Low Chemical Landscape Management on a Golf Course

PART II: *An IPM Approach to Long-term Plant Maintenance*

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The problems which landscape plants can develop are difficult to identify and resolve because of the many variables involved. Problems can arise from either biological causes (including insects, diseases, animal damage, and genetic problems of the plants themselves), or abiotic causes including mechanical damage, fertilizer imbalances, water deficiency or excess, pollution and construction damage). Symptoms can vary dramatically from one plant to another, and from one environment to another. Some problems cause a rapid reaction, which can be diagnosed and treated immediately, but other problems develop slowly over time and may not become evident until the casual agent is long gone. While one problem is developing, others can begin, producing a diagnostic mystery that would baffle even the best of detectives.

No two plants are exactly alike. Even two plants of the same cultivar planted side by side have their differences. For example, they may be pruned differently, or one may be more exposed to wind, or one may be planted over a ledge which affects root development. Since no two plants are identical, it makes sense that they would not react to a biological or abiotic pressure in the same way. But with all this variation there is a bottom line: the healthier a plant is, the better it is able to fend off problems. The first part of this series (see the last issue) focused on promoting healthy plants on the golf course through proper plant selection, sound landscape design, and getting plants off to a good start through proper planting and early care. This "preventive medicine" is the first step toward reducing chemical use in landscape management.

That's fine ... but let's get practical! Unless you are developing a new golf course, you already have established plants. They may not have been selected with low maintenance in mind, they may not have been planted in the most appropriate environments, and they may not have been planted correctly. How do you establish an IPM program in an existing landscape? How do you determine what problems are already active, and which ones should be treated?

To get started, you need a person dedicated to developing a low-chemical landscape management program over time. Find someone who loves landscape plants, who wants to learn more about them, and who looks at landscape plant management as a systematic, interdisciplinary process. Developing an IPM program requires attention to detail, substantial knowledge about plants and their problems, an appreciation of how the various components of a landscape are connected, and a desire to learn. A person with these traits can develop an effective program following these five basic steps.

Step 1: Assess the plantings and the environment

Get to know the plants. Check reliable references (Dirr, 1990; Hasselkus, 1991; Sabuco, 1987; Wandell, 1989) for proper identification of landscape plants. If you can't identify a plant from a reference book, take a sample to your local county extension office or to a nursery. Proper identification of plants in the landscape is a critical first step to success.

Make notes not only of plant identification, but also of plant condition. Assess the plants' age, health and size, and evaluate the environmental setting and its appropriateness for the plants in question. Try to determine past stress on the plants—evidence of previous insect and disease pressure, construction damage, pruning damage, drought or winter stress, etc. Create a profile of the health of the plants. Remember that a healthy plant can fend off problems more effectively than a stressed plant, so a stressed plant should be monitored more closely.

Create a map of the major ornamental plantings on your golf course. This may seem like a major effort, but it will create the framework for your monitoring program, and will allow you to be systematic in your efforts. A good map can minimize the amount of record keeping needed later on. You may have a hundred sugar maples, but if only a few of them are in stressed condition, those are the ones you should concentrate your monitoring efforts on, because they will be most susceptible to problems.

Step 2: Assess the potential problems

Good plant reference books are the basis for determining potential problems. Books such as Dirr (1990), Gerhold, H.D. et. al (1989), Johnson and Lyon (1988), Pirone (1978) and Sinclair, Lyon and Johnson (1987) provide excellent summaries of the problems woody plants can experience. Of course, not every pest is a problem on

every plant in every environment. For example, you may read in a reference book that bagworms can be a serious problem of arborvitae and juniper, but you are unlikely to see a perennial bagworm problem in most of Wisconsin, because bagworms do not overwinter successfully in northern areas. [Nursery stock coming in from southern states may have a minor bagworm infestation but handpicking serves as an excellent control, and the problem should resolve itself after winter.] On the other hand, you will find scab on susceptible crabapples every year, and should be alert to the problem.

Learn the key pests in the system—those pests that cause economic damage year after year. In many cases, relatively few pests are involved. For each type of planting your landscape, identify the pests you expect to be problems.

