



IPM Certification Examination for Turfgrass Management

STUDY GUIDE

The IPM Certification exam is a 60-minute closed book exam with 50 multiple-choice questions based on the following documents:

- **Integrated Pest Management for Turf** Publication 845 – Ontario Ministry of Agriculture, Food and Rural Affairs, 2015
- *Ontario Regulation 63/09* (O. Reg. 63/09) under the **Pesticides Act**
- **Integrated Pest Management Golf Accreditation Program (Ontario) Policies and Procedures** – IPM Council of Canada, April 2022
- **Integrated Pest Management Certification Program for Specialty Turf, Sports Turf & Cemeteries (Ontario) Policies and Procedures** – IPM Council of Canada, April 2022
- **IPM Certification Examination for Turfgrass Management Study Guide** – IPM Council of Canada, April 2022

This Study Guide is created to assist in focusing on the basic topics and concepts on which the exam has been designed to test your knowledge. Since the changes to O. Reg. 63/09, effective May 1, 2020, the IPM Certification programs has been re-aligned so that there is one exam for golf, specialty turf, sport turf and cemeteries. This will allow any registered IPM Certified Agent to act as an IPM Agent for any of these industries under O. Reg. 63/09 without having to write multiple exams.

This means that you will be tested on your knowledge of basic IPM principles as well as how IPM is applied for turfgrass management in general and not necessarily for one specialty. There may be pests that you may not feel are of particular concern in golf or lawn bowling, but these may be of concern on sports fields or cemeteries and vice versa.

It was also decided to avoid overlapping with the exam you wrote to obtain your Ontario Landscape Exterminator's Licence. This exam is more about your knowledge of IPM. Therefore, the handling of pesticides and specific pesticide recommendations are not covered in this exam.

Questions will be based on material found in OMAFRA Publication 845 – **Integrated Pest Management for Turf**, specific sections of O. Reg. 63/09 and the **Policies and Procedures** documents for both the Golf Accreditation Program and the Specialty Turf, Sports Turf & Cemeteries Program to ensure that you are aware of your obligations under both the Regulation and the IPM programs.

Integrated Pest Management for Turf - OMAFRA Publication 845

1. Integrated Pest Management for Turf

- ❖ Introduction
 - Definition (as per PMRA)
 - Advantages of IPM Programs
- ❖ Planning and Managing Turf
 - Soil Conditions
 - Turf Selection
- ❖ Management
 - Water Management - the effects of frequency and quantity
 - Fertilization - effects of too much or too little
 - Mowing - how often and how much
 - Thatch Control - why it is a problem and how to control
 - Aeration - what and why
 - Verticutting
 - Topdressing
- ❖ Growing Environment - How to decide when and how to irrigate; and which and how much fertilizer to apply
- ❖ Identification of Problems
 - Abiotic vs biotic problems
- ❖ Scouting and Record Keeping - why they are important/necessary
 - Plant Phenology - definition and use
 - Steps to help diagnose a turf problem - the basic steps
 - Key Pests
 - Scouting Methods
 - Visual Methods and Tools
 - Counting Methods
 - Insect Traps - types & methods
 - Weed Counts
 - How many samples are enough? - importance of number and how selected
- ❖ Thresholds - factors involved
- ❖ Controls
 - Cultural
 - Physical - definition and examples
 - Biological - definition and examples
 - Chemical - definition and best management practices
- ❖ Evaluation - why do it and what is needed

2. Developing a Turf IPM Program

- ❖ Set Realistic Objectives - choosing what to work on
- ❖ Categorize the Sites - basis for categories or “classes” of site
- ❖ Assemble Site Background Information
 - What information should you collect?
- ❖ Conduct a Site Assessment - types of information needed for an assessment
- ❖ Draft an IPM Program
 - Identification resources
 - Scouting
 - Thresholds - elements to consider or include and considerations when establishing thresholds for various pests

- Controls
- Evaluation
- ❖ Revise the IPM Program

3. IPM for Turf Weeds

- ❖ Intro
 - When do weeds tend to become a problem
- ❖ Weed Biology
 - What are some of the major weeds in Ontario – broadleaf or grassy, annual or perennial
 - Identification
 - Table 3-1. Conditions Favouring Weed Invasion in Lawns – valuable information for both the exam and in real life
- ❖ Scouting
 - Counting Methods – how each method works and calculating the percentage weed cover
 - Transect method
 - Grid method
 - Centreline method
- ❖ Thresholds
 - Table 3-2. Examples of Action Levels/Thresholds for Weeds – helpful information, especially when justifying thresholds
- ❖ Cultural Controls
 - Turf Establishment – advantages/disadvantages of each species and preferred seeding time
 - Mowing – basic principles of mowing and some other benefits
 - Fertilizing – more info in chapter 6
 - Irrigating – how often, how much is best and consequences of not irrigating
 - Compaction – why is it a problem
- ❖ Physical Controls
 - Hand Removal
 - Heat treatment – how does it work and when can it be used
- ❖ Biological Controls
- ❖ Chemical Controls
- ❖ Evaluation

