

Integrated Pest Management Program - IPM Manual for Landscape Pests in B.C. - Chapter 5

Integrated Pest Management

IPM Manual for Landscape Pests in British Columbia

Chapter 5: IPM for Weeds in Turf

Learning Objectives

When you have completed this lesson, you should be able to:

1. Classify common types of turf sites into three categories according to maintenance level.
2. List seven management methods that help prevent weed problems in turf.
3. Know where to look for help in identifying weeds.
4. Describe three ways to count weed populations in turf.
5. Give examples of treatment thresholds for three categories of turf.
6. Describe two physical controls for turf weeds.
7. List guidelines for selecting appropriate herbicides.
8. Describe the role of evaluation in a turf IPM program.

[↑ Top](#)

Introduction

IPM programs for weeds in turf are well-developed in BC. Turfgrasses are used for lawns because they are tough, hardy and adaptable plants. Given good conditions, vigorous turf will out-grow most other kinds of plants, therefore preventing weed problems through good management should be the primary approach. As described in [Chapter 2](#), using a system for categorizing sites according to maintenance level can help in planning an IPM program.

[↑ Top](#)

Facility Categories

Examples of turfgrass sites that might be included in each category include:

- **Class A** - High level of service: fine ornamental lawns, golf and lawn bowling greens, irrigated sports fields.
- **Class B** - Moderate level of service: general park areas, residential and commercial lawns, boulevards, recreational fields, golf fairways.
- **Class C** - Low level of service: meadows, picnic areas, rough grass, undeveloped and naturalized areas.

The following section describes the steps in an IPM program for turf weeds and gives examples of techniques currently available to turf managers. This information is intended as a starting point, to be adapted to suit specific sites and improved as new products and methods are developed.

 [Top](#)

Prevention

When designing and planting turf areas, plan for long-term weed management by starting with the correct drainage, soil preparation and choice of turfgrass cultivars. Follow this with good turf management practices to ensure healthy, vigorous turf. A general list of management methods that prevent weed problems and other pests (also called "cultural controls" in some references) includes:

- a) Select turfgrass cultivars suited to local conditions and intended use.
 - For example, choose wear resistant perennial rye grass for sports fields or choose shade-tolerant fescues for shaded areas in parks. Invest in the best quality seed available.
- b) Use fertilizers that suit turfgrass nutritional requirements.
 - For large or high profile facilities, regular soil testing, and possibly tissue analysis, may be advisable to make sure that lime and fertilizer requirements are being met.
 - Adjust application rates to avoid nutrient imbalances and to prevent leaching of soluble fertilizers beyond the root zone.
- c) Follow good irrigation practices.
 - Water deeply and infrequently. Avoid shallow watering, which promotes shallow rooting and accumulation of thatch.
 - Test for moisture requirements rather than relying on automatically timed intervals. Relate irrigation cycles to the local evapo-transpiration rates, soil type, drainage characteristics and species of turfgrass.
 - Have manual overrides on automatic watering systems that are easy to adjust for unusually wet or dry conditions or use automatic rain delays to shut off irrigation during rainy periods.
- d) Use correct mowing practices.
 - Keep the mower height as high as possible for the turfgrass species and use of the site. This gives the grass plants more leaf area, so they grow more vigorously, with deeper roots and are better able to compete with weeds. The dense turf also

shades the soil, which prevents weed seeds from germinating. Most turf grass species used in parks, home lawns and recreational fields can be mowed at a height of 5-7 cm.

- Maintain sharp blades on mowers and mow as often as work schedules and budgets allow. For most turf, scheduling mowing according to the growth rate of the turf, so that mowing removes about 1/3 of the plant height, gives the best results.
- Use mulching mowers and leave the grass cuttings on the turf to provide nutrients. This has been shown to replace up to 15% of the nitrogen fertilizer required and does not cause thatch to build up (but may not be advisable in cool, wet spring conditions when turf is growing rapidly).

e) Keep thatch to an optimum thickness.

A moderate layer of thatch (1-2 cm) is beneficial for most turf because it insulates roots from temperature extremes, reduces water loss and acts as a cushion to reduce compaction from wear.

- If necessary, remove excessive thatch by verticulating or raking.
- Where *Poa annua* is a problem, avoid de-thatching operations in early fall or spring when weed seeds are germinating.
- Leave as much soil covered as possible to reduce germination of weed seeds.

f) Manage to reduce soil compaction.

- Provide mechanical aeration as required, preferably with hollow core aerators instead of solid core equipment. How often to aerate depends on the type of turf and use patterns.
- Avoid compaction from overuse. For example, rotate goal mouth areas and entrance points onto turf areas for people and equipment; alternate direction of mowing; establish a sports field closure policy during poor weather and limit play on sensitive or stressed sports fields.



g) Promptly repair worn or damaged areas.

- Use overseeding, re-seeding or re-sodding to close openings in the turf and increase the density of turf plants. This prevents weeds from germinating and becoming established.

