

## 5.0 PEST MANAGEMENT

Pest management is an important component of crop production. Pests can have a detrimental effect on horticultural operations by affecting the quantity, quality and ultimately, the marketability, of the crops grown.

### Pests in Horticulture

A pest is any animal, insect, weed or disease that attacks a crop. Pests come in many forms:

- ! **Animals.** Grazing wildlife (moose, deer, rabbits and rodents) and birds can eat and destroy crops in the field.
- ! **Insects.** These pests come in many forms. They include foliage and root-feeding insects which feed on leaves or flowers or attack roots. Examples include the cabbage root maggot and many species of caterpillars and beetles. Insects with beak-like mouthparts used for piercing the plant and sucking plant juices include aphids, thrips and spider mites (which are not insect but are more closely related to spiders). Leafminers, like the beet leafminer, are small larvae of flies, beetles or moths that tunnel between upper and lower leaf surfaces. There are also many species of insects which bore into twigs or trunks (examples include the bronze birch borer, the elderberry borer and bark beetles).
- ! **Weeds.** Weeds are really any plants growing where they are not wanted. A plant can be a weed in one situation, and a desirable plant in other situations. Weeds compete with crops for space, light, water and nutrients. They can also act as hosts to diseases such as clubroot.
- ! **Diseases.** For a vegetable, fruit or ornamental crop to become severely diseased, several conditions must be present. These include having a susceptible host plant, a pathogenic organism (an agent causing disease), a good method of distributing the organism (sometimes by an insect and known as a vector), and the proper environment for it to exist, enter the plant and thrive. When all phases are satisfactory, infection may occur, and a disease agent may become established. A variety of diseases infect horticultural crops. These include various forms of rot, wilt, scab and leafspot. Late blight fungus is an aggressive pathogen of potatoes.

### Management of Pests

Pest management requires much more than a “see and spray” approach - **use pesticides only when essential**. The goal of pest management is to provide effective, economical, and safe long-term pest control. It usually involves suppression of pest numbers to acceptable levels rather than total elimination of the pest.

Horticulture operators must be aware that while the use of pesticides in crop production is an accepted practice, there is the potential for water pollution when pesticides are improperly stored, prepared, applied or disposed of. This section presents information on alternative pest management systems to help minimize pesticide use and provides guidelines for pesticide use.

Good pest management includes the following steps:

1. **Pest Monitoring.** Regularly inspect crops or traps to determine if pests are present in numbers that should be treated, and if they are, at a growth stage most suitable for treatment. Monitor weather conditions favourable to pest development as well as the presence of beneficial organisms that may help control the pest. Methods of monitoring pests include using traps, counting pests on a number of leaves, or simple observation. Good monitoring practices allows control action to be taken only if and when needed and at a time when it will be most cost effective (which can reduce the number of sprays required each season).
2. **Pest Identification and Biology.** Accurately identify the pest and know something of its habits, life cycle (some insect pests overwinter on other crops or weeds) and natural enemies. Correct identification is the key to good pest management because some treatments will only control certain pests. Sometimes it is easier to identify the damage caused by the pest than to locate the pest itself. This is true not only of microscopic disease organisms but of pests which remain out of sight. A hand lens with at least 10 x magnification is also useful.
3. **Considering All Available Management Methods.** An effective control program uses a combination of pest management methods to try and prevent a pest from getting a good start or reaching levels where costly treatment is needed. Pest management controls can be divided into five categories: sanitary, cultural, mechanical, biological and chemical.
4. **Slowing the Development of Pest Resistance.** Pests can produce thousands of offspring. Offspring born with characteristics that make them more resistant to a pesticide may survive. They soon multiply and pass on their resistance to thousands of their own offspring. Successive treatments of the same or similar pesticide repeats this process which accelerates selection of a strain of resistant pests. Eventually the pesticide and others similar to it become less effective or not effective at all. There has been no known incidence of this happening in Newfoundland and Labrador. This underscores the importance of slowing pest resistance by using a variety of control methods (chemical and non-chemical), using pesticides only when needed and alternating pesticides from different chemical groups.
5. **Making Sound Pest Management Decisions.** Rarely is it necessary to eliminate all pests. The goal is to manage these pests in the most economical and safest manner possible. Consider the following in your decision-making:

- (i) What loss will the pest cause if not controlled?
- (ii) How much will each control method cost and how effective will it be?
- (iii) What are the risks to the applicator and environment of each control method?
- (iv) Is it possible to combine control methods for more economical and effective results?

## 6. **Keeping Records to Evaluate and Refine Your Pest Management Program.**

The best decisions are those that relate directly to your land, crops, weather, farming methods and the pest in question. Keep records of pests encountered, the control measures used, the conditions and when they were used, and the costs and effect on the pest. This information when combined with records of your cropping (varieties and rotations) and cultural practices (time of planting, harvesting, fertilizing, etc.) will better enable you to plan future prevention and treatment of pests.

