Grape Pests and IPM Practices for Cold Climate Vineyards

NENY & VT Grape School
Anna Wallis
Cornell Cooperative Extension
• What is IPM?
• Grape pests
  Birds
  Deer and Rodents
  Weeds
  Insects
  Diseases
  Viruses
• Summary – General recommendations
IPM

‘A philosophy of pest control founded on the principles of ecology.’
- Galen Dively

‘A sustainable approach to manage pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks’
- National Coalition on IPM
Establishing Thresholds

- untreated
- time to treat
- pest population
- EIL
- ET
- Time1
- Time2

Number of pests vs. Time graph showing untreated and treated pest populations.
IPM Tactics

**Chemical:**
- Pesticide Selection
- Spray Coverage

**Biological:**
- Natural Enemies
- Biopesticides

**Physical:**
- Air Movement
- Sanitation

**Cultural:**
- Site Selection
- Clean Vines
Avian Pests

- Lethal Control
- Bird Netting
- Visual Scare Devices
- Recorded Distress Calls
- Falconry
Other Wildlife

Rodents:
- Weed control
- Avoid mulches
- Traps or bait
- Habitat surrounding vineyard

Deer:
- Exclusion fencing

http://lof.cce.cornell.edu/submission.php?id=269
Weed Pests

Why?
- Soil Moisture
- Nutrient Competition
- Rodent Habitat
- Sunlight (Young Vines)

How?
- Cultivation
- Mowing
- Grazing
- Herbicide Strip
- Undervine Cover Crop

Insect Pests

Grape Berry Moth

Remove small infestation by hand
Use predictive models to target young larvae at egg hatch

Japanese Beetles

Insecticide application to target adults if they become a problem
- Pyrethroids
- Sevin (Carbaryl)
- Neonicotinoids

Attract and Kill lures are NOT recommended
Disease Pests

Challenges:

Most fungal pests are active and infect vines before we can detect them.

Chemical Control is necessary for our climate.

Management Strategy:

Know disease biology

Prevent

Predict

Protect
### Chemical control

#### Table 3.2.2. Effectiveness of fungicides for management of grape diseases

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Phomopsis cane and leaf spot</th>
<th>Black rot</th>
<th>Downy mildew</th>
<th>Powdery mildew</th>
<th>Botrytis bunch rot</th>
</tr>
</thead>
<tbody>
<tr>
<td>ametoctradin + dimethomorph (<em>Zampro</em>)</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>+++</td>
<td>0</td>
</tr>
<tr>
<td>azoxystrobin (Abound)</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++/+++++</td>
</tr>
<tr>
<td>azoxystrobin + difenoconazole (Quadris Top)</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++/+++++</td>
</tr>
<tr>
<td>boscalid (Endura)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>+/+++++</td>
</tr>
<tr>
<td>boscalid + pyraclostrobin (Pristine)</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++/+++++</td>
</tr>
<tr>
<td>captan (Captan, Captec)</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>cyazofamid (Ranman)</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>cyflufenamid (Torino)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>0</td>
</tr>
<tr>
<td>cyprodinil (Vangard)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>difenoconazole + cyprodinil (Inspire Super)</td>
<td>0/??</td>
<td>+++</td>
<td>0</td>
<td>+++f</td>
<td>+++j</td>
</tr>
<tr>
<td>dihydrogen potassium phosphate (Nutrol)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>++</td>
<td>0</td>
</tr>
<tr>
<td>fenamidone (<em>NY+Reason</em>)</td>
<td>0</td>
<td>0</td>
<td>+++</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>fenhexamid (Elevate)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>fixed copper (several formulations) and lime</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>++</td>
<td>0</td>
</tr>
<tr>
<td>fluopicolide (<em>Presidio</em>)</td>
<td>-</td>
<td>-</td>
<td>+++</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>fluopyram + tebuconazole (*Luna Experience)</td>
<td>+</td>
<td>++++/+</td>
<td>0</td>
<td>+++</td>
<td>++++/+</td>
</tr>
<tr>
<td>iprodione (Rovral, Meteor)*</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>++++*</td>
</tr>
</tbody>
</table>

---

2014 New York and Pennsylvania Pest Management Guidelines for Grapes
Phomopsis

Rachis, Shoot, Berries infected
Persists for years on old wood

Photos: W. Wilcox
Phomopsis

Control

• Sanitation: Prune out dead wood
• Infects early, usually only 1 event and spores depleted
• Fungicides:
  • 1 spray early
  • Protect from when clusters appear to 3-5” shoots
Anthracnose

MN Cold-hardy hybrids are susceptible (Marquette)

Overwinters on diseased wood and berries
Rain splash disperses spores
Re-infects throughout season

Photos: W. Wilcox
Anthracnose

Control

• Sanitation! Most 1° inoculum from within vineyard
• Canopy management for fast drying
• Delayed Dormant spray of Lime Sulfur
  • Very caustic!!
• Broad-spectrum fungicides
Downy Mildew

**Overwinters** on leaf debris

Specific conditions:
- Warm humid nights: ≥52F
- Rain > 0.1”
- Cloudy

Generation time: **4hrs** under optimal conditions
Downy Mildew Control

- Don’t let it start. If it starts, don’t let it spread.
- Fungicide program: Start ~2-3 wk pre-bloom, then every 7-10 days

