Weed Control Update for Fruit Plantings

R. David Myers
Principal Agent, Agriculture
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Have You Seen Palmer Amaranth?
Increase in Glyphosate-Resistant Weeds Worldwide

Number of Species

Year

Dr. Ian Heap, WeedScience.org 2016
How to ID Palmer

Smooth Stems

Long leaf stem/petiole

Poinsettia

Long seed heads

Watermark
Spray Program for Multi-Tree Fruit Orchards

Many local orants are composed of multi-fruit combinations producing for fresh market apples, peaches, pears, plums, nectarines, and cherries. Aggressive fruit tree spray programs are required to achieve high quality fruits. These multi-fruit orchards create many spray management challenges for the achievement of good pest control in accordance with label guidelines.

Therefore, the following multi-fruit orchard spray program for the control of major tree pests and diseases may offer some assistance. Labeled as noted in 2018 for All Tree Fruit – Pome: Apple & Pear Stones: Peach, Plum, Nectarine, and Cherry.

**FUNGICIDES: [FRAC]**

<table>
<thead>
<tr>
<th><em>RATE</em></th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain® 80WG [M4]</td>
<td>3.5 lbs</td>
</tr>
<tr>
<td>Dormont Oil [NC]</td>
<td>4.0 g</td>
</tr>
<tr>
<td>Kocide® 15 [M1]</td>
<td>6.0 lbs</td>
</tr>
<tr>
<td>Rally® 40DF [3]</td>
<td>4.0 oz</td>
</tr>
<tr>
<td>Sulfur 95W [M2]</td>
<td>3.0 lbs</td>
</tr>
<tr>
<td>Grow® 50G SC [11]</td>
<td>3.0 oz</td>
</tr>
<tr>
<td>Admire® 50WG [3/11]</td>
<td>6.0 oz</td>
</tr>
<tr>
<td>Preteel® [7/11]</td>
<td>14.5 oz</td>
</tr>
<tr>
<td>Indar® 24F [3]</td>
<td>6.0 oz</td>
</tr>
<tr>
<td>Topspin® 40F [1]</td>
<td>8.0 oz</td>
</tr>
<tr>
<td>Ziram 67DF [M3]</td>
<td>5.0 lbs</td>
</tr>
<tr>
<td>Agrimycin® 17 W [Ph-M]</td>
<td>24.0 oz</td>
</tr>
<tr>
<td>Ph® 15W [19]</td>
<td>6.2 oz</td>
</tr>
</tbody>
</table>

**INSECTICIDES: [HRAC]**

<table>
<thead>
<tr>
<th><em>RATE</em></th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imidan® 70W [1A]</td>
<td>2.9 lbs</td>
</tr>
<tr>
<td>Warrior® [3]</td>
<td>4.0 oz</td>
</tr>
<tr>
<td>Actara® [4A]</td>
<td>4.5 oz</td>
</tr>
<tr>
<td>Lorsban® Advanced [15]</td>
<td>1.0 oz</td>
</tr>
<tr>
<td>Avid® 5GW [25]</td>
<td>1.0 oz</td>
</tr>
<tr>
<td>Sevin® 5W [1A]</td>
<td>4.0 oz</td>
</tr>
</tbody>
</table>

*Rate for 50-100gal Acre Concentrate Spray
** Be sure to follow all labels closely for PHI and REI.

**Multi-Tree Fruit Spray Calendar**

**March 15 -** Dormont Oil 40L (Scale & Mites)
Kocide® DF 6.0 lbs
Lorsban® 15.0 lbs

**April 5 -** Peach Scab
Apple Tight Cluster

**April 15 -** Peach Petal Fall
Apple Scab

**April 25 -** Peach Shuck Split
Apple Petal Fall
Preteel® 14.5 oz

**May 5 -** 1st Cover Spray
Captain® 80WG 2.4 lbs (Cedar Apple Rust - Higher Rates for Wetter Conditions)
Indar® 4F 6.0 oz (Powdery Mildew & Rusts)
Actara® 4.5 oz (Curculio & Aphids; PHI 35-Days Pomes, 14-Days Stones)

