CITY OF BRANDON

# INTEGRATED PEST MANAGEMENT (IPM) PLAN

FINAL DRAFT

# CITY OF BRANDON INTEGRATED PEST MANAGEMENT (IPM) PLAN

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## *OVERVIEW*

Although the City of Brandon's current management strategy includes the use of maintenance practices that demonstrate responsible pest controls, there is also a need to establish formal pest control guidelines. These guidelines will be in the form of an Integrated Pest Management (IPM) Plan that will serve as a guide for Brandon landscape professionals and the citizens of our community.

Infestations of pests can cause considerable damage, whether it relates to the quality of turf, stress to our urban forest, or the aesthetics of floral displays. The purpose of these formal guidelines is to outline pests control practices that demonstrate an ecological approach to vegetation and pest management with the emphasis on the reduction of pesticide use.

The guidelines also address the concerns of many citizens with regard to the location and frequency of pesticide applications throughout our community. The IPM plan will provide our community with the tools required to manage pest populations at acceptable levels.

## *DEFINITION*

An Integrated Pest Management Plan is a holistic approach used to prevent and manage pest problems at acceptable levels through effective, economical, and environmentally sound methods. For the purpose of this plan, a pest is identified as any injurious insect, plant or disease. The IPM Plan provides guidelines for landscape professionals and the citizens in our community with the emphasis being to minimize the use of pesticides while controlling the pest. The IPM plan is a decision – making model used to prevent and manage pest problems. The goal of a IPM Plan is to keep pests at acceptable levels through effective, economical, and environmental – sound methods. A highly effective IPM Plan incorporates a number of strategies including criteria, identification, monitor, threshold, treatment, and evaluation.

## *PRINCIPLES*

The integrated pest management plan establishes an ecological approach to vegetation and pest management with an ongoing emphasis on the reduction of pesticide use and the implementation of preventative measures and alternative control measures. The plan identifies pest control practices with minimal risk to human health and the environment. The IPM Plan applies to all civic properties and is a guide for landscape professionals and the residents of our community.

The integrated pest management plan establishes cost-effectiveness, community values, and ensures accountability in pesticide use through a regular reporting system.

The City of Brandon promotes the use of traditional integrated pest management strategies including cultural, manual, biological, mechanical, chemical, legal, and genetic as a means to improve plant health and prevent and manage pest infestations.

Although there has been some desire from members of our community to ban the use of pesticides, this would reduce the number of management tools for pest control and also prevent the use of biological agents that have received approval by the Federal Government. Integrated Pest Management promotes using the best strategy to address a pest problem, which includes using pesticides when necessary.
Prior to all pesticide applications, products will be screened to determine the product that will provide a tolerable threshold and have the least toxic impact on public and environment. Regarding the cosmetic application of herbicides in parks, the City of Brandon will establish a regulatory process to maintain a pesticide-free buffer zone in and around playgrounds, tot lots, public outdoor swimming pools, senior citizen facilities, daycares, churches, and hospitals. Alternative controls will be identified as outlined in the turf care section. This may include over seeding, aerating, irrigation, or fertilizing.

**City of Brandon will establish a Pesticide Bylaw regulating the adoption of a Central Registry for citizens with health concerns relating to pesticide exposure and the establishment of buffer zones in specified locations throughout our community**

**Note: In each calendar year, prior to all pesticide applications, the City of Brandon will provide public notice through the local newspaper outlining the pesticide products, period of application, and a mailing address for residents to register for health related concerns. A Central Registry will be established for individuals with health related concerns, verified by a physician confirmation, and all licensed applicators providing pest control within the boundaries of the City of Brandon will be required to maintain a buffer zone, as identified by City of Brandon By-Law, between their property and application areas.**

## *EDUCATION*

The City of Brandon will initiate a public education campaign to inform the citizens on current and alternative pest management practices. This education campaign will

focus on establishing the IPM Plan on our city web site, media advertising, brochures, and workshops. The pesticide advisory committee will meet each year the review our current practices and make recommendations on alternative pest management practices. These recommendations will be passed on to the residents of our community.

## INTEGRATED PEST MANAGEMENT ACTION PLAN

The IPM action plan establishes the strategies that need to be considered prior to identifying the specific application that will be utilized in controlling a pest. These strategies fall into five specific categories which form the framework of our community's Integrated Pest Management Plan.
These include:

1. Criteria
2. Identification
3. Monitor
4. Threshold
5. Treatment
6. Evaluation

## CRITERIA

The City of Brandon and Landscape Professionals will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

## IDENTIFICATION

The City of Brandon will only allow the use of pest control products that have received Federal registration. Health Canada is the governing body that approves and grants registration for pesticides in Canada. Prior to registration, manufacturers are required to demonstrate that the products do not pose a significant health concern, as long as they are used in accordance to the label. The following is an outline of the procedures that will be administered prior to pesticide application in our community.

