



University of Manitoba  
Physical  
Plant General  
Services  
Integrated Pest Management  
2018

# University of Manitoba

## Integrated Pest Management

### Statement of Purpose

The University of Manitoba's Physical Plant Department is responsible for the establishment and maintenance of an extensive and diverse landscape environment. Management strategies employ established horticultural practices and the principles contained in the concepts of Plant Health Care. Operations reflect the latest agricultural/horticultural science and research, and the application of sensible, practical methods. All operations comply with applicable federal and provincial legislation, as well as municipal by-laws and the University's commitment to sustainability.

The University of Manitoba recognizes that there will be circumstances requiring interventions which go beyond sound landscape management, in order to interrupt and reduce pest populations. Unchecked infestations of landscape pests in the form of insects, disease organisms or weeds, will significantly impact aesthetics and site integrity. Losses of plant material, particularly large mature trees, carry significant monetary costs, in addition to negative impacts on our physical environment.

Responsible and effective pest control at the University of Manitoba requires the establishment of formal pest control guidelines. In the Province of Manitoba, pest control guidelines must be in the form of an Integrated Pest Management (IPM) Plan. Therefore the University of Manitoba's Physical Plant has adopted IPM as a sustainable ecological approach to landscape management.

### Defining IPM

Integrated Pest management is an ecologically based strategy focused on the long term prevention of pest impacts through the implementation of sound horticultural practices and ecosystem stewardship. The essential and identifying elements of an IPM program includes:

- Prevention
- Identification

- Monitoring
- Injury Thresholds/Action Decisions
- Treatment
- Evaluation

Well-designed IPM is an approach that employs a combination of techniques in an organized program to **reduce prevalence and proliferation of pests, disease and invasive species** effectively and economically in an environmentally sustainable manner. A clear understanding of the impact of pesticides on the environment and human health has focused the need to reduce pesticide use through the implementation of preventative measures and alternative control techniques. There is now an acceptance of the idea that it is only necessary to keep pest numbers below established damage levels. Eradication is not the goal. Each IPM program is designed to meet unique situations and circumstances and will employ all appropriate pest management strategies. This may include judicious use of pesticides registered for use in Canada by the PMRA branch of Health Canada. Pesticide application will be limited to situations where non chemical controls have been ineffective and potential losses are unacceptable. Pesticide treatments will be made with the objective of removing only the target organism and pesticide selections will rely on the published recommendations on preferred/bio-rational products. The critical objectives in such choices are to minimize exposure to people and non-target organisms in the environment. This IPM Plan will apply to all University of Manitoba properties.

# Practical Implementation of Integrated Pest Management Plans

## TURF

Turf management at The University of Manitoba Fort Garry Campus is focused on providing quality, aesthetically pleasing **and erosion resistant** lawns and greenspaces. Turf grass is an often unappreciated component in attractive healthy ecosystems, but has an important role in moderating and cooling urban environments. **In areas not used for recreational activities, the University has been transitioning away from turf grasses to perineal, native and horticultural species that are hardy in relation to changing climate and pest and disease resistance.**

## PREVENTION

Prevention is foundational to IPM and is best represented in the principles of Plant Health Care. Simply stated, pest problems can be reduced by growing healthy plants. Categorizing sites according to required maintenance levels is essential prior to preparing turf IPM programs. Grass types, seed mixes or clover are employed depending on location.

- *Class A* - High level maintenance: fine, irrigated, sports fields and high profile lawns.
- *Class B* - Moderate level maintenance: recreational green space, commercial lawns and boulevards.
- *Class C* - Low level maintenance: undeveloped and naturalized areas and rough turf.

For example the management program on campus differs significantly from that on the Southwood Lands. The former golf course is currently receiving design consideration for mixed use development. Management is currently limited to mowing and mechanical weed control.

## Standard Cultural Practices

- Optimize site design. Including correct drainage and soil preparation.
- Select certified, site suited, pest resistant turf grass cultivars.
- Seasonal adjustment to mowing height and frequency.
- Appropriate fertilizer programs in class A and B sites, including soil testing.
- Irrigate only as required, avoiding automatic timed cycles.
- Mechanically remove thatch and aerate to reduce soil compaction
- Renovate, repair and overseed as required.

## IDENTIFICATION

Correct identification of turf pests is critical because monitoring techniques and management methods are tailored to particular organisms. Accurate diagnosis includes a sample collection of the affected turf roots, leaves, stem and crown. A representative sample of soil will also be included.

Field notes and records include:

- Site characteristics and management regime
- Past weather information

The Physical Plant Department may at times consult with experts in the Faculty of Agriculture in order to assist in the identification of weeds, diseases and insect pests. The Province of Manitoba's Crop Diagnostic Laboratory is also located on campus.

## MONITORING

Monitoring for pests in turf include records of weather patterns and plant phenology since plant and animal life cycle events are closely linked with seasonal variations in climate. Surveys, inspections and interventions are conducted during the seasons and periods of weather which favour the organism. Frequency of inspections will depend on the category of the site. Class C sites may only require occasional visual inspections in order to monitor for noxious weeds.

