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# A Minimal Spray Program for Cold Climate Grapes in Vermont & NE New York

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LAKE GEORGE, NY

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# Integrated Pest Management (IPM)

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# “Integrated”

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A holistic program that considers:

- Horticultural
- Environmental
- Economic
- Social

Components to manage crops for maximum sustainability



# “Pest”

- Biotic organisms that may damage crops, reduce marketable yields, or compete with crops for water or nutrients.
  - Insects & Mites (arthropods)
  - Pathogens -- disease causing organisms (fungi, bacteria, nematodes, viruses, etc.)
  - Weeds
  - Vertebrate "pests" -- birds voles, deer, etc.



# “Management”

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- Planning
  - Developing tolerance thresholds
  - Practicing good viticulture
- Monitoring
  - Weather, pest life cycles
  - Preventative vs curative
- Application of knowledge and information

*The Goal is for Knowledge  
to Substitute for Pesticides*



# Components of a minimal spray program for cold-climate grapes

- Knowledge of weather patterns
- Knowledge of pest life cycles
- Sanitation
- Host resistance
- Tolerance
- Prevention
- Chemical application



2017  
New York and Pennsylvania Pest  
Management Guidelines for  
Grapes



Cornell University  
Cooperative Extension



PennState Extension

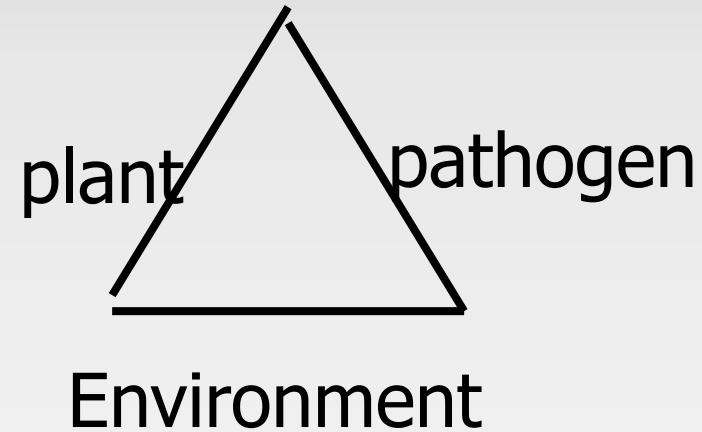
These guidelines are not a substitute for pesticide labeling. Always read and understand the product label before using any pesticide.



# Disease Triangle

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- Susceptible Plant
- Pathogen
- Favorable Environment



# Disease Triangle

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- Susceptible Plant
- Pathogen
- ~~• Favorable Environment~~



***No Disease***





# Disease Triangle

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- Susceptible Plant
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# Cultural Practices Impact Environment

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- Measure wetting events
- Black rot development model: minimum leaf wetting hours for infection to occur



# Cultural Practices Impact Environment

South Burlington, VT

	Past	Past	Current	Grape Disease 5-Day Forecast			Forecast Details	
	Jun 10	Jun 11	Jun 12	Jun 13	Jun 14	Jun 15	Jun 16	Jun 17
<b>Phomopsis</b>	No	No	No	-	-	-	-	-
<b>Powdery Mildew</b>	No	No	Yes	Yes	No	-	-	-
<b>Black Rot</b>	No	No	No	-	-	-	-	-

**Phomopsis** - calculates when weather conditions may allow spores to infect susceptible tissue.  
**Powdery Mildew** - runs from bud break until early bloom; calculates when weather conditions may allow overwintered, primary spores (ascospores) to infect susceptible tissue.  
**Black Rot** - calculates when weather conditions may allow spores to infect susceptible tissue.

[newa.cornell.edu](http://newa.cornell.edu)

Phenological stage: Immediate pre-bloom ▼

Choose the phenology stage for the grape variety of interest to display management messages. Concord grape phenology is estimated by the model from historical records for this variety.