- The addresses of property owners that may have a health concern with pesticides will be forwarded to the private lawn care companies. These companies will be required to follow the regulations as outlined in the City of Brandon pesticide bylaw.
- The city will post this IPM plan on our city web site as an information tool to the public.
- Prior to the method of control for the particular pest a process of identification will be implemented. This will include life cycle information, reference guides, and consultation with professional agencies.
- The city will require a high level of professionalism for pesticide application. Landscape professionals are required by provincial legislation to be certified and licensed in the application of pesticides.
- Application equipment that is designed to minimize the potential for drift should be used in a weed control program.

## MONITORING

Establish a process of monitoring to help staff to make decisions on the best timing for treatments to achieve the desired effects. This category will involve participation with educational institutions in developing test sites to research various pest control applications.

It is also recommended that a form be established to include the following information as the result of a site inspection:

- Location
- Type of pest
- Stage of growth or development
- Population Density
- Reason for treatment
- Outcome – Establish thresholds that will outline what will be tolerated as the result of a pest infestation.

## THRESHOLDS

There are a number of variables that determine the amount of control that needs to be applied. The main consideration that the professional needs to be aware of is what will be the impact on the species from the particular pest and what level of damage will be tolerated. Thresholds may be defined and recorded as:

- Percentage or proportion of leaves damaged on a particular plant
- Percentage of plants affected on a site
- Number of pests or pest colonies counted

## TREATMENT

Select the type of treatment that will be applied as a means of control. When possible, non-chemical treatments should be used as a means to limit negative impacts to the environment. If pesticides are identified as the tool for managing the pest, treatment should be based on careful timing and the use of precise equipment. Some chemical and non-chemical techniques include:

1. **Preventative/Cultural Measures** – Design and construction of landscape facilities that prevent or minimize pest problems. Cultural practices may include routine irrigation, fertilizing, top dressing, and selecting plant material with disease resistance.

2. **Biological Control** involves the use of registered biological agents that are specific to the target species having no negative impact to the environment. This application is administered through the federal government.

3. **Physical And Mechanical Controls** – This measure is primarily associated with the use of mechanical equipment as a means to maintaining a tolerable threshold. Some examples include controlling weeds with mowing equipment and using chainsaws to prune out diseased branches from trees.

4. **Chemical Controls** are applied when it has been identified as the best strategy for achieving an acceptable threshold. Control products are selected with preference given to low toxicity and being target-specific whenever practical. The most target-specific application techniques available should be used. This may include using back-pack or hand held sprayers, low volume closed-system applicators (shrouded applicators).

5. **Manual Control** involves the removal of the pest by hand (i.e. pulling weeds from a flower bed).

6. **Environment Control** simply means modifying the environment in a manner that will not negatively impact the plant while significantly reducing the effects of the pest. (e.g. using a sterile soil medium for growing greenhouse plants)

## EVALUATION

Evaluation is a very important process to determine the results. The frequency and timing of inspections will vary in each situation. The value of this process is that it allows the professional to validate the application that will be used for the control.

# INTEGRATED PEST MANAGEMENT PROGRAMS

The following is a summary of the current IPM programs that the City of Brandon has implemented. These strategies will relate to the most common pest problems that may impact the health of our community's green space. Although these maintenance strategies are identified as part of the City of Brandon's maintenance program, they can easily be adopted and modified for use by landscape professionals and citizens.

## *MOSQUITO CONTROL PROGRAM*

### CRITERIA

The City of Brandon will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

Pamphlets will be made available to the general public outlining practices for protection and population control. The media continues to interview staff throughout the summer on the Mosquito Program.

### IDENTIFICATION

The City of Brandon coordinates a mosquito control program with the main emphasis directed at maintaining mosquito populations at a tolerable level throughout our city. The program consists of identifying breeding sites, monitoring, establishing thresholds, and treatment.
The program also monitors the mosquito species known as the vector for the spread of Western Equine Encephalitis virus.
In 2003 the mosquito program provided assistance to Manitoba Health in their efforts to monitor and control a new virus that was showing up in our province referred to as West Nile Virus. The culex tarsilus mosquito species had been identified as the vector for this virus which poses a health threat to humans.

### MONITORING

The following is a list of IPM strategies that have been implemented for the mosquito control program:

1. A control zone has been established that extends a perimeter of one mile beyond the boundary of our city. All potential breeding sites within this zone have been identified, categorized, and mapped for the provision of pest control.

2. Mosquito traps are established at designated sites and adult mosquitoes are collected and identified. This portion of the program provides data that is used by our department to track population trends and also to provide the necessary data needed to monitor for the potential spread of West Nile Virus and Western Equine Encephalitis. Manitoba Health coordinates the program for West Nile and data that we collect becomes available to this program.

3. The City of Brandon and Manitoba Health are committed to coordinating resources to monitor and provide the required control in an effort to minimize the impact of the West Nile Virus on the community. An extensive larviciding program is conducted throughout our city. Although our commitment is to maintain larviciding as the primary mechanism for mosquito control, as controls can be maintained using the environmental friendly pesticide (Bacillus thuringiensis), we are prepared to conduct an adulticide program if Manitoba Health declares an emergency situation due to elevated numbers of the mosquito vector infected with this virus.