Surveys include:

- Visual inspections. Rough estimates forming the first step. Field notes. Hand lens.
- Counting methods: grid, transect or centerline. Written records maintained.

## INJURY THRESHOLDS/ACTION DECISIONS

Monitoring information is carefully evaluated when determining injury thresholds and the need for interventions. Each site category will have different acceptable injury levels. High quality Class A turf may require prompt action depending on the identified pest, its life cycle, the season and expected weather conditions, as well as plant health and growing conditions.

## TREATMENT

The University of Manitoba's IPM program is designed to emphasize improved cultural techniques in regular landscape maintenance. Preventative cultural control programs reflect a commitment to environmental sustainability and cost effectiveness. Treatment decisions are based on the results of a monitoring program designed to detect pests prior to reaching established injury thresholds. Interventions are only considered where pests have not

responded to control within the regular horticultural program and losses are both imminent and unacceptable.

- Physical/Mechanical: some disease pathogens may be brought under control by increasing mowing frequency and removing clippings in conjunction with increasing Nitrogen fertilizer
- Biological: insect parasites and microbial amendments have limited commercial availability but are becoming more common
- Chemical: potentially controversial uses of herbicides, insecticides and fungicides continue to occupy an important position among available control solutions. However they have become a last step, not a first choice
  - When pesticides are appropriate, registered products are applied sparingly as spot treatments, rather than as broadcast applications. Selections are made from listed preferred/biorational products

*Recommendations include:*

- Herbicides containing iron, citric and lactic acids
- Insecticides containing clothianidin

Selection criteria:

1. Effective for control of target species
2. Low human hazard
3. Compatible with natural predators
4. Minimal hazard to birds, mammals, aquatic and non-target species
5. Can be applied in a technique that limits non target transport
6. Low environmental persistence

Utilizing chemical control as a component of Integrated Pest Management is compatible with the university's goal of responsible environmental stewardship.

## EVALUATION

Following any treatment intervention, turf areas are inspected for efficacy and site impact. This information is combined with seasonal monitoring records, field notes and budget records to assess the overall effectiveness of the IPM program. Adjustments are made accordingly in order to achieve long term control, reduced maintenance costs and a healthy environment.

## ORNAMENTALS AND TREES

The University of Manitoba is home to over 10,000 trees and shrubs within the managed campus grounds. The forested land also includes an intact riparian zone, the Point Lands agricultural research fields and the recently acquired Southwood golf course property. These properties receive significantly different management approaches. Within campus proper, the horticultural inventory is planned and installed with scheduled management in order to **provide diversity of species and** enhance the aesthetics of the institution. In the riparian zone and the Point Lands, management is limited to visual monitoring for hazard control and Dutch Elm Disease monitoring and removal. Southwood Lands are an evolving responsibility focused on ensuring safety for the public as well as residents on adjoining properties. The positive contribution of tree canopy and the urban forest is by now well understood, and the University of Manitoba devotes considerable resources to maintaining our trees within a healthy and sustainable environment. Ornamental plantings include shrubs, perennials and annuals installed in prominent locations at building entrances, patios and courtyards. These floral and vegetative displays are designed to enhance the aesthetics of the site and provide attractive surroundings for staff, students and visitors to campus.

### PREVENTION

The first step towards maintaining healthy herbaceous and woody plants begins with optimum design.

#### *Ornamental Plantings*

- Ensure drainage. Soil preparation includes fertility and pH correction for planting beds.
- Plant selection includes hardy, site suitable plants adaptable to low maintenance programs.
- Selections are directed toward aggressive and spreading varieties capable of outcompeting weeds.
- Selections are proven to be pestresistant.
- Regular irrigation and fertilizer program in order to quickly establish healthy root systems.
- **Other maintenance to promote healthy plant growth**

#### *Trees*

- Selections are hardy and adaptable to existing soil conditions.
- Growth habit and mature size is considered. Site appropriate selections are required.
- Only healthy well grown specimens from established nursery growers are selected.
- Diverse species and families are utilized, with emphasis on native plants.
- Insect and disease resistant cultivars are featured.

- Adherence to horticultural best practices for planting, fertilizing, watering and maintenance programs is maintained.
- Provide physical protection in the form of tree guards from mechanical damage due to turf and other maintenance activities.

## IDENTIFICATION

Prior to diagnosis, samples are collected which may include soil, leaves, shoots, branches and insects on or in the tree. Insect and disease damage is often difficult to diagnose due to similarities in symptoms and some pest injury resembles disorders caused by poor growing conditions.

Field notes and records should include:

- Weather conditions and season at sampling. Corresponding pest life cycles are considered
- Site conditions and maintenance practices

The Physical Plant Department may at times consult with experts in the Faculty of Agriculture in order to assist in the identification of weeds, diseases and insect pests. The Province of Manitoba's Crop Diagnostic Laboratory is also located on campus.

