Pesticide Applicator Advanced Training
MGGA Annual Conference
Towson, Maryland, February 6, 2015
R. David Myers
Extension Educator, Agriculture

The Library of Congress is the largest library in the world, with more than 158 million items on approximately 838 miles of bookshelves.

CAS REGISTRY is the most authoritative collection of disclosed chemical substance information, containing more than 89 million organic and inorganic substances and 65 million sequences.

Plant Medicine?
Dave’s Ramble

The wisdom of mankind according to the 2nd Edition of Oxford’s Dictionary abides in 171,476 English words in current use and numerous other words of sundry languages; ancient and romantic. Words constructed from a mere 26 letter alphabet reside at the Library of Congress, the largest library in the world, to form a treasure of more than 158 million books and documents, on approximately 838 miles of bookshelves. Our words have not become exhausted; we keep writing.

The elemental substance of mankind is incubated in the solar atomic interior by intense heat and gravity to be released at the star’s demise; thus creating the 118 elements of the known periodic table. These elements, according to the American Chemical Society Registry of Chemicals, the most authoritative collection of disclosed chemical substance information, contain more than 89 million organic and inorganic chemical substances and 65 million chemical sequences.

The Environmental Protection Agency lists 84,000 chemicals of both natural and synthetic origin on the Toxic Substance Control Act list of regulated chemical compounds. EPA also reports, that apportioned to this TSCA list are 925 pesticide active ingredients. Of the 925 pesticide active ingredients: 259 are herbicides; 231 are insecticides; 185 are fungicides/nematicides; 37 are rodenticides; and 213 are biocides (antimicrobials and disinfectants) and miscellaneous; all comprising 11,947 labeled pesticide products. Without doubt, stewardship demands that we use pesticides and all toxic chemicals with great care and scrutiny; A chemical substance inherently is neither good or evil, but we can be.

The amazing thing about chemistry is that we are still in a relatively new science compared to the timeline of literature. Our chemicals have not become exhausted; we have only just begun. Words and substance make us human; our responsibility relies on adhering to wise words in an chemically active world: Be Sure to Read the Label!
Do We Need Pesticides?

- National Organic Standards
  
Do We Need Pesticides?

• Organic Trade Association

• Current Organic Food Sales 1-2%

ERS collected data from USDA-accredited State and private certification groups to calculate the extent of certified organic farmland acreage and livestock in the United States. These are presented in tables showing the change in U.S. organic acreage and livestock numbers from 1992 to 2011 (see the National tables section). Data for 1997 and 2000-11 are presented by State and commodity (see the State tables section).

Organic production tables are in .xls format. Each workbook contains multiple years of data in worksheets that are accessed through tabs. State-level tables cover the years 1997 and 2000-2011 (no data are available for 2009). National-level tables also include data from earlier years.

Errata: On October 24, 2013, table 3 was revised. The correct 2011 value for certified organic peanut acres was 5,066.

- National Tables
- State-Level Tables
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. Total:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total pasture and rangeland:</td>
<td>914,800</td>
<td>1,776,073</td>
<td>4,054,429</td>
<td>4,630,798</td>
<td>5,383,119</td>
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<tr>
<td></td>
<td>796,436,717</td>
<td>843,866,715</td>
<td>0.5%</td>
<td>0.57%</td>
<td>0.64%</td>
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<tr>
<td><strong>Total cropland:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grains—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>32,650</td>
<td>77,912</td>
<td>130,672</td>
<td>194,837</td>
<td>234,470</td>
</tr>
<tr>
<td>Wheat (including spelt)</td>
<td>120,800</td>
<td>206,474</td>
<td>253,624</td>
<td>415,902</td>
<td>344,544</td>
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<tr>
<td>Oats</td>
<td>13,250</td>
<td>29,771</td>
<td>46,466</td>
<td>57,374</td>
<td>62,015</td>
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<tr>
<td>Barley</td>
<td>17,150</td>
<td>41,904</td>
<td>39,271</td>
<td>46,554</td>
<td>63,903</td>
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<tr>
<td>Sorghum</td>
<td>1,602</td>
<td>6,642</td>
<td>16,068</td>
<td>17,360</td>
<td>17,360</td>
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<tr>
<td>Rice</td>
<td>6,400</td>
<td>26,870</td>
<td>26,428</td>
<td>49,630</td>
<td>48,533</td>
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<tr>
<td>Millet</td>
<td>18,550</td>
<td>15,103</td>
<td>14,176</td>
<td>11,953</td>
<td>19,293</td>
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<tr>
<td>Rye</td>
<td>2,900</td>
<td>7,488</td>
<td>8,597</td>
<td>11,859</td>
<td>21,456</td>
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<tr>
<td>Beans—</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Soybeans</td>
<td>47,200</td>
<td>136,071</td>
<td>122,217</td>
<td>125,621</td>
<td>132,411</td>
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<tr>
<td>Dry beans</td>
<td>14,010</td>
<td>10,561</td>
<td>16,466</td>
<td>28,656</td>
<td>1,569,300</td>
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<tr>
<td>Dark peas and lentils</td>
<td>5,900</td>
<td>10,144</td>
<td>17,757</td>
<td>16,987</td>
<td>17,887</td>
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<td>Oilseeds—</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Flax</td>
<td>5,850</td>
<td>25,076</td>
<td>30,843</td>
<td>21,554</td>
<td>21,468</td>
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<tr>
<td>Sunflowers</td>
<td>14,200</td>
<td>19,342</td>
<td>6,087</td>
<td>18,777</td>
<td>18,072</td>
</tr>
<tr>
<td>Hay and silage—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All types</td>
<td>64,100</td>
<td>231,207</td>
<td>411,342</td>
<td>793,442</td>
<td>785,970</td>
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<tr>
<td>Vegetables—</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Tomatoes</td>
<td>3,063</td>
<td>6,655</td>
<td>9,237</td>
<td>9,271</td>
<td>411,840</td>
</tr>
<tr>
<td>Lettuce</td>
<td>11,410</td>
<td>11,856</td>
<td>27,796</td>
<td>34,967</td>
<td>32,450</td>
</tr>
<tr>
<td>Carrots</td>
<td>5,665</td>
<td>5,737</td>
<td>12,415</td>
<td>12,080</td>
<td>98,870</td>
</tr>
<tr>
<td>Tree nuts—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All tree nuts—</td>
<td>4,468</td>
<td>15,986</td>
<td>23,307</td>
<td>23,218</td>
<td>996,300</td>
</tr>
<tr>
<td>Fruits—</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Citrus</td>
<td>6,509</td>
<td>10,152</td>
<td>14,085</td>
<td>18,601</td>
<td>939,000</td>
</tr>
<tr>
<td>Apples</td>
<td>9,270</td>
<td>12,772</td>
<td>17,626</td>
<td>19,542</td>
<td>381,160</td>
</tr>
<tr>
<td>Grapes</td>
<td>12,575</td>
<td>22,800</td>
<td>28,289</td>
<td>38,664</td>
<td>934,750</td>
</tr>
<tr>
<td>All fruit</td>
<td>39,013</td>
<td>81,291</td>
<td>97,760</td>
<td>131,498</td>
<td>3,049,000</td>
</tr>
<tr>
<td>Other cropland—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td>32,860</td>
<td>15,027</td>
<td>9,537</td>
<td>15,377</td>
<td>12,030</td>
</tr>
<tr>
<td>Peanuts</td>
<td>2,085</td>
<td>11,940</td>
<td>16,176</td>
<td>5,066</td>
<td>1,657,000</td>
</tr>
<tr>
<td>Potatoes</td>
<td>5,433</td>
<td>6,681</td>
<td>8,273</td>
<td>13,268</td>
<td>1,180,400</td>
</tr>
</tbody>
</table>

