CHAPTER 1. INTRODUCING INTEGRATED PEST MANAGEMENT

INTRODUCTION

This section introduces the definitions of Integrated Pest Management (IPM) and sustainability. It covers how these concepts apply to turf management, how to maintain a profitable business while moving toward an IPM program, and discusses professionalism and the role of consumers.

WHAT IS INTEGRATED PEST MANAGEMENT?

Definitions of Integrated Pest Management IPM vary, but at the core of current definitions are two important concepts: IPM is based on preventing pest problems, and IPM is a decision making process for determining what actions to take when pest problems occur. In IPM programs, all available information and treatment methods are considered in order to manage pest populations effectively, economically and in an environmentally sound manner.

The elements of IPM, as defined nationally,[1] are:

1. preventing organisms from becoming pest problems by planning and managing ecosystems,
2. identifying pest and beneficial species,
3. monitoring pest and beneficial species populations, pest damage and environmental conditions,
4. using injury and action thresholds to determine when to treat pests,
5. using treatments that usually include a combination of methods, such as cultural, biological, physical, mechanical, behavioural, or chemical methods, to achieve acceptable control with minimal impact on the environment, and
6. evaluating the effects and efficacy of pest management strategies.

A well-developed IPM program emphasises making changes in the way we manage plants and how we design sites to prevent pest problems from occurring. For turf, this mean shifting operations from a focus on regular mowing and spraying programs to providing conditions that produce healthy, sustainable growth. Much of the information in this manual applies to this aspect of IPM.

IPM/PHC (Plant Health Council) of Canada Definition of IPM

The IPM/PHC has re-stated the national IPM definition for use in it's Industry IPM Accreditation program, as the following steps:

- manage landscapes to prevent pests from becoming a threat,
- identify potential pests (weeds, diseases and insects),
- monitor environmental conditions, pest and beneficial organism populations and pest damage,
- decide whether treatment is needed on the basis of population and damage thresholds,
- use biological, mechanical and behavioural control methods (such as resistant plant varieties, physical barriers and traps) to reduce pest populations to acceptable levels,
- when necessary, use targeted applications of pesticides, and
- have a built-in evaluation process.

A key concept is that IPM programs are usually intended to suppress pest populations, keeping them at

an acceptable level (i.e., below a level that causes damage). It does not usually involve eradication, which is the total elimination of a pest population. In the case of insects, for example, it is actually desirable to have low numbers of pests present to feed the natural enemies of the pests and keep them present in the area.

IPM is a Process--Not a Blueprint

IPM is a decision process rather than a specific prescription for turf management. It provides a framework that allows the turf manager a great deal of latitude in selecting the techniques suited to the site, the available resources, and the desired results. It is a decision process that applies equally to organically managed lawns, to sites where no pesticides can be used and to sites where pesticide use is permitted.

A parallel might be the transportation system. A manager needs a crew at a work site. There are many options available: the crew can walk, they can take a cab or bus, they can be given bicycles, cars, a crew cab or a van. Depending on the location, the resources available, and when they have to be there, the manager makes decisions, all the while considering safety, time constraints, and budget. So it is with an effective IPM program – an owner or manager selects from a number of choices, all aimed at developing healthier plants and reducing the need for pesticides.

There are three essential steps that could be used to determine whether or not a management program is following an IPM format. A program that clearly includes these steps is moving towards IPM:

- identifying pest problems before taking action,
- an effective monitoring program, and
- applying the concept of using thresholds for treatment decisions.

Applying these three steps can provide short term, immediate and dramatic reductions in pesticide use in turf. For example, applying these steps resulted in a reduction of over 80% in herbicide and insecticide use in "conventional" turf care programs in Quebec, while maintaining the same appearance standards.[2] With the addition of management practices that improve the health of turf (the prevention element), and the follow-up, evaluation step, a complete IPM program can eliminate unnecessary pesticide use.

Role of Prevention

Prevention is the basis for IPM programs. This is because avoiding pest problems—for example, by growing turf that resists pest invasion—is usually cheaper and gives better long-term results than relying on treatments. Even where pest problems do occur, preventative steps can lessen the extent of the problem and make any treatments that are required more effective and economical.

Prevention is a long-term, ongoing activity, because it can take time to develop a healthy lawn, especially where past management practices have created stressed, shallow rooted turf. With respect to turf, prevention has two components:

- Creating optimum conditions when turf is being established or renovated for healthy, sustainable growth. This includes preserving (or restoring) a soil profile during construction

that can maintain adequate moisture reserves and upward capillary flow (see Chapter 2). It also includes selecting lawn species appropriate to the site. Most, if not all, of the challenges faced in maintaining turfgrass are dramatically reduced when sites are correctly designed from the outset.

