Benefiting the environment, the community and high quality grapes and wine

CHAPTER 5

Minimizing Pest-Related Risks

Integrated Pest Management (IPM) is an integral part of any sustainable farming program.

IPM is an approach to managing pests by combining biological, cultural, and chemical tools in a way that minimizes economic, health, and environmental risks.

Various pests - insects, mites, plant pathogens, nematodes, vertebrates, and weeds - pose economic risks to the production of winegrapes when pest densities surpass tolerable levels, i.e., exceed economic thresholds. The incidence, frequency, and severity of the risks vary, depending on the vineyard location, climate, ecological conditions, and other factors. A diversity of cost-effective management tactics are generally needed and used to prevent or reduce economic risks from pests and sustain production.

Moreover, pest-related risks include potential impacts to human and environmental health. Some tactics for controlling pests may harm humans or the environment, especially when used improperly. Growers should minimize all pest-related risks (economic, social, and environmental) as part of an overall approach to sustainability and risk management.

"Integrated pest management (IPM) is an integral part of any sustainable farming program," as explained in the California Code of Sustainable Winegrowing Practices (SWP Workbook, page 6-1.) IPM is an approach to managing pests by combining biological, cultural, and chemical tools in a way that minimizes economic, health, and environmental risks (National Coalition on Integrated Pest Management, 1994). IPM is relevant for all farming systems, including organic and biodynamic systems.

IPM does not provide standardized prescriptions. In fact, the application of IPM changes in time and space, as pest managers adjust to circumstances. Nevertheless, IPM always is a knowledge-based, multi-faceted approach that safely maintains pests at sub-economic levels. IPM programs emphasize preventive, ecologically-based methods first. Good IPM practitioners improve over time, as their knowledge increases (SWP Workbook, page 6-1).

The SWP workbook provides a detailed characterization of IPM and its components. Although excluding some components of comprehensive IPM programs, this chapter focuses on four beginning elements that are essential for minimizing risks:

Box 5.1

What is a Reduced-Risk Pesticide?

Reduced risk is a term used by the US Environmental Protection Agency to refer to pesticides that pose less risk to the environmental or human health for one or more of the following reasons:

- The product is effective at a very low rate
- The pesticide affects only the target pest and does not kill natural enemies
- The mammalian toxicity of the pesticide is lower than that for older products
- The environmental toxicity of the pesticide is lower than that for older products

Source: SWP Workbook, page 6-23, originally from Kathleen Knox, U.S. EPA, Washington,

- Knowledge of Pests and Their Natural Enemies
- Monitoring Pests and Natural Enemies
- Preventing Environmental and Human Health Risks from Pesticides
- Training for Safe and Sustainable Pest Management

A. Knowledge of Pests and Their Natural Enemies

The proper identification of pests and natural enemies is an essential starting point for reduced-risk pest management. For effective monitoring and decision making, pest managers must be able to identify the important species in their vineyard and region including:

- Main insect and mite pests associated with the vineyard and region (e.g., leafhoppers, Pacific mites, thrips, leafrollers, mealybugs)
- Naturally occurring beneficial species that predate or parasitize pests (e.g., Anagrus wasp, predatory mites, spiders)
- Main diseases associated with the vineyard and region (e.g., powdery mildew, botrytis, eutypa, phomopsis)
- Main vertebrate pests associated with the vineyard and region (e.g., gophers, ground squirrels, voles, deer, finches, rabbits)
- Naturally occurring predators of vertebrate pests (e.g., owls, hawks, kestrels, bats)
- Main weeds associated with the vineyard and region

For optimal management, pest managers also should be aware of pest and natural enemy life cycles and population dynamics in relation to vine growth. For their region, for example, practitioners should know that leafhoppers usually go through 2-3 generations while associated Anagrus wasps have 3-4 times more generations per growing season.

B. Monitoring Pests and Natural Enemies

The field monitoring of population densities of pests and natural enemies is a fundamental tenet of IPM. Some damage by pests can be tolerable, i.e., when no economic losses in yield and quality occur. If pest densities remain below economic thresholds and crop injury is not excessive, remedial control generally is unnecessary, especially if sufficient natural enemies exist. Effective monitoring enables informed decisions about whether pest control is economically justified and about the design of the safest and most cost-effective management tactic(s). The information from monitoring is

Using infrared technology, an optical weed control sensor mounted on an ATV emits a pinpoint spray only on weeds, not bare ground, resulting in cost-savings up to 80 percent for weed control.

therefore crucial to avoid or reduce risks and should include that listed below:

- Monitoring of pests (including major insects, mites, and diseases) at least weekly during the growing season
- Monitoring of beneficial species (including Anagrus wasps, predatory mites, and others) weekly
- Monitoring of weather conditions in relation to decision support tools to track disease (mildew) susceptibility
- Monitoring for the glassy-winged sharpshooter (GWSS) using yellow sticky traps

Monitoring information should be recorded for comparison to economic thresholds and other management decisions. In addition, employees should be trained in pest monitoring.

