

Choosing a Pesticide Product

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Garden stores and online retailers often offer a variety of pesticide products for gardeners. How do you choose an appropriate product for your particular situation? What factors are important to consider? How do you know it will be safe and effective? To answer these questions, this factsheet provides an overview of five steps to follow and important information to look for on pesticide product labels in order to help you make an informed decision.

What Pesticides Do

Pests are destructive or nuisance organisms that affect people, pets, livestock, or plants. Weeds, insects, slugs, rodents, fungi, and bacteria are all examples of organisms that can be pests. Pesticides control pests most often by killing them, although some pesticides repel pests or disrupt their behavior. Common types of pesticides are listed in the table below. Pesticides are most effectively used in combination with other integrated pest management (IPM) strategies, which offer a range of tactics to address pest issues and are discussed later in the fact sheet.

Common types of pesticides	Corresponding target
insecticides	insects
herbicides	weeds
fungicides	fungi that cause plant diseases
rodenticides	rodents
molluscicides	slugs
repellents	deer, rabbits, domestic pets
miticides or acaricides	mites



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Choosing a Pesticide

The following steps are useful before choosing a pesticide:

1. Identify the pest correctly.
2. Determine your pest management objective.
3. Consider IPM options.
4. Review pesticide options.
5. Read the pesticide label to ensure it is appropriate for your purpose.

Step 1: Identify the pest correctly. Searching for online Extension fact sheets about common garden insects can help narrow down the possibilities. Speaking with a local county Extension educator can assist in identifying pests. Educators can offer reliable information about the insects that are found in your garden and can help prevent incorrect conclusions, such as mistaking beneficial insects for pests. Search for OSU Extension offices by county online [here](#).

Step 2: Determine your pest management objective.

Your goal might be to repel the pest, prevent the pest from accessing new plants, reduce its numbers to a more manageable level, or eliminate it entirely. Select the most appropriate strategy for your particular goal and context.

Step 3: Consider IPM options. IPM is an approach to pest management that combines several different tactics based on the biology of the pest, its living habits, and the particular environmental context. Examples of tactics include removing the pest's food source; using physical barriers like netting; or using beneficial organisms that feed on the pest. IPM offers options for pest management that provide the least risk. If further control is needed, then pesticides might be used together with other methods. In some cases, pesticides may not be the most effective option, while in others, pesticides can be an important part of an IPM plan. Pesticides usually need to be combined with other management tactics to control pests effectively—they are not a magic bullet.



These Colorado potato beetle larvae on a potato plant are an example of a pest.

Step 4: Review pesticide options that will accomplish your goal. Not all pesticides will be equally effective for your pest problem. Extension fact sheets, bulletins, and your county office are great sources of expert pest management recommendations. Online fact sheets can be easily found by searching “Extension [insect/disease/weed name] management” to find science-based information about pesticide options, integrated pest management, and related topics. For more resources, consult the “Ask an Expert” online service through OSU Extension and newsletters such as Buckeye Yard & Garden Online at bygl.osu.edu.

Step 5: Read the labels of the products available at your local garden store or online retail sources. Note which pests it controls, use locations, instructions, environmental considerations, toxicity, and other important information. Garden stores often organize shelves by the type of pesticide and the site where the product may be used, such as vegetable gardens or indoor structures.

Reading the Pesticide Label

Pesticide labels provide critical information about pesticide safety and handling. Always read the pesticide label on a product before buying in order to make an informed choice. Follow the application directions found on the label to use the pesticide effectively and manage potential risks. You may need to open a booklet attached to the container to find the following information.

Active ingredients are substances in the product that kill, repel, or otherwise act on the pest. A list of the percentage of active ingredient(s) by weight can usually be found on the front page of the label. If you seek expert help for choosing effective pesticides, recommendations are usually given in terms of active ingredients, rather than brand names. Brand names are created by the manufacturer for marketing and may change frequently for the same active ingredient.



Consumers can find important information in the pesticide label booklet.

Toxicity is the capacity of a substance to injure a living organism. Every pesticide product sold in the United States falls into one of four toxicity categories that indicate the risk associated with a particular product. The category is indicated by a signal word that appears on the front of the label. There are three words: “caution” meaning slightly toxic, “warning” meaning moderately toxic, or “danger” meaning highly toxic. Some pesticides are categorized as “practically non-toxic.” This fourth group may have the “caution” signal word or sometimes no signal word at all.

To choose low-toxicity pesticides, avoid using pesticides with the signal words “danger” and “warning.” Bear in mind that the risk associated with pesticide use depends on both the toxicity of the product and the amount of time that a person is exposed to the product. Careless use and excessive exposure even to low toxicity materials can still be risky.

While pesticides that are permitted in organic production typically have natural origins and tend to be less toxic than synthetic pesticides, this is not always the case. A product’s origin (natural or synthetic) is a broad category and does not necessarily determine a pesticide’s potential toxicity to humans and other organisms. The toxicity of a pesticide depends on the molecular structure of the active ingredient. To learn more about the types of pest control materials used in organic production, see the Ohioline fact sheet “[Understanding Pesticides in Organic and Conventional Crop Production](#).” For more information on toxicity of different pesticide options, see the National Pesticide Information Center’s website for fact sheets on a wide variety of active ingredients.