Source: USDA, United States Department of Agriculture
2001 U.S. Pesticide Use Estimates

% Values Are Based on Pounds of Pesticides Used

- Chlorine/Hypochlorites (52%)
- Specialty Biocides (7%)
- Wood Preservatives (16%)
- Other Pesticides (6%)
- Conventional Pesticides (18%)
2001 PESTICIDE USER GROUPS

U. S. Consumption in pounds

1) Agriculture: 78%
2) Industry and Government: 12%
3) Home and Garden: 10%
## 2001 PESTICIDE ESTIMATES

### Use Rate in U.S. Based on Active Ingredient

- **Herbicides**: 553 million lbs : 46%
- **Insecticides**: 105 million lbs : 9 %
- **Fungicides**: 73 million lbs : 6%
- **Other**: 472 million lbs : 39%
- **TOTAL….**: 1,203 million lbs or 1.2 billion lbs

Other Category consist of rodenticides, molluscicides, sulfur, oil, sulfuric acid, insect repellents, zinc sulfate, moth balls, nematicides, fumigants and other miscellaneous chemicals.
“The Contribution of Pesticides to Pest Management in Meeting the Global Need for Food Production by 2050”

The CAST (Council for Agricultural Science and Technology) article entitled, *The Contribution of Pesticides to Pest Management in Meeting the Global Need for Food Production by 2050* summarizes topics and issues regarding the use of pesticides in a scientific and responsible manner.
Southern Maryland Fruit Team
CMREC, Upper Marlboro
Dave Myers
Ben Beale
Herb Reed
Joe Fiola
Chris Walsh
Meadow Orchard: Streuobstwiese
A Sustainable Commercial Fruit Production Approach
Southern Maryland Fruit Team
Dave Myers, Herb Reed, Ben Beale, Joe Filda & Chris Walsh
University of Maryland Extension
CMREC, Upper Marlboro Research Farm
2011

Fruit & Nut Trees:
1) Breda Medlar
2) Lodi Apple
3) Brown Turkey Fig
4) Moon Glow European Pear
5) Hosoi & Shinko Asian Pear
6) Montmorency Tart Cherry
7) Eastern Seedling & Collins PawPaw
8) American Persimmon
9) Fuji Oriental Persimmon
10) Blue Damson Plum
11) Japanese Heartnut
12) American Filbert

Experimental Design:
- 3 Randomized Reps: 2 Trees/Rep, 14 Tree Varieties, 72 Total Tree Plots.
- Orchard Density: 18’ Between Row Spacing X 15’ In Row Spacing.
- Training Systems: Traditional

Protocol:
- Organic and soft pesticide canopy evaluations, with conventional orchard floor management utilizing herbicides and fertilizers.
- Tree growth, disease and yield assessments will determine viability.
New Meadow Bush & Hops Yard
2013-2014 CMREC, Upper Marlboro
Hops Yield 9/6/2014
CMREC, Upper Marlboro

Average lbs/Acre

- Alpha Roma: 3500 lbs/Acre
- Newport: 1000 lbs/Acre
- Teamaker: 1500 lbs/Acre
- Williamette: 500 lbs/Acre

University of Maryland Extension
Solutions in your community
Integrated Pest Management -- IPM

“Pest Anticipation Fosters Responsible Reaction”

What is IPM?

“Integrated pest management (IPM) is a sustainable approach which combines the use of biological, cultural, physical, and chemical tactics in a way that minimizes economic, health, and environmental risks.”
IPM Mechanics

EIL = Pest Density (P)

\[ P = \frac{C}{V \times D} \]

C = Cost of Control
V = Value of Crop
D = Damage

Note: At EIL Benefit = Cost; B = C
EIL = Pest Density (P)

\[ P = \frac{C}{V \times D} \]

- \( C \) = Cost of Control
- \( V \) = Value of Crop
- \( D \) = Damage/Pest

When \( C \uparrow \) \( P \uparrow \) and When \( C \downarrow \) \( P \downarrow \)

When \( V \uparrow \) \( P \downarrow \) and When \( V \downarrow \) \( P \uparrow \)

When \( D \uparrow \) \( P \downarrow \) and When \( D \downarrow \) \( P \uparrow \)
Action Threshold Is Low For Fresh Fruit Market Therefore A Control Action Will Need To Be Taken

Because Action Threshold Is Much Higher For Apple Sauce No Control Is Required
### Spray Program for Multi-Tree & Small Fruit Plantings

The following multi-tree and small fruit spray program was developed based on research and recommendations from the University of Maryland Extension. This program is intended to help growers manage pests and diseases on their multi-tree and small fruit plantings.

#### Spray Program Details

- **Spray Program Dates:**
  - June 15: Strawberry 2nd Cover & Harvest, Small Fruit
  - July 1: Strawberry Harvest

- **Product Mix:**
  - First Cover: Captan 5W 2 lb (1/2 oz in 3 gal of water)
  - Second Cover: Captan 5W 2 lb (1/2 oz in 3 gal of water)
  - Harvest: Captan 5W 2 lb (1/2 oz in 3 gal of water)

- **Application Dates:**
  - June 15: Strawberry 2nd Cover & Harvest, Small Fruit
  - July 1: Strawberry Harvest

- **Spray Covers:**
  - First Cover: 2 lb (1/2 oz)
  - Second Cover: 2 lb (1/2 oz)
  - Harvest: 2 lb (1/2 oz)

- **Product Information:**
  - Captan 5W: 5% thiophanate-methyl

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### Spray Program Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Product</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 15</td>
<td>Captan 5W</td>
<td>2 lb (1/2 oz)</td>
</tr>
<tr>
<td>July 1</td>
<td>Captan 5W</td>
<td>2 lb (1/2 oz)</td>
</tr>
</tbody>
</table>

---

### Notes

- **First Cover:** Used to control early season pests such as aphids, spider mites, and whiteflies.
- **Second Cover:** Used to control late season pests such as aphids, spider mites, and whiteflies.
- **Harvest:** Used to protect against fungal diseases and pests that may affect the quality of the fruit.