## MONITORING

Monitoring for pests on ornamentals and trees involves regular inspections often carried out weekly during the growing season. Seasonal weather patterns and plant phenology are reliable predictors of pest activity.

Surveys include:

- Visual inspection and field notes
- Applied counting method: insects per leaf/stem/shoot
- Hand lens and collection vessels for insects, diseased leaves, fruiting bodies or mycelium
- Pheromone traps
- Honeydew card



## INJURY THRESHOLDS/ACTION DECISIONS

Accepted injury thresholds are variable and correspond to location. Tolerance of pest organisms is limited within campus, but is acceptable in the riparian zone, Point and Southwood Lands. Dutch Elm Disease (DED) cannot be treated, only prevented, and represents a significant threat to all American Elm. Injury threshold is extremely low and required action decisions are urgent. When prevention has failed on campus, the response is swift removal at first indication of tree dieback. At Southwood and Point Lands, monitoring and removals are carried out by the City of Winnipeg Forestry Department.

In all horticultural settings, disease and insect pests are evaluated based on long term impacts and the likelihood of spreading to adjoining sites. Pest populations may expand rapidly in herbaceous plantings. While mature, healthy trees are usually able to withstand repeated defoliation from insects, recently planted young specimens are vulnerable. Pest infestations, particularly diseases, may be contained by quickly bringing them under control. Seasonal weather patterns are considered when evaluating interventions and with all decision making, long term monitoring records are invaluable.

## TREATMENT

In order to meet the University of Manitoba's commitment to limiting environmental impact through the use of sustainable practices, Physical Plant employs a coordinated management program emphasizing physical and cultural control techniques that will limit the need for treatment interventions involving pesticides.

### *Physical/mechanical*

- Sanitation programs including removals, leaf cleanup and regular pruning and maintenance to remove dead or affected branches in woody plants, and the complete removal of impacted herbaceous plants will be considered before pesticide application is considered. Regarding Dutch Elm Disease, pruning and care of Elm in Manitoba is governed by provincial legislation. Pruning is prohibited from April 1-July 31. In the case of Emerald Ash Borer there is no effective, economical treatment or approach for insect control. Once the insect is established, a program of removals will be initiated.
- Application of Tanglefoot sticky barriers to trap insects. Eg. Elm Bark Beetle.

### *Biological controls*

- Beneficial microorganisms and parasitic insects are always present in the natural environment. In a healthy balanced ecosystem, plant pathogens and insect populations are controlled by natural predators. In managed urban scenarios natural conditions do not exist. Poor soil conditions, pollutants, introduced non-native organisms and human impacts are common. Where appropriate and available, commercial biological control agents are effective if released prior to pest population explosion. *Bacillus thuringiensis kurstaki* (BTK) is a biological product used to effectively control leaf feeding caterpillars such as Cankerworm and Forest Tent Caterpillar. It is a PMRA registered pesticide and is considered a preferred/biorational product. Continuing research in this field is promising.

### *Chemical Controls*

Preferred pesticides are listed by provincial authorities and emphasize the following characteristics:

1. Registered effective for target pest and intended use
  2. Low human hazard
  3. Compatible with natural predators
  4. Minimal hazard to birds, mammals, aquatic life and any non-target species
  5. Applied in a manner to eliminate or reduce transport
  6. Low environmental persistence.
- Horticultural grade mineral oils. Dormant and summer formulations
  - Insecticidal soaps.
  - BTK.
  - Sulphur and lime/sulphur formulations as fungicides.
  - Pyrethrins
  - Systemic injectable fungicides for control of DED.

Seasonal displays of ornamental plantings can be extended with pesticide interventions to reduce mid and late summer spikes in insect pests. Young trees installed as replacements due to losses from DED and other factors will benefit from interventions with chemical controls to reduce the repeated defoliation by leaf eating caterpillars.

The University of Manitoba is committed to the preservation of the extensive plantings of American Elm, particularly the remaining Memorial Elms planted in recognition of past students that served in the World Wars. In order to accomplish this, Physical Plant conducts a regular and thorough OED monitoring program aided by an updated tree inventory. Scheduled and responsive maintenance programs include pruning, fertilizing and prompt removal of infected trees. Since therapeutic treatments are prohibited in Manitoba, diagnosis of the disease is fatal, as removal is legislated in the province. Therefore effective and responsible care of American Elms should include scheduled root flare injections with systemic fungicides, and may include basal spraying with insecticide.

Warmer winters and earlier drier growing seasons have provided ideal conditions for the beetles which spread the disease. In order to keep Elm on the landscape all available control measures must be incorporated into maintenance programs.

## EVALUATION

Annual field notes and records are essential in order to evaluate successes and failures in any IPM program. Review and revisions can be made at any time based on results, experience, budgets and confidence. Annual adjustments are realistic and form the basis for improvement.