**May 15 -** 2nd Cover Spray
Captain® 80WG 3.4 lbs
Rally® 40F 4.0 oz (Powdery Rust Spots Only)
Warrior® 4 oz (Curculio; PHI 21-Days Pomes, 14-Days Stones)

**June 1 -** 3rd Cover Spray
Captain® 80WG 3.4 lbs
Topspan® 40F 8.0 oz (Apple Scab Resistance Likely)
Indar® 7F 8.0 lbs (Cucurbita, Scale & Fruit Moth; PHI 7-Days Pomes, 14-Days Stones)
Acmite® 25W 1.0 oz (For Mites; PHI 3-Days Pomes, 3-Days Stones)

**June 15 -** 4th Cover Spray
Captain® 80WG 3.4 lbs
Sulfur 95W 3.0 lbs (Over PHI; Stones Only)
Tornado® 2.0 oz (Bokers, Curculio & Fruit Moths - 7-day PHI)

**July 1 -** 5th Cover Spray
Early Peach Harvest
Captain® 80WG 3.4 lbs (6-day PHI; 1-day REI;)
Prertime® 14.5 oz (Early Stone; PHI 4 Sprays/Season With Only 2 Consecutively)
Tornado® 2.0 oz (Bokers, Curculio & Fruit Moths - 7-day PHI)

**July 15 -** 6th Cover Spray
Peach Harvests
Captain® 80WG 3.4 lbs (1-day PHI; 1-day REI)
Rally® 40F 4.0 oz (Over PHI; except apple 14-days)
Sevin® 5W 4.0 lbs (Japanese Beetle & Moths - 7-day PHI For All Fruit)

**August 1 -** 7th Cover Spray
Early Apple Harvests
Late Peach Harvest
Captain® 80WG 4.0 lbs (0-day PHI; 1-day PHI;)

**August 15 -** 8th Cover Spray
Early Apple Harvests
Late Peach Harvest
Captain® 80WG 4.0 lbs (0-day PHI; 1-day PHI;)

**HERBICIDES: [HRAC]**

<table>
<thead>
<tr>
<th><em>RATE</em></th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gramoxone® [22]</td>
<td>1.0 qts</td>
</tr>
<tr>
<td>Roundup® [9]</td>
<td>1.0 qts</td>
</tr>
<tr>
<td>Devrinol® 50 DF [15]</td>
<td>4.0 lbs</td>
</tr>
<tr>
<td>Princep® 4L [5]</td>
<td>1.0 qts</td>
</tr>
<tr>
<td>Solicam® [12]</td>
<td>2.5 lbs</td>
</tr>
<tr>
<td>Goal® or Galigan® [14]</td>
<td>2.0 pts</td>
</tr>
<tr>
<td>Chateau® [14]</td>
<td>12.0 ozs</td>
</tr>
<tr>
<td>Aim®, Shark® or Venue [14]</td>
<td>2.0 ozs</td>
</tr>
<tr>
<td>Matrix® [2]</td>
<td>4.0 ozs</td>
</tr>
<tr>
<td>Poast® [1]</td>
<td>1.5 pts</td>
</tr>
<tr>
<td>Karmex® [7] or Diuron® [7]</td>
<td>1.6 qts</td>
</tr>
</tbody>
</table>

*Lowest Use Rate Recommended Initially

For Anne Arundel and Prince George's County Orchards, and may vary by location in Southern Maryland. Be sure to adjust your spray schedule application dates accordingly. The above recommendations very closely reflect the current spray program utilized at the University of Maryland Research and Education Center, Upper Marlboro Facility for its research orchards. Remember to always ‘Read the Label'