Disease	Disease Management
Phomopsis	At this time, protect against rachis infections and prevent infections that move from berry stems into the fruit later in the season. Monitor infection events and <a href="#">maintain fungicide protection on susceptible varieties</a> , in hedged vineyards, or locations with a history of Phomopsis.
Powdery Mildew	<p>A lot of powdery mildew the previous year = More primary inoculum to cause infections this spring. The model logs potential primary infection events. <b>CAUTION:</b> Prolonged cloud cover (lack of sunshine), high RH (&gt;60%) and warm (63-86F) weather significantly increases the risk of powdery mildew infections.</p> <p>Do not delay sprays beyond the 10 inch shoot growth stage for <a href="#">highly susceptible V. vinifera and hybrid varieties</a>.</p> <p>Do not delay sprays beyond the immediate prebloom stage on Concord and other <a href="#">moderately to slightly susceptible varieties</a>.</p> <p>Fruit is extremely susceptible to powdery mildew from immediate prebloom through fruit set. This is the most critical period to protect from fruit infections. Management programs should be at their peak, emphasizing the use of <a href="#">effective fungicides</a>, full rates, appropriate spray intervals, and superior spray coverage.</p>

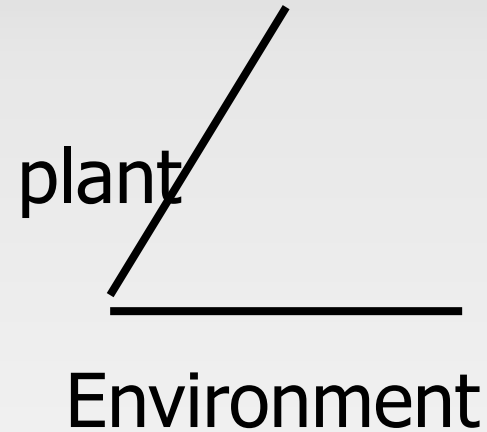
[Back to South Burlington, VT Weather Station Page](#)



# Disease Triangle

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- Susceptible Plant
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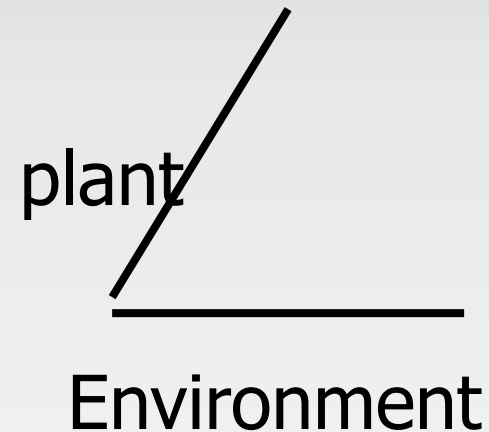
***No Disease***