## THRESHOLDS

Established thresholds are primarily based on a dip sample taken at the breeding sites. Mosquito larvae are collected in a dip sampler. A larviciding program is initiated if more than 25 mosquito larvae are caught in 10 dips. Staff will document the control and monitor for results.

## TREATMENT

Methods of Control include:

- Draining wet areas
- Frequently change outside water containers (e.g. bird baths)
- Cleaning catch basins throughout the community
- Mowing long grass which will reduce resting sites for the adults
- Larviciding all areas of standing water as identified
- Adulticiding will only be applied when Manitoba Health identifies a health concern. The current pesticides available for adulticiding are not target specific and non threatening insects could be affected.

## EVALUATION

The treatment will be evaluated to determine the results. The frequency and timing of inspections will vary in each situation.

# *TURF MAINTENANCE PROGRAM*

## CRITERIA

The City of Brandon will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

The goal of this program is to have green spaces throughout our community inspected on a regular basis and provide timely maintenance that is appropriate to the use and function of the green space. The City of Brandon's turf maintenance program has established a classification system for the various public green spaces throughout our community. The following is a description of each of the classifications.

### Level 1

These are areas that require a high level of maintenance as they tolerate frequent use from the community and the expectation from user groups is for a high standard of green space. These areas include irrigated sports fields, bowling greens, and golf courses. Maintenance requirements for these facilities include:

- Mowing Height 6.3 cm (2 ½ inches)
- Mowing Frequency 7 – 10 working days
- Irrigation – As required
- Weed Control – Maintaining minimal weed growth
- Fertilizing – Twice per year (spring and fall)
- Over-Seeding – As required
- Aeration and Repair – As required
- Litter pick up – As required

### Level 2

These areas require a moderate level of maintenance. These areas include General park areas, school grounds, boulevards, golf course rough and buffer strips. Maintenance requirements for these areas include:

- Mowing Height 7.6 cm (3 inches)
- Mowing Frequency 10 – 14 working days
- Irrigation – None

- Weed Control – No herbicide application in parks, school grounds, critical care senior citizen complexes, licensed day-care centres, public education facilities, and medical facilities. **A pesticide application will be permitted to control or destroy plants or insects that constitute a danger for humans or to control or destroy weed or insect infestations**. **This will be determined by the City of Brandon Weed Inspector.**
- Fertilizing – Fall only
- Over-Seeding – Done annually between April 20 and May 10
- Renovation and Repair – As required
- Aeration and Repair – In conjunction with fertilizing
- Litter pick up – Free of visible debris

**Level 3**

These areas require a moderate to low level of maintenance. This classification refers to the undeveloped green spaces throughout our community. Maintenance requirements for these areas include:

- Mowing Height 15 cm (6 inches)
- Mowing Frequency 3 times yearly
- Irrigation – None
- Weed Control – Mowing **(herbicide application in infested areas as determined by the City of Brandon Weed Inspector)**
- Aeration and Repair – None
- Litter Pick up – Free of visible debris

## IDENTIFICATION

In an effort to provide the most effective pest management strategy the professional will ensure the treatment is determined by properly identifying the weed and applying the most effective control mechanism. Reference guides are available for this diagnostic procedure.

## MONITORING

This provides the information required to determine if the treatment is necessary, timing of treatment, and the success of the treatment. Our current classification system will also be a valuable tool in determining the method of treatment. Monitoring will also allow the professional to determine the threshold that will be allowed.

## THRESHOLD

Thresholds are established through the classification of the various turf areas.

Level 1 - 10% to 15% weed cover
Level 2 - 20% to 30% weed cover
Level 3 - Over 40% weed cover

## TREATMENT

Treatments may include one specific application or a combination of treatments. The use of biological, physical, or cultural controls should always take preference over the use of chemicals in an effort to conserve beneficial native species and reduce the impact on the environment. Controls should focus on limiting seed spread.
Some examples of environmentally safe pesticides include:

1. Acetic Acid (Horticultural Vinegar) – non selective spot treatment of broadleaf and grassy weeds.
2. Corn Gluten Meal – herbicide for the inhibition of seed germination of dandelion and crabgrass on lawns.

