



## *Washington Guide to Sustainable Viticulture*

# PEST MANAGEMENT

## **HOW DO I MANAGE PESTS (INSECTS, MITES, DISEASES, WEEDS, VERTEBRATES) IN A SUSTAINABLE WAY THAT MINIMIZES ECONOMIC, HEALTH, AND ENVIRONMENTAL CONCERNS?**

### CHECKLIST OF QUESTIONS TO ANSWER

#### **1. Is integrated pest management (IPM) part of my grape production program?**

IPM, which plays an integral role in grape production, is a cost-effective, long-term approach to managing pests.

IPM combines biological, cultural, and chemical tools to minimize economic, health, and environmental issues. It involves a broad-based strategy and takes a systems approach to pest management.

What are the components of IPM?

a. Crop growth

- Do I understand the basic growth stages of the crop?
- Do I understand the relationship between plant health and pests?
- Do I understand the impacts of canopy management and irrigation systems on pest populations?

b. Pests and biological control agents

- Do I understand the basic interactions of pests and biological control agents?
- Do I understand environmental impacts on pests?
- Do I understand the critical growth stages of both pests and biological control agents, and know what causes pest populations to change?
- What is the pest's weak link that I can use to help control it?

c. Evaluation of control techniques

- Am I considering all available control techniques (chemical, cultural, biological, behavioral, and genetic control) and their effects on the environment, pests, predators, and worker safety before choosing the most appropriate method for my particular situation?
- Am I watching for the cause and effect of my pest control activities and other vineyard operations?
- Am I pursuing IPM with the understanding that it doesn't offer a cookbook approach to farming, but is a process to identify and solve problems by continually refining strategies?

## 2. Identification and Monitoring

Have I instituted a pest monitoring program to assess population levels in the field on a regular basis?

- a. Monitoring equipment should include a hand lens with a 10x magnification.
  - Am I scouting for insects, mites, and beneficial predators on a weekly basis?
  - Do I have a recordkeeping program in place to record numbers, track populations over time, and evaluate pest damage?
  - Am I sampling leaves to look for pests and biological control agents?
  - Am I sampling for insects and mites in hotspots and in locations where they will most likely be found?
- b. Key insect and mite pests in Washington (not a complete list):
  - Western grape leafhopper, Virginia creeper leafhopper
  - Grape mealybug
  - Cutworms (spotted, red backed, and other species)
  - Mites (McDaniel, two-spotted spider, bud, grape leaf rust, brown)
  - Western flower thrips, grape thrips
- c. Minor or occasional insects of Washington
  - Black vine weevil
  - Cottony maple scale
  - Phylloxera (isolated locations)
  - Sharpshooters (can vector devastating diseases but generally don't in Washington)
  - Ten-line June beetle
  - Multi-colored Asian ladybug beetle
  - Be on the lookout for new, exotic/invasive pests (spotted wing drosophila, brown marmorated stink bug, vine mealybug, flea beetle, other moths)
- d. Choice of control methods
  - Conservation and biological control is the preferred method of insect and mite control.

## 3. Threshold Determination

Economic thresholds are levels of pest populations that can cause economic loss if no action is taken to control or reduce pest numbers.

- Am I making management decisions based on established or unofficial economic thresholds for pests?
- Have I established economic thresholds and economic damage levels for the insects found in my vineyard?
- Am I leaving untreated rows and control plots within my vineyard to help determine control efficacy of pests, especially when official economic thresholds have not been established?
- Do I use weather modeling programs (AgWeatherNet) to help forecast pest and disease presence and outbreak?

## 4. Diseased Vines and Vectors

Diseases, like grapevine leafroll disease, are the most damaging of pests in Washington to fruit quality and affect the long-term health of the vineyard. Prevention is the only control option because there is no cure once vines become infected with viruses and diseases.

- a. Clean material
  - Have I obtained planting material certified to be free of viruses (leafroll, fanleaf, corky bark) and phylloxera?  
(If certified stock is not available, planting material can be indexed or tested to be sure that it is virus-free.)
  - Am I controlling insects in my vineyard that can vector viruses, such as grape mealybug?



#### b. Site history

- Does the site have a history of viruses or diseases from previously grown crops? (Some diseases, like crown gall can persist in living grape roots for years after vineyards have been removed. Vineyards with cold temperature pockets are more susceptible to winter kill, which can lead to crown gall.)
- If the site had previous virus or disease history, did I remove as much rooting material as possible and consider fallowing land to allow time for roots to decay?
- Do I know what previous pesticides were used on the site?
- Is fumigation avoidable?
- Are diseases present in adjacent or surrounding vineyards?
- Is adjacent vegetative material a host for insects or diseases?