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**University of Maryland Extension**

Solutions in your community
**Spray Program for Multi-Small Fruit Plantings**

Many local farms are composed of multi-small fruit combinations producing fresh market blackberries, raspberries, blueberries, strawberries and grapes. Aggressive fruit spray programs are required to achieve high quality fruit. These multi-small fruit plantings create many spray management challenges for the achievement of good pest control in accordance to label guidelines.

Therefore, the following multi-small fruit spray program for the control of major small fruit pests and diseases may offer some assistance:

Labeled as noted in 2015 for All Small Fruit – Strawberries, Brambles: Blackberries, Raspberries, Blueberries, and Grapes.

### Fungicides: [FRAC] *Rate* Notes

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>[FRAC]</th>
<th><em>Rate</em></th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime Sulfur [M2]</td>
<td></td>
<td>10.0 gals</td>
<td>Dormant Fall Sanitizer</td>
</tr>
<tr>
<td>JMS® Stylet Oil [NC]</td>
<td></td>
<td>1.0 gal</td>
<td>Apply Temp 35-85°F</td>
</tr>
<tr>
<td>Kocide® DF [M1]</td>
<td></td>
<td>2.0 lbs</td>
<td>Other Fixed Coppers</td>
</tr>
<tr>
<td>Captan® 50W [M4]</td>
<td></td>
<td>2.0 lbs</td>
<td>General Protectant</td>
</tr>
<tr>
<td>Ziram® 76DF [M3]</td>
<td></td>
<td>5.0 lbs</td>
<td>General Protectant</td>
</tr>
<tr>
<td>Sulfur 95W [M2]</td>
<td></td>
<td>3.0 lbs</td>
<td>General Protectant</td>
</tr>
<tr>
<td>(Grape variety sensitivity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rally® 40W [3]</td>
<td></td>
<td>4.0 ozs</td>
<td>Powdery Mildew &amp; Black Rot</td>
</tr>
<tr>
<td>(Except for blueberry use Tilt®)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pristine® [7/11]</td>
<td></td>
<td>14.5 ozs</td>
<td>Fruit Rots, Fruit Spots, Powdery &amp; Downy Mildew &amp; Cane Blight</td>
</tr>
<tr>
<td>Elevate® 50 WG [17]</td>
<td></td>
<td>1.5 lbs</td>
<td>Botrytis &amp; Powdery Mildew</td>
</tr>
<tr>
<td>Switch® 62.5 WG [9/12]</td>
<td></td>
<td>11.0 ozs</td>
<td>Anthracnose, Mummy Berry, Phomopsis, Sour Rot &amp; Botrytis</td>
</tr>
<tr>
<td>Phostrol® [33]</td>
<td></td>
<td>4.0 pts</td>
<td>Downy Mildew &amp; Red Stele</td>
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</tbody>
</table>

### Insecticides: [IRAC] *Rate* Notes

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>[IRAC]</th>
<th><em>Rate</em></th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provado® Admire® [4A]</td>
<td></td>
<td>4.0 ozs</td>
<td>SWD, Grubs, Aphids, Hoppers, Curculio &amp; Whitefly</td>
</tr>
<tr>
<td>or Actara® [4A]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brigade® WSB [3]</td>
<td></td>
<td>12.0 ozs</td>
<td>BMSB, SWD, Clipper Beetle, Plant Bug, Mites &amp; Root Weevil</td>
</tr>
<tr>
<td>Malathion [1B]</td>
<td></td>
<td>2.0 pts</td>
<td>SWD, Scale, Fruit Moths &amp; Whitefly</td>
</tr>
<tr>
<td>Sevin® 50W [1A]</td>
<td></td>
<td>4.0 lbs</td>
<td>SWD, Japanese Beetles, Hornets &amp; Sap Beetles</td>
</tr>
</tbody>
</table>

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

### Herbicides: [HRAC] *Rate* Notes

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>[HRAC]</th>
<th><em>Rate</em></th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gramoxone® [22]</td>
<td></td>
<td>1.0 qts</td>
<td>Burndown, Directed Spray</td>
</tr>
<tr>
<td>Roundup® [9]</td>
<td></td>
<td>1.0 qts</td>
<td>Burndown, Shielded &amp; Directed Spray</td>
</tr>
<tr>
<td>Devrinol® 50 DF [15]</td>
<td></td>
<td>4.0 lbs</td>
<td>Spring/Summer 35-day PHI</td>
</tr>
<tr>
<td>Princep® 4L [5]</td>
<td></td>
<td>1.0 qts</td>
<td>Spring Dormant, Avoid High pH Soils</td>
</tr>
<tr>
<td>Solican® [12]</td>
<td></td>
<td>2.5 lbs</td>
<td>Spring/Fall Dormant, 1-yr Established</td>
</tr>
<tr>
<td>(Except strawberry)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aim® [14] or Shark® [14]</td>
<td></td>
<td>2.0 ozs</td>
<td>Directed Spray to Weeds, 3-day PHI</td>
</tr>
<tr>
<td>Venue [14] (Grapes only)</td>
<td></td>
<td>2.0 ozs</td>
<td>Directed Spray, 0-day PHI</td>
</tr>
<tr>
<td>Chateau [14]</td>
<td></td>
<td>12.0 ozs</td>
<td>After Harvest to Spring Bud Swell</td>
</tr>
<tr>
<td>(Except brambles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surflan® [3]</td>
<td></td>
<td>2.0 qts</td>
<td>Spring, Summer, Prowl 60-day PHI</td>
</tr>
<tr>
<td>(Except strawberry)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poast® [1]</td>
<td></td>
<td>1.5 pts</td>
<td>Summer Grasses, Variable PHI</td>
</tr>
<tr>
<td>Sinbar® [5]</td>
<td></td>
<td>4.0 ozs</td>
<td>Fall Dormant, 1-yr Established</td>
</tr>
</tbody>
</table>

*Lowest Use Rate Recommended Initially

Organic Approach Substitutions:

<table>
<thead>
<tr>
<th>Conventional Product</th>
<th>Organic Certified Product (OMRI)</th>
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<tbody>
<tr>
<td>Captan®</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® or Dipel®</td>
</tr>
<tr>
<td>Gramoxone® or Roundup®</td>
<td>Avenger®, Burnout® or Scythe® (no OMRI label)</td>
</tr>
<tr>
<td>Date</td>
<td>Task</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>March 5</td>
<td>Spring Dormant Spray&lt;br&gt;JMS&lt;sup&gt;®&lt;/sup&gt; Style Oil 1.0 gal (Scales &amp; Mites)</td>
</tr>
<tr>
<td>April 10</td>
<td>Early Strawberry Bloom&lt;br&gt;Captan® 50W 2.0 lbs&lt;br&gt;Thiram® 75WDG 5.0 lbs (Strawberry Only)</td>
</tr>
<tr>
<td>April 15</td>
<td>Strawberry Bloom/ Blueberry Early Bloom&lt;br&gt;Captan® 50W 2.0 lbs&lt;br&gt;Ziram 76DF 5.0 lbs (Except Strawberry)&lt;br&gt;Brigade&lt;sup&gt;®&lt;/sup&gt; WSB 12.0 ozs (Clipper Beetle, 0-3-day PHI)</td>
</tr>
<tr>
<td>April 25</td>
<td>Strawberry Full bloom/Blueberry Mid-Bloom/ Grape Bud Break&lt;br&gt;Captan® 50W 2.0 lbs&lt;br&gt;Pristine® 14.5 ozs&lt;br&gt;Brigade&lt;sup&gt;®&lt;/sup&gt; WSB 12.0 ozs (Clipper Beetle, 0-3-day PHI)</td>
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<tr>
<td>May 5</td>
<td>Strawberry 1&lt;sup&gt;st&lt;/sup&gt; Cover &amp; Early Harvest Spray/ Blueberry Full Bloom/ Grape &amp; Bramble Shoot Growth&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Elevate® 1.5 lbs (0-day PHI)&lt;br&gt;Provado® 4.5 ozs (Curculio &amp; Aphids; 7-Day PHI)</td>
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<tr>
<td>May 15</td>
<td>Strawberry 2&lt;sup&gt;nd&lt;/sup&gt; Cover &amp; Harvest Spray/ Blueberry 1&lt;sup&gt;st&lt;/sup&gt; Cover/Grape Bloom Spray/Bramble Cane Development&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Switch® 11.0 ozs (0-day PHI)&lt;br&gt;Malathion® 2.0 pts (Curculio, Scale &amp; Fruit Moths; 0-3-day PHI)</td>
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<tr>
<td>June 1</td>
<td>Strawberry 3&lt;sup&gt;rd&lt;/sup&gt; Cover &amp; Harvest Spray/Blueberry 2&lt;sup&gt;nd&lt;/sup&gt; cover/Grape 1&lt;sup&gt;st&lt;/sup&gt; Cover/Bramble Bloom&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Pristine® 14.5 ozs (0-day PHI)&lt;br&gt;Malathion® 2.0 pts (Curculio, Scale &amp; Fruit Moths; 0-3-day PHI)</td>
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<tr>
<td>June 15</td>
<td>Strawberry 4&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest Spray/Blueberry 3&lt;sup&gt;rd&lt;/sup&gt; Cover &amp; Early Harvest/ Bramble 1&lt;sup&gt;st&lt;/sup&gt; Cover/ Grape 2&lt;sup&gt;nd&lt;/sup&gt; Cover&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Elevate® 1.5 lbs (0-day PHI)&lt;br&gt;Sevin® 50W 4.0 lbs (sap beetle, 3-Day PHI)</td>
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<tr>
<td>July 1</td>
<td>Strawberry Renovation/Blueberry 4&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest/ Bramble 2&lt;sup&gt;nd&lt;/sup&gt; Cover &amp; Early Harvest/Grape 3&lt;sup&gt;rd&lt;/sup&gt; Cover&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Pristine® 14.5 ozs (0-day PHI)&lt;br&gt;Rally 40 W 4.0 ozs (Except Blueberry, 0-day PHI)&lt;br&gt;Brigade&lt;sup&gt;®&lt;/sup&gt; WSB 12.0 ozs (0-3-day PHI)</td>
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<tr>
<td>July 15</td>
<td>Strawberry Post Harvest/ Blueberry 5&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest/ Bramble 3&lt;sup&gt;rd&lt;/sup&gt; Cover &amp; Harvest/ Grape 3&lt;sup&gt;rd&lt;/sup&gt; Cover &amp; Veraison&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Switch® 11.0 ozs (0-day PHI)&lt;br&gt;Sulfur 95W 3.0 lbs (0-day PHI)&lt;br&gt;or Kocide DF 2.0 lbs (0-day PHI)&lt;br&gt;Malathion 2.0 pts (0-3-day PHI)</td>
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<tr>
<td>August 1</td>
<td>Strawberry Post Harvest/ Blueberry 6&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest/ Bramble 4&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest/Grape 4&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Early Harvest&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Pristine® 14.5 ozs (0-day PHI)&lt;br&gt;Sevin® 50W 4.0 lbs (Japanese Beetle, 3-Day PHI)</td>
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<tr>
<td>August 15</td>
<td>Strawberry, Blueberry &amp; Bramble Post Harvest/ Grape 5&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Elevate® 1.5 lbs (0-day PHI)&lt;br&gt;Phostro® 4.0 pts (0-day PHI)&lt;br&gt;Sevin® 50W 4.0 lbs (Hornets – 3-Day PHI for All Fruit)</td>
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<tr>
<td>September 1</td>
<td>Strawberry Post Harvest/ Grape 6&lt;sup&gt;th&lt;/sup&gt; Cover &amp; Harvest&lt;br&gt;Captan® 50W 2.0 lbs (0-3 Day PHI &amp; 4-Day REI)&lt;br&gt;Phostro® 4.0 pts (0-day PHI)&lt;br&gt;Sevin® 50W 4.0 lbs (Hornets – 3-Day PHI for All Fruit)</td>
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<tr>
<td>October 30</td>
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<tr>
<td>November 25</td>
<td>Fall Dormant&lt;br&gt;Lime Sulfur 10.0 gals&lt;br&gt;Kocide DF 2.0 lbs (0-day PHI)</td>
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* Important Note: The calendar spray dates given are an average estimate for Anne Arundel and Prince George’s County small fruit production, 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 fruit plots. Remember to always “Read the Label”! *
<table>
<thead>
<tr>
<th>Product</th>
<th>Cost per Container</th>
<th>Typical Container Size</th>
<th>Cost per Unit</th>
<th>Unit</th>
<th>Rate per Acre</th>
<th>Cost Per Application</th>
<th># of Applications per year</th>
<th>Total Cost per Acre</th>
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<td>oz</td>
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Total Per Acre: $506.21
Insecticide Mode of Action Classification: A key to effective insecticide resistance management

IRAC website: www.irac-online.org

Introduction
IRAC promotes the use of a Mode of Action (MoA) classification of insecticides as the basis for effective and sustainable insecticide resistance management (IRM). Insecticides are allocated to specific groups based on their target site. Reviewed and re-issued periodically, the IRAC MoA classification list provides farmers, growers, advisors, extension staff, consultants and crop protection professionals with a guide to the selection of insecticides or acaricides in IRM programs. Effective IRM of this type preserves the utility and diversity of available insecticides and acaricides. A selection of MoA groups is shown below.

Moulting & Metamorphosis
Group 18 Edysone agonist / disruptor
Diacylhydrazines (e.g. Tebufenozide)
Group 7 Juvenile hormone mimics
JH analogues, Fenoxycarb, Pyriproxyfen, etc.