### 1. Preventative/Cultural Measures

- When selecting seed for a site always select the best seed available (e.g. certified seed, shade tolerant seeds for shade areas)
- Irrigate the site deeply and infrequently. Shallow watering promotes shallow rooting, accumulation of thatch and germination of weed seeds on exposed soil areas. Time irrigation cycles for early morning whenever possible as this allows for rapid drying of the leaves thus reducing the opportunity for disease to Establish. Golf greens benefit from the removal of dew and guttation water as these contain high amounts of nutritious plant sugars that are attractive to some fungi.
- Early spring removal of snow will help to reduce some fungal diseases in golf greens
- Keep thatch to a minimum through periodic removal by verti-cutting or raking. De-thatch when weed seeds are dormant and leave as much soil covered as possible to reduce potential germination.
- Provide regular aeration to reduce soil compaction. The amount of aeration will depend on the type of turf and usage.
- Avoid compaction from overuse of the facility. Athletic facilities, including the golf course need to be regularly monitored to avoid compaction. Some Maintenance procedures may include moving the tee/ hole, entrances, and alternating mowing directions.
- Repair worn or damaged areas by seeding or sod
- Apply fertilizers that are best suited to the area. Prior to a fertilizer application the area should be soil tested. Consideration should always be given to using fertilizer blends that will prevent leaching beyond the root zone.

- Use grass species that are suited to the area, disease resistant, high wear tolerance, aggressive rejuvenation, drought resistant, and maintain good color throughout the season.
- Biological control using insects that feed on target weeds. There have been some test sites established for controlling leafy spurge. Other biological controls include modifying the soil with micro-organisms that will compete and suppress disease organisms.
- Organic mulches can be used to suppress weeds in specified areas

**2. Physical And Mechanical Controls** include

- Mowing heights on turf areas should be kept as high as possible for the particular species and the usage. These heights and the frequency of mowing should be adjusted to the seasonal changes.
- Small populations of weeds can be pulled while larger areas may need to be re-landscaped.
- Pesticide applications using herbicides that are of low toxicity. Weeds should be treated when they are actively growing. Pesticides should be applied with target specific techniques. This may include using back-pack or hand held sprayers, low volume closed-system applicators (shrouded applicators).
- Flame or steam application for weed control along curbs and sidewalks
- Cultivation and grading reduce the ability for weeds to become established.
- There are some locations that are difficult to maintain turf (perimeters of centre mediums – salt damage). An alternative could be re-designing these areas to better suit the environment.

## EVALUATION

The treatment will be evaluated to determine the results. The frequency and timing of inspections will vary in each situation.

# *LANDSCAPE DISPLAY PROGRAM*

## CRITERIA

The program includes all floral displays and ornamental shrub plantings. Treatments may include one specific application or a combination of treatments. The City of Brandon will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

## IDENTIFICATION

In an effort to provide the most effective pest management strategy the professional will ensure the treatment is determined by properly identifying the weed and applying the most effective control mechanism. Reference guides are available for this diagnostic procedure

## MONITORING

This provides the information required to determine if the treatment is necessary, the timing of the treatment, and the success of the treatment.

## TREATMENT

Treatments may include one specific application or a combination of treatments. The use of biological, physical, or cultural controls should always take preference over the use of chemicals in an effort to conserve beneficial native species and reduce the impact on the environment.

1. **Preventative/Cultural Controls**

    - Landscape with aggressive plant material in mass plantings to reduce the space, light, and nutrient availability to potential weeds
    - Where possible use a crop rotation
    - Destroy garden residue
    - Make compost. This process will eliminate weed seeds.

- Use landscape fabric or a mulch material to conserve moisture and reduce the potential for weed seed germination
- Provide growing conditions that will allow the plants to thrive and compete with weeds. This includes a clean and friable soil media amended with compost. This media should be amended yearly.
- Always use clean, disease resistant, and hardy nursery stock in plantings
- Time irrigation cycles for early morning whenever possible as this allows for rapid drying of the leaves thus reducing the opportunity for disease to establish
- Design and construct landscape beds in a manner that will optimize growing conditions for the plants.

**2. Physical And Mechanical Controls**

- Manual weeding is the preferred method of weed control
- Provide a yearly cultivation to landscape beds when possible. This is useful in amending beds with compost plus provides an aerated environment for plant growth.

**3. Chemical Controls**

This includes pesticide application to landscape beds using back pack sprayers or painting the target plant with a herbicide. The most common product recommended for this form of chemical control is Roundup/ Transzorb as this has a low toxicity to human health and the environment.

**Note: Be sure to read the label as many landscape plants are very sensitive to certain herbicides.**

## EVALUATION

The treatment will be evaluated to determine the results. The frequency and timing of inspections will vary in each situation.

## *FORESTRY PROGRAM*

### CRITERIA

The City of Brandon will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

The following is a list of IPM strategies for preventing/controlling insect and disease damage to the trees and shrubs throughout our community.

### IDENTIFICATION

This is essential because treatments need to be evaluated to ensure they are directed at the specific pest species. This will include information on life cycles and the mode of damage.

Classes of insects and other arthropods include:

- Sucking arthropods; aphids, scales, mites, mealy bugs, etc.
- Root/Crown feeding insects; weevils
- Leaf chewing and mining insects; leaf miners, caterpillars, etc.

