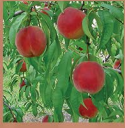




Stone Fruit IPM for Beginners

Developed by the Great Lakes Fruit Workers and funded by a working group grant from the North Central Integrated Pest Management Center



Chapter 5

Guidelines for Safe and Effective Pesticide Use

Julianna Wilson, Michigan State University, Department of Entomology

What is a pesticide?

A pesticide is any material that is applied to a crop to protect it from pest damage or disease infection; this includes synthetically and naturally derived materials. If the material is used against an insect, it is called an insecticide. If the material is used against a disease, depending on the disease-causing organism it may be called a bactericide, fungicide or nematocide. If the material is used against weeds, it is called an herbicide. All of these are pesticides.

Pesticides will either be registered as “general use” or “restricted use.” To be able to apply restricted-use pesticides (RUPs), applicators must obtain the training and licensing required to use RUPs. Pesticide applicator licenses must be renewed through state or provincial agencies. Many growers obtain credits toward renewal by attending educational programs that offer RUP credits. Renewal can also be achieved by successful completion of a renewal examination offered by a state or provincial agency.

The label is the law

Reviewing pesticide labels is critically important! Labels list the active ingredients of a pesticide, the pesticide’s mode of action (i.e., key information for managing resistance), which crops it can be used on, the pests it targets, and how and under what conditions the product can be applied including what safety precautions are required. It is vital to thoroughly read the entire label and any supplemental information for the pesticides you consider using for crop protection before applying them.

Pesticides must only be used for the specifically listed purposes and in the manner described on the product label. Non-compliance with pesticide labels could reduce the product’s performance and may cause harm to humans, the crop and the environment. The pesticide label is legally binding and you are obligated by law to adhere to the instructions and information provided. Most pesticide labels are available to download as PDF files from the CDMS Label Database (<http://www.cdms.net/Label-Database>).

Select the right tools for the job

When you are selecting pesticides, select products that specifically list your crop and the pests you intend to control. Pay close attention to the preharvest interval (PHI) or days before harvest guidelines provided on the label; this information provides the required number of days that must pass between pesticide application and product harvest. Also, take note of the required personal protective equipment (PPE) listed on the label to ensure the application process is safe for human health.



Cory Outwater, MSU Tree Fruit Pathology

Always check the label for the required personal protective equipment such as boots, gloves, respirators or eye protection. These will vary depending on the toxicity of the pesticide.

The re-entry interval (REI) will inform you of how much time must pass after application before it is safe to re-enter the orchard. Pesticide products should be chosen based on the size of your farm, the quantity of available product, anticipated use and application rates, cost and product shelf-life.

Beware of creating pesticide resistance

Pesticides are grouped by how they work against target pests, also known as their “mode of action.” A pest population repeatedly treated with pesticides having the same mode of action has a greater chance of having some members of its population emerge with resistance to that mode of action.

Over time, these resistant individuals can develop into an orchard-wide pest population that is resistant to that pesticide group. This renders any pesticide

that shares the same mode of action useless for managing the pests it was developed to target.

The key to resistance management is to alternate modes of action against a target pest population. Pay attention to the IRAC and FRAC group numbers on pesticide labels, follow the label directions to limit the amount of active ingredient applied and rotate different pesticide modes of action.

Sprayer calibration

To ensure good spray coverage and reduce pesticide waste and potential drift, it is critical to calibrate your application method to the particular orchard where pesticides will be applied. For more information and resources on sprayer calibration, including calibrating backpack sprayers for small plot work, check out <http://sprayers101.com>.