Midgut
Group 11 Microbial disruptors of insect midgut membranes
Toxins produced by the bacterium Bacillus thuringiensis (Bt) sprays and Cry proteins expressed in transgenic Bt crop varieties (specific cross-resistance subgroups)

Nervous System
Groups 1A & B Acetylcholinesterase (AChE) inhibitors
Carbamates and Organophosphates
Group 2 GABA-gated chloride channel antagonists
Cyclodiene OCs and Phenylpyrazoles (Fiproles)
Group 3 Sodium channel modulators
DDT, pyrethroids, pyriproxyfen
Group 4A Acetylcholine receptor (nAChR) agonists
Neonicotinoids
Group 5 nAChR agonists (Allosteric) [not group 4A]
Spinosyns
Group 6 Chloride channel activators
Avermectins, Milbemycins
Group 22 Voltage dependent sodium channel blocker
Indoxacarb

Metabolic Processes
Many groups acting on a wide range of metabolic processes including:
Group 12 Inhibitors of oxidative phosphorylation,
dispersuants of ATP
Dialathionur & Organotin miticides
Group 12 Uncouplers of oxidative phosphorylation via disruption of H proton gradient - Chlorfenapyr

Non-specific MoA
Group 10 Compounds of non-specific mode of action (mite growth inhibitors)
Clofentezine, Hexythiazox, Etoxazole

Non-specific MoA
Group 9 Compounds of non-specific mode of action (selective feeding blockers)
Pymetrozine, Flonicamid, etc.

Metabolic processes
Group 20 Mitochondrial complex III electron transport inhibitors
Acarosyn, Flucaerpyrim, etc
Group 21 Mitochondrial complex I electron transport inhibitors
Rotenone, METI acaricides
Group 23 Inhibitors of lipid synthesis
Tepronlc acid derivatives

Use Mode of Action wisely for good IRM!
• **Stomach Insecticides**
  - Must be Ingested by the Insect
  - Example: Bt type Insecticides (Dipel)

• **Contact Insecticides**
  - Insect Needs to Come in Contact with Insecticide. This Can Be At time of Application or After Application
  - Example: Sevin
For Disease to Occur Need These 3 Factors to Occur

When should I spray, before or after a rain?
INORGANIC FUNGICIDES

• Sulfur: Oldest effective fungicide. Marketed as a Dust, Colloidal Sulfur, and Wettable Sulfur

• Copper: Bordeaux Mixture: Copper sulfate and hydrated lime. Low water solubility
Air Blast Sprayers

RM 65-110 Vineyard Sprayer

RM 25 Utility w/ 5 Nozzle Boom

ATV Sprayers
Spraying Equipment

- Understanding Sprayer Plumbing.
- Agitation & Bypass.
- Nozzle Tip Selection.
- Boom Height & Target.
- Boom Pressure Gauge.

Why is the spray pressure always more at the pump gauge then at the boom gauge?
FIGURE 4. TREE-ROW-VOLUME DETERMINATION IN APPLE ORCHARDS

Gallons/acre for full dilute: 50, 100, 150, 200, 250, 300, 350, 400, 450
Percent of material, rate/acre: 25%, 37.5%, 59%, 62.5%, 75%, 87.5%, 100%, 112.5%
Special Sprayer Maintenance

• Flush & Rinse Sprayer as Required by Products.
• Check Nozzle Output Uniformity.
• Clean & Lubricate Pump and Other Components.
• Inspect for Leaks.
• Winterize.

What procedure insures thorough rinsing of a sprayer?

RM 65-110 Vineyard Sprayer
Spray Application

- Sprayer Calibration: Ground Speed X Pressure X Nozzle Output.
- Calibrate When a Product or Sprayer Component Changes.

A farmer discovers a leak while spraying – What should he do?
FIRST AND FOREMOST, BE A GOOD STEWARD

Many factors affect the impact of pesticides on man and the environment. Although the government, industry, and extension provide regulations, labels, and educational outreach to promote judicious use and good stewardship, success is ultimately contingent on the personal knowledge and diligence of everyone who handles a pesticide.

There are excellent resources available through your Extension Service and the Pesticide Safety Education Program in your state.
Tell me more about herbicides!
How to Read Your Pesticide Label
Remember it is a Legal Document

Pesticide Label Parts:
• Manufacturer’s Brand or Trade Name
• Ingredient Statement, % Active and Inert Ingredients
• Chemical Name or Shorter Common Name Designation
• EPA Registration Number
• Type of Formulation: EC-Emulsifiable Concentrate, S-Solution, F-Flowable, D-Dust, WP-Wettable Powder, G-Granular, WDG-Water Dispersible Granular, M-Microencapsulated, Aerosol, Fumigant. and Baits.
• Classification: Restricted or General Use
• The Signal Word: Danger, Warning, or Caution
• Human Hazard Statements
• Personal Protective Equipment Requirements -- PPE
• Worker Protection Standard Requirements -- WPS
• Practical First-Aid Treatment
• Environmental Hazard Statement
• Directions for Use
• Mixing, Additives, and Application Instruction
• REI- Restricted Entry Interval, and PHI- Pre-Harvest Interval Statements
• Special Requirements – EPA or Other Agencies
• Storage and Disposal

Remember it is a Legal Document
BASF Ag Products
Prowl® H2O, EPA Reg No. 241-418

Available PDF files for Viewing:
Specimen Label, NVA 2008-04-195-0353

BEARING AND NONBEARING GRAPE

Prowl H2O may be only applied by ground, chemigation, or flood, flooded basin and gravity flow irrigation systems.

Use Methods, Timings and Rates
With a single application, uniformly apply Prowl H2O in bearing grape vineyards up to 6.3 quarts per acre depending on the grower’s weed control program, level of weed infestation, and desired use strategy (see chart following).

<table>
<thead>
<tr>
<th>Prowl H2O Use Rate per Acre</th>
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<tbody>
<tr>
<td>Low Use Rate</td>
<td>3.2 quarts</td>
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<tr>
<td>High Use Rate</td>
<td>6.3 quarts</td>
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</table>

Prowl H2O may be applied anytime after fall harvest, during winter dormancy, and in the spring.
The leading provider of electronic data, information and decision support technologies to the agro-business and food industries.

Welcome

For a quarter of a century, CDMS has delivered the most comprehensive market access to critical agro-chemical information and decision support tools for the agricultural, turf & ornamental, and food industries.

Our technologies, data, and information resources facilitate on-demand product distribution, utilization and regulatory compliance, which provide critical information that drive decisions and shape strategies.
CDMS' Agro-chemical database is the most widely used and trusted resource for critical agronomic, regulatory, and use criteria.

