

# **Weed Control Strategies with Herbicides**

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# Weed Control Strategies with Herbicides

At the 2002 Grape Growers Conference, I did a presentation on “Weed Control In New & Established Vineyards”. That presentation covered the various methods of weed control, introduced the herbicides registered for use on grapes, and cover the calibration of an herbicide sprayer.

## Cultural:

- Mechanical
- Mulching
- Burning
- Biological

## Chemical:

- Fumigation
- Herbicides
  - Materials
  - Calibration

# Weed Control Strategies with Herbicides

This presentation covers effective strategies for using grape herbicides, and will attempt to answer the following questions:

- What herbicides can be use?
- When should they be use?
- How should they be applied?
- How much is needed?
- How cost effective is it?

# Types of Herbicides

Pre-emergence Herbicide

Post-emergence Herbicide



Applied in late fall or spring  
before weed seeds germinate.



Applied in spring or summer after  
weed seeds have germinated.

# Herbicides Registered for Grapes \*

| Pre - emergence   |                    | Post - emergence    |
|-------------------|--------------------|---------------------|
| Casoron /         | Kerb (6 mo AP, R)  | Fusilade (NB only)  |
| Norosac (4wk AP)  | Princep (3 yrs AP) | Gramoxone Extra (R) |
| Devrinol          | Prowl (NB only)    | Poast               |
| Gallery (NB only) | Snapshot (NB only) | Rely                |
| Goal              | Solicam (2 yrs AP) | Roundup Ultra       |
| Karmex (3 yrs AP) | Surflan            | Select (NB only)    |
|                   | Treflan            | Touchdown           |

Some have restrictions regarding when & by whom they can be used:  
 AP = after planting; NB = non-bearing; R = restricted use pesticide

\* Refer to **PM-1375** *Midwest Commercial Small Fruit & Grape Spray Guide*  
 (an annual publication)

# Characteristics of Pre-emergence Herbicides

## Control weeds as they germinate.

- Most must be applied before the weeds emerge.
- Require rain / irrigation (1/2 to 1”), or incorporation into the soil to “activate”.
- Most have residual activity that provides season-long control, with some carrying over to the following year.
- Will not control established perennial weeds.

## They are broad-spectrum (non-selective).

- Generally a given herbicide will provide better control of one type of weed than the other (Broadleaf vs. Grasses).
- Avoid using the same pre-emergence herbicide each year.

# Weeds Controlled by Pre-emergence Herbicides

| Product                     | Broadleaf |           | Grasses |           |
|-----------------------------|-----------|-----------|---------|-----------|
|                             | Annual    | Perennial | Annual  | Perennial |
| <b>Casoron</b>              | Most      | Some      | Most    | Some      |
| <b>Devrinol</b>             | Some      |           | Most    |           |
| <b>Gallery</b>              | Most      |           | Some    |           |
| <b>Goal <sup>Y</sup></b>    | Most      |           | Few     |           |
| <b>Karmex</b>               | Most      |           | Most    |           |
| <b>Kerb <sup>Z, Y</sup></b> | Some      |           | Most    |           |
| <b>Princep</b>              | Most      |           | Some    |           |
| <b>Prowl</b>                | Some      |           | Most    |           |
| <b>Snapshot</b>             | Most      |           | Some    |           |
| <b>Solicam</b>              | Some      |           | Most    |           |
| <b>Surflan (oryzalin)</b>   | Some      |           | Most    |           |
| <b>Treflan</b>              | Many      |           | Most    |           |

<sup>Z</sup> Restricted use pesticide.

<sup>Y</sup> Has pre- & post-emergence properties.

# Characteristics of Post-emergence Herbicides

## Control weeds after they emerge.

- Can be selective or non-selective.
- Stage of weed development can be critical.

