INTEGRATED PEST MANAGEMENT IN NURSERIES

Prepared for publication in
"2002 B.C. Nursery & Landscape Pest Management & Production Guide"

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Integrated Pest Management, or IPM, is a decision-making process that aims to suppress pest problems with procedures that are effective, economical, and environmentally-friendly. This process includes proper use of pesticides and in some situations a successful program will result in fewer pesticide applications.

In British Columbia, the B.C. Nursery Landscape Association, the B.C. Ministry of Agriculture, Food and Fisheries and the B.C. Ministry of Environment, Lands and Parks support the use of Integrated Pest Management. Many nurseries, landscape maintenance companies, and municipalities across the province successfully use this approach.

Every nursery should implement an Integrated Pest Management program. When establishing an IPM program, keep it simple. Begin by focusing on only a few plants and their associated problems; thus allowing nursery management to become familiar with the process without becoming overwhelmed by introducing multiple changes simultaneously. Once these initial problems are solved, the program can be expanded.

Individuals with experience in nursery IPM programs prepared the following information. It was designed to be a step-by-step process to starting, developing, and maintaining a program that is successful and adaptable to the special needs of each nursery.

I. MONITORING OF PLANTS

Monitoring is the regular inspection of plants to detect problems caused by pests or environmental disorders. Monitoring is the core component of Integrated Pest Management, without it an IPM program does not exist.

The aim of monitoring is to detect plant problems as they start. The information gathered during inspections will allow the site manager to make sound decisions on the need for cultural remedies or pesticide applications. If successful, the plant problems will be found at the nursery, not by the customer receiving a shipment.

The following steps are useful when developing a monitoring procedure.

1) Dedicate one person for monitoring of the nursery

The most effective way to build a successful IPM program is for nursery management to assign one person the task of crop inspection.

This person, often called a "scout", must be given enough time to tour the facility and look for plant problems. This time must be dedicated exclusively to monitoring; the "scout" should not be expected to perform other duties such as shipping, pruning or weeding.

2) Allocate the required amount of time for monitoring

Each nursery must determine how much time is necessary to conduct adequate monitoring. Some nurseries require one day every second week, while others need two days per week.

Two factors influence the amount of time required for monitoring.

First, nurseries that grow a large variety of plants will take longer to monitor than nurseries growing a smaller selection. More plant varieties mean more potential pest problems and increase the time required to inspect the plants.

Second, the abundance of pest problems is seasonal. Typically, there are more pest problems to monitor during spring and summer months and fewer pest problems in fall and winter months. Similarly, spring monitoring can take twice as long as summer monitoring.

3) Learn to recognize "normal" from "not normal"

The monitoring scout must be able to recognize plant problems as they start. Many problems first appear on the newest foliage and will cause leaves that are pierced, deformed, or discoloured.

The monitoring scout must also recognize when a plant is not growing normally. For example, leaves with two colours are "normal" on variegated plant cultivars, but are "not normal" on plants suffering from nutrient deficiencies.

4) Use a variety of monitoring methods

There are many different ways to monitor plants, and different problems require different monitoring methods.

Some of the most common monitoring methods are:

- Inspecting the plant visually, looking for damaged leaves, the presence of insects, or plant parts with poor colour.
- Beating branches over a white sheet of paper attached to a clipboard, to dislodge insects such as spider mites and root weevils.
- Installing coloured traps or pheromone traps to capture the adult stage of many insects such as thrips, tree borers and many moths.
- Using indicator trees to monitor specific insect pests at the most appropriate times. For example, certain plants in bloom will indicate the most vulnerable stage for certain insects.
- Keeping track of weather conditions that favour the development of certain diseases or emergence of insects.

5) Seek the observations of field supervisors

Most nurseries have field personnel and supervisors dedicated to specific production areas. They look at the plants on a daily basis and will notice when a pest infestation is starting or when a plant is becoming "not normal".

The monitoring scout should regularly discuss the conditions with the field supervisors, as their observations are a time-saving method of going directly to infected plants.

6) Examine plants with many predator insects

In their adult stage, many predator insects are very efficient in finding small infestations of aphids, spider mites, and thrips. An abundance of predators in a bed of plants is a warning signal that a pest problem may be developing.

7) Use appropriate field equipment

The following tools are useful for field monitoring:

- A hand lens, sixteen power magnification, to examine the insects and disease structures in the field. Hand-held lenses sell for about $30.
- Hand pruners, kept sharp and disinfected regularly, to remove plant parts.
- Containers and bags to collect insect and leaf samples.
- A trowel and a shovel, to examine the soil at the base of the plants.
- A notebook and a pen, to record observations and counts.

II. IDENTIFICATION OF PLANT PROBLEMS

Different problems require different solutions. The proper identification of the problem is the first step before selecting a treatment that will be effective. For example, spraying for insects will not solve a plant problem caused by a disease.

Proper identification serves many purposes. If an insect is causing the problem, the site manager can examine the life cycle of the pest and apply a treatment at the most vulnerable growth stage of the pest. If a disease is causing the problem, the site manager can modify growing practices to reduce the conditions that favour the disease development.

Here are useful steps in regards to the identification of problems.

1) Look at the whole plant, not just the top growth

A thorough examination of the plant is often the only way to obtain an accurate diagnosis of the underlying problem.

Many plant problems are caused by environmental factors that cannot be fixed by spraying pesticides. For example, a plant that is wilting may suffer from the lack of water in the soil, or has root rot from excess water, or has root damage caused by rodent feeding.

