IPM for Trees and Shrubs on School Grounds

INTRODUCTION

Landscapes vary so greatly that it would be impossible to provide specific management suggestions for all the pest problems on the many trees and shrubs that might be encountered on school grounds. Instead, we will try to provide a basic framework that will enable you to solve your own problems using information from your specific site. At the end of this manual are references to Penn State publications about lawns and landscaping in Pennsylvania. They may help with specific problems.

PLANT HEALTH CARE MANAGEMENT

Plant health care management (PHC) is a new concept in managing landscapes that was developed from the concept of integrated pest management (IPM). Many arborists, horticulturists, and landscape managers have long felt that IPM's focus on "pests" is too narrow when applied to landscape plants. More than half of the problems encountered in landscapes or gardens probably are not caused by insects, mites, or disease; instead, they are the result of compacted soil, drought stress, overwatering, frost damage, and many other factors. To manage landscapes effectively, plant health and the ecosystem in which the plant is growing must be taken into consideration. PHC takes just this kind of broad approach. PHC incorporates all the principles of IPM, including monitoring, record keeping, and integrating treatments, but PHC emphasizes plant health and proper horticultural practices. PHC is *plant* management, not just *pest* management. By focusing only on pests, we often overlook the horticultural or environmental factors that affect plant growth and health.

COMPONENTS OF A PHC PROGRAM

Van Bobbitt, community horticulture coordinator for Washington State University Cooperative Extension, lists the following 5 components of a PHC program (Bobbitt, 1994):

- Know your plants.
- Determine key problems.
- Study your landscape ecosystem.
- Promote plant health.
- Consider a variety of strategies to manage pests.

Know Your Plants

Before you can properly care for the trees and shrubs on your school grounds, you must know what they are. Make a map of the grounds and identify every tree and shrub. There are books that can help you with this, or you can take a specimen to a nursery, the Penn State Cooperative Extension office in your county, or a landscaping professional.

Once you know the names of all your plants, do some research on each one. Talk to nursery personnel and horticulturists, and read about your plants in gardening books. From your research, you should be able to answer the following questions:

- What kind of soil does the plant prefer?
- How much water does it need?
- When should it be fertilized?
- How should it be pruned?
- Does it prefer shade or sun?
- How much heat or cold can it tolerate?
- What are its most common pest problems?
- What environmental problems—soil compaction, air pollution, salt damage, and others—is it susceptible to?

Your research and your experience can help you identify key plants that are prone to problems and need more of your time and attention than other plants. If there are many trees and shrubs on the school grounds, this information can help you focus your maintenance activities. You also may want to use this information to remove plants that are not suited to their sites, that have too many problems, or that require too much care.

Determine Key Problems

Many things affect the health of a tree or shrub. They are generally divided into biotic factors and abiotic factors. Biotic factors are living organisms, such as diseases, insects, mites, and deer. Abiotic factors include maintenance practices (fertilizing, pruning, irrigation), weather, soil quality, amount of sunlight, and human activities such as vandalism or soil compaction caused by constant foot traffic. These abiotic factors probably are responsible for the majority of landscape plant problems.

Most of the information in this chapter is from *IPM for Schools: A How-to Manual.* United States Environmental Protection Agency. EPA 909-B-97-001. March 1997.

Determining key problems involves deciding which situations or factors are most likely to affect the health of your plants. Ask yourself if the problem is a serious threat to plant health, a minor threat, or just an aesthetic problem. Your research and your experience will help you answer these questions. For instance, one plant disease may kill a tree, but another disease may cause premature leaf drop year after year without seriously affecting tree health.

It is likely that you will have not only key problems, but also key problem sites. For example, perhaps the heavy equipment used in remodeling the school last year severely compacted the soil in several areas, or perhaps drainage is poor in one corner of the schoolyard because of heavy clay soil. These sites will need special attention, and most likely special plants, too.

Learn as much as you can about your key problems. If they are living organisms, learn about their life cycles, how to identify various stages of the pest, and how to recognize symptoms of damage. Do enough research to help you decide which management options are both safe and effective.

You also will need to research abiotic problems. Are there specific symptoms that you can learn to recognize? What techniques are available for solving the problem? Which solutions can you afford and which are best suited to the particular site? Are there specific plants that can tolerate the abiotic factors?