The key to managing turf weeds is preventing, and correcting, conditions that stress the turf plants. When weed populations exceed tolerance levels in turf it is usually because the grass has been thinned out by poor conditions, such as drought, compaction, poor drainage, mowing too low, etc. Any openings in the turf will be colonized by weeds adapted to those conditions. Noting which species of weeds appear, and where, can help you diagnose the type of stress the turf is experiencing (see text box).

Weeds as Indicators of Stress Conditions in Lawns

Annual Bluegrass (<i>Poa annua</i>)	Low fertility, compaction, mowing too short
Buttercup (<i>Ranunculus</i> spp.)	
Chickweed (<i>Stellaria media</i>)	Excessive moisture
Clover (<i>Trifolium repens</i>)	Excessive moisture
Crabgrass (<i>Digitaria</i> spp.)	Thin grass, excessive moisture
Dandelion (<i>Taraxacum officinale</i>)	Low nitrogen, drought, compaction Thin grass, low fertility, compaction
Dock (<i>Rumex</i> spp.)	Thin grass, low fertility, mowing too short
English daisy (<i>Bellis perennis</i>)	Excessive moisture
Moss (various)	Low fertility, low pH, excessive moisture
Plantain (<i>Plantago</i> sp.)	Heavy shade, low fertility, low pH Low fertility, mowing too short

Adapted from: Olkowski, W., S. Daar, H. Olkowski, 1991.
Common-sense Pest Control. The Taunton Press, Newtown, CT. pg. 55

[↑ Top](#)

Identification

Collect leaves or whole plants and identify to species if possible. Find out whether the plants are annuals or perennials, as well as other characteristics, such as whether they are grasses, broadleaf weeds or noxious weeds. This information will help in deciding the best management methods and when to use them. Weeds that cannot be positively identified should be carefully collected, and pressed if necessary, to preserve them for future diagnosis.

Identification resources include:

- reference books, plant guides (see Further Reading, at the end of this chapter)
- resources on the internet
- staff at garden centres, community colleges, botanical gardens
- professional diagnostic services

Note: Professional services and companies can send samples to the provincial [Plant Diagnostic Laboratory](#), Ministry of Agriculture and Lands (there is a charge for this service).

[↑ Top](#)

Monitoring

Most monitoring programs for weeds in turf are based on visual inspections (rough estimations) and on weed counts, which give a more accurate picture of the weed situation. For more information on the principles of sampling, see [Chapter 1](#).

It is important to keep written records of all counts, as well as notes from visual inspections for future reference. Some turf managers also find it useful to keep photographs as a record.

[↑ Top](#)

Counting Methods

Methods for counting weed populations in turf:

- **Transect Method:** Use a rope or string to stake out a 10 m transect (straight line) through an average section of turf. Walk along the line and record the plants you see in a 10 cm² area at 10 points along this transect; check 10 or more transects per site. Averaging the scores from each type of site gives a percentage of weeds in the turf. Transect lines can be marked or knotted to show where to sample or you can pace along the length of the line and record the plants seen near your toe after each large stride.
- **Grid Method:** Make a wire or wood frame, 1 metre square. Lay it down, randomly, on the turf and count all of the weeds inside the frame. Count at least 10 squares per site. Average the scores to arrive at a percentage of weed cover.
- **Centreline Method:** Walk the center of sports fields from goalpost to goalpost and estimate percent weed cover in a 10 cm² area at every second step.



Which Method: The choice of monitoring method depends on the site and the user. Once a method is chosen, the same one should be used each time so that counts and averages can be compared from one year to the next.

When and How Often: The monitoring schedule depends on the category of the site, its history of weed problems, the local climate, as well the budget. Schedule monitoring to coincide with



periods of active vegetative growth or flowering periods, when some weeds are easiest to see.

On low maintenance sites, an occasional visual inspection may be the only monitoring required. On intermediate sites, if a visual inspection shows cause for concern, then the weed population can be more accurately estimated by counting weed populations. On high profile turf, weed counts are usually done once or twice a year (early spring and late summer).

[↑ Top](#)

Action Decisions

On general use turf, in parks and other public facilities, the need for treatment often depends on how many weeds the public will tolerate. On sports turf, safety considerations also influence treatment decisions because bare areas or large weedy patches can increase the slipping hazard. Playability is a key consideration in deciding when to treat on golf course and lawn bowling greens.

Examples of injury levels used by turf managers in BC are:

- **Class A Sites:** Usually maintained relatively "weed free". Turf with 5-10% weed cover is often accepted by users as "weed free". A common action level for herbicide treatment is 10-15% weed cover.
- **Class B Sites:** Some weeds are acceptable, providing the function of the site is not compromised. Acceptable levels used by municipalities for such sites range from 20% to 50% weed cover.
- **Class C Sites:** Controls may only be needed in the interest of public safety (i.e., to maintain sight lines, remove a fire hazard) or if noxious weeds are present or other weed populations threaten to contaminate nearby high value facilities. Acceptable levels are often over 50% weed cover.