4. IPM for Turf Insects

- ❖ Intro – where insects damage turfgrass plants
- ❖ Biology of Insects – basic parts of an insect
 - Mouth parts and damage – different types
 - Metamorphosis – two types
 - Life Cycles
- ❖ Insect Identification
 - Table 4-1. Turf Insect Summary – good to know the overwintering stage to be able to identify what might appear in the spring and how to scout for each species
- ❖ Scouting
 - Where, when and how often to scout
 - Visual inspections
 - Specific insect scouting techniques – see Table 4-1 for which techniques is best for which species of insect
- ❖ Thresholds
- ❖ Control Methods
 - Selection of turfgrass species – what are endophytes and where are they found
 - Irrigation management – do specific pests prefer specific moisture conditions
 - Biological Controls

- Beneficial insects
- Nematodes and bio-insecticides
- Bacteria and fungi
- Chemical Controls
- Evaluation
- ❖ Foliar and Stem Feeding Insects – are there preferred plant species; how can you tell which insect is doing the damage; which life stage causes the damage; when is the damage seen and what does it look like
 - Black cutworm
 - Sod webworms
- ❖ Crown and Thatch Feeding Insects – are there preferred plant species; how can you tell which insect is doing the damage; which life stage causes the damage; when is the damage seen and what does it look like
 - Annual bluegrass weevil
 - Bluegrass billbug
 - European crane fly
 - Hairy chinch bug
 - Turfgrass scale
- ❖ Soil Inhabiting Insects – are there preferred plant species; how can you tell which insect is doing the damage; which life stage causes the damage; when is the damage seen and what does it look like; how can you tell these insects apart
 - Black turfgrass atenioides
 - Aphodius granaries
 - White grubs or June beetles
 - European chigger
 - Japanese beetle
- ❖ Other Turf Insect Pests
 - Turfgrass ant

5. IPM for Turfgrass Diseases

- ❖ Diseases – abiotic agents or biotic pathogens
 - Fungi
 - Disease triangle – what is it and what are the components
 - Disease Cycle – what are the different events or stages and how the pathogen is introduced to the host may be a key to interrupting the cycle
 - Diagnosis – what to look for
 - Table 5-1 Key to Turfgrass Diseases of Ontario - when and where on the plant do you see the symptoms; which species are affected
- ❖ Winter Diseases – how do you tell these apart
 - Grey snow mould
 - Pink snow mould and Fusarium patch
- ❖ Spring and Fall Diseases – susceptible grasses and what are the symptoms and management techniques
 - Red thread
 - Yellow patch
 - Leaf spots
 - Necrotic ring spot
 - Take-all patch
- ❖ Summer Diseases - susceptible grasses, symptoms and management techniques
 - Summer patch
 - Dollar spot
 - Brown patch

- Anthracnose foliar blight
- Anthracnose basal rot
- Pythium blight
- Pythium root rot
- Brown ring patch
- Bentgrass dead spot
- ❖ Other Diseases - susceptible grasses, symptoms and management techniques
 - Fairy Ring
 - Powdery Mildew
 - Rusts
 - Slime moulds

6. Soil Management and Fertilizer Use

- ❖ Intro - Benefits of a balanced fertilizer program and how to develop a good program
- ❖ Soil Testing
 - Soil sampling - when and how to sample
 - Micronutrient tests - when and how these are useful
- ❖ Plant Analysis - when plant analysis is useful
 - Sampling - how to collect a proper sample
- ❖ Nitrogen (N) - what N does in the plant; when to apply; and how to test for N
 - Nitrogen equivalency
 - Nitrogen sources - the advantages or disadvantages of various N sources
 - Inorganic nitrogen
 - Synthetic organic nitrogen
 - Slow-release synthetic organic nitrogen
 - Coated ureas
 - Natural organic nitrogen sources
- ❖ Phosphorus (P) and Potassium (K) - what P & K do in the plant; when to apply; and how to test for P & K
- ❖ Applying Fertilizer
 - Turf use, conditions and soil type
 - Type of fertilizer
 - Timing of application
 - Environmental consideration
- ❖ Municipal Sewage Biosolids
- ❖ Adjusting soil pH
 - Raising pH
 - Buffer pH
 - Limestone quality
 - Lowering pH
 - Soluble Salts in Soil