David Myers
Principal, Agriculture
<table>
<thead>
<tr>
<th>HERBICIDES: <em>[HRAC]</em></th>
<th><strong>RATE</strong></th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gramoxone® [22]</td>
<td>1.0 qts</td>
<td>Burndown, Directed Spray</td>
</tr>
<tr>
<td>Roundup® [9]</td>
<td>1.0 qts</td>
<td>Burndown, Shielded &amp; Directed Spray</td>
</tr>
<tr>
<td>Rely® [10]</td>
<td>22.0 ozs</td>
<td>Burndown</td>
</tr>
<tr>
<td>Devrinol® 50 DF [15]</td>
<td>4.0 lbs.</td>
<td>35-day PHI</td>
</tr>
<tr>
<td>Princep® 4L [5]</td>
<td>1.0 qts</td>
<td>Avoid High pH Soils, 3-yr. Established</td>
</tr>
<tr>
<td>Solicam® [12]</td>
<td>2.5 lbs.</td>
<td>2-yr. Established</td>
</tr>
<tr>
<td>Chateau® [14]</td>
<td>12.0 oz.</td>
<td>Broadleaves, After Harvest to Spring Bud Swell</td>
</tr>
<tr>
<td>Goal® [14] or Galigan® [14]</td>
<td>1.0 qts</td>
<td>Broadleaves, Dormant Only</td>
</tr>
<tr>
<td>Surflan® [3] or Prowl® [3]</td>
<td>2.0 qts</td>
<td>Surflan 0-day PHI; Prowl 60-day PHI</td>
</tr>
<tr>
<td>Poast® [1]</td>
<td>1.5 pts</td>
<td>Grasses, 45-day PHI</td>
</tr>
<tr>
<td>Sinbar® [5]</td>
<td>4.0 ozs</td>
<td>Fall Dormant, 1-yr. Established</td>
</tr>
<tr>
<td>Kerb® [15]</td>
<td>2.0 lbs.</td>
<td>Fall Dormant, 1-yr. Established</td>
</tr>
</tbody>
</table>

*HRAC- WSSA Chemical family Designation
**Lowest Use Rate Recommended Initially- Be sure to read the label!

**Organic Approach Substitutions:**
Avenger® or Burnout® or AXXE®/BioSafe® or (Scythe® no OMRI label)
Organic Approach Substitutions:

<table>
<thead>
<tr>
<th>Conventional Product</th>
<th>Organic Certified Product (OMRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captan® &amp; Topsin-M®</td>
<td>Surround® or Sulfur or Lime Sulfur</td>
</tr>
<tr>
<td>Rally®</td>
<td>Kaligreen® (Powdery Mildew Eradicant)</td>
</tr>
<tr>
<td>Listed Insecticides</td>
<td>Neem® or Pyganic® or Entrust® (Stone Fruits Only)</td>
</tr>
<tr>
<td>Agrimycin®</td>
<td>Agrimycin® or Fixed Copper (Apples &amp; Pears Except During Bloom)</td>
</tr>
<tr>
<td>Gramoxone® or Roundup®</td>
<td>Avenger® or Burnout® or AXXE®/BioSafe® or (Scythe® no OMRI label)</td>
</tr>
</tbody>
</table>
Herbicide Mode of Action & Classification

- Cell Membrane Disrupters
  - Nonaonic acid
  - Pelargonic Acid: AXXE® [27]

Directed spray (Organic Label)

- Post-emergence with no soil activity or uptake.
- Non-selective. Apply to point of drip.
- Contact herbicide: rapid foliar absorption, non-systemic.
- 30-120 gals/acre spray solution of 6%-15% AXXE®.