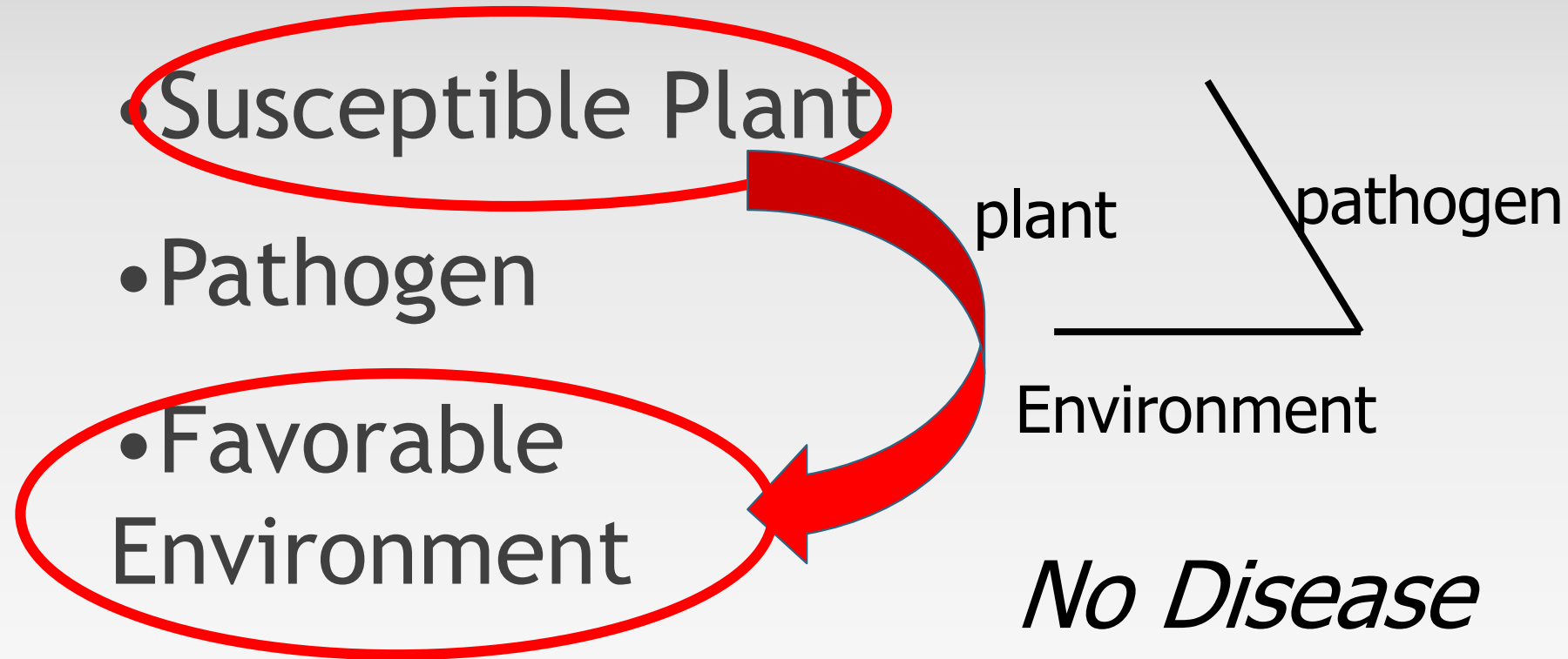
# Sanitation - Impacts Pathogen

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- Winter Pruning
- Removing dead wood
- Removing decayed fruit, stems
- Removing or flail mowing prunings and foliage



# Disease Triangle: Cultivar Selection



# Disease Triangle: Cultivar Selection

*V. vinifera* less susceptible to diseases in areas similar to where they evolved (middle east)

- Culture in moist/humid regions leads to disease problems

North American *Vitis* spp. confer resistance to pests they co-evolved with

- Large part of success of eastern viticulture is due to inherent resistance of many varieties to pests
- Greater resistance to BR, PM, DM, Bot



# Primary pests of concern for cold-climate grapes

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## Diseases:

- Phomopsis
- Black rot
- Powdery mildew
- Anthracnose
- Downy mildew
- Botrytis (and other fruit rots)

## Insects:

- Grape berry moth
- Grape phylloxera
- Japanese beetle

## Others:

- Weeds
- Birds
- Deer





# Anthracnose: Fungicide Options

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Not a major disease except in wet years, especially infested vineyards with significant overwintering inoculum

Dormant Lime Sulfur application very helpful in suppressing spores in spring

Application of EBDC fungicides @ 3-5" shoot growth - 2-4 weeks post-bloom effective



# Black Rot: Management

Remove all mummies- sanitation is critical

Canopy Management

Fungicide applications

- Immediate Pre-Bloom
- First Post-Bloom;
- Second Post-Bloom

If more than a trace level of BR is observed -sprays should continue through end of July if conditions are suitable for infection (wet)



# Powdery Mildew: Management

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## Canopy Management

- Sun exposure,
- Relative Humidity (leaf pulling, shoot positioning)
- Weed management

## •Fungicide applications: Sulfur, Strobilurins, DMI's

- Immediate Pre-Bloom
- First Post-Bloom
- Second Post-Bloom [may need to start earlier]

## Resistance Management Plan



# Phomopsis Management

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- Site Selection:
  - direct all-day sunlight, good air circulation and soil drainage
- Pruning:
  - Whilst vines are dormant, cut out any infected canes; destroy them
- Chemical management:
  - mancozeb and captan (latter can be used closer to harvest)
  - Strobilurins (Sovran/Abound) are weaker but effective in low-pressure vineyards/seasons
  - first few weeks after cluster emergence (immediate prebloom)
  - Repeat 7-10 days



# Downy Mildew: Management

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Any practice that improves air circulation and speeds drying w/in canopy will help

- Good canopy & weed management
- Spring cultivation to bury fallen leaves

Focus of management:

- (1) preventing early disease establishment and cluster infections during the prebloom and early postbloom periods
- (2) limiting secondary spread on the foliage during the summer

Unique fungicide chemistries

- Mancozebs (66 day PHI), Captan
- Strobilurins
- Phosphorus acid
- Phenylamide (Ridomil)
- Coppers ??



