Vineyard Weed Management and Covercrops
Why Manage Weeds?

Direct competition
Why Manage Weeds?

**Direct competition**

Extremely important when grapes are young.
There is a milk carton under there!
Why Manage Weeds?

Direct competition

Water (stress) management
Why Manage Weeds?

Direct competition

**Water (stress) management**

If you determine how much water each vine should receive, how do you account for the weeds?
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
Why Manage Weeds?

Direct competition
Water (stress)management

Frost protection

Interfering with absorption and reradiation of warmth may add to frost damage
Why Manage Weeds?

Direct competition
Water (stress)management
Frost protection

**Harbor other pests**
Why Manage Weeds?

Direct competition
Water (stress)management
Frost protection

Harbor other pests

Vole, gophers, insect hosts
Why Manage Weeds?

Direct competition
Water (stress)management
Frost protection
Harbor other pests
Block air movement
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- **Block air movement**
  
  Reduced air movement could increase pathogens and frost potential
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- Block air movement
- Interfere with harvest operation
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- Block air movement
- **Interfere with harvest operation**
- By hand or machine, weeds in the cluster are not a good thing
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- Block air movement
- Interfere with harvest operation
- Effect crop quality
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- Block air movement
- Interfere with harvest operation
- **Effect crop quality**
- Off-flavors from weeds
Essentials of Good IPM Program for Weeds

• Know the ecology and dynamics of your crop.
• Know your weeds: Identification and biology.
• Have a monitoring program- and use it!
• Consider all management techniques and determine which is best for you
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Northern California Weed Control Calendar

- September
- October
- November
- December
- January
- February
- March
- April
- May
- June
- July
- August

- Harvest
- Frost-leaf drop
- Bud Break
- Verasion
- Dependable (?) Precipitation for incorporation
- Preemergence Herbicides
- Late Fall Herbicides
- Contact herbicides
- Drip irrigation
- "Summer" annuals
- Horseweed
- Ryegrass
- Filaree
- Malva
- Fluvellin
- Horseweed
- Summer grasses*
- Fluvellin

Contact herbicides
- glyphosate

Preemergence Herbicides
- glyphosate
Essentials of Good IPM Program for Weeds

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Malva
Ryegrass

- Species  *Lolium perenne* L. – perennial ryegrass
  - Subspecies - multiflorum (Lam.) Husnot – Italian ryegrass
  - Subspecies - perenne – perennial ryegrass
- Species  *Lolium rigidum* Gaudin – Wimmera ryegrass
Confirmed Herbicide Resistance in Italian Ryegrass in Northern California

• Glyphosate (Roundup and others) (Lanini)
• Glufosinate (Rely, Lifeline and others) (Jasieniuk)
• Fluazifop (Fusilade) (Hanson, Brunharo)
• Paraquat (Gramoxone) (Hanson, Brunharo)
• Sethoxydim (Poast) (Hanson, Brunharo) (reduced effectiveness)
Essentials of Good IPM Program for Weeds

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• **Have a monitoring program- and use it!**
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Sharp-point Fluvellin (*Kickxia elatine*(L.)Dumort)

- Reproduces by seeds
- Most seeds germinate in spring or summer
- Will germinate thru fall if moisture is present.
- Seeds can last up to 20 years!
Transects 126 ft. long/252 points
Transects 126 ft. long / 252 points
Transects 126 ft. long/ 252 points
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Undervine weed management strategies

- Undervine cover cropping +/- mowing
  - Tillage
  - Flaming
  - Animals
  - Herbicides
Undervine cover cropping +/- mowing
Undervine cover cropping +/- mowing

Weed Competition
Erosion control
CO2 sequestration
Undervine cover cropping +/- mowing
Undervine cover cropping +/- mowing
## Undervine cover cropping +/- mowing

<table>
<thead>
<tr>
<th>Row #</th>
<th>willowherb</th>
<th>fluvellin</th>
<th>bindweed</th>
<th>oxtounge</th>
<th>sow/prec let</th>
<th>bur clover</th>
<th>dry grass</th>
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<tbody>
<tr>
<td>10</td>
<td>3.2%</td>
<td>0.0%</td>
<td>4.4%</td>
<td>2.4%</td>
<td>0.0%</td>
<td>4.4%</td>
<td>92.9%</td>
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<td>0.0%</td>
<td>1.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>5.6%</td>
<td>87.3%</td>
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<tr>
<td>25</td>
<td>1.6%</td>
<td>0.0%</td>
<td>5.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.2%</td>
<td>85.7%</td>
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<tr>
<td>31</td>
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<td>0.0%</td>
<td>4.0%</td>
<td>2.8%</td>
<td>0.0%</td>
<td>2.0%</td>
<td>96.4%</td>
</tr>
</tbody>
</table>

Transects 126 ft. long/ 252 points
Undervine cover cropping +/- mowing
Undervine cover cropping +/- mowing

Increased vertebrate pests
Undervine weed management strategies

- Undervine cover cropping +/- mowing
- Tillage
- Flaming
- Animals
- Herbicides
Tillage
Is our vineyard suitable for mechanical cultivation?
Tillage