10-gallon spray mixtures:

- 6% Solution – 2.5 qts. AXXE® + water.
- 8% Solution – 3.25 qts. AXXE® + water.
- 10% Solution – 4.0 qts. AXXE® + water.
- 15% solution – 6.0 qts. AXXE® + water.
Herbicide Mode of Action & Classification

• Cell Membrane Disrupters

Bipyridiliums [22]

Paraquat: Gramoxone Inteon®

Directed Spray, Restricted Use - Danger
✓ Post-emergence with no soil activity or uptake
✓ Non-selective
✓ Contact herbicide: rapid foliar absorption with some translocation
✓ Use with a non-ionic surfactant (NIS)
✓ New Label Restrictions 2018!
RESTRIC TED USE PESTICIDE
DUE TO ACUTE TOXICITY
FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION
AND ONLY FOR those USES COVERED BY THE CERTIFIED APPLICATOR’S CERTIFICATION.

Gramoxone® SL 2.0

Herbicide
A Weed, Grass, and Harvest Aid
Desiccant/Defoliant Herbicide
Active Ingredients:
Parquat dichloride (1,1’-dimethyl-4,4’-bipyridinium dichloride) ........... 90.1%
Other Ingredients: 69.9%
Total: 100.0%
Gramoxone SL 2.0 contains 2.0 pounds ammonium per gallon as 2.76 pounds salt per gallon.
Gramoxone SL 2.0 contains strong ing agent (odor, stearic, and dye).

KEEP OUT OF REACH OF CHILDREN.

DANGER / POISON
PELIGRO / VENENO

2.5 gallons
Net Contents

Spot Spraying
When only small areas are to be sprayed with labeled applications, it is advantageous to mix small quantities of Gramoxone SL 2.0. To aid in mixing small quantities, the following table should be consulted.

<table>
<thead>
<tr>
<th>If the Broadcast Rate Per Acre for Gramoxone SL 2.0 is:</th>
<th>Add the Following Amount of Gramoxone SL 2.0 to 1 Gallon of Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2 pt</td>
<td>1/2 fl oz</td>
</tr>
<tr>
<td>2 pt</td>
<td>3/8 fl oz</td>
</tr>
<tr>
<td>2 1/2 pt</td>
<td>1/2 fl oz</td>
</tr>
<tr>
<td>3 pt</td>
<td>3/8 fl oz</td>
</tr>
</tbody>
</table>

Always add 1/8-1/2 fl oz of a nonionic surfactant for each gallon of spray. When spot spraying in this manner, spray to thoroughly wet the foliage, but not to the point of runoff.

Precautionary Statements
Hazard to Humans and Domestic Animals
May be fatal if swallowed. Fatal if inhaled. Do not breathe spray mist. Wear a dust mist NIOSH-approved respirator with any N, R, P, or HE filter. Causes substantial but temporary eye injury. Wear protective eyewear (face shield required when micropelleting). Harmful if absorbed through skin. Do not get in eyes, on skin, or on clothing. Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

IMPORTANT: Inhalation is an unlikely route of exposure due to low vapor pressure and large spray droplet size. But mucous irritation or nose bleed may occur. Prolonged contact with this concentrated product can irritate your skin.

Personal Protective Equipment (PPE)
Applicators and other handlers (other than Mixers and Loaders) must wear:
- Long-sleeve shirt and long pants
- Shoes plus socks
- Protective eyewear
- Chemical-resistant gloves - Category A (e.g. barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or Viton®)
- A dust mist NIOSH-approved respirator with any N, R, P, or HE filter

Mixers and Loaders must wear:
- Long-sleeve shirt and long pants
- Shoes plus socks
- A dust mist NIOSH-approved respirator with any N, R, P, or HE filter
- Chemical-resistant gloves - Category A (e.g. barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyvinyl chloride (PVC) or Viton®)
- Chemical-resistant apron
- Face shield

Discard clothing and other absorbent materials that have been dried or heavily contaminated with this product’s concentrate. Do not reuse. Follow manufacturer’s instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls
When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240)(4)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations
Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

University of Maryland Extension
Herbicide Mode of Action & Classification

• Aromatic Amino-Acid 5 Enolpyruvyl-Shikimate-3-Phosphate Synthase (EPSP) Inhibitors

Organophosphorus [9]

Glyphosate: Roundup Weather Max® 7+ Roundup formulations or Touchdown ® or Credit® or Rattler® [9] Shielded Spray Only!