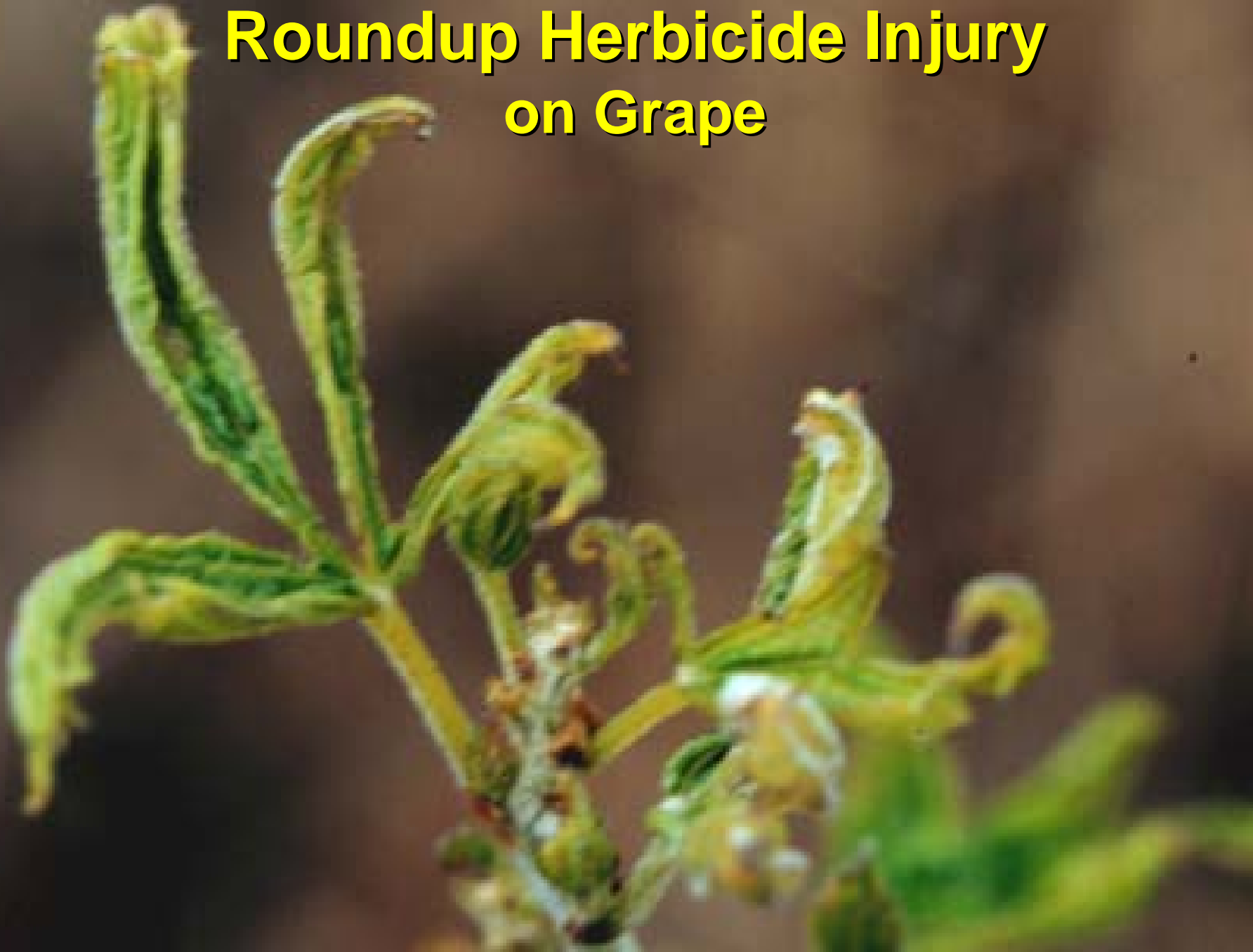
## Kill either a) on contact, b) must be absorbed, or c) be absorbed and translocated to the roots.

- May require a surfactant or other additive to be most effective.
- They exhibit no residual activity, and must be re-applied as needed.

## Can cause injury to the crop.

- Avoid contact with the foliage, canes, and fruit.