# Botrytis: Management

Bunch rot most concerning, but fungus infects any green tissue

Spore production greatest @ bloom & veraison

Prevention (early season management)

Cultural (good airflow in canopy, loose clusters)

Spray materials: novel, many classes

- 7: Endura, Pristine,
- 9: Vangard, Scala Inspire Super (also 3)
- 11: Sovran, Flint
- 17: Elevate, Protexio



# Dormant lime sulfur

## High concentration liquid lime

- 10%
- Highly phytotoxic
- VERY difficult to work with
- Noxious & caustic

## Applied @ dormant

- Timing tricky
- After pruning, before bud break
- Warm & dry enough to spray

## Very effective @ reducing inoculum:

- Phomopsis
- Anthracnose
- Others?



# General Disease Activity Calendar





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# Insect pests in vineyards

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# Grape Berry Moth



# Symptoms

Injures in 3 ways

1. Contamination of fruit
2. Lower yield
3. Entry point for diseases

Split open and shriveled fruit or leaf



# Monitoring

Visually examining your grape clusters for GBM

Use sticky traps with a pheromone lure

Spray @:

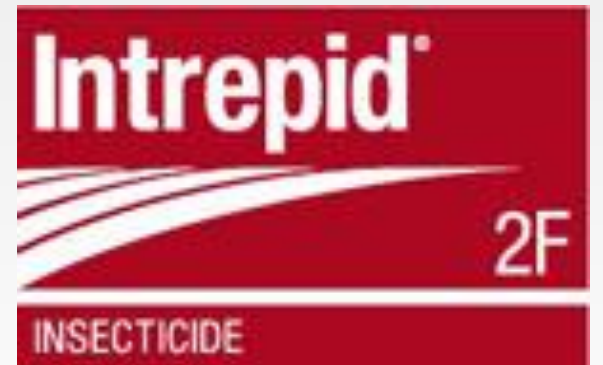
- First sign of infestation in clusters
- Preventatively based on scouting
- NEWA Model
- Wild grape as biofix



# GBM Materials

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- Lep-only, preventative:
  - IGR's
  - Bt
- Broad-spectrum, 'cleanup'
  - Neonicotinoids
  - Carbamates
  - Pyrethroids



# Phylloxera

Two forms, root and leaf-feeding

- Root feeding phylloxera managed with resistant rootstocks

‘Aerial’ form common in VT vineyards

Tolerance



# Defoliating beetles: Japanese Beetle and Rose Chafer

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*University of Minnesota Extension*



# Effective Disease Management

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## Knowledge about the Diseases

- when are critical times to manage based on their disease cycles?

## Knowledge about the relative susceptibility of the varieties to specific diseases

## Knowledge about what cultural factors can impact disease development

## Knowledge about what materials are effective

## Knowledge about fungicide resistance management





# Effective Disease Management

## Pesticide Alternatives (Cultural Practices)

### Cultivar resistance

### Sanitation

- Mummies
- overwintered infected leaves
- Dead wood and other prunings

### Canopy management

- Pruning
- Shoot Positioning
- Leaf Removal



# Pesticide Considerations

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- Efficacy
- Spectrum of Activity
- Applicator Risk
- **Resistance Management**
- Non-Target Impacts
- Sensitivity of Plant to Material
- Label Restrictions
- Cost



# High Risk - Fungicide Resistance

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- **Sterol Inhibitors** - includes Rally, Elite, Procure, Rubigan

- **Strobilurins** - includes Sovran, Flint, Pristine

[Note: Pristine is a combination product which contains both a strobilurin fungicide and a carboxin fungicide]

- **Anilinopyriidine** - includes Scala, Vangard

- **Phenylamide** - Ridomil products

- **Dicarboximide** - Rovral

- **SDHI**- Endura, Pristine, Luna Experience

- (Luna Experience includes a Sterol inhibitor as well)



# Fungicide Classes

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GROUP	11	FUNGICIDE
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## *Flint<sup>®</sup> Fungicide*