Classes of disease include:

- Fungi
- Bacteria
- Viruses
- Mycoplasmas

### MONITORING

This provides the information needed to determine if treatment is necessary. Examples of monitoring methods include:

- Visual Inspections
- Use of sticky or pheromone traps
- Severity of the problem
- Number of plants in the area that are affected by the pest
- Stage of the injury
- Plant history
- Outside influences (e.g. weather, salt application)
- Evidence of nearby fertilizer or pesticide use
- Construction in the immediate area

## THRESHOLDS

There are a number of variables that determine the amount of control that needs to be applied. The main consideration that the professional needs to be aware of is what will be the impact on the species from the particular pest and what level of damage will be tolerated. The general accepted tolerance for damage to a forest is around 30 % defoliation as this is the point the growth becomes affected. The tolerance for internal damages to trees will depend on the threat of the pest. (e.g. elm beetle spreading DED)

Thresholds may be defined and recorded as:

- Percentage or proportion of leaves damaged on a particular plant
- Percentage of plants affected on a site
- Number of pests or pest colonies counted

## TREATMENT

Treatments may include one specific application or a combination of treatments. The use of biological, physical, or cultural controls should always take preference over the use of chemicals in an effort to conserve beneficial native species and reduce the impact on the environment.

### 1. Preventative/Cultural Controls

- Plant a variety of tree and shrub species in an effort to prevent single species plantings which can become vulnerable to serious pest problems
- Inspect planting stock and purchase only healthy plants that conform to Manitoba Nursery Standards
- Plant trees and shrubs at the proper depth and establish the hole at a size that will allow the roots to grow properly and prevent girdling
- Maintain a mulched tree circle around new plantings. This will allow improved moisture retention and prevent injury from mowers and other equipment
- When using irrigation systems, design these to suit the plant material moisture requirements
- Begin pruning trees at a young age to allow the tree to develop a strong structure. *Note* Elm trees can only be pruned during the period from August 1$^{st}$ to March 31$^{st.}$
- Sanitation includes disinfecting pruning tools between cuts/ trees when the professional is pruning trees/shrubs that are prone to disease. (e.g. Dutch Elm Disease)

- Avoid using fast acting nitrogen fertilizers that promote succulent, insect susceptible plants. Fertilizers with high phosphorus content should be considered when fertilizing deciduous trees and a higher ratio of nitrogen can be considered for coniferous trees. Some soil conditions will not require a fertilizer application. Soil testing is advised.
- The site selected for the particular plant species should be well suited to the particular species. If the health of a plant is impacted by biotic factors (environmental conditions) then the professional should consider an alternate species. If the plant is impacted be abiotic factors (mechanical and physical damage) then the site can be replanted with the same species.
- Tree/shrub watering will be impacted by the soil conditions at the site. This will determine the frequency of the watering. Soils with high clay content will require less frequency of watering compared to soils with a high sand content.

**2. Biological Controls may include the use of predatory insects like**

Aphids, parasitic wasps, nematodes, predatory mites, symbiotic microorganisms, and preserving the natural biological controls.

**3. Physical And Mechanical Controls may include:**

- Sticky barriers on tree trunks (e.g. to control cankerworm migration)
- Water sprays for aphids, thrips, and mite control
- Pruning out infected branches (e.g. tent caterpillar)
- Wiping plant scales from stems

**4. Chemical Controls**

An application of a chemical pesticide may be required when populations are too high to successfully start a biological control program. The least toxic and low residual chemicals should be considered.

Some preferred insecticides include:

- Insect growth regulators
- Bacillus thuringiensis for caterpillar control
- Insecticidal soaps
- Pyrethins – insecticide for the control of aphids, mosquitos leafhoppers, earwigs, and beetles.
- Mineral Oils (dormant and supreme horticultural oils)
- Use of systemic pesticides
- Flowable sulphur is relatively safe as it is least disruptive to the beneficial organisms.

Broad spectrum insecticides should only be considered when the opportunity allows for spot spraying. The professional should also alternate chemical families in an effort to reduce the potential for resistance in the pest.

## EVALUATION

The treatment will be evaluated to determine the results. The frequency and timing of inspections will vary in each situation.

# *GREENHOUSE AND NURSERY PROGRAM*

## CRITERIA

The City of Brandon will consider the following criteria when selecting IPM strategies:

- Human health and safety
- Minimal impact on the natural controls for the particular pest
- Minimal negative impacts to non-target organisms
- Minimal environmental damage
- Maximize potential for long term control
- Be operationally effective and feasible
- Be cost effective in the short and long term

This program includes all conservatories, floral gardens, greenhouse, and interior displays.

## IDENTIFICATION

This is essential because treatments need to be evaluated to ensure they are directed at the specific pest species. This will include information on life cycles and the mode of damage.

Categories of insects that damage ornamentals include:

- Sucking arthropods: aphids, whitefly, scale, mealbug, thrips, spidermite
- Root/Crown feeding insects: fungus gnats, root weevils
- Leaf feeding insects: leaf miners, various caterpillars.

