Welcome to Foothill Grape Day 2013:

“Quality Collaborations”
Thanks to:

Robin Cleveland, UC Cooperative Extension

Nancy Starr, UC Cooperative Extension

Bill and Carrie Manson, Cielo Estate for their generous hospitality

Sierra Rizin Bakery

Sheila Bush for her gluten-free bread

Mid-Valley Ag for our wine glasses

Our UC, USDA speakers:
Dr. Andy Walker and Dr. Sudhi Sudarshana

The grower/winemaker panelists:
Stephen Colum, Scott Klann, Carol Laubach, Kris Mapes, Bill Naylor and Jonathan Lachs.

All of the wineries who donated wine and everyone who volunteered to help pour so we could taste, share, and enjoy.
Precipitation (inches) from Foothill CIMIS Stations for Past 3 Years

- Camino #13:
  - 2011: 11.87
  - 2012: 35.83
  - 2013: 26.51
- Diamond Springs #228:
  - 2011: 17.96
  - 2012: 24.37
  - 2013: 21.86
- Plymouth #227:
  - 2011: 11.87
  - 2012: 20.15
  - 2013: 17.96

*Note: Figures in italics represent precipitation data from the most recent year.*
Foothill Research Update: Tools You Can Use to Improve Quality.

Lynn R. Wunderlich, UC Cooperative Extension Farm Advisor, Central Sierra
Foothill Research projects 2012-2013

1. Early leaf pulling for Botrytis management
Collaborators: Rhonda Smith, UCCE Sonoma; Holly’s Hill Vineyard, Goldbud Farms, Cedarville Vineyard and Naylor Vineyards. **Quality goal:** Botrytis bunch rot control, improved juice parameters (?)

2. Powdery Mildew Index Stations
Lead/Collaborators: Doug Gubler and Brianna McGuire, UCDavis Plant Pathology, *USDA Specialty Crop grant, *Various donors (Gubler), Joyce Strand, Marty Martino, UCIPM; American Screaming Eagle, Renwood Winery, Lauzere Vineyard Services, Oleta Vineyards, Amador Winegrowers. **Quality goal:** Improved p.m. control, cost savings? (reduced number of sprays), logistics

3. ET Slope Measurements for Irrigation Management
Lead/Collaborators: Rick Snyder, UCDavis Biometeorology, Tom Shapland, UCD, Ali Montazar, Silvio Lima; Cayle Little, CDWR, Walker Vineyard. **Pressure Bomb Measurements for Irrigation Measurement** Collaborators: Ken Shackel, UCD Irrigation Specialist, Growers. **Quality goal:** Improved irrigation management, efficiency.

Lead: Toby O’Geen, UCDavis LAWR, Growers, *UCANR Core Grant funding. **Quality goal:** Improved nutrition and water management, decision making for new plantings, marketing tool (?)
Early leaf pulling for Botrytis Management
Berries become infected, especially in wet springs. These infections *remain latent* until berry ripens.

Slide courtesy of R. Smith, UCCE Sonoma
Berry to berry spread pre-harvest
Why pull leaves *early*?

- Reduce fruit set, thus producing *looser cluster*
- Alter canopy *microclimate* for reduced rot
- Increase fungicide spray *coverage*
- Alternative to Gibb. applications (less risky?)
- Growing body of scientific lit. with promising results, and also showing increase in positive juice attributes.
Leaf removal can effectively manage Botrytis bunch rot and the "summer bunch rot complex" of wine grapes in the San Joaquin Valley and coastal growing areas. The practice may help manage such insect pests as leafhoppers. Producers have adopted leaf removal as a routine cultural practice, especially where high-value, premium varietals are grown.

Grapevine canopy management by leaf removal has been shown to be of significant value for integrated pest management (IPM) of Botrytis bunch rot of grape in coastal growing areas (California Agriculture, March-April 1989). Adoption by viticulturists in coastal valleys has been rapid and successful, and has been aided by research data showing trends toward improved grape must and wine quality parameters after the leaf-removal treatment. Improvement of wine quality is of highest importance to producers of premium varietals.

Although most of California's premium varietal wine grape production is concentrated in the coastal areas, the majority of wine grape acreage is located inland, in the San Joaquin Valley. This latter production area is characterized by relatively hot and dry climatic conditions during much of the growing season. A complex of diseases including sour bunch rot, Aspergillus bunch rot, Botrytis bunch rot, and powdery mildew, and arthropod pests such as corn earworm and leafhopper are responsible for causing bunch rot, resulting in yield and quality losses in Valley growing areas.

Before promoting leaf removal as a standard IPM practice, we needed to test its effects on incidence and severity of bunch rot under the different climatic conditions. Objectives of this research also included determining the effects of leaf removal on a broad range of grape pests, since control of problems other than bunch rot can increase the value of leaf removal over its cost of application.