**For control of certain diseases in almonds, cucurbit vegetables, fruiting vegetables, grapes, hops, leafy petiole vegetables, pistachios, pome fruits, root vegetables (except radishes), stone fruits, and tree nuts.**

### I. General Information

This package contains **Sovran<sup>®</sup> fungicide**, a 50% water-dispersible granule (WG). The active ingredient in **Sovran**, kresoxim-methyl, belongs to a new class of fungicides, the strobilurins. Strobilurins are synthetic analogs of a natural antifungal substance and belong to the group of respiration inhibitors classified by the EPA as Quinone Outside Inhibitors (QoI) or Target Site of Action Group 11 fungicides. **Sovran** is effective against pathogens resistant to other fungicides of different modes of action.



*Sample* simplified disease management spray schedule for cold-climate grapes grown in Vermont or similar climates.

Terence Bradshaw, University of Vermont. tbradsha@uvm.edu

Updated March, 2017

<u>Timing</u>	<u>Target pest<sup>z</sup></u>	<u>Chemical family</u>	<u>Example Material<sup>y</sup></u>	<u>Efficacy rating<sup>x</sup></u>	<u>FRAC / IRAC code<sup>w</sup></u>
5-8" shoot growth	PH, BR, DM	mancozeb	Manzate 75	3-4	N/A
<b>Immediate pre-bloom to early bloom</b> <b>(10-14 days from last spray)<sup>v</sup></b>	PM, BR BR, DM, AN	DMI mancozeb	Rally Manzate 75	3-4	3 N/A
<b>1st post-bloom</b> <b>(10-14 days from last spray)<sup>v</sup></b>	PM, BR BR, DM, PH, AN	DMI + mancozeb <b>or</b> captan	Rally Manzate 75, Captan 80WDG	3-4 2-4	3 N/A
2nd post-bloom 10-14 days from last spray)	BR,DM, PM	strobilurin or SDHI <b>or</b> captan + sulfur	Flint, Luna Experience Captan 80 WDG, sulfur	3-4 1-4	11, 7 N/A
Additional summer sprays As needed, dependent on weather or physical injury (hail, etc.)	Bot DM PM	SDHI, dicarboximide Mandipropamid, phos acid sulfur, stylet oil	Luna Experience, Rovral Revus, Prophyt sulfur, JMS stylet oil	3-4 3-4 3	11, 2 40,33 N/A

Insecticides, as needed determined by scouting, and suggested timing. VT vineyards likely need only one insecticide per year targeted at grape berry moth, although other insect pests may be problematic in certain vineyards, especially on young vines.

Immediate Pre-bloom to early bloom	Phylloxera	NNI, TAD	Assail, Movento	2-3	4A, 23
1st post-bloom, summer	grape berry moth	BT, IGR, Oxadiazine, carbaryl	Dipel, Intrepid, Avaunt, Sevin	2-4	11, 18, 22A, 1A
1st post-bloom, summer	grape leafhopper Japanese beetle	NNI, carbaryl, pyrethroid	Assail, Sevin, Danitol	3-4	4A, 1A, 3A

<sup>z</sup> AN= anthracnose; Bot= botrytis; BR= black rot; DM= downy mildew; PH= phomopsis cane & leaf spot; PM= powdery mildew

<sup>y</sup> Not all materials will be registered for use in all states

<sup>x</sup> Efficacy rating based on 2016 NY & PA Pest Management Guidelines for Grapes

<sup>w</sup> Rotate materials after no more than two applications of the same FRAC or IRAC code to deter against development of resistance to pesticides in target populations.

<sup>v</sup> Immediate pre-bloom and 1st post-bloom sprays are the most critical timings for seasonal disease management.

*Where trade names or commercial products are used for identification, no discrimination is intended and no endorsement is implied. Always read the label before using any pesticide. The label is the legal document for the product use. Disregard any information in this article if it is in conflict with the label. This is a suggested guide only- all spray decisions should be based on individual pesticide labels in concert with a comprehensive management guide.*



The University of Vermont



CATAMOUNT  
FARM

SUMMER EXPERIENCE



# PSS 195: Cold Climate Viticulture

Tuesdays & Thursdays,  
9:00-3:00

June 20-July 13

- Basic horticultural, pest management and post harvest (winemaking!) concepts of cold climate grape production

Thank You!