Categories of disease organisms that infect plants include:

- Fungus
- Bacteria
- Viruses
- Mycoplasmas

## MONITORING

This provides the information needed to decide if treatment is necessary, the best option for treatment, and the success of the treatment. Examples of monitoring techniques include:

A. Visual Inspection – This may vary from daily, weekly, monthly, and yearly. The use of a 10X hand lens is useful for identifying small anthropods. Examples for specific pests include:

- Inspect new growth and the undersides of the oldest leaves when looking for aphids
- Inspect the stems, petioles, and along leaf veins when checking for scale
- When inspecting for root weevils check the adult damage on leaves and check the root crown of the plant

B. Sticky Traps – Yellow traps are used to monitor whitefly, fungus gnats, leaf miners, thrips. Blue traps are used to monitor for thrips.

- One trap should be established for every 40-75 m² (400-700 ft²) of bench space
- Traps should be hung as soon as the plant material is located on the bench
- Traps should be inspected daily
- Traps should be replaced after 6-8 weeks (indoors) and 2 weeks (outdoors)

Action levels for some greenhouse pests include:
Whitefly ~ 10 per trap per week
Thrips ~ 3 to 4 per trap per week

## THRESHOLDS

The amount of damage that is tolerated will depend on what part of the plant is damaged, cost of treatment, value of the plant, and the aesthetic value. In conservatories the need for treatment will depend on the tolerance of the public. In the greenhouse the amount of damage that will be tolerated will depend on potential for spreading to other plants and the effect it will have on the overall health of the plant.

Some general threshold levels include:
Trace - up to 5% defoliation
Light - 6-9% defoliation
Moderate - 30-60% defoliation
Severe - 70-100% defoliation

## TREATMENT

Treatments may include one specific application or a combination of treatments. The use of biological, physical, or cultural controls should always take preference over the use of chemicals in an effort to conserve beneficial native species and reduce the impact on the environment.

## 1. PREVENTATIVE/CULTURAL CONTROLS

PM strategies should always emphasize changing the environment of plants and habitats to prevent pest problems form developing. The professional should constantly monitor the environment to determine how to improve pest management. Some measures that could be considered include:

- Routine inspections of plant material and the outside environment
- Grow bedding plants from seed to avoid plant borne pests
- Purchase plant material that is healthy and free of disease
- Use sterile soil mixes to avoid soil borne insects and disease
- Sterilize tools regularly to avoid transmitting disease to other plants

## 2. BIOLOGICAL CONTROLS

Many species are now available and effective for various pest controls in greenhouses and conservatories. Some of these include:

- Encarsia formosa for greenhouse whitefly
- Aphidius matricariae for aphids
- Amblysieus cumueris for western flower thrips
- Phytoseiulus persimilis for two spotted spider mite
- Cryptolaemus montrouzouri for above ground mealybugs
- Several species of ladybeetle
- Hypoaspis mites for fungus gnats and mites on small plants

## 3. PHYSICAL AND MECHANICAL CONTROLS

- Screening to prevent entry
- Drain wet spots in benches, floors, between nursery rows
- Applying the required irrigation for the particular plant. Over and under watering causes stress and can allow an environment susceptible for pest to develop.
- Use of sticky traps
- Sometimes a strong spray of water can control certain pests. (e.g. aphids)

## 4. CHEMICAL CONTROLS

Once again it is realized that the application of chemicals is part of an IPM program. Although it is not the preferred method of control, there are times when pest populations reach a level that will require the application of a pesticide to establish a tolerable threshold with the particular pest.

The following is a list of the preferred pesticides to use in a chemical application:

- Insect growth regulators
- Bacillus thuringiensis
- Insecticidal soaps for chewing and sucking species
- Botanicals such as pyrethrins or rotenone for clean-up spray before release of biological controls
- Diatomaceous earth (silicon dioxide) applied for soil thrips and fungus gnats on potted plants
- Dormant Oil for scale, mites, aphids, etc.
- Summer Oil for the dipping of rooted cuttings of poinsettias and treatment during growing season

## EVALUATION

The treatment will be evaluated to determine the results. The frequency and timing of inspections will vary in each situation.

## EMERGENCY CONTACTS

**Provincial Poison Information Centre**
Children's Hospital Health Sciences Centre
840 Sherbrook St.
Winnipeg, MB R3A 1S1
(204) 787-2591 emergency inquiries;
(204) 787-2444 general inquiries; (204) 787-4807 fax

**Pesticide Spills Line** (24 hrs. collect calls accepted)
1-204-945-4888 or 1-204-944-4888

**Dangerous Goods Transportation**
Transport Canada – (204) 983-5969
Manitoba Environment – (204) 945-7025

**Health Canada, Pest Management Regulatory Agency**
Information Line – 1-800-267-6315

**A.C.R.E.- Association for a Clean Rural Environment**
Manitoba Pesticide Container Disposal Program
Box 254
Gladstone, Manitoba R0J 0T0
(204) 385 – 3262

