Presentations_529/
Vines can consume more water than you might think

Wunderlich, Shackel, Snyder and Zaccaria, unpublished.
Vine spacing is 5 feet X 6 feet (1452 vines/acre)

**Yield:** 4.6 tons (South) and 5.3 tons (North)

**Ravez Index: Vine yield/pruning weight**

S: 3.68  
N: 3.83
Vine Balance: Crop Load Management

Canopy and last year’s wood

Yield: fruit (RIPE) and next year’s wood
Foothills very challenging: different “capacity” in different regions, counties, even individual parcels and within parcels. Makes it difficult to translate a particular vineyard practice that works well in one location onto another parcel.

The better you understand your own site and site capacity, the better you will be to properly manage your vineyard or help others manage it for you, to achieve VINE BALANCE.
Thank you!

lrwunderlich@ucanr.edu