Weed Control Options for Vineyards

University of California
Agriculture and Natural Resources

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UC CE Weed Science Advisor
Why Manage Weeds?
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, increased moisture and disease pressure
Why Manage Weeds?

Direct competition

Water (stress) management

Frost protection

Harbor other pests

**Interfere with harvest operation**
Why Manage Weeds?

Direct competition

Water (stress)management

Frost protection

Harbor other pests

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
Interfere with harvest operation
Effect crop quality
Why Manage Weeds?

- Direct competition
- Water (stress) management
- Frost protection
- Harbor other pests
- 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
Essentials of Good IPM Program for Weeds

▪ Know the ecology and dynamics of your crop.
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# Grape Lifecycle

## VITICULTURE MANAGEMENT

### WEATHER
- Rain hazard on fruit
- Frost danger—spring
  - fall
- Heat spell hazard

### THE VINE
- Dormant period
- Bud break
- Rapid shoot growth
- Bloom
- Veraison (berry softening)

### HARVEST
- Wine grapes—early
  - midseason
  - late

## VITICULTURE OPERATIONS
- Pruning
- Nitrogen (N) fertilization
- Shoot removal
- Leaf removal
- Spring cultivation
- Plant cover crops for erosion control
- Irrigation
- Preharvest vine preparation
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.
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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- Know your weeds: Identification and biology.
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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
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.
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>
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<td>2.8%</td>
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<td>96.4%</td>
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Transects 126 ft. long/252 points
Undervine cover cropping +/- mowing
Alternative weed management in vineyards.

Undervine covercrop?

Increased vertebrate pests
Undervine weed management strategies

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

Fossil Fuel Use

Release sequestered CO₂

Erosion

Vineyard following cultivation
Tillage
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
Alternative weed management in vineyards.

Will you utilize sheep?
Animals

In the right situation animals can do a good job of weed control.
Animals

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>
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<tbody>
<tr>
<td>Surflan</td>
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<tr>
<td>Chateau</td>
</tr>
<tr>
<td>Princep</td>
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<tr>
<td>Goal</td>
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<td>Solicam</td>
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<td>Kerb</td>
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<td>Alion</td>
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<td>Casoron</td>
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<td>Karmex</td>
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<td>Devrinol</td>
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<td>Trellis</td>
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<td>Prowl</td>
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<td>Matrix</td>
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<td>Glyphosate</td>
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<td>Goal</td>
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<td>Shark</td>
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<tr>
<td>Fusilade</td>
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<tr>
<td>2,4-D</td>
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<tr>
<td>Poast</td>
</tr>
<tr>
<td>Venue</td>
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</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>
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<tr>
<td>%</td>
<td>Raked</td>
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<tr>
<td>Ave</td>
<td>8.30%</td>
<td>28%</td>
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Comparison of Weed Control Methods

Year 1
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<tr>
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<th>Treatment</th>
<th>Fall</th>
<th>Late Winter/Spring</th>
<th>Early Summer</th>
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<tr>
<td>1</td>
<td>WHITE</td>
<td>Total cultivation</td>
<td>Cultivate</td>
<td>Cultivate</td>
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<tr>
<td>2</td>
<td>BLUE/WHITE</td>
<td>Cultivate + post herbicide</td>
<td>Cultivate</td>
<td>Post herbicide (Glyphosate)</td>
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<tr>
<td>3</td>
<td>ORANGE/WHITE</td>
<td>Cultivate + organic herbicide</td>
<td>Cultivate</td>
<td>Organic herbicide</td>
</tr>
<tr>
<td>4</td>
<td>BLACK</td>
<td>Conventional Post then Pre + Post</td>
<td>Glyphosate</td>
<td>Glyphosate + Flumioxazin</td>
</tr>
<tr>
<td>5</td>
<td>BLUE</td>
<td>No-Till Post herbicide (glyphosate)</td>
<td>Glyphosate</td>
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<tr>
<td>6</td>
<td>PINK</td>
<td>No-Till Post herbicide (glufosinate)</td>
<td>Glufosinate</td>
<td>Glufosinate</td>
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<tr>
<td>7</td>
<td>ORANGE</td>
<td>Organic-No-Till</td>
<td>Suppress 7%</td>
<td>Suppress 7%</td>
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</tbody>
</table>

First cultivation November 10  
Second cultivation March 15  
Third cultivation May 31  
First Herbicide application Dec 20  
Second Herbicide application Mar 9  
Third Herbicide application June 9  
Weed Eater June 9
<table>
<thead>
<tr>
<th></th>
<th>May 25</th>
<th>July 6</th>
<th>July 6</th>
<th>May 25</th>
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<tr>
<td></td>
<td>Overall</td>
<td>Overall</td>
<td>AVE</td>
<td>Fluvellin</td>
<td>Fluvellin</td>
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<td>Cultivate + post herbicide (glyphosate)</td>
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</table>
Treatment 1
Total cultivation
Treatment 2
Cultivate +glyphosate
Treatment 3
Cultivate + Suppress
Treatment 4
Conventional Post then Pre +Post
Treatment 5
No-Till Post herbicide (glyphosate) 3 times
Treatment 6
No-Till Post herbicide (glufosinate) 3 times
Treatment 7
Organic-No-Till  (Suppress 2 times- mowing)
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
Thank You

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