- Excellent weed control
- Non-chemical
Tillage- timing is very important
Tillage

Fossil Fuel Use

Release sequestered CO2

Erosion

Vineyard following cultivation
Tillage –
Undervine weed management strategies

- Undervine cover cropping +/- mowing
- Tillage
- Flaming
- Animals
- Herbicides
Flaming
Flaming - Advantages

- No resistance
- No residue
- Non-chemical
Flaming Disadvantages

- Timing important
- Not as good on grass
- Cost
- Potential Fire Hazard
Undervine weed management strategies

- Undervine cover cropping +/- mowing
- Tillage
- Flaming
- Animals
- Herbicides
Undervine weed management strategies

Sheep?
Animals

In the right situation, animals can do a good job of weed control.
In the wrong situation animals can cause compaction, and crop damage—can be expensive—do you rent or buy? Commercial operations use 200-300 head/acre. Are there health/safety restrictions?
Animals
Animals
Undervine weed management strategies

• Undervine cover cropping +/- mowing
• Tillage
• Flaming
• Animals
• Herbicides
<table>
<thead>
<tr>
<th>Herbicides Registered for Use on Bearing Grapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surflan</td>
</tr>
</tbody>
</table>
Herbicide Resistance

- Herbicide resistance: the inherited ability of a plant to survive and reproduce following exposure to a dose of herbicide normally lethal to the wild type.
  “We used to be able to control this weed with this treatment but it doesn’t work as well anymore…”

Herbicide Tolerance

- Herbicide tolerance: the inherent ability of a species to survive and reproduce after herbicide treatment; implies no selection or genetic manipulation to make the plant tolerant.
  “We’ve never gotten dependable control of this weed with this herbicide…”
Remove leaves and debris

Plots raked and treated on December 19th with 10 oz Chateau +24 oz Roundup
60% Leaf Cover

Raked pre-treatment

Raked post treatment

Unraked pre-treatment

Unraked post treatment
<table>
<thead>
<tr>
<th>% Leaf Cover</th>
<th>% Fillaree Cover</th>
<th>% Willowherb control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/1/2008</td>
<td>6/12/2008</td>
</tr>
<tr>
<td>60</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>40</td>
<td>5</td>
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<td>33</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Ave</td>
<td>8.30%</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>96%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60%</td>
</tr>
</tbody>
</table>
Vineyard floors easily divide into two management areas:

- Undervine
- Middle
- Undervine
Vineyard Floor Management

Middles:
No Covercrop

Covercrop
Covercrops—Potential Benefits

Vineyard access in winter
Reduced soil erosion and offsite movement
Addition of organic matter
Enhanced pest management
Covercrops—Potential Benefits

- Improved soil structure and water penetration
- Enhanced aesthetics
- Addition of nutrients (nitrogen)
- Competition for moisture and nutrients—growth management
Covercrops-Potential Drawbacks

- Increased frost hazard
- Competition for moisture and nutrients
- Increased vertebrate pests
- Addition of nutrients (nitrogen)
Covercrops - Potential Drawbacks

Additional equipment
Increased water use
Increased cost and management
Middles are managed as:
No till- mowed permanent or annual cover
Cultivated- ‘mow down mix’
Combination- every other row
No-Till Mowing Advantages

- Erosion Control and reduced offsite movement
- More competitive to weeds
- Winter access to vineyard
- Vine vigor management
No-Till Mowing Disadvantages

- Higher potential for frost
- Competition when growing near vines
- Increased water use
No-Till Mowing Disadvantages

Favors low-growing and perennial weeds
Cultivated Middles
Cultivated Middles

Advantages

Added Organic Matter
Cultivated Middles

Advantages

Release of Nitrogen
Cultivated Middles Advantages

Reduced competition for Water
Cultivated Middles Advantages

Controls Weeds in Middles
Cultivated Middles Disadvantages

Increased Erosion Potential
Cultivated Middles Disadvantages

Increased Dust Potential
Cultivated Middles Disadvantages

Increased Erosion Potential
Cultivated Middles

Disadvantages

Release of Nitrogen - May increase vine vigor
Covercrops

Types of Covercrop

[Images of different types of covercrops]
Covercrops

Resident Vegetation
Covercrops

Resident Mustards
Covercrops

Cultivated Mustards/Radish
Covercrops

Insectaries mix
Covercrops

Annual Grass-reseeding
Covercrops

Cereal
Covercrops

Perennial Legume-Clover
Covercrops

Annual Legume-Cereal Mix
Covercrops

Perennial Grass
Covercrops

Perennial Grass-Turf-Type
Cover Cropping in Vineyards-A Grower’s Handbook-
Chuck A. Ingels, Robert L. Bugg, Glenn T. McGourty, and L. Peter Christiensen
DANR Publication -3338
Covercrop Resources

UC SAREP Program webpage-
http://www.sarep.ucdavis.edu
on the left menu look for Cover Crops

Thank You!