Results of this study showed that leaf removal can significantly reduce incidence and severity of bunch rot in the San Joaquin Valley, as has been shown previously and confirmed here for coastal areas. Leaf removal also can reduce populations of leafhoppers. We found no consistent effect on grape yield and quality parameters during these studies.
Our study in 2012 (repeated this year)

• Petite sirah with heavy Botrytis in 2011
• Split block design with 2 treatments, 4 replicates
  – Leaf Pull Timing
    • **Early** leaf pull (first sign of bloom-June 3, 2012; May 15, 2013)
    • **Normal** leaf pull (July 2, 2012)
  – Botrytis Spray Program
    • **No** botrytis sprays
    • **Botrytis** sprays (timed for bloom-6/11/12 and pre-bunch closure-7/1/12): Vanguard 10 oz/ac
• Measured:
  – #berries/cm. rachis (“looseness”)
  – Percent rotten fruit weight
  – Cluster weight
  – Berry weight
  – Percent sunburn
  – Brix
Effect of Botrytis sprays compared to no Botrytis sprays in 2012

- No Botrytis Spray
- 2X Vanguard Botrytis Spray

Bar charts showing:
- % Sunburned
- % Rotten Fruit Weight
- Cluster Wt (g)
- 100 Berry Wt (g)
- # Berries / cm rachis
- Degree Brix
Effect of early leaf pulling compared to normal leaf pull timing in 2012

- Normal Leaf Removal Timing
- Early Leaf Removal

### Graphs

- **Cluster Wt (g)**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'

- **100 Berry Wt (g)**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'

- **# Berries / cm rachis**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'

- **% Sunburned**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'

- **% Rotten Fruit Weight**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'

- **Degree Brix**
  - Normal Leaf Removal: Category 'a'
  - Early Leaf Removal: Category 'b'
Early leaf pull 2012 summary

- Not much Botrytis in 2012
- Probably went too late with early leaf pull treatment
- No interaction effects (spray x leaf pull)

Main effects:

- **No difference in botrytis** in sprayed vs. unsprayed as measured by % rotten fruit weight for either spray or leaf pull
- **No difference in cluster looseness** in early leaf pull vs. normal as measured by #berries/cm rachis for either spray or leaf pull
- Degree Brix higher for early leaf pull and for Botrytis spray treatment as measured by 100 berry sample
- Percent sunburned berries higher for leaf pull treatment, cluster weight lower for leaf pull treatment.
- Repeat in 2013 (bigger Botrytis year?)
Using the Powdery Mildew Index
How the index works
Powdery mildew is a fungus: growth is temperature dependent.
**Optimal powdery mildew growth is between 70-85 °F** *(canopy temperatures can be different than ambient).* Too cold or too hot and growth is slowed.

Powdery mildew index (PMI or **RAI**, Risk Assessment Index) is calculated based on temperatures. Scale 0-100 recorded daily.

**To initiate the index. At bud break:** Spore trap, use a leaf wetness sensor OR assume spores are present after sufficient moisture *(rain and leaf wetness).*

Starting with the index at 0 on the first day, add 20 points for each day with **6 or more continuous hours of temperatures between 70 and 85°F**. Until the index reaches 60, if a day has fewer than 6 continuous hours of temperatures between 70 and 85°F, reset the index to 0 and continue.

**Index number tells you:**
1. How quickly powdery mildew is reproducing *(ASSUMING it is present).*
2. When to spray
3. What to spray
4. How long your chosen fungicide will last *(spray interval)*
# SPRAY INTERVALS BASED ON DISEASE RISK USING THE POWDERY MILDEW INDEX

<table>
<thead>
<tr>
<th>Index</th>
<th>Risk</th>
<th>Pathogen status</th>
<th>Suggested spray schedule</th>
<th>Biologicals(^1) and SARs(^2)</th>
<th>Sulfur</th>
<th>Sterol-inhibitors(^3)</th>
<th>Strobilurins(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>low</td>
<td>present</td>
<td>7- to 14-day interval</td>
<td>14- to 21-day interval</td>
<td>21-day interval or label interval</td>
<td>21-day interval or label interval</td>
<td></td>
</tr>
<tr>
<td>30-50</td>
<td>intermediate</td>
<td>reproduces every 15 days</td>
<td>7-day interval</td>
<td>10- to 17-day interval</td>
<td>21-day interval</td>
<td>21-day interval</td>
<td></td>
</tr>
<tr>
<td>60 or above</td>
<td>high</td>
<td>reproduces every 5 days</td>
<td>use not recommended</td>
<td>7-day interval</td>
<td>10- to 14-day interval</td>
<td>14-day interval</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) *Bacillus pumilis* (Sonata) and *Bacillus subtilis* (Serenade)

\(^2\) SAR = Systemic acquired resistance products (AuxiGro, Messenger)