## 7. **The Use of Integrated Pest Management Control Measures.**

### **Integrated Pest Management Control Measures**

Integrated Pest Management, also known as IPM, is an approach to pest control which integrates the preceding management practices and control methods into one pest management program. A common definition of IPM is a broadly based method that uses all suitable control measures to reduce pest-related losses to an acceptable level with the goal of respecting genetic diversity and reducing risks to human health and environment. This is considered the national definition of IPM and was developed by the federal Pest Management Alternatives Office.

The main IPM control measures are grouped in five main categories:

- 1) **Sanitary Controls.** Simply stated, do not give the pest a place to breed or a way to spread. You can accomplish this in the following ways:
  - ! using certified disease-free and clean seed and transplants;
  - ! grading potato seed carefully while cutting and discarding suspicious looking tubers and seed pieces;
  - ! destroying plant trash which can harbour pests (cull piles, dropped fruit, etc.) and tilling under or burying vegetable culls;
  - ! controlling vectors which can carry disease;

- ! controlling weeds in ditches, along roads and fencelines, etc.; and,
- ! sterilizing soil and equipment in greenhouses (including storage facilities).

2) **Cultural Controls**. Adopt growing methods that discourage pest establishment.  
For example:

- ! choosing crop varieties or cultivars with natural resistance to the pest;
- ! rotating between crops of different families to break the life cycle of the pest, for example, rotate cole crops such as cabbage or cauliflower with potatoes to help combat clubroot (in some cases, limited landbase restricts the ability to implement an effective program of crop rotation).
- ! using cover crops to provide shelter for the main crop to allow it time to grow and compete for space, nutrients and moisture;
- ! using trap crops to attract the pest away from the main crop (pests can then be eradicated in a more localized area with less pesticides and labour);
- ! increasing plant and row spacing to reduce canopy density;
- ! intercropping by planting a mixture of crops to reduce damage (be aware though that competition may reduce yields);
- ! reducing infection hot spots to reduce the production and spread of disease by bagging and destroying individual plants; and,
- ! following other good growing practices (proper fertilizers, limestone, irrigation, etc.) that strengthen crops, make them more resistant to damage by insects and diseases, and allow them to compete more successfully with weeds.

Late blight prevention and control techniques also include using proper hilling to reduce tuber infections and reducing plant densities in potatoes. For more information on controlling this pest, refer to Factsheet S96-02 in the Sustainable Pest Management Series, “*Integrated Management of Late Blight on Potatoes*”, from the Pest Management Regulatory Agency of Health Canada.

3) **Mechanical Controls**. Pests can be kept out, disrupted, captured or killed by mechanical or physical controls such as:

- ! tilling and mowing of weeds;

- ! pruning and trellising (allows better air movement and penetration of pesticides);
- ! installing screens on greenhouse openings; and,
- ! using fences, ditches, traps, nets, noisemakers, vacuums and flammers.

4) **Biological Controls.** Pests can be controlled by using predators, parasites and diseases to help keep pests at management levels. Adding natural enemies in field situations has not received widespread use in the horticulture industry in this province mainly because they are not commercially available. Natural enemies, however, have been successfully used in some greenhouse operations. This includes the use of beneficial organisms such as:

- ! the beetle, *Aleochara bilineata*, which can parasitize and kill a large number of cabbage root maggot pupae (a major pest of cole crops in this province);
- ! syrphid flies and ladybugs which eat aphids in fields and on vegetables;
- ! predatory mites which control two-spotted mites and western flower thrips on greenhouse cucumbers (note that conserving some mites such as apple rust mites is important since they are an alternate food source for these predatory mites early in the season before the pest appears);
- ! parasitic wasps (such as those to control whiteflies in greenhouses);
- ! grazing animals which eat weeds;
- ! insect pheromones (chemicals produced by insects which may repel or attract other insects, affect mating patterns, stimulate or deter feeding or to attract insect pests to a trap); and,
- ! decoy sterile insects to lure breeding insects away from fertile mates so that egg production is reduced.

5) **Chemical Controls.** Pesticides are very effective when used correctly. However, they should only be used when absolutely necessary to minimize the risk to humans and animals, pest resistance, damaging beneficial organisms, leaving a residue on crops and providing a risk to the environment (water, ground and air contamination).

Pesticides can be either selective (affect certain pests and not others) or

non-selective (kill many living organisms). Pesticides may have a residual effect (effective for some time after they are applied) depending on soil type, climate, moisture, or they may be non-residual. (Contact your Regional Crop Specialist to obtain issues of the document, “Atlantic Provinces Vegetable Crops Guide to Cultivar Selection and Chemical Pest Control”).

Proper use of these IPM control measures will provide a number of benefits including:

- ! more cost-effective pest control;
- ! slowing the development of pest resistance;
- ! reducing the dependence on one type of control; and,
- ! addressing consumer and governmental concerns about the careful use of pesticides.

The Factsheet, SLM013, Pesticides, provides accepted guidelines for transporting, storing, applying and disposing of pesticides to minimize the risk of contamination of the environment. Appendix A provides metric/imperial unit conversion tables.

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