Optimal spraying weather

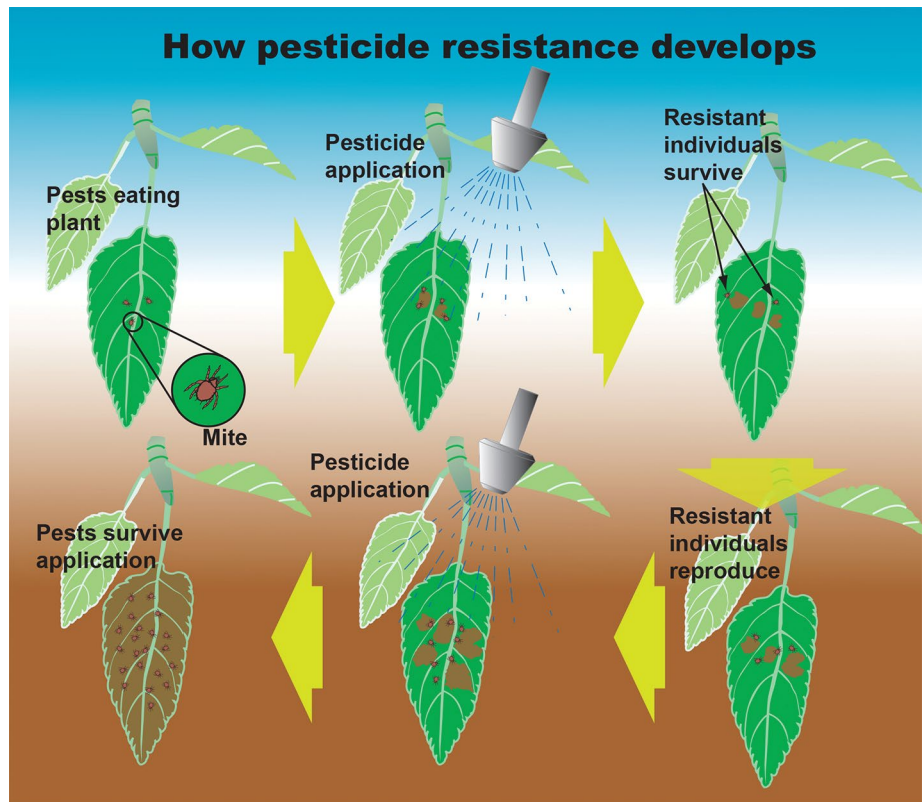
Applying pesticides under optimal weather conditions is essential for the effectiveness of the product and the reduction of environmental risks. Optimal weather for spraying occurs when the temperature is below 85 F, there is no rain forecasted for at least 6 hours and the wind is within 3-8 mph. Do not include oils within a spray 48 hours before or after freezing temperatures.

Tank mixes

If weather monitoring and scouting results suggest an insecticide and fungicide are needed, most growers will combine the two products in a “tank mix.” Tank-mixing requires knowing about the properties of the pesticides being mixed, whether they are compatible. Always read the label for information on tank-mix restrictions, as some tank mixes are toxic to trees or fruit and may cause damage.

Keeping good records

Any grower who applies restricted-use pesticides (RUP) is required by the 1990 Farm Bill to keep records of application practices and maintain these records for two years. The state of Michigan requires maintaining RUP records for three years. The first violation of this requirement results in a \$500 penalty and up to \$1,000 for any subsequent violations. However, in general it is a good practice to keep records of all pesticides used on a farm for a variety of reasons including tracking resistance management and to



look back and know what was applied when there are questions about efficacy, drift or misapplications. For the purposes of keeping legal records, the following information about each application is required:

- ▶ EPA registration number of product
- ▶ Brand name of product
- ▶ Total amount of product used
- ▶ Crop, commodity or stored product to which the pesticide was applied
- ▶ Location of application
- ▶ Size of area where applied
- ▶ Month, day and year of application
- ▶ Name and certification number of the applicator (or applicator's supervisor)

See an example of a record-keeping form that can be used to track pesticide applications.

Protecting pollinators and other beneficial insects

Pollination is the process where pollen from one flower is transferred to another flower, which is a basic requirement for almost all fruit production. Bees contribute about 80 percent of all insect pollination, so it is crucial to consider the safety of bees while

Pesticide use pesticide recordkeeping form example

Farm or business name and address: _____

Treated Area	Pesticide Information	Applicator Information
Date mo/day/yr:	Trade Name:	Name:
Crop:		
Location:	EPA Reg. Number:	Certification Number
Size (acres):	Total amount applied*:	
Notes:		
*The total quantity of the pesticide applied, such as pounds, pints, quarts, gallons, etc. of concentrated pesticides. Amount does NOT refer to the percent of the active ingredient (a.i.).		

