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# Selecting Pesticide Products

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## Introduction

Pesticides can be an important tool in pest management, especially when nonchemical methods fail to provide adequate pest control. However, you must select and use them with care and attention. All pesticide products have a label (affixed to the product container) which provides detailed information about its safety and use. Reading the label before purchasing a pesticide is the only way to be sure you can use the product as directed. When selecting a pesticide, keep in mind the following considerations: safety, site, equipment, effectiveness, specificity, speed, persistence, storage and disposal, and cost.

## Product Safety

One of the most important factors when selecting a pesticide product is its safety. Although many pesticides are designed to kill pests, some active ingredients or product formulations are more toxic than others and could pose a greater risk to human health and/or the environment. The acute toxicity level of a pesticide is indicated by its $LD_{50}$ (lethal dose that kills 50% of a test population). You can find the $LD_{50}$ on the product's Safety Data Sheet (SDS), available from the manufacturer's website. The higher the $LD_{50}$ value, the less toxic the chemical. Each product label provides a signal word (CAUTION, WARNING, or DANGER) which indicates the pesticide's relative acute toxicity to humans. The label also contains information on potential hazards to humans and the environment as well as ways to mitigate potential harm.

## Intended Application Site

Before using a pesticide product, read the label to be sure it can be used in the place and manner you intend. For example, products used on lawns or ornamental plants might not be labeled for use on fruits and vegetables. Products toxic to fish or other aquatic organisms should never be used near streams, ponds, or other bodies of water. It is also important that products labeled for outdoor sites are never used inside a home or other structure.

## Personal Protective Equipment and Application Equipment

Pesticide product labels list the minimum personal protective equipment (PPE) required to protect the body from contact with the pesticide. Requirements and recommendations for PPE vary and depend on the toxicity and the formulation of the product. Products that require mixing may require you to wear additional PPE. Before purchasing a pesticide, be sure you have all of the required PPE listed on the label. Some products also require specific application equipment or devices to apply the pesticide safely, evenly, and at the proper rate. If you do not have the necessary PPE or application equipment, and do not wish to make an investment in its purchase, select a different pesticide product.

## Effectiveness

A pesticide product must effectively control the pest you are targeting, or it will be a waste of both time and money to apply. Unfortunately, determining a product's effectiveness is not always straightforward. Effectiveness can vary depending on a number of factors. For example, is the pest that needs to be controlled listed on the label? Does the pesticide need to be applied before the pest is apparent (as a preventative), or can it be used once the pest has already established (as a curative)? Will the pesticide be applied when the susceptible life/growth stage of the pest is present? Will the pesticide be applied in a way that ensures proper coverage or foliage penetration to reach the pest? Has the pest developed (or is it developing) resistance to a particular pesticide or mode-of-action? Is the spray water at an optimal pH (most

pesticides require a slightly acidic pH) to maintain stability of the chemical and prevent premature breakdown? By answering these questions before applying a product, you can improve your chances of effectively controlling the target pest.

## Product Specificity

Product specificity refers to the degree to which a pesticide is toxic to a specific target pest. A highly "selective" pesticide will kill the target pest while having little to no effect on nontarget organisms. Conversely, "broad spectrum" pesticides have the potential to kill or harm many other species in addition to the target pest. Some degree of specificity is desirable because there is less chance of harm to beneficial and/or nontarget organisms.

## Speed of Control

The speed at which a pesticide controls a pest can also be an important consideration. Some pesticides are slow acting, while others are more acutely toxic and fast acting. It is important to be aware of the speed at which a pesticide controls a pest so you can accurately gauge its effectiveness. For example, results from a spray application may not be readily apparent soon after treatment, and can take several days to become noticeable.

## Persistence

Persistence refers to the length of time a pesticide remains active in the environment. Many environmental conditions (e.g., sunlight, soil pH, soil microbe activity) can play a role in the breakdown of pesticides. Some pesticide products readily breakdown in the environment, while others can persist and remain active for months. Selecting a pesticide that offers a short period of control or more long-term protection will depend on the particular pest situation. For any pesticide, it is important to read the re-entry (REI) and harvest (PHI) restrictions printed on the label to avoid entering a treated area or harvesting a treated crop too soon after application.

## Storage and Disposal

Proper pesticide storage and disposal practices are necessary to protect people, animals, and the environment. Pesticide labels often list temperature storage requirements or specific disposal instructions for an empty container or any unused chemical. Consider these requirements before purchasing any pesticide product.

## Cost

Although an important consideration when selecting a pesticide, cost is not necessarily as straightforward as looking at a product's unit price (cost per pound, quart, or other unit of weight or volume). Many newer pesticides are formulated to be used at lower rates and thus may be packaged in smaller containers. These products might seem more expensive at first glance, but application rates can be several times less than another product packaged in a larger container. In addition, some ready-to-use products may be more expensive than concentrated products, but provide a savings in time and the need for certain mixing and application equipment.

## Conclusion and Resources

Pesticides can be valuable tools, but they must be selected with personal and environmental safety in mind. As with other tools, it is important to use the right pesticide for the job. Careful planning before purchasing a pesticide can ensure safe and proper use. If you still have trouble selecting a pesticide product after working through the considerations outlined in this publication, contact your local Extension agent for assistance: ext.vt.edu/offices.html. For additional information about selecting pesticides, please refer to the following resources:

- Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services, vapesticidesafety.com/choosing_pesticide.shtml
- Pesticide Environmental Stewardship, pesticidestewardship.org/homeowner/selecting-a-pesticide/

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