\(^3\) tebuconazole (Elite), triflumizole (Procure), myclobutanil (Rally), fenarimol (Rubigan), and triadimefon (Bayleton)

\(^4\) methyl (Sovran), and pyraclostrobin/boscalid (Pristine)
We have 2 powdery mildew stations in Shenandoah Valley, data online at UCIPM

Amador-Eagle
Distacio Ranch, 1470 feet
Head trained zinfandel
Budbreak April 1

Amador-Renwood
Renwood, 1580 feet
Bilateral trained zinfandel
Budbreak April 10
How to Manage Pests

Interactive Tools and Models:
Grape Powdery Mildew Risk Assessment Index

The grape powdery mildew risk assessment index (RAI) is useful for determining disease pressure and how often you need to spray to protect the vines. For information on how to use the RAI, see the pest management guideline.

Powdery mildew risk for stations in counties:
- Fresno
- Madera
- Amador
- San Joaquin

RAIs are based on actual weather data for stations that take appropriate readings.

<table>
<thead>
<tr>
<th>County</th>
<th>Active weather stations (Click on station for year-to-date graph/daily data)</th>
<th>RAI* for 06/04/2013</th>
<th>Disease pressure</th>
<th>Pathogen status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amador</td>
<td>Based on bud break, March 29, in , you may need to adjust for other cultivars that emerge earlier than the indicated date.</td>
<td>80</td>
<td>high</td>
<td>reproduces every 5 days</td>
</tr>
<tr>
<td></td>
<td>Amador_Eagle-01.P, FAG1, Screaming Eagle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amador_Renwood-01.P, REN1, Renwood Winery</td>
<td>80</td>
<td>high</td>
<td>reproduces every 5 days</td>
</tr>
<tr>
<td>Fresno</td>
<td>Based on bud break, March 14, in Thompson Seedless, you may need to adjust for other cultivars that emerge earlier than the indicated date.</td>
<td>0</td>
<td>low</td>
<td>is present</td>
</tr>
<tr>
<td></td>
<td>CARUTHERS-01.P, CAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Del_Rey/Fowler-01.P, DELF</td>
<td>40</td>
<td>intermediate</td>
<td>reproduces every</td>
</tr>
</tbody>
</table>
Powdery mildew experimental sites:
Ostrom and Davancy
4 treatments (p.m. control timing),
3 replicates each:

1. Grower standard
2. Actual model
3. “Virtual” model
4. Untreated for mildew

Leaf and fruit evaluations
200 leaves/rep, 600/treatment
Comparison of grower standard to model (actual station) spray program: Davancy site

Actual model:
- 4/24/13 micronized sulfur + sticker
- 5/2/13 micronized sulfur + sticker
- 5/10/13 micronized sulfur + sticker
- 5/19/13 Mettle + sticker
- 5/29/13 Pristine + sticker

Grower standard:
- 4/24/13 micronized sulfur + sticker
- 5/4/13 micronized sulfur + sticker
- 5/14/13 Mettle + sticker

Virtual model: Dropped from experiment due to problems.
Powdery mildew station locations in Shenandoah Valley, 2013

- Renwood: 1580 ft.
- Shenandoah High: 1470 ft.
- Storm: 2553 ft.
Powdery mildew index for Amador stations, Spring 2013
Powdery mildew spore trap
ET Slope Measurements ("Surface renewal") for Irrigation Management

UC Davis Biometeorology Specialist Rick Snyder setting up radiation measurement tools in the Walker vineyard.
ET (Evapotranspiration): water evaporation from plant leaves (transpiration) and soil surface (evaporation).

$E_{tc}$: incorporates crop coefficient (canopy, shading)

ET requires ENERGY: **Solar radiation**

Solar radiation has several “sinks”: soil surface, sensible and latent heat flux.

Surface renewal estimates ET based on energy equation for solar radiation.
Napa study using surface renewal method to estimate ET on slope.

Level vineyard: 2.4 mm/day (June-Sept.)

NE aspect: 2.2 mm/day

SW aspect: 2.7 mm/day
Leaf water potential (“Pressure bomb”)
Ken Shackel, UCD

Strategy based on research and experience.

*Less than -10 bars: no stress
-10 to -12: mild stress
-12 to -14: moderate
-14 to -16: high stress
Above -16: severe stress

*Pritchard and Smith, Irrigation Short course 2009
Soil Survey Decision Support Tools/Understanding Foothill Soils
Toby O’Geen, UCDavis LAWR

Geographic Nutrient Management Zones
Water Management
Rootstock selection, vineyard design

Terroir: What makes the foothills unique?

Soil Pit Field Days:
August 29: El Dorado,
Sept. 6: Calaveras
Thank You!

http://cecentralsierra.ucanr.edu/Agriculture/Viticulture/