7. Turfgrass Species

- ❖ Intro - How to choose the right species and how are they seeded
The best uses for each of these species and why; which have endophytes; which species can be used successfully when seeded together; which are drought, shade, cold, disease or insect tolerant. This is well summarized in Table 7-2.
- ❖ Kentucky bluegrass
- ❖ Canada bluegrass
- ❖ Rough bluegrass
- ❖ Supina bluegrass

- ❖ Weeping alkaligrass
- ❖ Fine fescue
- ❖ Turf-type perennial ryegrass
- ❖ Spreading turf-type perennial ryegrass
- ❖ Creeping bentgrass
- ❖ Colonial bentgrass
- ❖ Velvet bentgrass
- ❖ Tall fescue
- ❖ Spreading all fescue
- ❖ Time of Seeding – when and why is the best time
- ❖ Weed Control
- ❖ Mowing newly seeded turf
 - Table 7-4 – height of cut and clipping removal

8. Water Management

- ❖ Intro – some of the things to consider when determining irrigation needs
- ❖ Laws and Regulations
- ❖ Irrigation Scheduling for Golf Courses, Sports Fields and Sod
 - What is ET and some of the influencing factors
- ❖ Measuring soil moisture – how soil type can influence soil moisture
- ❖ Water budget – what is a water budget and how it works
 - Rain and irrigation vs. evapotranspiration
 - Table 8-3: how conditions can combine to affect ET
 - Crop factor
 - Water budget example – predict water needs as well as waste
 - Scheduling home lawn irrigation – recommended amounts and timing
 - Dormant turf
 - Weed invasion
- ❖ Quality of irrigation water
 - Testing irrigation water – water quality effects
 - Salinity
 - Table 8-6 Relative salt tolerances of the various grass types
 - Sodium – how sodium risk is expressed and possible effects
 - Bicarbonate – how bicarbonate risk is expressed and possible effects
 - Chlorides
 - Boron
- ❖ Management Strategies for Low-quality Irrigation Water
- ❖ Conserving Water – ways to conserve water

Ontario Regulation 63/09 under the Pesticides Act

Section 16 – Definitions

Section 17 – Explanation of active ingredients allowed for cosmetic purposes, now known as the *allowable list*.

Section 18 – The *allowable list*.

Section 19 – The Annual Report – Unlisted Pesticide Use and what it must include.

Section 20 – Golf course requirements and limitations including IPM Accreditation

Section 24 – Specialty Turf requirements and limitations including IPM Certification

Section 26 – Sports Turf requirements and limitations including IPM Certification

Section 27 – Cemetery requirements and limitations including IPM Certification

Section 48 – Obligations of an exterminator supervising other exterminators, technicians and trainees

Integrated Pest Management Golf Accreditation Program (Ontario) – Policies and Procedures

IPM Council of Canada, April 2022

2.1 IPM Registered Golf Facilities

- ❖ Owner/owner’s representative’s responsibilities
 - Annual Registration
 - Annual Desk Review Audit
 - On-site Audit

2.2 IPM Certified Agents

- ❖ IPM Certified Agent’s responsibilities
 - IPM Certified Agents Acting for More Than One Property – additional responsibilities and formal written request
 - IPM Examination
 - Annual Registration
 - Continuing Education Credits

2.3 Certification / Registration / Accreditation Status Definitions

4.0 Non-Conformance

Integrated Pest Management Certification Program for Specialty Turf, Sport Turf & Cemeteries – Policies and Procedures (Ontario)

IPM Council of Canada, April 2022

2.1 IPM Certified Agents

- ❖ IPM Certified Agent’s responsibilities
 - IPM Examination
 - Annual Registration
 - Continuing Education Credits

2.2 Certified Definition

4.0 Non-Conformance

Regulatory information for cemetery owners, operators, and licensed landscape exterminators that apply pesticides for the purposes of the cemeteries exception under the cosmetic pesticides ban is provided below. Pesticides used on cemeteries must be used in accordance with all relevant legislation, including requirements of the *Pesticides Act* and *Ontario Regulation 63/09* that are related to licensing, posting of signs and storage of pesticides. While every effort has been made to ensure the accuracy of the information contained in this document, it should not be construed as legal advice. In the event of conflict with requirements identified in the Act or Regulation, the legal requirements will apply.