#### c. Identification and Understanding

- Can I identify virus and disease symptoms?  
Common Viruses and Diseases in Washington:
  - Grapevine leafroll virus
  - Rugose wood disease complex
  - Rupestris stem pitting, corky bark
  - Grapevine fanleaf virus
  - Grape powdery mildew
  - Botrytis bunch rot
  - Sour rot
  - Crown gall
- Do I know when the risk/pressure is high for disease incidence to occur?

#### d. Controls

- Do I implement cultural techniques to help prevent disease incidence and break disease cycles?
- Am I using weather data and a predictive model to indicate the level of powdery mildew disease risk and to schedule appropriate spray intervals for the correct material instead of spraying by the calendar?
- Do I follow resistance management practices (rotating fungicides with different modes of action and avoid using any one fungicide class more than three times in a growing season) to preserve available fungicides?
- Do I consider using reduced resistance-risk fungicides?

## 5. Herbicide Considerations

Weeds compete with vines for water, nutrients, and sunlight, harbor insects, and can reduce vine growth and yields, especially in young plantings under three years old still developing their root systems. In mature, established vineyards, competition from weeds is greatest under drip irrigation zones. Weeds can also interfere with harvest operations, pesticide spray operations, and contaminate mechanically harvested grapes with MOG (material other than grapes).

a. Are there benefits to the presence of some weeds in my vineyard (i.e. wind or water erosion control, reduction of dust, food source for biological control agents, reduction of excessive soil moisture)?

- Do I tolerate some weeds?

#### b. Monitoring

- Am I monitoring my vineyard to identify the broad spectrum of annual and perennial weeds, scouting at least bimonthly and keeping records from year to year?
- Am I scouting for the presence of new perennial weeds so I can control them early before



widespread infestation?

c. Control methods

- Have I developed a weed management strategy to guide my herbicide choice or cultivation equipment and practices?
- What methods of control will be part of my weed management plan?

d. Considerations when using herbicides

- Do I consider potential leaching when choosing herbicides?
- Do I consider timing when weeds are most susceptible to sprays?
- Do I use spot treatments to control weed hot spots instead of spraying the entire vineyard?
- Do I rotate herbicides and non-chemical controls to avoid buildup of weed resistance to herbicides?

## 5. Vertebrate Pests: Habitat Management, Plan, and Control

Birds, rodents, and large mammals like coyotes, deer, and elk are significant pests in Northwest vineyards. Birds and deer feed on grape berries, reducing yields and can cause secondary infections to the clusters and leaves. Rodents, such as gophers, ground squirrels, and meadow voles, can damage young vines by gnawing on the roots and crowns. Coyotes chew on drip irrigation tubing causing havoc to irrigation systems and will feed on low hanging fruit.

a. Monitoring

- Am I scouting for vertebrate pests bimonthly and keeping a written record of pests?
- Am I watching trees or power lines in the area for signs of birds moving in?

b. Habitat management plan

- Do I have an action plan prepared before vertebrates cause problems?

c. Understanding biology for optimum timing of control

- Do I consider biology of the organism, implementing control measures at the optimum time for best results (i.e., late spring or fall for baiting gophers or voles)?
- Do I consider non-target organisms that may be impacted by control measures?
- Am I taking steps to prevent ingestion of anti-coagulant bait by non-target animals (i.e. bait stations)?

d. Controls

- Am I targeting problem areas identified through scouting only or am I treating the entire vineyard for vertebrate problems?
- Do I encourage establishment of predators in my vineyard habitat (barn owls, kestrels, hawks, etc.) to help control problem vertebrate?
- Are trees left in the vineyard or other tall poles erected with perches or nesting boxes to encourage predator populations?
- Do I use a combination of controls (visual, audio, trapping, netting, shooting)?
- If using loud devices, have I considered if the noise will be annoying to neighbors?
- Am I complying with the Federal Migratory Bird Treaty and targeting only nonprotected birds?
- Have I considered the need for fencing for protection from large animals?
- Are grow tubes used to protect young vines from chewing rodents?
- Am I knowledgeable about any permits needed to control vertebrate?



## RESOURCES

The following Pacific Northwest Pest Management Handbooks can be accessed on-line at:

Insects - <http://pnwpest.org/pnw/insects>

Diseases - <http://pnwhandbooks.org/plantdisease/>

Weeds - <http://pnwhandbooks.org/weed/horticultural/orchards-and-vineyards>

Watson, J. 1999. Growing grapes in eastern Washington. Good Fruit Grower, Yakima, Washington.

Weeds of the West – Ninth Edition. 2006 .Western Society of Weed Science and the Western United States Land Grant Universities Cooperative Extension Services



*Washington Guide to Sustainable Viticulture*