✓ Post-emergence with no soil activity or uptake.
✓ Non-selective.
✓ Contact systemic herbicide: foliar absorption with translocation.
✓ Do not use with a surfactant – see label.
✓ Avoid trunk, fruit, branch & bud contact.
Herbicide Mode of Action & Classification

• Glutamine Synthesis Inhibitor

Organophosphorus

Glufosinate: Rely® [10]

Lower dermal LD$_{50}$ then oral LD$_{50}$.

✓ Post-emergence with no soil activity or uptake.

✓ Non-selective.

✓ Contact herbicide: foliar absorption with limited translocation.

✓ Use with a surfactant – see label.

✓ Avoid fruit, branch & bud contact.

✓ Degrades rapidly in the soil, 7-days by soil microbes.
Herbicide Mode of Action & Classification

- **Meristematic Root Inhibitors**: Inhibition of Cell Division and Elongation of Roots
  - **Dinitroanilines** [3]
  - **Pendimethalin**: Pendimax® or Prowl® New H2O formulation
    - 60 day PHI
  - **Oryzalin**: Surflan® A.S.
    - 0 day PHI
  - **Trifluralin**: Treflan® or Trilin®
    - Pre-emergence with 1-3 months of soil activity
    - Does not leach – forms a herbicide barrier in clay soils
    - Apply before rainfall or shallowly incorporate
    - Controls grasses & small seeded broadleaves
    - Not translocated in plants
Herbicide Mode of Action & Classification

• Cellulose Biosynthesis Inhibitor: Acts Primarily at Actively Dividing Meristems – Roots Tips & Growing Points

Benzonitrile [20]
Dichlobenil: Casoron® 4G

✓ Pre-emergence with 2-6 months of soil activity
✓ Controls broadleaves & grasses equally
✓ Very little leaching – high vapor potential
✓ Absorbed primarily through the roots translocated readily via the xylem – rapid growth inhibition
✓ Apply before rainfall or shallowly incorporate
Herbicide Mode of Action & Classification

• Mobile Photosynthetic Inhibitors

Ureas

Diuron: Karmex® or Diuron® [7]

Uracils

Terbacil: Sinbar® [5]

- Pre and Post-emergence with 4-12 months of soil activity
- Controls broadleaves & grasses
- Absorbed primarily through the roots translocated readily via the xylem
- Some foliar uptake
- 1-3 year established vineyards & Orchards
  - Consult label
Herbicide Mode of Action & Classification

• Meristematic Shoot Inhibitors: Strong Inhibitor of Mitosis - Cell Division

Chloracetamides or Amides [15]
Napropamide: Devrinol®
Safe for all fruit!

Pronamide: Kerb®

Apply post harvest to 1-year old vineyards & orchards
 ✓ Pre & Post-emergence with 1-3 months of soil activity
 ✓ Very little leaching – forms a herbicide barrier in clay soils
 ✓ Apply before rainfall or shallowly incorporate
 ✓ Controls primarily grasses & small seeded broadleaves
 ✓ Absorbed primarily by the roots and readily translocated via the xylem
Herbicide Mode of Action & Classification

• Mobile Photosynthetic Inhibitors
  
  **Triazines [5]**
  
  Metribuzine: Sencor® *(Peaches Only)*
  
  Simazine: Princep®
  
  **3-year old vineyards & established orchards**
  
  ✓ Pre and Post-emergence with 2-6 months of soil activity
  
  ✓ Controls broadleaves & grasses
  
  ✓ Absorbed primarily through the roots translocated readily via the xylem
  
  ✓ Some foliar uptake
  
  ✓ Avoid application on high pH soils above 6.8
  
  ✓ *Half low rate!*
Herbicide Mode of Action & Classification

• Carotenoid Synthesis Inhibitors

Pyridazinone

Norflurazon: Solicam® [12]

2-year established vineyards & Orchards.