Ontario's Cosmetic Pesticide Ban

Ontario's cosmetic pesticides ban is in place to reduce potential risk from the cosmetic uses of pesticides. Pesticides cannot be used for cosmetic purposes unless the only active ingredients in the pesticide are active ingredients that are on the Allowable List. It is illegal for any person to use, cause or permit the use of a pesticide for cosmetic purposes in a land extermination unless under an exception to the ban. "Cosmetic" as defined in the Pesticides Act means the non-essential use of a pesticide.

Pesticide products that contain only active ingredients that are on the Allowable List (i.e. biopesticide or lower risk pesticide) are allowed to be used for cosmetic purposes, such as to control weeds and other pests on lawns, gardens, and driveways. All pesticides must be federally registered and used according to label directions.

Pesticide active ingredients on the Allowable List include:

- biopesticides (microbial, pheromones or semiochemicals) as defined by the Pest Management Regulatory Agency,
- non-conventional pesticides that pose a low risk to human health and the environment based on consideration of the following factors
 - The active ingredient has a low inherent toxicity to non-target organisms.
 - The products in which the active ingredient is contained have a low potential for their use to result in significant human or environmental exposure.
 - The active ingredient is not persistent in the environment.
 - The active ingredient is widely available to the public and has a history of safe use for a purpose other than as a pesticide.
 - The active ingredient has a mode of action that is not the result of toxicity to the target organism.

Exception for Cemeteries

Under the cosmetic pesticide ban, the use of pesticides with an active ingredient that is not on the Allowable List is permitted for certain excepted purposes in accordance with specific conditions. One such purpose is to maintain turf on a lot in a cemetery.

Definitions for "cemetery" and "lot"

For the purposes of the cemetery exception to the Cosmetic Pesticide Ban, the terms "cemetery" and "lot" have the same meaning as in the *Funeral, Burial and Cremation Services Act, 2002* and are defined below:

"cemetery" means,

- (a) land that has been established as a cemetery under this Act, a private Act or a predecessor of one of them that related to cemeteries, or
 - (b) land that was recognized by the registrar as a cemetery under a predecessor of this Act that related to cemeteries,
- and includes,

- (c) land that, in the prescribed circumstances, has been otherwise set aside for the interment of human remains, and
 - (d) a mausoleum or columbarium intended for the interment of human remains;
- and
- “lot” means an area of land in a cemetery containing, or set aside to contain, Interred human remains and includes a tomb, crypt or compartment in a mausoleum and a niche or compartment in a columbarium and any other similar facility or receptacle;

Maintaining Turf on a Lot in a Cemetery

Pesticides with an active ingredient that is not on the Allowable List that are used under the cemeteries exception can only be used to maintain turf on a lot in a cemetery. An IPM certified licensed landscape exterminator must ensure pesticides are used according to label directions and for purposes allowed under the ban.

The exception does not apply to other lawns or turf areas that are not cemetery lots. To control of pests in gardens, paved areas or other turf areas, such as lawns in areas of the cemetery where burial plots are not located or around buildings and border areas of the cemetery, only pesticides with active ingredients that are on the Allowable List can be used.

IPM Certification requirements

The exception to the cosmetic pesticide ban for cemeteries sets out certain requirements related to IPM certification. The person using the pesticide must be certified by an integrated pest management body approved by the Director or working under written instructions of a person so certified.

Currently, IPM Council of Canada, is an approved IPM body.

If the person using the pesticide is certified by an integrated pest management body, the person shall carry (or have readily available at the extermination site) the certificate or a copy of the certificate.

Alternatively, if the person using the pesticide is working under the written instructions of a person who is certified by an integrated pest management body, the person shall carry (or have readily available at the extermination site) a copy of the following:

1. The certificate issued to the certified person.
2. The written instructions.

Annual Report

The owner or operator of the cemetery that is using unlisted pesticides must prepare an annual report each year. The annual report covers the period from January 1 to December 31 in a year and shall be prepared before January 31 in the following year.

The form that must be used for the Annual Report can be found on the IPM Council of Canada webpage for IPM Certification. The annual report must include the following information:

- The name of each active ingredient used.
- The quantity in kilograms of each active ingredient used.
- The reason for using each active ingredient.
- The method of use for each active ingredients
- A map or plan showing the location of all application areas.
- An explanation of how future use of each active ingredient used will be minimized.
- The signature of the integrated pest management agent or another person who is certified by an integrated pest management body approved by the Director and who used, supervised the use of or provided any written instructions on the use of unlisted pesticides.

A copy of this report must be kept at the head office of the owner or operator of the cemetery for at least five years and, on request, given immediately to a provincial officer or the Director or to any person free of charge within seven days.