Search Results for **Venue**

<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
<th>Category</th>
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<tr>
<td>Venue 8</td>
<td>Nichino America, Inc.</td>
<td>Agriculture/Crop Protection Labels &amp; MSDS - USA</td>
<td><img src="image1.png" alt="Labels" /> <img src="image2.png" alt="MSDS" /></td>
</tr>
</tbody>
</table>
A Nonselective Contact Herbicide for Tree, Nut, and Vine Crops

ACTIVE INGREDIENT:
Pyraflufen ethyl: ethyl 2-chloro-5-(4-chloro-5-difluoromethoxy-1-methyl-1H-pyrazol-3-yl)-4-fluorophenoxyacetate 2.0%
OTHER INGREDIENTS: 98.0%
TOTAL 100.0%
Contains 0.17 lb. pyraflufen ethyl per gallon

superscript corresponds with lot number

KEEP OUT OF REACH OF CHILDREN

CAUTION
See inside booklet for First Aid, Precautionary Statements, and Directions for Use

NET CONTENTS: 1 quart

550507 07/11

Nichino America, Inc.
4550 New Linden Hill Road
Wilmington, DE 19808
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)
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]**

Skin contact may be fatal –
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
  - Dinitroanalines [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 establishment!*

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]**

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®**

  **Pyraflufen-ethyl: Venue®**

  Vineyard & orchards 0-3-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).

  ✓ Apply with a hooded sprayer
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

- 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)
There's an inspector at the gate

Pesticide Enforcement Program
Private Applicator Certificate

Remember, a private applicator certificate is for the use of the certified applicator them self to purchase a restricted use pesticide for their own use, or their employees use, on their property or rented property.

It cannot be used to purchase a restricted use pesticide that is then given to a neighbor, or friend, for their use. This is a violation of both state and federal law.
# What Pesticide Applicator?

<table>
<thead>
<tr>
<th>Private Applicator</th>
<th>Commercial Applicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Core Manual Exam</td>
<td>• Core Manual &amp; Category Exams (13)</td>
</tr>
<tr>
<td>• Owned or Leased Production</td>
<td>• For Hire: Licensed and Insured</td>
</tr>
<tr>
<td>• 3-Year Certificate $7.00</td>
<td>• 1-Year Certificate $75.00 &amp; Exam Fees</td>
</tr>
<tr>
<td>• 2-Hr Recertification Training/3-Years</td>
<td>• 3-6 Hr Recertification Training Annually</td>
</tr>
</tbody>
</table>
FY 13 ROUTINE BUSINESS INSPECTIONS
Violations Most Frequently Cited

Disposal
  Failure to rinse jugs

Storage
  Secured during transport
  Maintaining a clean storage area

Employee Registration
  Failure to register in 30 days

Records
  Location of application
Record Keeping Requirements For Private Applicators

### PRIVATE APPLICATOR PESTICIDE APPLICATION RECORD

<table>
<thead>
<tr>
<th>Name/Address of Certified Applicator or Applicator (if different)</th>
<th>Application Date (mm/dd/yyyy)</th>
<th>Location of Treated Area</th>
<th>CropSite Treated &amp; Acres, Size, No. of Plants Treated</th>
<th>Application Rate &amp; Total Amount Used</th>
<th>R.E.I. (in hrs)</th>
<th>DO NOT ENTER UNTIL (mm/dd/yyyy)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe's Agri-Service 123 Tomato Alley Road Regulation, MD 12345</td>
<td>5/2/01 4:00pm-6:00pm</td>
<td>Field 1A</td>
<td>Biory Magnam 100-0-17 atrazine/s-metolachlor</td>
<td>Field Corn (pro-enorge) 65 acres</td>
<td>2.5 sq. ft. /acre 40.6 gal.</td>
<td>24</td>
<td>5/3/01 6:00pm</td>
</tr>
<tr>
<td>Jim Johnson 11 Corn Hollow Farm Ln Regulation, MD 12345</td>
<td>6/3/01 4:30am-6:30am</td>
<td>Field 7 Block 1A</td>
<td>Warrior 10-10-208 lmtr-cyhalothrin</td>
<td>Sweet Corn 15 acres</td>
<td>3oz / acre 45 cm</td>
<td>24</td>
<td>6/2/01 6:00am</td>
</tr>
<tr>
<td>Joe's Agri-Service</td>
<td>6/29/01 6:00am-9:00am</td>
<td>Field 1A</td>
<td>Ascent 352-0.60 microfluorone</td>
<td>Field Corn 65 acres</td>
<td>1oz / acre 60cm</td>
<td>4</td>
<td>6/29/01 1:00pm</td>
</tr>
<tr>
<td>Jim Johnson</td>
<td>7/5/01 7:00am</td>
<td>Field 25</td>
<td>Qualtrin 10-12-45 oxyfenon</td>
<td>Tomatoes 10 acres</td>
<td>6.2oz / acre 82cm</td>
<td>12</td>
<td>7/6/01 9 am</td>
</tr>
</tbody>
</table>

**Meets Maryland and EPA Worker Protection pesticide application record keeping requirements**
Records Must Be Maintained For Both General and Restricted Use Pesticide Applications

Records Must Be Held For A Period Of Two Years
PESTICIDE SECURITY
2014 Complaint Investigations By Category

Formal Complaints 33

- Wood Destroying Insect Inspections 7
- Structural 9
- Public Health 2
- Agricultural 6
- Ornamental & Turf 7
- Unlicensed 1
- Neighbor vs Neighbor 7
- Right of Way 1

July 1, 2013 thru June 30, 2014
2014 Agricultural Investigations
Type of Applicator

- Other Complaints: 34
- Agricultural Complaints: 6

Private Applicator:
- 2 complaints

Commercial Applicator:
- 4 complaints
2013 Agricultural Investigations
Type of Complaint

- Other Complaints: 34
- Agricultural Complaints - Drift: 6
MDA’s Searchable Database

www.mda.state.md.us

Pesticide products registered with MDA.
- Search by product name, active ingredient, pest/site, EPA Reg. No.

Licensed businesses, Certified Applicators & RUP Dealers
- Search by name, category, county
Drift Reduction

As Part Of The Reregistration Process EPA Is Requiring New Language On Product Labels In An Effort To Reduce Worker and Ecological Risks.

- Currently Limited To Products Containing Azinphos-methyl

In Order To Reduce Drift The label will require:

- The Use Of Best Management Practices
- Buffer Zones To Protect Surface Water
- The Use Of New Equipment Technology
Plants/Pests > Pesticide Regulation

Pesticide Regulation

The Pesticide Regulation Section administers Maryland’s Pesticide Applicator’s Law, approves training courses in the handling, storage and use of pesticides, conducts examinations to determine that pesticide applicators are competent to follow prescribed pest control practices, enforces federal laws on the sale and use of pesticides, and investigates pesticide accidents or incidents and consumer complaints on pesticide misuse.

To find out more, call Pesticide Regulation at 410-841-5710.