✓ Preemergence with 1-6 months of soil activity
✓ Controls grasses, sedges and many broadleaves
✓ Absorbed primarily through the roots translocated readily via the xylem
✓ Half low rate – Dormant or in fall post harvest
Herbicide Mode of Action & Classification

- PPG or Protox Inhibitor
  Diphenylethers [14]

Oxyfluorfen: Goal® or Galigan® or Fire Power®

✓ Pre & Post-emergence with 1 month of soil activity or uptake.
✓ Controls broadleaves, assists in grass control preemergence.
✓ Contact herbicide: Foliar with shoot & some root uptake from the soil – non mobile in plant.
✓ Use with a non-ionic surfactant (NIS).
✓ Dormant applications only.
Herbicide Mode of Action & Classification

• PPG or Protox Inhibitor
  
  **N-Phenylphthalimides [14]**

Flumioxazin: Chataeu®

**1-year established & 60-day PHI.**

✓ Pre & Post-emergence with 1 month of soil activity or uptake.
✓ Controls broadleaves, assists in grass control preemergence.
✓ Contact herbicide: Foliar with shoot & some root uptake from the soil – non mobile in plant.
✓ Use with a non-ionic surfactant (NIS).
✓ Hooded sprayer unless dormant.
Herbicide Mode of Action & Classification

- PPG or Protox Inhibitor
  - **Triazalone** [14]

Carfentrazone-ethyl: *Aim®* or *Shark®*
  - Vineyard & Orchards 3-day PHI

Pyraflufen-ethyl: *Venue®*
  - Vineyard & Orchards 0-day PHI

- Post-emergence with no soil activity or uptake, rapid microbial breakdown.
- Selective broadleaf control
- Contact herbicide: Rapid foliar absorption with leaf translocation (15-minutes).
- Use with a non-ionic surfactant NIS or COC.
- Apply with a hooded sprayer
Venue Herbicide Observations
University of Maryland CMREC Upper Marlboro Facility
R. David Myers

Late Season Venue Application - August 26, 2013

Visual Evaluation Venue 4.0 ozs/acre 20gpa with NIS 8.0 ozs/100 gal verses a no-spray control.

- Poor 60%
- Fair 70%
- Good 80%
- Very Good 90%
- Excellent 100%

Notes: 70-80% (Suppression) 90-100% (Season Control)

Perennial Weeds
- Horsenettle 80%
- Plantain, Buckhorn 60%
- Dock 70%
- Greenbriar 80%
- Bindweed, Field 80%
- Smartweed 80%
- Mulberry 70%

Annual Weeds
- Morningglory 100%
- Lambsquarter 100%
- Pigweed 100%
- Bed Straw 60%
- Spurge 100%
- Henbit 60%

Notes: No injury to grapes or fruit trees
Moderate bramble injury with directed spray, but quick recovery.
Herbicide Mode of Action & Classification

- PPG or Protox Inhibitor
  - Triazalone [14]
  - Saflufenacil: Treevix®

  **Apples & pears only, 0-day PHI**
  - Post-emergence weed control with root activity and seasonal persistence.
  - Burndown broadleaf control.
  - Contact herbicide: Rapid foliar absorption with leaf translocation (15-minutes).
  - Use with MSO, AMS or UAN.
  - Avoid contact with fruit & foliage & follow label drift management guidelines
Herbicide Mode of Action & Classification

- Amino-Acid Acetolactate Synthase (ALS) Inhibitors

Sulfonyl-Ureas (SU’s) [2]

**Rimsulfuron: Matrix®**

1-year established vineyards & orchards

14-day PHI

- Pre and Post control of selected grasses & broadleaves
- 4.0 ounces/acre - 1 application per year
- 2-3 month activity crop rotation restrictions.
- Bioassay Required.
Herbicide Mode of Action & Classification

- Cellulose Biosynthesis Inhibitors
  Triazolocarboxamides [29]