**Manitoba Agriculture, Food and Rural Initiatives -** (204) 745-5661

**Manitoba Labour, Workplace Safety and Health Branch**
(204) 945-3446 24 Hour Emergency Number (204) 945-0581

**Manitoba Hazardous Waste Management Corporation -** 1-800-782-2474

**Citizens' Inquiry Service (Government of Canada and Manitoba) -** 1-800-282-8060

**Central Switchboard (Government of Manitoba) -** 1-800-282-8069

**Manitoba Environment Pesticide Use Permit Applications -** (204) 945-7067

**City of Brandon Emergency Response Coordinator -** (204) 729-2239

**City of Brandon, Department of Operations -** (204) 729-2170 or (204) 729-2285

## GLOSSARY

**Abiotic** - Non-Living

**Action Levels** - The level of development of a vegetation and pest population at as specific site at which actions must be taken to prevent the population from reaching the injury level

**Acute** - Short term

**Biotic** - Living

**Biological Control** - The use of living organisms to reduce or maintain pest populations at a tolerable level

**Chemical Control** - The use of a control product such as a pesticide to suppress or control a pest

**Chronic** - Long term

**Community** - A group of populations of plants and animals in a given area. This also relates to a group of individuals living within a legal or political boundary.

**Control Product** - Any product, device, organism, substance, or thing that is manufactured, represented, sold or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting, or repelling any pest

**Cultural Practices** - Management practices that focus on the prevention of pest by maintaining healthy hosts through proper planting, pruning, mulching and sanitation procedures

**Diversity** - The variety of species, vegetation communities, habitats, or landforms in a given area

**Ecology** - The study of relationships between living things, with each other and with environments

**Ecological Approach** - A systems approach to prevention and management where control strategies are determined based on the relationship between the target organism's life cycle and its environment

**Ecosystem** - A community of organisms and their physical environment

**Education** - The knowledge and development arising from training

**Environmentally Sound Methods** - IPM strategies and prescriptions that provide the desired result of reducing the impact of pest populations. These strategies are chosen based on the selection criteria to ensure minimal impact on the general environment and non-target organisms.

**Evaluation** - Involves analysis of treatment strategies and prescriptions to help determine the effectiveness of the control program

**Fungicide** - A chemical substance or cultural biological organism used to kill or suppress or prevent the developing fungi

**Genetic Control** - Management practices that focus on the prevention of pests by selecting plant material that has desirable genetic predisposing features such as resistance to pests, suitable for the environmental conditions of the site

**Herbicide** - A chemical substance or cultural biological organism used to kill or suppress the growth of plants

**IPM Prescriptions** - Integrated pest control or eradication plans that are specific to a variety of pest management situations and/or pests and vegetation; these plans are based on the principles of IPM

**IPM Programs** - Department, Division, and/or Operational Section level programs which are designed and developed to implement the Integrated Pest Management Plan; individual programs are geared to the specific administrative and operational requirements and responsibilities of that specific working group

**Insecticide** - A chemical substance or cultured biological organism used to kill or suppress the growth of insects

**Inventory** - A survey of selected natural resources not necessarily including an assessment

**Integrated Pest Management (IPM)** - Integrated Pest Management is an ecological approach to suppressing pest populations (e.g. weeds, insects, diseases, etc) in which all necessary techniques are consolidated in a unified program, so that pests are kept at acceptable levels in effective, economical, and environmentally sound methods. Since pest problems are often symptomatic of ecological imbalances, the goal is to attempt to plan and manage ecosystems to prevent organisms from becoming pests

**Injury Levels** - Injury level refers to the point in growth of a vegetation or pest problem where it will cause an unacceptable impact on: public safety, recreation, or health, natural and/or managed ecosystems; aesthetic values; economic injury to desirable plants, or the integrity, function, or service life of facilities.

**Legal Control** - The use of Acts, Bylaws, or other legal statutes that limit the development of pest populations by restricting or regulating human activities (e.g. quarantine programs)

**Management** - To direct to a degree, the outcome of a particular project or land area

**Material Safety Data Sheet (MSDS)** - A listing of chemical, technical, and hazard information for the specific product it names. It states health hazards of product use and a list of all hazardous ingredients (unless a specific exemption has been granted). The sheet details safe handling and usage procedures for all applications.

**Miticide** - A chemical substance or cultured biological organism used to kill or suppress the growth of mites

**Monitoring** - Involves the regular surveying of sites and/or features to understand and identify the location and extent of potential pest management problems

**Native** - Species of animals or plants that have not been introduced by people or their direct activities

**Natural Area** - Any land and/or water area that has existing characteristics of a natural/ native plant or animal community; portions of a natural ecological and or geomorphic system. It retains or has reestablished a natural character although it need not be completely natural.

**Noxious** (weed) - Plants which have potential for rapid spreading and major economic impact. Weeds in this category are to be controlled to prevent their spread. They are well established in some areas of the province. Efforts must he undertaken to prevent spread to other locations within the province.

**Non-Park Areas** - Parcels of civic land that are managed by City of Brandon but are owned by another Department within The City of Brandon. This includes roadway green spaces and undeveloped land. These properties will be managed within the framework of the IPM Plan.