- Contains pyrethrins – a botanical insecticide derived from chrysanthemums
- Provides rapid knockdown and kill of listed plant pests
- For use on growing crops
- Can be used on day of harvest
- Kills more than 100 listed insects

ACTIVE INGREDIENT:

Pyrethrins a *botanical insecticide* 1.40%

OTHER INGREDIENTS: 98.60%

100.00%

Example of active ingredient found on a pesticide label.

**For use on roses, flowers, house
ornamental trees and shrubs, fr
nuts and vegetables**

ACTIVE INGREDIENT:

Clarified Hydrophobic Extract of Neem Oil 0.9%

OTHER INGREDIENTS: 99.1%

TOTAL: 100.0%

EPA Est No. 4-NY-1

EPA Reg. No. 70051-13-4

Keep Out Of Reach Of Children

CAUTION (See Back Panel for Additional
Precautionary Statements and First Aid)

Net Contents 32 FL. OZ. (946 ML.)

*Example of signal word
“CAUTION” on pesticide
label front page.*

The specific pest problem is the target pest found on the label. Reading the list of pests that the product controls will help you choose the most appropriate product. For example, herbicide labels describe which vegetation will be controlled, such as broadleaf weeds, grasses, woody plants, brush, or multiple types of weeds. If an insecticide label requires application during a specific life stage of the target insect such as the larval stage, make sure that the insects being treated are at the appropriate stage.

FOR THE CONTROL OF INSECTS:

Including, but not limited to: Ants, Aphids, Apple Maggot, Armyworms, Artichoke Plume Moth, Asparagus Beetle, Beet Armyworm, Bagworm, Bean Beetles, Beetles, Blister Beetles, Blow Flies, Biting Flies, Boll Weevil, Cabbage Looper, Cankerworms, Carrot Weevil, Caterpillars, Clover Mite, Clover Weevil, Cockroaches, Codling Moth, Colorado Potato Beetles, Crane Flies, Crickets, Cross-striped Cabbageworm, 12-spotted Cucumber

Example list of target insects listed on an insecticide label.

The *location* is the site where the product can be used. It is illegal to use pesticides for a purpose, location, or crop not listed on the label. For example, if you use an insecticide to treat ants in your bathroom, the product must indicate that it may be used inside a structure. If a product is used in a fruit or vegetable garden, the specific crops that you intend to treat must be listed on the label.

Instructions for use describe the precautions and directions for pesticide use. Take note of factors such as the time of year of application, the number of total applications per season, the frequency of applications, the time of day the pesticide should be applied, and considerations related to weather. When applying to edible plants, consider the pre-harvest interval, which is the wait time between the application of a pesticide and when the crop can be safely harvested.

The *environmental considerations* section contains warnings and precautions about potential harm to pollinators or sensitive areas. Consider the presence of children, pets, fish, and bodies of water nearby. Note any warnings on the label concerning sensitive areas. When considering using a pesticide that affects a broad range of insects, note other organisms that could be affected, particularly beneficial insects such as pollinators. To learn more about this topic, consult the Ohioline fact sheet "[Protecting Pollinators While Using Pesticides](#)."



This honeybee is an example of a pollinator.

ENVIRONMENTAL HAZARDS

To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area.

BEE HAZARD

This product is toxic to bees exposed to direct treatment. Do not apply this product while bees are actively visiting the treatment area.

This excerpt shows the environmental and bee hazard sections found on pesticide labels.

The *formulation options* are the physical form of the pesticide, such as granular or liquid spray. When choosing a formulation, consider how the product will be used, equipment required, application rate, and handling instructions. Different formulations may be more convenient or effective depending on your situation. It may be necessary to buy a sprayer or other application equipment. Ready-to-use formulations can be convenient because they do not require mixing or additional equipment. The same product may also be available in a concentrate form that needs to be mixed with water before being applied. Consider the amount of pesticide needed. For instance, do not purchase a concentrate product that will make 10 gallons of spray for a situation where a small bottle of ready-to-use product would be sufficient.

Personal protective equipment (PPE) is the equipment required to make an application safely. Pesticide products will describe specific PPE requirements on the label, such as waterproof gloves or long pants. Make sure you have the required PPE on hand.

Rotate Pesticides

Pesticide resistance can occur when pests become tolerant to a pesticide that had previously been effective. This can be caused by repeatedly using the same product over time. At first, it successfully controls the majority of the target pests. However, since individual members of the pest population are genetically diverse, a small number may possess characteristics that allow them to resist the harmful effects of the pesticide. If the same pesticide is used repeatedly, the small portion of resistant pests may survive and reproduce, creating a growing population of pests that a particular pesticide cannot control.

The mode of action is the way that a pesticide affects biochemical sites in the organism. Pesticides in the same chemical group exhibit the same mode of action. When treating the same site multiple times over the years, rotating between different modes of action can help prevent resistant pests from surviving and reproducing.

In summary, begin by identifying the pest correctly to help determine the most appropriate management objective. Next, consider a variety of integrated pest management options that can be implemented before pesticide use. Search for OSU Extension fact sheets online or call your county Extension office for a recommendation about effective products. If you determine that pesticides are necessary, review options and consider the following information found on labels: location, active ingredients, target pest, toxicity, use instructions, environmental hazards, formulation options, and personal protective equipment. Always read the label thoroughly before using a pesticide product.



Example of a hand-held pesticide sprayer found at a garden store.

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