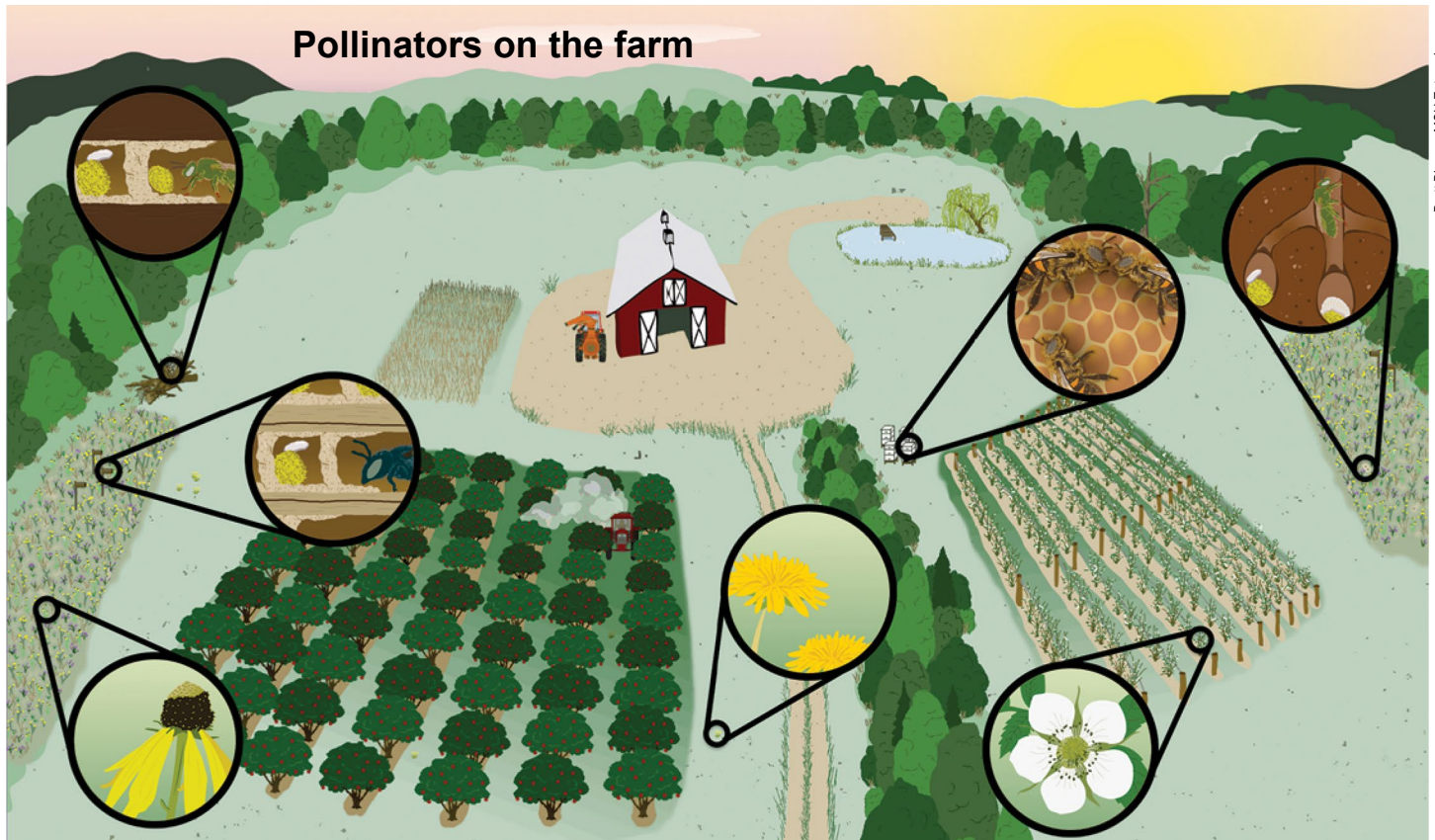
designing a pesticide program. Other insects such as natural enemies of orchard pests can be beneficial too. Parasitic wasps and lady beetles are examples of beneficial natural enemies.

Tips for reducing risks to bees and other beneficial insects:

- ▶ Use selective pesticides when possible and apply when needed as indicated by scouting for the pest and decision support tools where available.
- ▶ Most insecticides are restricted for use only before or after orchard bloom to protect bees. For

pesticides allowed to be used during bloom, select formulations that are least toxic to bees:

- Granular insecticides are typically the least harmful to bees.
- Dusts are typically more harmful to bees than spray-applied materials.
- Wettable powders are typically more harmful than emulsifiable concentrates or water-soluble formulations.
- Avoid microencapsulated insecticides as they are extremely hazardous to bees.