Contact Information

Dennis Howard
Program Manager
Pesticide Regulation Section

Telephone: 410-841-5719

- View Pesticide Sensitive Crop Locator Map
- Pesticide Sensitive Crop Locator User Guide
- Pesticide Sensitive Crop Locator Application
SENSITIVE CROP LOCATOR

Base Map Options

Maryland Pesticide Sensitive Crops Locator

Pesticide Sensitive Crops (2013)

Field crops
Floriculture/Greenhouse
Fruits
Livestock
Melons/Pumpkins
Nursery crops
Vegetables
Vineyard/Grapes

Pesticide Sensitive Crop Information

SITE ID #: 56
SITE #: 1.00
NAME: SUGAR LOAF MOUNTAIN VINEYARD
ADDRESS: 15125 COMUS ROAD
CITY: DICKERSON
STATE: MD
ZIP: 20842
COUNTY: MONTGOMERY
CROP ID: 1.00
CROP: Vineyard/Grapes
TYPE: 
Zoom to

Base Map Options:

- NCAA Nautical Charts
- Canvas - Light Grey
- Terrain
- Imagery - Bing
- OpenStreetMap
- Topo
- Roads - Bing
- Hybrid - Bing
Vineyard Floor Management

2,4-D damage to vine
**Pasture Herbicides**

**Post Emergence Broadleaf Control**

- **Growth Regulators: Abnormal Growth Response**
  - Pyridinecarboxylic Acid
  - Aminopyralid: Milestone®
  - Aminopyralid + 2,4-D: Forefront R&P®

**Bioassay Required.**

- Broadleaf weed control with very active & long soil residual >12-months. Also controls multiflora rose, sumac, honeysuckle and blackberry.
- No grazing restriction, except dairy. 7-day hay harvest interval. Manure and Hay must remain on the farm.
Herbicide Drift Potential

✓ All herbicides are subject to particle drift.

✓ Vapor drift potential varies by each herbicide’s vapor potential.

✓ Droplet size controls both types of drift.

✓ Wind, temperature and humidity affects drift severity.
Distance Water Droplet Drifts While Falling 3ft in a 5mph wind

<table>
<thead>
<tr>
<th>Size</th>
<th>Microns</th>
<th>Drift Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Coarse</td>
<td>600</td>
<td>0.3</td>
</tr>
<tr>
<td>Coarse</td>
<td>500</td>
<td>0.4</td>
</tr>
<tr>
<td>Medium-Coarse</td>
<td>400</td>
<td>0.7</td>
</tr>
<tr>
<td>Fine</td>
<td>200</td>
<td>5.5</td>
</tr>
<tr>
<td>Very Fine</td>
<td>100</td>
<td>26.0</td>
</tr>
<tr>
<td>Ultra Fine</td>
<td>50</td>
<td>88.0</td>
</tr>
</tbody>
</table>

Note: Spray particles under 50 microns in diameter may remain suspended in the air indefinitely or until they evaporate.
Turbo TeeJet® flat spray tip

VMD of TT11004VP at 40 psi ≈ 420 microns
% Driftable Fines at 40 psi: TT11004 = < 2%
(<150 Microns)
ASAE Classification at 40 psi - Coarse
AIXR TeeJet - Air Inducted Extended Range

VMD of AIXR11004VP at 40 psi ≈ 445 microns
% Driftable Fines at 40 psi: AIXR11004 = < 2%
(<150 Microns)
ASAE Classification at 40 psi – Extremely Coarse
Al TeeJet™

Excellent for Systemic Herbicide

30-90 psi
Pesticide Usage Survey

MDA will be conducting a usage survey for the pesticides used during 2015.

The Maryland Agricultural Statistics Service will be conducting the survey.
U.S. Environmental Protection Agency

Update
Neonicotinoid Pollinator Protection

Last year EPA began requiring the manufacturers of neonicotinoid insecticides that are labeled for outdoor foliar applications (except granules) to incorporate new labeling to minimize exposure to bees and other pollinators.

This includes:
- Clothianidin
- Dinotefuran
- Imidacloprid
- Thiamethoxam

New label Icon for pollinator protection
Bluegrass, Tall Fescue & Ladino Clover
Pasture Herbicides
Post Emergence Broadleaf Control

- Proroporphyrinogen Oxidase (PPG or Protox) Inhibitor

**Triazalone**

**Carfentrazone-ethyl : Aim®**

Post-emergence with no soil activity or uptake, rapid microbial breakdown.

- Selective broadleaf control - Does not kill established clover.
- Contact herbicide: Rapid foliar absorption with leaf translocation (15-minutes).
- Use with a non-ionic surfactant (NIS).
- Targeted Weeds: Bedstraw, bittercress, black nightshade, carpetweed, cocklebur, common mallow, jimsonweed, lambsquarters, morningglories, mustards, pigweed sp., purslane, shepherdspurse, thistles, velvetleaf, wild buckwheat, and others.
Smart phones can be used for having the label on site.

However, there must be an app on the phone to go directly to the label site. A copy of the label must be made available immediately.

Note: If there is no cell coverage at the application site either a pdf copy of the label has to be on the phone or a hard copy of the label has to be available.
Certified Private Pesticide Applicator

New Maryland Pesticide Applicator Core Manual


http://www.mda.state.md.us/plants-pests/pesticide_regulation/index.php

http://pesticide.umd.edu/

http://www.mda.state.md.us/plants-pests/pesticide_regulation/index.php

http://pesticide.umd.edu/

http://www.nasda.org/workersafety/
Airlytics – Team 6

Bill Marose, IM

Dave Myers, PI

Tom Eberle, EL

Real-time Aerial Imaging for Precision Agriculture

Number of Customer Interviews
Conducted this week: 7
To Date Total: 44
Miles Logged To Date: 1217
Are the days of heavy equipment farming numbered?
Normal Respiratory Anatomy

**Nasal cavity**
Air passing over the mucous membrane of the nasal cavity is moistened, warmed, and filtered.

**Pharynx**
The pharynx, or throat, is located where passages from the nose and mouth come together.

**Epiglottis**
The epiglottis is a flap of elastic tissue that forms a lid over the opening to the trachea.

**Larynx**
The larynx, or voice box, is located between the pharynx and the trachea. It contains two ligaments—the vocal cords—that produce sound when air moves through them.

**Lungs**
If one lobe is injured or diseased, the other lobes may be able to function normally.

**Bronchiole**
Inside the lungs, the bronchi branch into smaller tubes called the bronchioles.

**Alveoli**
At the ends of the bronchioles are bunches of alveoli, air sacs, arranged like grapes on a stem.

**Trachea**
From the larynx, air enters the trachea, or windpipe, which leads toward the lungs.

**Bronchi**
The trachea divides into two tubes called bronchi.
The alveoli are where the oxygen from the air enters your blood, and the carbon dioxide from your body goes into the air.