# Roundup Herbicide Injury on Grape



# Weeds Controlled by Post-emergence Herbicides

|                                     | Broadleaf |           | Grasses |           |
|-------------------------------------|-----------|-----------|---------|-----------|
| Product                             | Annual    | Perennial | Annual  | Perennial |
| <b>Contact:</b>                     |           |           |         |           |
| <b>Gramoxone Extra <sup>Z</sup></b> | Most      | Suppress  | Most    | Suppress  |
| <b>Rely</b>                         | Most      | Suppress  | Most    | Suppress  |
| <b>Systemic:</b>                    |           |           |         |           |
| <b>Roundup Ultra</b>                | Most      | Some      | Most    | Many      |
| <b>Touchdown</b>                    | Most      | Most      | Most    | Most      |
| <b>Grass control only:</b>          |           |           |         |           |
| <b>Fusilade</b>                     |           |           | Most    | Suppress  |
| <b>Poast</b>                        |           |           | Most    | Suppress  |
| <b>Select</b>                       |           |           | Most    | Suppress  |

<sup>Z</sup> Restricted use pesticide.

# How should they be applied?

This is determined by the Herbicide Formulation, or how it is manufactured:

- Manufactured wet, applied wet:
  - Emulsifiable concentrate – EC \*
  - Liquid – L
  - Flowable – F, HF, HFP, XL
- Manufactured dry, applied wet:
  - Wettable Powder – W, WP
  - Dry Flowable – DF
- Manufactured dry, applied dry:
  - Granular – G, GT

\* Abbreviations commonly found on herbicide product labels.

# Vineyard Sprayers for Applying Herbicides

3-point sprayer  
w/ rear-mounted boom



PBM Supply & Mfg., Inc.

Slimline  
Manufacturing, Ltd



Side-mounted  
spray boom



Enviromist  
Industries, PTY. LTD

Shielded spray boom

# Hand-held Delivery Systems

can be used to apply post-emergence herbicides



“Directed Spray”