Remember: you are not alone! Pests and weather patterns do not stop at landowner or political boundaries. Other landscape managers in your area probably see the same problems you see, at about the same time. In fact, you can use other people's observations to predict the timing of problems in your landscape, since many weather-related problems move in a predictable direction. This is important, because if you are trying to reduce the use of chemicals in the landscape, you must identify problems in their early stages, and implement control measures before problems reach devastating proportions. One excellent source of information on active plant problems is the Wisconsin Cooperative Pest Survey Bulletin, a publication which you can request at no charge by sending your name and address to: 801 West Badger Road, PO Box 8911, Madison WI 53708. The bulletin is distributed weekly during the growing season, and less frequently during the off-season.

Step 3: Monitor the landscape regularly

Monitoring, or scouting, has a specific purpose: to gain ongoing, accurate information about plant health, environmental conditions and the presence of pests, on which you can make appropriate management decisions. Chemicals have allowed us to almost ignore problems until they have reached damaging levels, because chemical application has the ability to rapidly reduce pest populations (especially insects). But if you want to use alternative methods, you must realize that some methods require a period of establishment before showing significant control. For example, a predatory insect must establish itself in a new environment and build up its population before it is able to keep a target pest insect at a low level of activity. That means that you must monitor the situation and recognize problems at an early stage, in order to have time to establish effective controls.

Monitoring is an ongoing educational process. Through monitoring, you can develop a great knowledge of plants, their growth patterns and seasonal changes, and the environmental conditions that promote high performance. Over time, you will learn to notice relatively small changes in your landscape plants, before those changes can develop into serious problems. You can learn to identify the pests and beneficial organisms that are active in your landscape.

But exactly what do you look for when you monitor? In a nutshell, you learn to identify what is normal, and then monitor for anything that is abnormal. Perhaps a better question is: How do you monitor? First, you can assess plant health by inspecting plants from a distance to see their form and general color, then approaching them to look at vigor, amount of new growth, leaf color, and the presence of abnormalities (leaf spots, cankers, wilting, insect feeding, etc.). Be sure to record cultural events such as pruning, fertilizing, and watering.

Second, record environmental data. As a golf course superintendent, you already keep good records on temperature and rainfall. In monitoring landscape plantings, you will want to record temperatures because plant growth responds to temperature, and because insect development is closely related to accumulated heat over the season. Rainfall is important because it affects plant vigor. And humidity is important because many fungal pathogens require high humidity to develop.

Third, you can look for pest problems by several techniques. The methods you use depend on what you expect to find. For example, if it is early spring and you expect to see scales on a euonymus, then you would look closely at the bark. Or, if you expect to find small flying insects within the foliage of a plant,

you would sweep with a net. Or, if it is midsummer and you expect you might see box elder bugs, then you would look for the typical leaf chewing damage and the adult insects. Many insects can be monitored through the use of traps. For example, attractant traps can be used to assess the populations of Japanese beetles and predict their potential damage before heavy foliar feeding becomes evident.

Remember that monitoring is a learning process. Don't wait until you have "all the answers" to begin (you would have to wait a long time, because all the answers aren't available). Don't be intimidated—you didn't wait until you had "all the answers" before you started to manage pests with chemicals; you started with one or two, and expanded from there, learning as you went along. The same is true for reducing your dependence on chemicals.

Step 4: When a pest needs to be controlled, choose the best approach

Through monitoring, you will be able to observe insect or disease problems over time. You will learn to tell the difference between a low pest population which is not damaging, and a pest problem that is severe enough to require control. Trial and error, along with good records, will help you refine your assessment of pest levels.

When you find a pest that requires management, you'll need to determine first what control method is most appropriate, and second whether the pest would best be controlled immediately or if it would be more susceptible at a different time. A good example is the gypsy moth population here in Maine. Monitoring earlier this season would have revealed that foliar feeding damage was high in some areas, but over time the feeding stopped, because the damaging larvae matured. They did their feeding in spring and early summer (when B.t. would have been a good control measure). Next, the adults emerged to lay their eggs. By now, the egg masses are evident. Since this year's damage is done, and next year's damage won't begin until spring 1992, we are entering a relatively long period of time during which a very effective nonchemical control measure can be practiced—the fuzzy brown egg masses can be scraped off the surfaces of trees, buildings, and wherever those prolific moths chose to lay their eggs earlier this summer.