Indfaziflam: Alion®

3-year established orchards 14-day PHI

✓ Preemergence control of selected grasses & broadleaves
✓ 1.0 ounces/acre application 3.0 ounces per year maximum.
✓ 2-year crop rotation restriction.
✓ Apply to bare soil surface not in proximity to water.
✓ Toxic to fish.
✓ Avoid green trunk, fruit, branch & root contact.
Herbicide Mode of Action & Classification

• Lipid Synthesis Inhibitor:
  Inhibits Acetyl-CoA Carboxylase

Cyclohexandiones [1]

Sethoxydim: Poast®

Bearing Orchards & vineyards. 14-50 day PHI.
✓ Post-emergence with no soil activity or uptake
✓ Controls grasses only
✓ Primarily leaf uptake – rapidly translocates to growing points
✓ Use with crop oil concentrate (COC)
WELCOME to this world famous wine growing region

NAPA VALLEY

and the wine is bottled poetry...
Implementation of Risk Mitigation Measures for Soil Fumigant Pesticides

Current as of December 2010

Soil Fumigant Toolbox

Welcome to the Soil Fumigant Toolbox which provides training, outreach, and other resource materials for applicators and handlers, communities, state and local agencies, and others interested in understanding and implementing the current requirements for safe use of soil fumigants. Learn what's new in the toolbox.
Plasticulture Production Method for Specialty Vegetables

The drama and specialty vegetables are to be investigated in the Central Maryland Region under a TILF program in 2000. By the end of the first year, the program was successful in growing vegetables for market production. The vegetables were grown in plastic tunnels, where the plastic is raised and then allowed to fall off. The plastic is then used again for the next season. The vegetables are harvested in June and July, and the plastic is removed in August. The plastic is then cleaned and ready for reuse in the next season.

The plastic tunnels are raised to a height of 2.5 meters (8.2 feet) and the tunnels are 3.6 meters (11.8 feet) wide. The tunnels are 6.1 meters (20 feet) long and are made of clear plastic. The tunnels are covered with a black plastic sheet to prevent weeds from growing. The tunnels are then covered with a layer of soil and the plastic is then raised to a height of 2.5 meters (8.2 feet). The plastic is then removed in August and the tunnels are then cleaned and ready for reuse in the next season.

The plastic tunnels are raised to a height of 2.5 meters (8.2 feet) and the tunnels are 3.6 meters (11.8 feet) wide. The tunnels are 6.1 meters (20 feet) long and are made of clear plastic. The tunnels are covered with a black plastic sheet to prevent weeds from growing. The tunnels are then covered with a layer of soil and the plastic is then raised to a height of 2.5 meters (8.2 feet). The plastic is then removed in August and the tunnels are then cleaned and ready for reuse in the next season.
<table>
<thead>
<tr>
<th>Fumigant</th>
<th>Disease</th>
<th>Nematodes</th>
<th>Weeds</th>
<th>Soil Injected</th>
<th>Chemigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TELONE II (DP-Dichloropropene 97.5%)</td>
<td>yes</td>
<td>yes</td>
<td>maybe</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>TELONE C-17 (DP 81% + CP-Chloropicrin 16.5%)</td>
<td>yes</td>
<td>yes</td>
<td>maybe</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>TELONE C-35/PicChlor (DP 63.4% + CP 34.7%)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>TELONE EC (DP 93.6%)</td>
<td>yes</td>
<td>yes</td>
<td>maybe</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>IN-LINE (TELONE DP 60.8% + CP 33.3 %)</td>
<td>yes</td>
<td>yes</td>
<td>maybe</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>VAPAM HL (Metam Sodium 42%)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>K-PAM HL (Metam Potassium 54%)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>PALADIN (Dimethyl Disulfide 98.8%)</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>DAZITOL (Capsaicin .42% + Alyl Isothiocanate 3.7%)</td>
<td>maybe</td>
<td>maybe</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
Final Worker Protection Standard Changes

• Annual training for workers and handlers
  • No longer a grace period for training