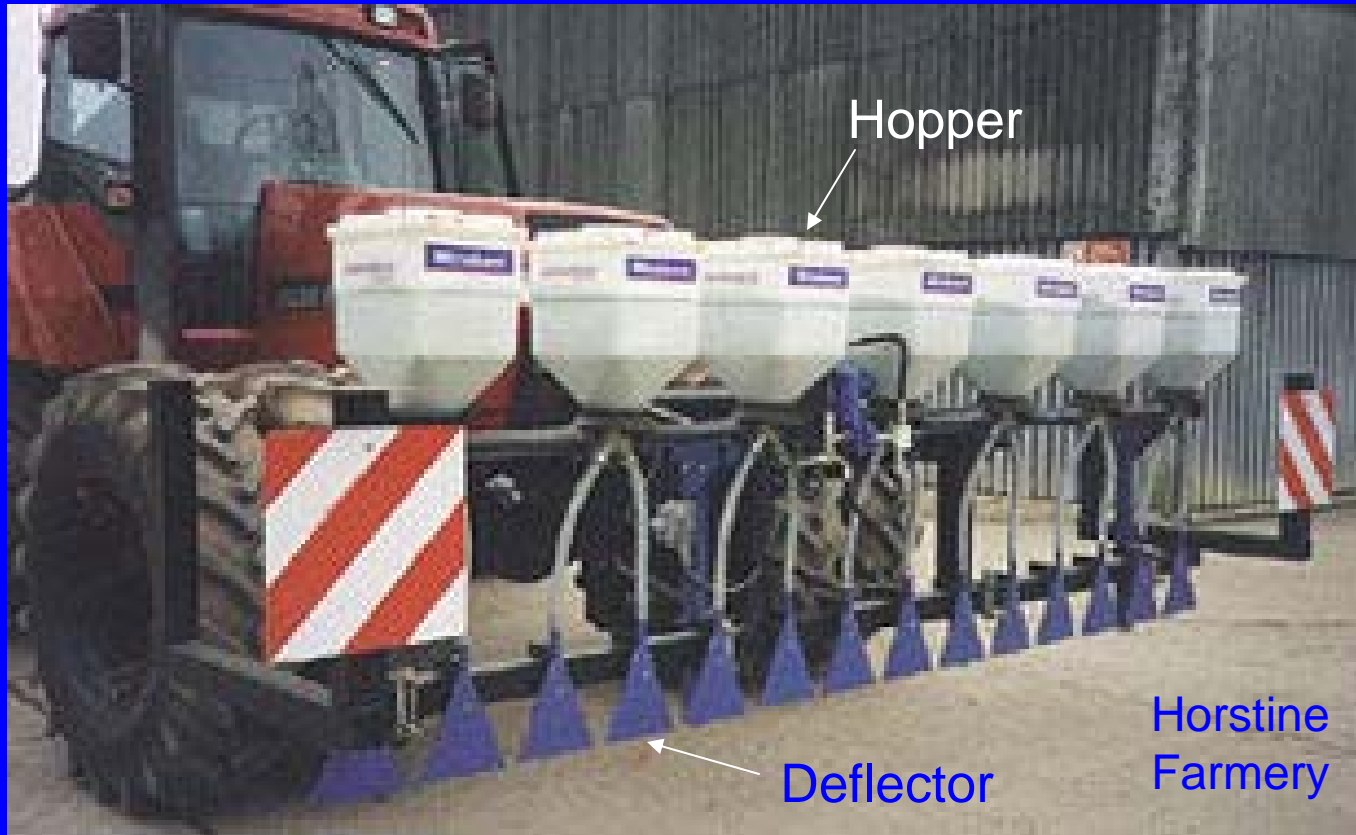


Sideswiper

Wick Applicator

# Granular Herbicide Applicators

use some form of drop to a deflector to achieve a distribution pattern. In a vineyard, one of these hopper units would be used.



# Spray vs Granular Application of Herbicides

## Spray:

- Subject to drift.
- Risk of plant injury.
- Easy to obtain uniform distribution.
- Application equipment easy to locate.
- Herbicide material is easy to store.
- Herbicide material is cost effective.

## Granular:

- Tolerant to drift.
- Little risk of plant injury.
- Difficult to obtain uniform distribution.
- Application equipment difficult to locate.
- Herbicide material is bulky and difficult to store.
- Herbicide material is expensive.

# When can the Herbicides be Used?

1. Before planting
2. New plantings (1<sup>st</sup> year)
3. Non-bearing years
4. Bearing years

# Herbicides for New Plantings Pre-Plant

|   |   |
|---|---|
| <p><b>Roundup Ultra</b><br/>or<br/><b>Touchdown</b></p> | <p><b>Fall:</b> To kill any competitive perennial grasses and broadleaf weeds.</p> <p><b>Spring:</b> To kill strips in sod before planting.</p> |
| <p><b>Treflan</b></p>                                   | <p><b>Spring:</b> Apply and incorporate before planting for pre-emergence control of annual weeds.</p>  |

Strips in fall-seeded bluegrass sod were killed with Roundup herbicide and are being tilled prior to planting. A pre-plant application of Treflan could be applied before tilling for pre-emergence weed control during the first season.



# Vine Planting with a Transplanter

a pre-plant application of Treflan is suitable when planting is done with a transplanter, but not with an auger.



# Pre-emergence Herbicides for New Plantings After Planting

|  |   |
|--|---|
| Treflan HFP                            | Must be incorporated.   |
| Goal 2 XL<br>Gallery 75DF (NB)         | Do not apply after buds have begun to swell.                                      |
| Prowl 4 EC (NB)                        | Do not apply after buds have begun to swell. Do not apply until soil has settled. |
| Snapshot 2.5TG<br>(NB)                 | Do not apply until soil has settled.  |
| Devrinol 50DF<br>Surflan AS (oryzalin) | Do not allow contact with foliage.  |
| Casoron 4G                             | Do not apply until 4 weeks after planting.  |

The window for safe application should be considered when selecting a pre-emergence herbicide for new plantings.

# Post-emergence Herbicides for New Plantings After Planting

|   |   |
|---|---|
| Gramoxone Extra                                   | <b>Restricted Use Pesticide.</b> Avoid contact with desired shoots, foliage or fruit. |
| Rely  | Avoid contact with desired shoots, foliage or fruit.                                  |
| Fusilade (NB)<br>Poast 1.5 EC<br>Select 2 EC (NB) | For control of grasses only.  |
| Roundup Ultra<br>Touchdown 5                      | Do not allow spray to contact any part of the grape vine.                             |

Precautionary statements must be observed when using post-emergence herbicides, particularly when they are used on new plantings.