- Managing existing turf to optimise the growing conditions on the particular site. Experience shows that this can require a two to five year program. Taking soil tests and correcting nutrient and pH deficiencies are important components in this step.

Using Damage Thresholds for Decisions

In IPM programs it is only necessary to keep pest numbers, whether weeds or insects, below a level that is perceived as damaging. This is the damage or injury threshold. Where pesticides are the treatment method, the damage threshold is essentially the same thing as an action or treatment threshold (see text box for an explanation of the two concepts). Where the number of pests in a lawn stays below the damage threshold, there is no need for treatment. The point of a monitoring program is to get an accurate estimate of how many weeds or pest insects are present. This estimate is then compared to the number set as a damage threshold in order to decide whether or not treatment is required.

Damage vs. Action Thresholds

In IPM programs, determining when to apply treatments really involves two related concepts: injury threshold (also called an injury threshold or injury level) and action threshold (or treatment level). The damage threshold is the number of pests that it takes to cause damage. For example, the number of weeds in a lawn that are noticeable, thus considered damaging, might be 3 weeds per square meter. The action threshold for using herbicides to control the weeds is essentially the same thing because the herbicide acts quickly—so it might also be 3 weeds/m^2. The difference between damage thresholds and treatment thresholds becomes apparent when different types of controls are used. For example, the action threshold for hand weeding might be only 1 or 2 weeds/m^2 because it is labour intensive and it is a method well suited to picking out low numbers of individual plants.

The damage threshold is not the same for every lawn or turf area. For example, some lawns may be valued as highly decorative turf; others may be valued as safe, resilient play areas for children or as general use areas in a park landscape. The damage threshold for the first type of lawn would usually be much lower than for the other two types of lawns. A residential lawn or general use area in a park might have quite a high tolerance for the presence of plants other than turfgrasses so the damage threshold would be higher.

One way to focus management activities is to divide turf areas into high, medium and low maintenance categories. Consider separating turf areas into Class A, B and C categories, as developed in British Columbia:[3]

- Class A – High level of service: *fine ornamental lawns, golf and bowling greens, irrigated sports fields.*

- Class B – Moderate level of service: *residential and commercial lawns, boulevards, recreational areas, golf fairways.*
- Class C – Low level of service: *Meadows, picnic areas, rough grass, undeveloped and naturalized areas.*

Each of these categories would have different thresholds for treatment decisions. Using such categories to allocate maintenance work and inputs helps turf managers provide a reasonable compromise between aesthetics and economics.

Evaluation

The evaluation and review component of an IPM program is essential. It is a "wrap-up" step to evaluate what worked, what didn't, and to plan more effective approaches next year. Keeping and reviewing records of soil tests, turf maintenance activities, pest monitoring and treatment results provide important management information. Over time, good records will show whether turf quality is improving and what the long-term costs have been. Such records can provide the information needed to base decisions on solid facts, rather than on subjective judgements. For example, records will help answer such questions as:

- Can treatment thresholds for insects or weeds be increased as cultural conditions improve?
- Does increased consumer tolerance permit increasing weed thresholds in a particular area?
- Did a particular treatment work?
- What controls used in other areas might apply here?

IPM AND SUSTAINABILITY

IPM is a vital component of sustainability. The concept of sustainability applies to the entire spectrum of lawn care activity from pre-construction planning through establishment and later maintenance of the turf.

The term 'sustainability' has many interpretations. Dr. Phillip Craul, formerly of the Harvard Graduate School of Design, states: "There has been much written, discussed, and reported about the term *sustainability.* To reduce confusion for our purposes I define *sustainability* as the ecological and technological planning, design, implementation, management, and maintenance of a landscape project that reduces environmental impact both on the project site and off the site".[4]

Craul's criteria for sustainable turf projects include:

- Projects are not sited on prime agricultural land.
- Construction and on-going management of the project do not have environmental impacts on other sites.
- The materials and products used in the project are recycled or from renewable resources.
- The production and by-products of these materials and products have minimal environmental impact.
- The final project does not require prolonged input of energy-consuming products or non-renewable materials.