There are many other reasons to examine a plant thoroughly. Insects such as leafhoppers and sawflies hide on the underside of the leaves during their young stages and are normally not detected until they have caused serious damage.

2) Make counts of plants with pest problems

Counts are a written record of the pest found and the number of plants affected. They also make a useful permanent record to verify whether a problem is increasing, disappearing, or whether a pesticide application has been effective.

The monitoring scout should make enough counts to have data that is reasonably accurate and pest numbers are sufficient to justify treatments. The number of counts will vary with each problem and the expertise of each person. Twenty counts may be sufficient in some situations, whereas five hundred counts may be required in others.

3) Seek professional help with difficult problems

A person observing a plant problem for the first time may find it strange and mysterious, but a more experienced individual will provide a rapid diagnosis and suggest effective control options. Seeking this expertise can be a time-saving process.

The monitoring scout should develop a list of contacts in the area that can help with specific problems. The Plant Diagnostic Lab, based in Abbotsford, provides a fee-for-service to industry professionals and can help diagnose most plant problems.

4) Use appropriate laboratory equipment

The following equipment will be useful to identify plant problems:

- Have a space that includes a table, shelves and a refrigerator. This space is used to examine plant parts more closely and to store samples.
- Use a microscope to examine small features more closely and learn to recognize insects and diseases more rapidly. Microscopes of acceptable quality range from $400 to $2,000.
- Build a library of books and articles that have colour pictures, technical descriptions, or control recommendations. Many good publications are available for nurseries and a list of suggested books is listed in this guide.

III. TREATMENT OF PLANT PROBLEMS

When infection levels justify it, a treatment is often necessary to fix a plant problem. There are many situations where non-chemical approaches can be very effective. For example, pruning out the infected plant parts can successfully control some diseases. Predator insects can provide acceptable control with a small population of aphids or spider mites.

In Integrated Pest Management, pesticides are used as a last resort when other methods are not practical. Pesticide treatments are more common in commercial nurseries than in landscape settings, as the cost of application is spread over hundreds of plants.

Here are useful steps when using pesticides to treat pest problems.

1) Use pesticides only when justified

There are three common situations that justify the use of pesticides in nurseries.

First, when the pest problem can seriously damage the plant. Insects such as bark borers, sawflies, or root weevils can kill an affected plant. In most cases, the only effective control is to apply pesticides at the proper time in their life cycle.

Second, when the pest problem is present on plants ready for sale. A minor insect problem in the nursery can still trigger a complaint by customers. Aphids and thrips are examples of minor pests, which should be controlled before the plants are shipped.

Third, when the pest problem will bother the nursery workers. Aphids on the new growth of field-grown trees will cause little damage to the plants but will annoy the workers who walk through the plants for routine activities such as pruning or tying.

2) Determine if other plants should be treated at the same time

If a pesticide application is required, there may be other plants in the vicinity that can be treated at the same time. The pest problem on these plants may be minor, but there is an economy of scale in treating more plants simultaneously.

Also, try to combine treatments. If an area is sprayed one week for one problem, and the following week for another problem, it becomes an inconvenience for work scheduling.

3) Use pesticides in the safest possible way

Pesticides are chemical products that may be toxic to people and the environment. It is important to use pesticides in a safe way.

Follow label instructions for application rates and safety precautions.

When a pesticide is applied, ensure the area is clear of people, and follow provincial regulations for restricted re-entry intervals. Generally, the re-entry interval is 24 hours for most herbicides and fungicides, and 48 to 72 hours for many insecticides.

When possible, select a pesticide of low toxicity to preserve naturally-occuring predators and parasites. These insects help control many common pests such as aphids, spider mites, and thrips, and are easily killed by pesticide products of moderate or high toxicity.

4) Verify the treatment was successful

The nursery management will support the IPM approach only if the pest problems are properly controlled. It is important to examine the plants following a pesticide application to verify the effectiveness of the control method.

In many situations, a pesticide application that was not successful can be traced back to a faulty application. Common errors include driving the tractor too rapidly, not getting thorough coverage of the plants, or plugged nozzles.

5) Build a calendar of pest problems

Each nursery has its particular set of pest problems, and the problems change with the seasons. Some pest problems return every year during the same period. By keeping a record of the date of treatment applications, a monitoring scout can inspect the plants only when seasonal pest problems are present and have a program in place before the pests arrive.

In this publication, you will find examples of seasonal pest problems for plants in the Lower Mainland and the Southern Interior of British Columbia.

6) Ask the question: Is there any way to control the problem without pesticides?

After a successful pesticide treatment, an important question should be asked: is there anything else than can be done in the future to eliminate the need to apply pesticide for this problem?

In some cases, pest problems come back every year and the only option is to apply a pesticide at the proper time. In other cases, the production practices can be modified, for example, by dropping a plant variety that is very susceptible to aphids, or by changing the irrigation scheduling to prevent leaf spot infections.

Building an IPM program in a nursery

- Dedicate one person for monitoring
- Allocate the required amount of time for monitoring
- Learn to recognize "normal" from "not normal"
- Use a variety of monitoring methods
- Seek the observations of field supervisors
- Examine plants with many predator insects
- Use appropriate field and laboratory equipment
- Look at the whole plant, not just the top growth
- Make counts of plants with pest problems
- Seek professional help with difficult problems
- Use pesticides only when justified
- Determine if other plants should be treated at the same time
- Use pesticides in the safest possible way
- Verify the treatment was successful
- Build a calendar of pest problems
- Ask the question: Is there any way to control the problem without pesticides?