# Pre-emergence Herbicides for Non-bearing Plantings

|   |   |
|---|---|
| Kerb 50 W                               | <b>Restricted Use Pesticide.</b> Do not apply until 6 months after planting.                                    |
| Casoron 4G                              | Apply from November 15 to February 15.  |
| Goal 2 XL                               | Do not apply when buds begin to swell.  |
| Gallery 75 DF<br>Prowl 4 EC             | Do not apply when buds begin to swell.<br>Do not apply within 12 months of harvest ( <b>non-bearing only</b> ). |
| Devrinol 50 DF<br>Surflan AS (oryzalin) | Do not allow contact with foliage.  |
| Snapshot 2.5TG                          | Do not apply within 12 months of harvest ( <b>non-bearing only</b> ).   |

The use of herbicides register for use only on non-bearing vineyards can present the problem of what to do with any left over product.

# Post-emergence Herbicides for Non-bearing Plantings

|                              |  |
|------------------------------|--|
| Gramoxone Extra              | <b>Restricted Use Pesticide.</b> Avoid contact with desired shoots, foliage or fruit.              |
| Rely                         | Avoid contact with desired shoots, foliage or fruit.   |
| Poast 4 EC                   | For control of grasses only.   |
| Fusilade<br>Select 2 EC      | For control of grasses only. Do not apply within 12 months of harvest ( <b>non-bearing only</b> ). |
| Roundup Ultra<br>Touchdown 5 | Do not allow spray to contact any part of the grape vine <b>other than mature bark</b> .           |

# Pre-emergence Herbicides for Bearing Plantings

|   |   |
|---|---|
| Casoron 4G                              | Apply from November 15 to February 15.  |
| Goal 2 XL                               | Do not apply when buds begin to swell, or when fruit are on the vines.                            |
| Kerb 50 W                               | <b>Restricted Use Pesticide.</b>  |
| Devrinol 50 DF<br>Surflan AS (oryzalin) | Do not allow contact with foliage or fruit.   |
| Solicam DF                              | Do not allow contact with foliage or fruit. <b>Vines must be established for 2 or more years.</b> |
| Karmex DF<br>Princep 4L, C-90, 4 G      | <b>For vineyards established for 3 or more years.</b>   |

Products with delayed usage restrictions are generally “hotter” materials.

# Post-emergence Herbicides for Bearing Plantings

|                 |  |
|-----------------|--|
| Gramoxone Extra | <b>Restricted Use Pesticide.</b> Avoid contact with desired shoots, foliage or fruit.  |
| Rely            | Avoid contact with desired shoots, foliage or fruit.   |
| Poast 1.5 EC    | For control of grasses only. <b>Do not apply within 50 days of harvest.</b>  |
| Touchdown 5     | Do not allow spray to contact any part of the grape vine other than mature bark.<br><b>May be applied up to bloom.</b>             |
| Roundup Ultra   | Do not allow spray to contact any part of the grape vine other than mature bark.<br><b>Do not apply within 14 days of harvest.</b> |

When the vines come into production, there are pre-harvest restrictions on some products that must be observed.

# How Much Material is Needed?

Herbicide rates are given in treated acres

$$\text{Treated Acres} = \text{Field acres} \times \frac{\text{Herb. Strip Width}}{\text{Row Width}}$$



$$\text{Field Acres} = \frac{\# \text{ of vines} \times \text{row width (ft)} \times \text{vine spacing (ft)}}{43,560 \text{ ft}^2}$$

# Pre-emergence Herbicides

## Factors Affecting the Rate of Application

- Soil Texture
- Soil Organic Matter Content

Relates to the ability of the soil particles to bind the herbicide molecules.