Topsoil as a Sustainability Issue

The practice of covering the material on a construction site with topsoil and planting a lawn in that layer is not a sustainable practice because:

- True topsoil has become a scarce and expensive material. Bringing topsoil from other sites is no longer acceptable because of the environmental damage it does to the site of origin. In most cases, the topsoil should remain for use on the original site.
- Spreading topsoil or any material as a layer over an unknown sub-base material is unwise. Instead, the entire soil profile should be designed to accommodate the existing conditions and provide future growing conditions that will require the minimum of fertilizer, water and other inputs.

The use of existing site materials as a component of a soil mix should be considered (see Chapter 2 for information on manufactured topsoils), as well as amending the soil with recycled materials such as compost and waste mineral material. It is Dr. Craul's contention that "the technology … has progressed to a sufficient degree that permits the serious consideration of a totally sustainable soil. That is, a soil composed entirely of recyclable materials and containing no non-renewable resources."[4]

Sustainability Tips from James C. Patterson*:

1. Reuse what is there,
2. purchase ingredients to make what is there, work, and
3. if there is something undesirably toxic on the site – get rid of it.

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MANAGING FOR SUCCESS

It takes time and expertise to implement an effective IPM program. The initial steps – identifying pests, establishing population thresholds, and monitoring – require a thorough understanding of the pest. This includes knowing the pest's appearance, behaviour and life cycle and when to use appropriate control methods to interrupt that cycle. The longer term steps – improving turf health and performance – require an understanding of plant biology and the impact of maintenance practices. The good news is that, as the cultural improvements to the turf take effect, long-term savings in cost and labour will offset the initial effort required to develop a successful program. The following sections include tips for managing an IPM service and improving your bottom line, while providing a high quality service.

Include Your Customer in the IPM Program

IPM programs also involve communicating with employees, customers, agencies and the public to inform them of the goals, methods, results and benefits of using IPM.

The customer is purchasing your professional expertise and experience to give them a quality turf. They also have a role to play in achieving the goals so they should be aware of the long-term

management strategy and where they fit.

As a professional, your role is to:
- prepare a package of cultural practices,
- explain the reasons for each cultural practice,
- outline what the client can do to assist in achieving the long-term goals, and
- highlight the long term cost savings and benefits to the environment.

A big advantage of developing this package approach is that it lets you work with the client over a 3 to 5 year period. The long-term benefits are multi-year contracts and a sustained client base rather than annual competitions for the lowest bid on fertilizer and pesticide applications.
To make this approach work demands that staff be professional and well trained in each aspect of turf management. This also improves the image of the turf industry as environmental stewards.

Tips on Making Your IPM Business Profitable

The following tips come from Neil Pond of Urban Landscaping Ltd., Saint John NB, one of the region's most experienced IPM practitioners. While he uses organic methods in his IPM programs, the sales and management approaches he suggests are relevant to any type of program.

- **Expect to increase prices**: Organic fertilizers and natural controls cost more. IPM takes more time. Do not try to be, or expect to be, as cheap as conventional lawn care services. The customer has to fund your business (they get what they pay for).

- **Offer full season service – No partial programs:** Get away from the idea of selling applications and calendar based programs. Sell only full season contracts and encourage your customers to take continuous service from year to year. It is better to have fewer customers with full services all season, year after year, than to sell partial services. This is more profitable because you have fewer service calls on poor lawns and you do not have to deal with over-capacity or under-capacity through the season.

- **Emphasize service:** Include monitoring, using environmentally safe products, timing of treatments based on thresholds and IPM strategies, and customizing your work to the lawn's needs. Emphasize safety and superior agronomics over conventional chemical-based programs.

- **Differentiate your service**: The biggest challenge is education and awareness. Start with an IPM brochure or fact sheet that you can leave behind. Use newsletters and give talks to interest groups to spread the word.

- **Believe in what you are doing!** This includes getting your employees to buy in to the program and believe in the changes. For example change your terminology to reflect the change in philosophy: use 'control materials' rather than 'pesticides', 'selective weed control' vs. 'weed spray', 'visits' vs. 'treatments'.

- **Start with customers that don't want pesticides used:** Work with them and convert them to organic only programs first. Offer them an all-natural control option using low-risk pesticides only.

- **Training is vital!** Develop a training program and educate your technicians and staff. IPM requires individual thinking and judgements in the field. Your people will sell and service your customers better when they are well informed and confident in their knowledge.

- **Change customer perceptions**: Let them know exactly what to expect in a **service agreement** that reinforces your organic turf management or IPM message. The service agreement is an appendix to your contract; it should stipulate in detail the terms and conditions of service and product use. For example: "We reserve the right to refuse to apply controls if thresholds and action levels are not reached". Customers also need to know that "zero tolerance" for pests is not realistic. In your service agreement, attach conditions to your guarantee based on following the guidelines of your IPM or organic turf management.