The control measure you choose should always be one that can control the pest at a level which is minimally damaging to both the landscape plants and to the environment. It may not be possible to eliminate chemicals from a landscape maintenance program, but the frequency of chemical use can be reduced to those occasions when no other control measure is feasible.

There are five approaches to pest control which should be considered before chemicals:

- environmental (examples: spacing roses to increase air circulation and reduce relative humidity, in order to reduce powdery mildew and black spot; planting root rot-susceptible plants on well-drained sites);
- mechanical (examples: handpicking and destroying small numbers of rose chafers; trapping slugs; syringing foliage with water to reduce populations of aphids and spider mites; pruning out egg masses of tent caterpillars);
- cultural (examples: using resistant cultivars of crabapples to reduce incidence of scab, cedar-apple rust, mildew and fireblight; pruning out cherry branches with black knot);
- physical (examples: using barriers such as buildings, ponds and fairways between plantings susceptible to the same pests); and
- biological (examples: using ladybird beetles to control aphid populations; using milky spore against Japanese beetles; using B.t. against tent caterpillars).

Again, chemicals are an option. If you find that chemical control is necessary, you can reduce the amount of chemical required by using more effective and efficient application methods (good sprayers, proper calibration); using "softer" chemicals and using pesticides wisely by properly identifying plants, pests, and control methods. Remember to rotate chemicals with different modes of action, avoid tank mixing, and spot treat whenever possible. And, of course, try alternative controls before using chemicals.

There are many people who can help when you need advice. Try your Cooperative Extension office, an experienced consultant, the IPM program at the University of Wisconsin Cooperative Extension Service, and colleagues who are trying the same things you are trying. Talking to people in your area who are gaining experience in reducing chemical use in the landscape can be the best source of information, because those people are dealing with the same pest complexes as you.

There are some helpful publications, too. The Wisconsin Cooperative Pest Survey Bulletin, mentioned earlier, will help you establish a sense of pest threshold levels and pest populations in your area. Other available publications include:

- "Landscape IPM Updates," a bimonthly newsletter which contains up-to-date IPM information and product reviews, and ideas for low chemical pest management. This newsletter is available for $36 per year, by writing to PO Box 309, Mt. Home NC 28758.
- Common-Sense Pest Control, a 715-page volume by W. Olkowski, S. Daar and H. Olkowski. It is printed by Taunton Press, and lists at $39.95. Order it from Bio-Integral Resource Center, PO Box 7414, Berkeley CA 94707.

Step 5: Evaluate and plan ahead

Evaluation and planning are important in any process. There is always room for improvement. Mistakes are made, and in spite of the best laid plans, something beyond your control can change

the outcome of what you do. Over time, you can learn from your experiences, but only if you keep records, evaluate what worked and what didn't and plan ahead for improvement.

Keep records of pest incidence, plant damage, effectiveness of control measures, and any other effects which may be of concern (environmental damage or human safety concerns, for example). Good records can help you predict future pest outbreaks before they cause significant damage, determine how well a control measure worked, and plan future landscape plantings to minimize problems.

The side benefits of low chemical pest management

You have been to enough pest management seminars, and have read enough literature about pest management, to know that there are compelling legal, business, safety and environmental reasons for reducing the amount of pesticides you use on your golf course. But there are two additional benefits you should be aware of.

Worldwide, natural habitats for animals are dwindling. Golf courses, especially in urban areas, provide open spaces and sanctuaries for birds, small mammals, beneficial insects and many other animals. This is a very positive and valuable contribution to maintenance of species diversity. The Audubon Cooperative Sanctuary Program (ACSP) encourages and recognizes golf courses that take a leadership role in conservation, and provide advisory information services on how to encourage environmental protection on golf courses. For more information about becoming a certified Cooperative Sanctuary, contact the Audubon Society of New York State, Inc., Hollyhock Hollow Sanctuary, Route 2, Box 131, Selkirk NY 12158. There are currently 149 members in 37 states (including Wisconsin).

Golf courses are also becoming a very important connection to nature for people who live most of their day-to-day lives in urban environments. If you ask people why they golf, their first reason might be enjoyment of the game, but their second reason would probably be that the golf course provides a beautiful, natural setting that they can access easily. Why not let people know that you are making every effort to provide that setting with as few chemicals as possible? Why not let them know that the "natural setting that they enjoy" really is as natural as you can make it? The public relations possibilities are endless!

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