**Non-Target Organism** - Any plant or animal other than the intended target of a pest management strategy

**Nuisance** (weed) - The most common weeds which are widespread across the province. They are found on nearly all land and while they do cause economic losses, their further spread is virtually impossible since they already occupy every area to which they are biologically suited. Further legislation is of no value.

**Organism** - Each individual living thing: animal, plant, fungus, bacterium, or one of the single-celled creatures called protists

**Parasite** - An organism (parasite) that lives in or on another (host), for which it obtains food, shelter, or other requirements

**Park** - A specific use open space area which is managed to provide opportunities for recreation, education, cultural or aesthetic use

**Pathogen** - A disease-causing organism

**Pathways** - A route that provides designated access by a variety of compatible multiple or single travel modes (excluding automobiles). It is designed for the pursuit of outdoor recreational experience and activities. Pathways may be for bicycles, cross country skiing, pedestrian or equestrian use unless otherwise identified.

**Pest** - Any injurious, noxious or troublesome insect, fungus, bacterial organism, virus, weed, rodent or other plant or animal pest, and includes any injurious, noxious or troublesome organic function of a plant or animal, whereby the situation or size of its population adversely interferes with the aesthetic, health, environmental, functional, or economic goals of humans

**Pesticide** - A substance that is intended, sold, or represented for use in preventing, destroying, repelling or instigating any insect, nematode, rodent, predatory animal, parasite, bacteria, fungus, weed or other form of plant or animal life or virus, except a virus, parasite, bacteria in living people of animals. A substance that is a pest control product within the meaning of the Pest Control Products Act (Canada) and is granted federal registration by Pest Management Regulatory Agency, Health Canada. (E.g. herbicides, insecticides, fungicides, rodenticides and miticides)

**Pest Control Products Act** (Canada) - A Federal Act administered by Health Canada. The Act and regulations cover the following areas: registration, labeling, classification, import/export control, storage, packaging, advertising, display, distribution, and use. All pesticides used in Canada must be registered under the Pest Control Products Act.

**Plant Health Care (PHC)** - A holistic approach to plant (turf and tree) care that focuses on the health, growth, and beauty of plants. Utilizes a comprehensive matrix of information to facilitate decision making.

**Preventative Measures** - Management practices that are directed toward preventing the establishment of pests (e.g. site design, genetic materials, optimal site selection for plant materials)

**Primary Pest** - A pest that poses a significant economic, physical, legal or health risk to the land inventory or personnel

**Record-keeping** - Involves maintenance of written records of specific pest management factors observed during monitoring, information on labour and materials used in implementation of the urban IPM program, results of applied pest management strategies, and comprehensive data on pesticide applications

**Restricted** (weed) - These weeds must be eradicated. Weeds in this category possess highly competitive characteristics, inherent for rapid spread, and may pose difficulties for control. These weeds are known to be very serious problems in other countries or provinces, but are not well established in Manitoba.

**Rodenticide** - A chemical substance or cultured biological organism used to kill or used to control or prevent the development of rodents

**Secondary Pest** - A pest, if left unattended, will over time create a significant economic, physical, legal or health risk to the land inventory or personnel

**Selection of Optimal Strategies** - The criteria for selecting treatment tactics and developing pest management strategies include:

A. Least disruptive of natural controls
B. Least hazardous to human health
C. Minimizes negative impacts to non-target organisms
D. Least damaging to the general environment
E. Best preserves natural or managed ecosystems
F. Most likely to produce long-term reductions in pest control requirements
G. Effective implementation is operationally feasible
H. Cost-effectiveness in the short and long term

**Special-Use Approvals** - An approval issued by Alberta Environmental Protection for projects in specific locations. This includes pesticides that are excluded from the Environmental Code of Practices for Pesticides but used within 30 horizontal metres of open bodies of water.

**Species** - A genetically distinctive group of natural populations that share a common gene pool that are reproductively isolated from all other such groups

**Timing** - Involves a treatment action during the most vulnerable time in the life cycle of the vegetation or pest with the least impact on natural predators and/or other non-target organisms

**Transportation of Dangerous Goods (TDG)** - An international system of identification so that dangerous goods may be handled, stored and shipped safely. This is enforced by a Federal Act. It applies to all persons who handle or offer dangerous goods for transport (i.e. shipper, mover, receiver).

**Undeveloped Land** - Corporately owned land that does not contain any permanent buildings, structures or facilities

**Weed** - Generally a herbaceous plant not valued for use or beauty, growing wild, and regarded as using ground or hindering the growth of useful or desirable vegetation

**Weed Control Act** - A provincial Act intended to protect land from the invasion and establishment of weeds. Powers of enforcement have been delegated to the local municipality.

**Workplace Hazardous Materials Information System (WHMIS)** - A Federally/ Provincially legislated information system designed to supply workers with the information needed to use workplace hazardous materials safely.

# *City of Brandon*
# *Operational Services*

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