- **Develop an effective monitoring system:** We use an **Agronomic Assessment** to evaluate each property during the season. We leave a carbon copy for the customer and have technicians call customers to review the assessment. This is an opportunity to educate customers and also sell your service. We also keep a **Technician IPM Report** for each visit. This is a record of monitoring information; a carbon copy is left with the customer so they can see the result of each visit.

- **Develop information sheets:** These educate your customers and are useful to inform local media. We also use them as handouts at seminars we give.

- **Promote additional services**: For example, core aeration, topdressing with compost and slice seeding. Look at this as an opportunity to add new business revenues to your operation by adding such customized services.

- **Promote soil testing:** Make a soil test a requirement for new customers and promote this to existing customers every two or three years.

- **Use organic fertilizers:** At least half of the N should come from natural organic sources; use less than 20% water-soluble N. Use synthetic organics that are water insoluble to make up the extra nitrogen requirements.

- **Place less emphasis on nitrogen and more on nutrient diversity:** The total nitrogen should be less than 20% of the total applied products. Concentrate on getting the maximum amount of organic material on the lawn rather than nitrogen. For example, well-cured compost with a low carbon:nitrogen ratio can provide the equivalent of 0.5 kg of soluble nitrogen/100 m^2 (1 lb of nitrogen per 1,000 ft^2).

- **Brush up on soil science!**

Facing the Challenges

The turf management industry has gone through a period of dramatic expansion over the past few years. The service area that has grown the most provides weed control with the objective of providing clients with a weed-free lawn. This industry now faces a challenge as it comes under attack from concerned citizen groups and municipal councils over the use of herbicides and other lawn care chemicals. The industry is also being encouraged by provincial and federal regulators to move away from the use of chemicals as a primary management tool and adopt sustainable approaches to managing turf. Key among these is IPM.

It is important to remember that the landscape industry is built on sales of products and services to customers. It is increasingly clear that sales and use of some types of pesticide products will continue to be reduced. This may be because of changes in public attitudes, because restrictive regulations are enacted, or because product registrations are withdrawn. For example, a once widely used insecticide, diazinon, is no longer registered for use in residential areas. On the other hand, more low toxicity or alternative pesticides are becoming available, such as the recently registered corn gluten herbicide. There will be a continuous learning challenge as the industry learns how to use new products effectively.

At this point, there is considerable resistance from consumers toward paying for professional turf management service, such as site visits for monitoring, when no products are applied. This is a major challenge for the industry. Our industry can learn a great deal from the structural pest control industry that only a few years ago made major changes in the attitude and approach to managing pests. They are now recognized more as inspectors and pest management professionals, not just applicators of pesticides. The turf pesticide applicator segment of the Quebec industry has achieved some success in meeting this challenge by moving from calendar based spray programs toward the service provider concept.[2]

Although there may continue to be work for companies that offer only chemical application programs, they will find that their market opportunities will be more restricted in the years ahead. Those in the industry who want a sustainable, long-term business will find it more profitable to move toward total lawn care management programs for their clients. There has already been a shift in this direction with government regulators promoting, and municipalities demanding, IPM programs. An indicator of this is that requirements for basing management decisions on monitoring and thresholds are increasingly being written into turf maintenance contracts.

The information in this manual is intended to help the industry meet these challenges by providing a practical guide to applying IPM and developing sustainable lawns.

REFERENCES

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[3] Gilkeson, L. and R. Adams. *Integrated Pest Management Manual for Landscape Pests in British Columbia*. 2000. BC Ministry of Environment, Lands, and Parks. p. 45.

[4] Craul, Phillip J. *Urban Soils – Applications and Practices*. 1999. John Wiley and Sons, New York, NY. p. 5.

FURTHER READING

Gilkeson, L. and R. Adams. *Integrated Pest Management Manual for Landscape Pests in British Columbia*. 2000. BC Ministry of Environment, Lands, and Parks. 128 pp. Available on-line: http://wlapwww.gov.bc.ca/epd/epdpa/ipmp/ipm-manuals.html; hard copies from: Office Products Centre, Victoria, BC. 1-250-952-4460; cost $15 plus postage. Contains an excellent in-depth discussion of the IPM process and how to get started.

MacDonald, Leslie S., (ed). *IPM for Turfgrass Managers*. 2002. Western Canada Turfgrass Association, Maple Ridge BC. ISBN 0-7726-4832-8.