# Soil Texture

Finer texture soils require higher rates of application to effectively control weeds.

| Soil Texture Class | Soil Texture Classification   | Herbicide Rate    |
|--------------------|---|-------------------|
| Coarse (Light)     | Sand, Loamy sand, Sandy loam  | Lower rate        |
| Medium             | Loam, Silty clay loam, Silty loam, Sandy clay loam                        | Intermediate rate |
| Fine (Heavy)       | Clay, Clay loam, Silty clay loam, Silty clay, Sandy clay, sandy clay loam | Higher rate       |

# Soil Organic Matter

Soils with higher organic matter contents require higher rates of application to effectively control weeds.

| <b>Organic Matter Content</b> | <b>Herbicide Rate</b>         |
|-------------------------------|-------------------------------|
| < 2 %                         | Do not apply, or a lower rate |
| 2 to 4 or 6 %                 | Intermediate rate             |
| > 4 or 6 %                    | Higher rate                   |

# Pre-emergence Herbicides for New Plantings

## Cost per Treated Acre / Application

| Herbicide             | Rate / Acre   | Cost / Acre *   |
|-----------------------|---------------|-----------------|
| Treflan HFP           | 1 - 4 pt      | 3.18 - 20.16    |
| Goal 2 XL             | 2 - 8 pt      | 23.46 - 108.18  |
| Gallery 75DF (NB)     | .66 - 1.33 lb | 89.10 - 179.55  |
| Prowl 4 EC (NB)       | 2 - 4 qt      | 10.20 - 30.40   |
| Snapshot 2.5TG (NB)   | 100 - 200 lb  | 165.00 - 330.00 |
| Devrinol 50DF         | 8 lb          | 72.00 - 78.00   |
| Surflan AS (oryzalin) | 2 - 6 qt      | 43.00 - 132.30  |
| Casoron 4G (4 wks)    | 100 - 150 lb  | 198.00 - 330.00 |

\* Based upon quotes received from various pesticide dealers in January, 2003.

# Pre-emergence Herbicides for Non-bearing Plantings

## Cost per Treated Acre / Application

| Herbicide                             | Rate / Acre   | Cost / Acre *   |
|---------------------------------------|---------------|-----------------|
| Kerb 50 W <sub>(restricted use)</sub> | 2 - 8 lb      | 69.90 - 314.72  |
| Casoron 4G                            | 100 - 150 lb  | 198.00 - 330.00 |
| Goal 2 XL                             | 2 - 8 pt      | 23.46 - 108.18  |
| Gallery 75 DF <sub>(NB)</sub>         | .66 - 1.33 lb | 89.10 - 179.55  |
| Prowl 4 EC <sub>(NB)</sub>            | 2 - 4 qt      | 10.20 - 30.40   |
| Devrinol 50 DF                        | 8 lb          | 72.00 - 78.00   |
| Surflan AS (oryzalin)                 | 2 - 6 qt      | 44.10 - 132.30  |
| Snapshot 2.5TG <sub>(NB)</sub>        | 100 - 200 lb  | 165.00 - 330.00 |

\* Based upon quotes received from various pesticide dealers in January, 2003.

# Pre-emergence Herbicides for Bearing Plantings

## Cost per Treated Acre / Application

| Herbicide                   | Rate / Acre  | Cost / Acre *   |
|-----------------------------|--------------|-----------------|
| Casoron 4G                  | 100 - 150 lb | 198.00 - 330.00 |
| Goal 2 XL                   | 2 - 8 pt     | 23.46 - 108.18  |
| Kerb 50 WP (restricted use) | 2 - 8 lb     | 69.90 - 314.72  |
| Devrinol 50 DF              | 8 lb         | 72.00 - 78.00   |
| Surflan AS (oryzalin)       | 2 - 6 qt     | 44.10 - 132.30  |
| Solicam 80 DF (2 yr)        | 2.5 - 5.0 lb | 44.88 - 110.00  |
| Karmex 80 DF (3 yr)         | 2 - 4 lb     | 9.00 - 20.40    |
| Princep 4 L (3 yr)          | 2 - 4 qt     | 8.18 - 18.69    |

\* Based upon prices received from pesticide dealers in Iowa and adjacent states (Jan. 2003).