<table>
<thead>
<tr>
<th>Material</th>
<th>Protectant</th>
<th>Post-Infection</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Strong protectants</td>
<td>No activity</td>
<td>No Problem</td>
</tr>
<tr>
<td>Captan</td>
<td></td>
<td>May wash off in rain</td>
<td></td>
</tr>
<tr>
<td>Mancozeb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoI fungicides (Group 11)</td>
<td>Strong protectants</td>
<td>Little activity</td>
<td>High Risk</td>
</tr>
<tr>
<td>Ridomil Gold (Group 4)</td>
<td>Strong protectant</td>
<td>Very good</td>
<td>High Risk</td>
</tr>
<tr>
<td>(Group 4)</td>
<td></td>
<td>Works systemically</td>
<td></td>
</tr>
<tr>
<td>Revus, Forum (Group 40)</td>
<td>Strong protectants</td>
<td>Some activity</td>
<td></td>
</tr>
<tr>
<td>(Group 40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphonates (Group 33)</td>
<td>Strong protectants</td>
<td>3-4 d post-Infection</td>
<td>Potential Risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>activity</td>
<td></td>
</tr>
</tbody>
</table>
Powdery Mildew

Unlike other diseases:
**Does NOT need free water**

High Humidity
Warm Temperatures
Powdery Mildew

Control

• Canopy management: Ventilation, Sun Exposure
  • 40% reduction in disease severity w/o sprays

• Fungicides:
  • Protect from 10” Shoots to Bunch Closure
  • Many good options
Black Rot

Overwinters in mummies

Infests during warm rains

Berries susceptible through + 5-6wks after bloom

Photos: W. Wilcox
Black Rot

Control

• Sanitation! Remove Mummies

• Fungicide program: Start of Bloom through +4 wks

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>(99)</td>
<td>(60)</td>
<td>(35)</td>
<td>(82)</td>
<td>(93)</td>
</tr>
<tr>
<td>1, 2, 3*</td>
<td>14</td>
<td>55</td>
<td>81</td>
<td>79</td>
<td>61</td>
</tr>
<tr>
<td>1, 2, 3*, 4</td>
<td>55</td>
<td>93</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1, 2, 3*, 4, 5</td>
<td>99</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2, 3*, 4, 5</td>
<td>100</td>
<td>100</td>
<td>97</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>3*, 4, 5</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4, 5</td>
<td>58</td>
<td>92</td>
<td>99</td>
<td>95</td>
<td>100</td>
</tr>
</tbody>
</table>

*Immediate prebloom (+/-); addl sprays @ 2-wk intervals
An Example of a “Skeletal” Disease Program
for Cold Hardy Cultivars
which can be Modified to Your Conditions

Stage of Growth - A Fungicide Option(s) [for specific diseases listed]

--5” – 8” shoot - Mancozeb [for Phomopsis, Black Rot (BR), and Downy Mildew (DM)]

--Immediate Pre-Bloom to Early Bloom - Rally [Powdery Mildew (PM), BR] +
Mancozeb [BR, DM, Phomopsis]

--1st Post-Bloom (10-14 days from last spray) - Rally [PM, BR] + Mancozeb [BR, DM, Phomopsis]

--2nd Post-Bloom (10-14 days from last spray) - Sovran or Abound* or Pristine*
[BR, DM, PM] [These are ‘big guns’; use if have very favorable weather for disease.]
OR Sulfur* [PM] + Mancozeb [BR, DM] [if outside 66 days to harvest and if under
the maximum amount allowed per season per acre] OR Sulfur*[PM] + Captan [DM] [note
captan has a restricted-entry interval of 48, 72, or 96 hours depending on the label]
[*denotes potential phytotoxicity issues - check labels]

--Additional Summer Sprays - possible options include Sulfur* for PM; Captan OR
a phosphonate product for DM

Red denotes critical period for disease management.

For rates of materials and further details see the
New York and Pennsylvania Pest Management Guidelines

Note: If your vineyard had a Phomopsis or Black Rot problem last year,
the first spray should go on earlier, at 3”- 5” shoot growth.

ALWAYS READ PESTICIDE LABELS VERY CAREFULLY
— THE LABEL IS THE LAW ON HOW THE MATERIAL CAN BE USED—

http://www.uvm.edu/~fruit/grapes/gr_ipm/AnInitialIPMStrategy.pdf
Virus Pests

Start with ‘Clean’ Plant Material!
All viruses are transmitted by vegetative propagation

Fanleaf Degeneration Disease
- Vectored by dagger nematodes

Grapevine Leafroll Disease
- Vectored by soft scales and grape mealybug

Grapevine Redblotch disease
- No known vector
General IPM Practices for Grapes

• Site Selection
• Appropriate Varieties
• Clean Vines
• Physical Barriers for wildlife
• Sanitation
• Canopy Maintenance
• Fungicide Program
IPM ‘Tool Box’

• NY and PA Pest Management Guidelines for Grapes

• Cornell IPM Fact Sheets
  http://nysipm.cornell.edu/factsheets/grapes/default.asp

• Wayne Wilcox, Grape Disease Control
  http://www.fruit.cornell.edu/grape/pdf/Wilcox-Grape%20Disease%20Control%202015.pdf

• Pesticide Applicator Technology – Andrew Landers
  http://web.entomology.cornell.edu/landers/pestapp/

• Webinar on Pest Management – Wilcox and Landers
  http://enych.cce.cornell.edu/submission.php?id=292&crumb=crops|crops|grapes|crop*45

• ID guides (chemical companies)
Thank you!

Wayne Wilcox
Cornell Plant Pathologist

Tim Martinson
CCE NY State Viticulture Specialist

Lindsey Pashow
ENYCHP Technician