Effective monitoring enables informed decisions about whether pest control is economically justified and about the design of the safest and most cost-effective management tactic(s).

C. Preventing Environmental and Human Health Risks from Pesticides

Preventing risks to the environment and human health is also important to minimizing risk and maximizing sustainability in pest management. The practices noted below are recommended for limiting environmental and health risks associated with pesticide use. Many of these measures also improve the efficiency and efficacy of applications when pesticides are necessary, therefore reducing economic risks as well.

1. Risk-reduction measures for pesticide applications

- If/when pesticides are required, pertinent regulations are followed and generally, or only, reduced-risk materials are used (see **Box 5.1** and the SWP Workbook for an explanation of reduced risk pesticides)
- Low-volume electrostatic sprayers (e.g., 20 gal/acres or less) or low-volume conventional sprayers are used
- Sprayers are calibrated regularly, especially when soil, terrain, or tractors change
- Spray nozzle discharge rates are monitored frequently, and changed if needed
- Sprayer components are checked yearly
- For optimal spray coverage, air-blast sprayers are driven 3.5 miles or less and nozzles are positioned according to canopy development
- Applicators are trained to ensure maximum on-target deposition, minimizing drift and runoff
- Applications are avoided when winds exceed 7 mph
- Lowest effective rates are used and nozzles are maintained to deliver recommended droplet sizes
- Low-drift spray technology and products with low volatile organic compounds (VOCs) content are used
- Sprayer and dusters are shutoff at row ends near sensitive areas
- Sign posting and/or other communication are used to ensure that field workers know about relevant environmental and health issues and avoid risks

2. Risk-reduction measures for pesticide storage, mixing, and loading

- On-site storage is minimized
- When stored on-site, pesticides are separately housed in a place/building designed for maximum safety
- Personal Protective Equipment (PPE) is provided for all workers who handle or apply pesticides

References and Resources

A more comprehensive coverage of IPM in vineyards to reduce pest-related risks can be found in the SWP Workbook Chapter 6, California Sustainable Winegrowing Alliance, Wine Institute, and California Association of Winegrape Growers (2006). Code of Sustainable Winegrowing Practices Self-Assessment Workbook.

UC IPM Pest Management Guidelines: http://www.ipm.ucdavis.edu/PMG/selectnewpest.grapes.html

Pesticide Safety Report by O'Connor Marer, 1997, can be found on the following website: http://www.ipm.ucdavis.edu/IPMPROJECT/ADS/manual_pesticidesafety.html

Thrupp, L. A., et. al. (2008). Biodiversity Conservation Practices in California Vineyards: Learning from Experiences. Available at http://www.sustainablewinegrowing.org/docs/2008-Biodiversity_in_Vineyards.pdf

- Measures are taken to prevent surface and ground water contamination. An emergency response plan has been developed and posted to address accidental spills or handler exposure. Further information on these safety measures can be found in a report on Pesticide Safety by O'Connor Marer, 1997, which can be found on the following web site:

http://www.ipm.ucdavis.edu/IPMPROJECT/ADS/manual_pesticidesafety.html.

D. Training for Safe and Sustainable Pest Management

Continuing training and education in IPM is important to ensure growers, pest control advisors, and employees have appropriate knowledge of pests and natural enemies, integrated management options, and the potential environmental and health risks and means to mitigate the risks. Training should include steps listed below:

- Employees are trained to identify the main pests and natural enemies found in vineyards in their region
- Employees are trained in the basic components of IPM, especially the identification of pests and natural enemies
- Employees are trained about cultural practices effective for preventing pest problems
- Employees are regularly trained about health/safety risks related to chemical use, and effective safety methods to prevent risks
- Employees receive regular safety training related to equipment operation and technologies for mixing, loading, and application of pesticides to avoid environmental and health risks.

Appropriate educational programs that ensure safety in pest management can reduce risks and liabilities for both employees and employers, while increasing the effectiveness of pest management.

Participants at a Sustainable Winegrowing Program educational workshop.