# Post-emergence Herbicides

## Factors Affecting the Rate of Application

- Weed Species

  - Cuticle layer & pubescence

    - Wetting of the plant surfaces

    - Absorption of herbicide

  - Tolerance to the Herbicide

  - Escape mechanisms

- Stage of weed development

## Post-emergence Herbicides

# Cost per Treated Acre / Application

| Herbicide                           | Rate / Acre             | Cost / Acre *                   |
|-------------------------------------|-------------------------|---------------------------------|
| Gramoxone Extra<br>(restricted use) | 2 - 3 pt                | 9.33 - 17.18                    |
| Rely                                | 3 - 6 qt                | 48.65 - 100.50                  |
| Roundup Ultra<br>(typical rate)     | .5 - 5 qt<br>(1 - 2 qt) | 5.43 - 70.44<br>(10.86 - 28.15) |
| Touchdown 5 (up<br>to bloom)        | .8 - 6.4 pt             | 3.96 - 31.67                    |
| Poast 1.5 EC                        | 1.5 - 2.5 pt            | 11.86 - 25.83                   |
| Fusilade (NB)                       | 1.0 - 1.5 pt            | 15.56 - 26.77                   |
| Select 2 EC (NB)                    | 6 - 8 oz                | 8.46 - 12.98                    |

\* Based upon prices received from pesticide dealers in Iowa and adjacent states (Jan. 2003).

# When weeds are already present,

tank mixing a pre-emergence herbicide with a post-emergence herbicide is called for.



# Tank Mixing Combinations

Pre-emergence

Post-emergence

| Devrinol | Gallery | Goal | Karmex | Kerb | Princep | Prowl | Solicam | Surflan | Gramoxone | Roundup | Touchdown | Rely | Poast |
|----------|---------|------|--------|------|---------|-------|---------|---------|-----------|---------|-----------|------|-------|
|          |         |      |        |      |         |       |         |         |           |         |           |      |       |
| X        |         |      |        |      |         |       |         |         |           |         |           |      |       |
| X        |         | X    |        |      |         |       |         |         |           |         |           |      |       |
| X        |         | X    |        |      |         |       |         |         |           |         |           |      |       |
|          |         | X    |        |      |         |       |         |         |           |         |           |      |       |
|          |         | X    | X      |      |         | X     |         |         |           |         |           |      |       |
|          |         | X    |        |      |         | X     | X       |         |           |         |           |      |       |
| X        | X       | X    | X      |      |         | X     | X       | X       |           |         |           |      |       |
| X        | X       | X    | X      |      |         | X     | X       | X       |           |         |           |      |       |
| X        |         |      | X      | X    |         | X     | X       | X       |           |         |           |      |       |
| X        |         | X    |        |      |         |       |         |         |           |         |           |      |       |
|          |         |      |        |      |         |       |         |         |           | X       | X         |      |       |

Because most pre-emergence are not equally effective in controlling grasses and broadleaf weeds, pre-emergence herbicides can be tank mixed with other pre-emergence herbicides. However, the costs can go up considerably.

# Successful Weed Control

Fall or early Spring:

- **Pre-emergence herbicide**

- Tank mixed with either a contact or systemic post-emergence herbicide.

**OR**

- Followed by a contact or systemic post-emergence herbicide

This choice often depends on the likelihood of rain following an application to “activate” the pre-emergence herbicide.



# Successful Weed Control

## Spring - Summer:

- **Control “escapes” with post-emergence herbicides**
  - Apply a contact or grass herbicide as a band under the vines.
  - Apply a contact or systemic herbicide as a directed spray.
  - Apply a systemic herbicide with a wick applicator to keep it off of any green tissue on the vines.



# Effective Weed Management with Herbicides

1. Control problem perennial weeds before planting.
2. Learn to identify problem weeds.

*NCR 281 Weeds of the North Central States*

3. Select herbicides that meet your needs.

*PM 1375 Midwest Commercial Small Fruit and Grape Spray Guide*

## **READ THE HERBICIDE LABEL**

Pesticide label web site:

<http://www.cdms.net/manuf/manuf.asp>

# To Optimize Your Weed Control Program with Herbicides

1. Calibrate your application equipment each year.  
*B 861 Midwest Small Fruit Pest Management Handbook*
2. Apply herbicides at the proper rate and time.
3. Alternate pre-emergence herbicides from year to year avoiding herbicides from the same **chemical group** or **mode-of-action**.