Brett Blaauw, MSU Entomology

- ▶ When contracting with a beekeeper for pollination services, select a place on the farm where hives will be *up wind from* and *outside of* the orchard; honey bees can fly up to 2 miles from their hives, so there is no need to put them in harm's way to achieve adequate pollination. Otherwise, turn off the sprayer when driving by hives or contact the beekeeper in advance of the application so they have the opportunity to cover or move the hives if needed.
- ▶ When using insecticides before or after crop-bloom, mow the blooms of any flowering cover crops or weeds prior to spraying to drive pollinators out of orchards.
- ▶ Use drift control methods whenever possible and calibrate sprayers to apply the amount needed to get the job done without over-spraying.
- ▶ If possible, apply pesticides in the evening and avoid midday applications.
- ▶ Clean up spills quickly and efficiently with an absorbent material, such as cat litter.
- ▶ Obey laws regarding disposal of pesticide wastes.
- ▶ Store and mix pesticides away from water sources.
- ▶ Delay pesticide application if expecting a heavy rain event.
- ▶ Do not spray when wind speeds exceed 8 mph, otherwise use drift control methods whenever possible.
- ▶ Reduce soil compaction; compacted soils increase the risk of run-off.
- ▶ Plant vegetative buffer strips around water ways to reduce erosion and run-off. Many states and provinces have cost-share programs to off-set the cost of installing buffer strips; in some areas, flowering plants can be seeded into buffer strips for the added benefit of providing food for wild bees and other beneficial insects when the crop is not in bloom.

For more information on best management practices for protecting bees while achieving pollination in fruit crops, check out: bit.ly/MinimizeRisk4Bees

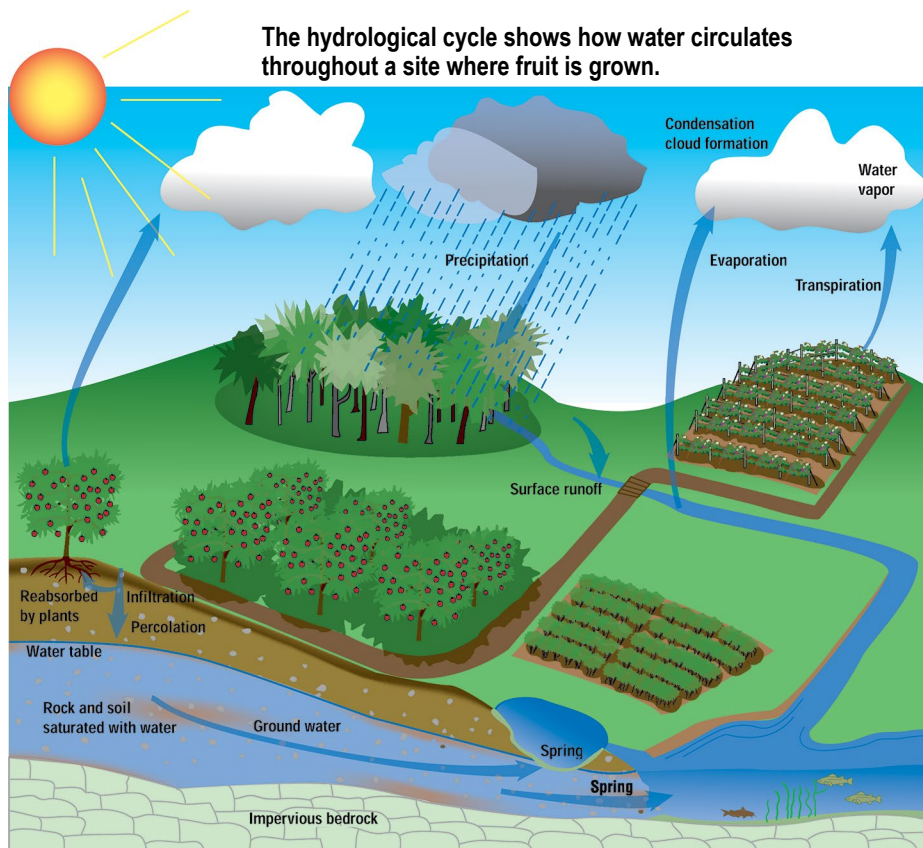
Protecting groundwater and wildlife

Pesticides can be harmful to vertebrates, such as fish and birds. Pesticides can affect birds through direct exposure to sprays, consuming treated crops or contaminated prey, and drinking contaminated water. Pesticides can enter water through drift, surface runoff, soil erosion or leaching, which can have negative effects on the safety of water resources and its aquatic inhabitants, as well as terrestrial wildlife utilizing the contaminated water. The Environmental Protection Agency (EPA) has determined threshold application rates that may impact species listed in the Endangered Species Act and provides this information on pesticide labels.

Tips for protecting groundwater and wildlife

- ▶ Calibrate equipment accurately and often.
- ▶ Carefully measure concentrates when preparing your spray tank.
- ▶ While filling a spray tank, ensure the end of the hose is above the water level to prevent back-siphoning.

- ▶ Consult the state or provincial Department of Natural Resources (DNR) or the Fish and Wildlife Services (FWS) to see if there are endangered species in your area that require special pesticide handling or added restrictions.



Used with permission from Fruit Crop Ecology and Management, MSU Extension E-2759