Here contaminants in the air enter the bloodstream and are rapidly transported throughout the entire body.
Health effects

Healthy Tissue

Healthy Tissue
90-year-old school teacher

Progressive massive fibrosis
40-year-old miner
New York Autopsies Show 2009 H1N1 Influenza Virus Damages Entire Airway

In fatal cases of 2009 H1N1 influenza, the virus can damage cells throughout the respiratory airway, much like the viruses that caused the 1918 and 1957 influenza pandemics, report researchers from the National Institutes of Health (NIH) and the New York City Office of Chief Medical Examiner. The scientists reviewed autopsy reports, hospital records and other clinical data from 34 people who died of 2009 H1N1 influenza infection between May 15 and July 9, 2009. All but two of the deaths occurred in New York City. A microscopic examination of tissues throughout the airways revealed that the virus caused damage primarily to the upper airway — the trachea and bronchial tubes — but tissue damage in the lower airway, including deep in the lungs, was present as well. Evidence of secondary bacterial infection was seen in more than half of the victims.

The team was led by James R. Gill, M.D., of the New York City Office of Chief Medical Examiner and New York University School of Medicine, and Jeffery K. Taubenberger, M.D., Ph.D., of the National Institute of Allergy and Infectious Diseases (NIAID) at NIH. The findings are reported in the Archives of Pathology & Laboratory Medicine, now available online and scheduled to appear in the February 2010 print issue.

"This study provides clinicians with a clear and detailed picture of the disease caused by 2009 H1N1 influenza virus that will help inform patient management," says NIAID Director Anthony S. Fauci, M.D."In fatal cases of 2009 H1N1 influenza, it appears the novel pandemic influenza virus produces pulmonary damage that looks very much like that seen in earlier influenza pandemics." The new report also underscores the impact 2009 H1N1 influenza is having on younger people. While most deaths from seasonal influenza occur in adults over 65 years old, deaths from 2009 H1N1 influenza occur predominately among younger people. The majority of deaths (62 percent) in the 34 cases studied were among those 25 to 49 years old; two infants were also among the fatal cases.

Ninety-one percent of those autopsied had underlying medical conditions, such as heart disease or respiratory disease, including asthma, before becoming ill with 2009 H1N1 influenza. Seventy-two percent of the adults and adolescents who died were obese. This finding agrees with earlier reports, based on hospital records, linking obesity with an increased risk of death from 2009 H1N1 influenza.
Respirator Maintenance

- Respirators must be cleaned, inspected and maintained regularly.
- Clean in warm soapy water.
- Allow to dry thoroughly before storing or using.
PPE Storage

Storage

Respirator Storage Cabinet
Protects and keeps Respirator Clean

PROTECTIVE EQUIPMENT

Storage
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 Information at:
www.annearundel.umd.edu

EPA on-line “Soil Fumigant Tool Box”
http://www.epa.gov/opp00001/reregistration/soil_fumigants/index.htm

EPA Fact Sheet 2010 Site-Specific Fumigant Management Plans and Post Application Summaries (PDF)

Respirator Fit Test Presentation
“Bay Area Fruit School” QAC TV 7
http://origin.peg.tv/pegtv_player?id=affiliate1&video=17451
National Poison Control Center

1/800/222-1222

Operates 24 hours a day
7 days a week
Human Health

- **Acute Toxicity**: Pesticide Poisonings
- **Chronic Toxicity**: Long Term Exposure
## Hazard Indicators / Signal Words

<table>
<thead>
<tr>
<th>Signal Word</th>
<th>LD 50</th>
<th>Signal Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>0 - 50</td>
<td>DANGER-POISON</td>
</tr>
<tr>
<td>LD 50</td>
<td>50 - 500</td>
<td>WARNING</td>
</tr>
<tr>
<td></td>
<td>&gt;500</td>
<td>CAUTION</td>
</tr>
</tbody>
</table>

### Signal Words:
- Effect of pesticide after a single exposure and within a 24 hour period.
- Active Ingredient is evaluated
- Determines the SIGNAL WORD on label
- Measured by Calculating an LD 50 value
Fatalities Due To Pesticide Poisoning

In 2002 the 17 Fatalities Were Caused By The Following Pesticides:

Fungicides = 1
Herbicides = 4
Insecticides = 6
Rodenticides = 5
Fumigants = 1
**LD<sub>50</sub>**

- **LD<sub>50</sub>** = the *dose* of a substance that *kills* 50% of a population of test animals
  - measured in milligrams of toxicant per kilogram of body weight (mg/kg)

Dose: 15 mg/kg 10 mg/kg 7 mg/kg

96 dead 50 dead 12 dead
RESTRICTED 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.

Bayer CropScience

Guthion® Solupak 50%
Wettable Powder Crop Insecticide
IN WATER SOLUBLE PACKETS
For effective economical insect control.

ACTIVE INGREDIENT:
O,O-Dimethyl S-[(4-oxo-1,2,3-benzotiazin-3(4H)-yl)methyl]phosphorodithioate..................................................50%
INERT INGREDIENTS:..........................................................50%

100%

EPA Reg. No. 264-733
DEALERS SHOULD SELL IN ORIGINAL PACKETS ONLY
Keep water soluble packets in the container and store in a cool dry place, but not below freezing (32°F). Protect from heat. Keep away from open flame. Do not heat. Entire inner packets dissolve in water. After opening outer bag, drop the required, unopened inner packets into spray tank as directed. Do not excessively handle water soluble packet or expose it to moisture, since this may cause breakage.

STOP – Read the label before use.
KEEP OUT OF REACH OF CHILDREN
DANGER  POISON
PELIGRO
Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER
Fatal if swallowed. May be fatal if inhaled. Harmful if absorbed through skin. Causes moderate eye irritation. Do not breathe dust or spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash clothing before reuse.
Guthion LD$_{50} = 10$

LD$_{50} = 10^{mg/kg}$

I weigh 185 lbs – What’s a lethal dose of Guthion?

$185^{lbs}/2.2^{kgs/lb} = 84^{kgs}$

$10^{mg/kg} \times 84^{kgs} = 840^{mgs}$ (2 Tylenol size tablets)

$.84^{gms}/28.35^{gms/oz} = .03^{ozs}$

$.17^{ozs} = 1^{tsp}$ (6 tsp/oz)

$.03^{ozs}/.17^{ozs/tsp} = .18^{tsp}$ (<1/5$^{th}$ Teaspoon)
Different parts of the body vary in their ability to absorb pesticides.

Scalp: 32%
Ear Canal: 40%
Abdomen: 18%
Genital Area: 100%
Ball of Foot: 13%
Forehead: 36%
Armpit: 64%
Forearm: 9%
Palm: 12%
Back of Hand: 21%

Percent Dose Absorbed
Chemical - parathion
Maibach 1974
New Campus Hall Funded by Warren Buffet
Teaching LD$_{50}$
Demonstration Plots
Sunset on the Kabul River
Journey from Jalalabad to Kabul
Near Kabul Negotiating the Kabul River Pass
Did You Get?

Vegetable & Fruit Headline News!
Thank You! Any Questions?

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