Study Your Landscape Ecosystem

The grounds of your school make up an ecosystem with complex relationships among the plants, animals, water, soil, sunlight, weather, and other components. Because of these complex relationships, there are many things you will need to pay attention to when promoting plant health. Questions you will need to answer include:

- What is your climate? What are the maximum and minimum temperatures?
- Are there microclimates in the school yard that might affect plant growth?
- Where do the prevailing winds come from? Are they unusually strong?
- What are your seasonal patterns of precipitation?
- Where are the sunny and shady parts of the yard? (These will change over time as plants grow and die.)
- What are the characteristics of the soil in each part of the yard?
- What are the drainage patterns?
- What is the history of each area in the school yard? What plants were grown there? (This can be an important factor for some plant diseases.) Was the area covered with asphalt or concrete at some point? Did a road or path go through the site?
- Are animals such as squirrels, deer, and dogs having an impact on the landscape? (The salts in dog urine can be very damaging to plants.)
- What human activities are having an impact on the landscape? Are children vandalizing plants? Are lawns growing right up to the trunks of trees so that mowers regularly damage the trees? Are city de-icing operations salting up the soil?
- What kind of irrigation system is installed in the landscape, and is it in working order? Are plants getting too little or too much water?
- Is air pollution a problem in your area? (Air pollution affects plants as well as animals.)

Since landscapes are constantly changing, you will need to monitor frequently in order to detect problems early. Monitor at least every two weeks during the growing season. In mild climates, you also should monitor once a month during the winter. Focus your monitoring efforts on your key plants and your key problems. Be aware that plants growing in poor conditions are under stress and are often more likely to suffer from insects and disease. As you monitor, look for the kinds of damage symptoms you learned about in your research.

Promote Plant Health

Proper plant care is the foundation of a PHC program. Healthy plants mean healthy landscapes, and healthy landscapes have fewer problems and require less special attention. The following points will help you to minimize cultural and environmental problems, as well as pest problems.

- Match the plant to the site. For example, you cannot grow a subtropical swamp plant in a cold, dry site. Some plants cannot grow in full sun, and some plants are better adapted to salty or compacted soil or soil with poor drainage. For help with finding plants for your area or for problem sites, talk to local gardening clubs, nurseries, or extension personnel, or consult books on regional gardening.
- Select pest- and disease-resistant species.
- Know what kind of care each plant needs, and pay special attention to how you water, prune, and fertilize them.

- Plant a diversity of species so that a single pest problem will not devastate your landscape.
- Include "insectary" plants in your landscapes. These are plants that attract and feed beneficial insects with their nectar and pollen; for example, sweet alyssum (*Lobularia* spp.), flowering buck-wheat (*Eriogonum* spp.), members of the parsley family (Apiaceae) such as fennel and yarrow, and members of the sunflower family (Asteraceae), such as sunflowers, asters, daisies, marigolds, and zinnias.
- Use proper planting techniques when installing vegetation.
- Improve the soil with organic matter and mulches.

Consider a Variety of Strategies

If you determine that a problem needs to be treated, it is important to consider a variety of strategies and to integrate those strategies into a comprehensive program. Treatment strategies can be divided into several general categories:

Education
This can include educating students and teachers about respect for landscape plantings; the more that students can be involved in the planting and care of various portions of the school yard, the less they will vandalize these areas. Education can also involve training maintenance staff in various aspects of plant care and plant selection.

Cultural controls
These usually include modifying horticultural practices to prevent plant problems or to improve plant health.

Biological controls
Biological control uses other organisms to combat pests. More and more beneficial organisms are becoming commercially available, and by planting "insectary" plants (see above), you can attract beneficial insects already in your area.

Chemical controls
Chemicals are not prohibited in a PHC program, but they are used as a last resort, and then they are used judiciously and in the least toxic formulations. Always spot-treat to minimize the amount of active ingredient used. **Pennsylvania law allows pesticide applications on school grounds only by certified applicators, registered technicians, or by non-certified applicators or non-registered technicians under the direct supervision of a certified applicator. Notification must be given to all staff and parents or guardians of students who request it 72 hours prior to pesticide use. Warning signs must also be posted in the vicinity 72 hours prior to and for 48 hours after the application.**

No action
This can be a valid strategy in many situations when the problem does not seriously affect the health of the plant. Your research will help you understand which problems are serious and which are minor or simply aesthetic problems.