Develop written injury and action levels using monitoring information for major sites or for each class of site. These should be quantitative (stated in terms of a number or measurement) for any sites where herbicides use is being considered. For future reference and to help in later evaluation, write down the criteria you use to make action decisions, such as percentage of weed cover, presence of noxious weeds species, risk of spread to adjacent turf, cost, etc.

Although there may not appear to be much difference between injury and action levels for turf weeds when herbicides are used, other types of treatments may have different action levels. For example, it may be justifiable to use a back-pack infra-red weeder to control dandelions in a public park to treat a lower weed population level than would be feasible using a herbicide. This is because using the pesticide would involve complying with regulatory requirements and public notification guidelines that do not apply to the infra-red weeder, which could be used at any time.

Setting an Injury Level for Weeds in a Lawn

When you ask someone how many weeds they would tolerate in their front lawn, their first reaction is often "None!". But does "none" really equal "zero"? One study conducted in California, found that people did not notice that there were weeds in a

lawn until weed counts exceeded 5-10%*. Sounds unlikely?

Try this — First, find some areas of turf that look "fine" to you, then count the weeds in 10 transects or grids (as described above) and average the counts. Do the same for turf that you consider looks "marginal" and again for turf areas that look "poor".

The whole exercise can be done fairly quickly. It should give you a better idea of acceptable and unacceptable weed counts, which can be used to set realistic injury and action levels.

* Olkowski, W., S. Daar, H. Olkowski, 1991. Common-sense Pest Control. The Taunton Press, Newtown, CT. pg. 55.

 [Top](#)

Treatments

Knowing whether a weed is an annual or a perennial is important because it affects treatment decisions.

For example, control of annual weeds would focus on preventing seeds from spreading and on preventing dormant seeds in the soil from germinating (i.e., by minimizing disturbances to the soil or by applying corn gluten herbicides if they become available in Canada). For perennial weeds, controls are usually used before the plants bloom, when nutrient reserves in the roots are at their lowest and the plant is least able to grow new leaves.

 [Top](#)

Physical and Mechanical Controls

- Hand-pull small populations of weeds. There are several well-designed hand tools on the market that make weed pulling more efficient. This is easiest when the soil is moist, but can be done any time of year and by anyone working on the site. Care should be taken to disturb the soil as little as possible. As a weed is pulled out, it is a good idea to sprinkle turfgrass seed in the opening to close the gap in the turf quickly and prevent weed seeds in the soil from germinating.
- Use a hand-held flamer or infra-red radiation applicator with a probe tip to control broadleaf weeds in turf (for heat treatment information, see [Chapter 3](#)).

 [Top](#)

Chemical Controls

The need to use herbicides on general use turf usually shows that turf management methods need to be improved. If herbicide use is judged necessary, however, select the product according to the following guidelines. Make sure the product selected is:

- effective and registered for the specific weed type
- applied as a spot treatment instead of a broadcast application wherever possible

- not phytotoxic to desirable turf species (i.e., some common turf herbicides kill bentgrasses)
applied at the right time to have the greatest effect on target plants

Preferred herbicides, including a promising mycoherbicide for dandelions, are discussed in [Chapter 3](#). For precautions and guidelines for using pesticides in landscapes, see [Chapter 11](#).

 [Top](#)

Evaluation

After any type of treatment, turf areas should be inspected for results at intervals appropriate to the type of treatment. For example, schedule an inspection 1-2 weeks after an herbicide treatment.

Use this information, along with other monitoring records, observations from field staff, feedback from clients, budget records, etc. to assess the effectiveness of the turf IPM program and find ways to improve it for next year. After several seasons of recording and evaluating, a long-term trend toward better turf quality and low weed populations should be noticeable.

If monitoring shows that weed populations continue to rise, it is essential to re-evaluate turf management practices. The goal should be to improve the health of the turf so that it is more competitive with weeds.

 [Top](#)

Further Reading

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Quarles, W. 1999. Non-Toxic Weed Control in the Lawn and Garden. Common Sense Pest Control Quarterly. 15(3):4-14. (From: [Bio-Integral Resource Center](#), PO Box 7414, Berkeley, CA 94707.

Whitsen, T.D. et al. 1991. Weeds of the West. University of Wyoming, Judson, Wyoming. 630 pp.

 [Top](#)

STUDY QUESTIONS

1. Why is prevention, through good turf management, the primary approach to managing weeds in turf?

2. Answer true or false for the following:

___ Leaving grass cuttings on turf after mowing causes thatch to build up.

___ Turf should be watered deeply and often, regardless of the weather.

___ A 1-2 cm layer of thatch is beneficial to a lawn.

___ Setting mowing heights as high as possible helps turfgrasses grow deeper roots.

3. List 3 methods for counting weed populations in turf.

4. Match the type of turf (column A) with factors that influence action decisions on treating for weeds (column B)

5. Fill in the blanks: To control annual weeds, you would focus on preventing

_____ and preventing

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