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## Section 6

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# Get the Best Results

### Choosing the Right Pesticide

After you have identified the pest, determined that a control measure is necessary and considered other methods of pest control, you may decide that the only practical method of control is to use a pesticide. You must now choose the best pesticide for the job.

### Pesticide Characteristics

When you choose a pesticide, you should consider how long it will remain in the environment after application - its **residual effectiveness** and which pests will be affected by the pesticide - its **selectivity**. Selective pesticides generally do not harm nontarget plants, insects and other organisms. Non-selective pesticides may control all pests and may even harm nontarget organisms. Extra caution should be taken when you use these pesticides.

### What Conditions Should You Consider?

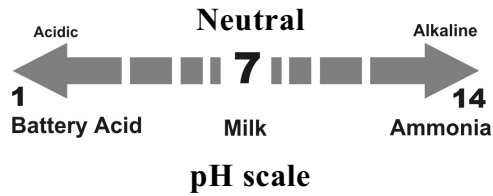
Before making a decision about what pesticide to use, you should consider the environmental conditions at or near the treatment site. The conditions can affect the safety of people, animals, and the environment, as well as the effectiveness of the control methods.

▶ For more information see the **Pesticides and the Environment** and the **Drift of Pesticides** sections in this manual.

### Water Quality and pH

The water that is used to dilute the pesticide may affect pesticide performance. The water should be at the recommended pH and temperature, as described on the pesticide label. It should also be free of sediment or organic matter. Always check the pH of the water that will be used for mixing before choosing a pesticide (see directions below).

The pH of water measures how acidic or alkaline the water is. pH can range from 1 (extremely acidic) to 14 (extremely alkaline).



**The performance of pesticides can be affected by the pH of the water you use.** Each pesticide is different. Most pesticides are not affected by acidic water. However, alkaline water can cause some pesticides to break down resulting in poor pest control. Many water sources in Ontario have a high (alkaline) pH. Water with a pH of 7.5 may be alkaline enough to affect the stability of some pesticides.

Here are examples of pesticides that break down in alkaline water, noted by their half life. Half life is the period of time it takes for one half of the amount of pesticide in the water to break down. Each half life that passes reduces the amount of the pesticide present in the water by one half, i.e. 1 to ½, ½ to ¼, etc.

captan (Captan)	pH 7 = 8 hrs	pH 8 = 10 min	pH 10 = 2 min
dimethoate (Lagon)	pH 2 = 21 hrs	pH 6 = 12 hrs	pH 9 = 1 hr
phosmet (Imidan)	pH 7 = 12 hrs	pH 8 = 4 hrs	pH 10 = 1 min

You can buy a pH indicator kit anywhere swimming pool supplies are sold. Place a small amount of the water sample in a small container. Add one or two drops of indicator to the sample. After 30 seconds compare the colour of the water/indicator solution to the colour chart provided with the indicator. Read the pH of the sample from the chart. Indicator paper can also be used.

**For best results, you should also make sure that the water does not contain sediment or organic matter.** Sediment in spray water will plug screens and wear down nozzles and pumps. Organic matter can reduce the effectiveness of some pesticides. If chemicals are adsorbed by the soil and organic matter in the water, the pesticide will not control the pest.

## Plant Stress

Some pesticides, such as Roundup, must enter the plant tissue to be effective. Mature plants and plants under moisture stress may have a tougher cuticle which makes it difficult for the chemical to penetrate the tissue. Spray generally should be applied to actively growing plants. **Read the label to find out what is the best time in the plant's growth to apply each pesticide.**

## Environmental Conditions

### Weather Conditions

**Temperature** - Some pesticides require a certain temperature to work effectively. Other pesticides may cause crop damage if used under certain temperature conditions. Many pests are only active within a certain range of temperatures.

**Relative Humidity** - Many plant diseases require high humidity to develop and spread. Time your application of pesticides to the weather forecast for humid conditions. If an Action Threshold has not yet been reached and high relative humidity is not forecast, you may be able to delay or avoid the use of a pesticide.

**Precipitation** - Rain soon after the application of some pesticides will wash away the chemical. However, pre-emergence herbicides require about ½ inch of rainfall within 10 days of application to achieve satisfactory weed control. Check the label for directions.

**Air Movement** - Pesticides and pests can be carried from the targeted area by the movement of air. Do not apply when winds speeds are high.

### Other Environmental Conditions

**Topography** - Rolling or steep land, nearby waterways, and other land features, such as soil type, may limit the use of certain pesticides.

**Nearby sensitive areas** - Avoid applying pesticides near environmentally sensitive areas such as wetlands.

**Always check the pesticide label for warnings of any environmental hazards.**

## Selecting Pesticides

When you select and purchase a pesticide, the pesticide should:

- ▶ **be effective** against the pest.
- ▶ **be registered by the PMRA, Health Canada** for use on the crop or animal, and the pest.
- ▶ **be classified in Ontario** by the Ontario Ministry of the Environment.
- ▶ **fit in with the work schedule.** Take into account the minimum amount of time before you can re-enter the field (specified on the label) so that the pesticide application does not interfere with other operations, like trimming, harvesting or packing.
- ▶ **complement the harvest date.** Some pesticides must be applied a specific number of days before the harvest to reduce pesticide residues in the fruit crop. The number of days is shown on the pesticide label as “days to harvest interval”.
- ▶ **present the least hazard** to the applicator and others who could be exposed to the application. The symbols on the label show you the hazards of the product.
- ▶ **have the least risk of harm to the environment.**
- ▶ **have the least effect on beneficial species.** For example, bees are required for the pollination of many crops. If bees are foraging or are located nearby, use a product with low toxicity to bees and spray at a time when bees are not foraging in the crop. Never apply insecticides while fruit trees are in bloom.
- ▶ **discourage pest resistance.** Crop consultants or specialists can advise you on the best Integrated Pest Management strategy to use to delay pest resistance. If you think that you may have a resistant pest, contact a crop consultant or specialist in your area.
- ▶ **be compatible.** If you must apply more than one pesticide, check the label for information about compatible products.

- ▶ **minimize exposure.** Select the formulation type which will minimize exposure for the applicator during mixing and loading and provide the minimum injury to the crop.
- ▶ **be right for the application equipment available.**
- ▶ **control secondary pests.** If secondary pests are present, select a product to provide the most effective control.

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# Review Questions

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1. A pesticide may work well EXCEPT when:
  - a) spray mix water pH is at 7.
  - b) plants are under moisture stress.
  - c) spray mix water is clear of sediment.
  - d) plants are actively growing.
  
2. List 5 things you should consider when you select a pesticide.
  - 1.
  - 2.
  - 3.
  - 4.
  - 5.
  
3. Some pesticides may break down more quickly when you mix them with water that is alkaline (has a pH greater than 7).

TRUE                      FALSE
  
4. Sediment in spray water may alter the effectiveness of some pesticides.

TRUE                      FALSE