• Trainers of workers may be:
  • Certified Applicators
  • State/Federal approved trainers
  • Those who have completed an EPA approved course

• No longer handlers

• New content – training not required for 2 years
Final Worker Protection Standard Changes

• Handlers and early-entry workers must be at least **18 years old**
  • Members of owner’s **immediate family** are exempt

• Employer must provide respirator and fit testing, training, and medical evaluation that conforms to OSHA standards
  • For any handler **required to wear any respirator by the labeling**
Final Worker Protection Standard

Changes

• Specific water amounts (for routine washing/exposure):
  • 1 gallon for each worker
  • 3 gallons for each handler and early entry worker

• Always follow label – several changes are addressed on pesticide label

## Recordkeeping Form for the Worker Protection Standard and the USDA Restricted-Use Pesticides Regulation

Maintain records of all agricultural-use (WPS) and restricted-use pesticide applications for a minimum of 2 years.

<table>
<thead>
<tr>
<th>USDA (2)</th>
<th>USDA (3)</th>
<th>USDA (4)</th>
<th>USDA (5)</th>
<th>USDA (6)</th>
<th>USDA (7)</th>
<th>USDA (8)</th>
<th>USDA (9)</th>
<th>USDA (10)</th>
<th>USDA (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date (mo/day/yr)</td>
<td>Time Planned Time Completed</td>
<td>Restricted Entry Interval (REI)</td>
<td>Crop or Commodity Treated</td>
<td>Brand Name(s)</td>
<td>EPA Registration Number(s)</td>
<td>Active Ingredient(s)</td>
<td>Size of Area Treated</td>
<td>Total Amount Applied</td>
<td>Applicator’s Name &amp; Certification Number</td>
</tr>
<tr>
<td>AM</td>
<td>PM</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>PM</td>
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<tr>
<td>AM</td>
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<td>PM</td>
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<td></td>
</tr>
</tbody>
</table>

This hand/head symbol indicates Worker Protection Standard (WPS) information (items 1-4 and 6-8). This information (except time completed) must be posted before the pesticide application and remain posted for 30 days after the end of the Restricted Entry Interval (REI). After this time, the records must be maintained for 2 years. All other information (items 9-11) must be recorded within 14 days of application. If you apply a tank mix of pesticides with different REIs, write down the longest REI. Note: WPS agricultural-use pesticides may be general-use or restricted-use.

* Multiply the rate of application that you used by Size of Area Treated (Item 9) to get Total Amount Applied (Item 10). The Total Amount Applied is not the quantity after water or a carrier is added.

Note: For applications made to less than 1/10-acre, indicate “spot treatment” within Crop or Commodity Treated (item 5) and record the Location of Treated Area (item 1). Record the Date, Brand Name, EPA Reg. No., and Total Amount Applied (items 2, 6, 7, and 10).

Developed by Wayne G. Buhler, Ph.D., NC State University, in collaboration with the Structural Pest Control and Pesticides Division, NCDA&CS.
Respirator Fit Testing!

Effective 12/1/2010, EPA will require that at least two individuals per farm using fumigants have medical clearance and respirator fit testing.
Respirator Fit Test Procedure

• Ask about any breathing difficulties prior to fit testing.
• Perform a sensitivity test.
• Fit respirator and perform a User Seal Check.
• Ask individual to close eyes while the irritant smoke is delivered to inhalation and seal points on the respirator.
• Ask the individual to breath normal and move head during the test.
• No irritation or detection indicates a successful respirator fit.
Respirator Fit Testing!

☑️ Medical Clearance Form
☑️ Physicians Release
Respirator Fit Testing!

The OSHA respiratory protection standard (29 CFR 1910.134) prohibits fit testing of employees if there is any hair growth between the skin and facepiece sealing surface, such as stubble beard growth, beard, moustache, or sideburns which cross the respirator sealing surface (Appendix A.I.A.9.).
Thank You!
Any Questions?

R. David Myers
Principal Agent
myersrd@umd.edu