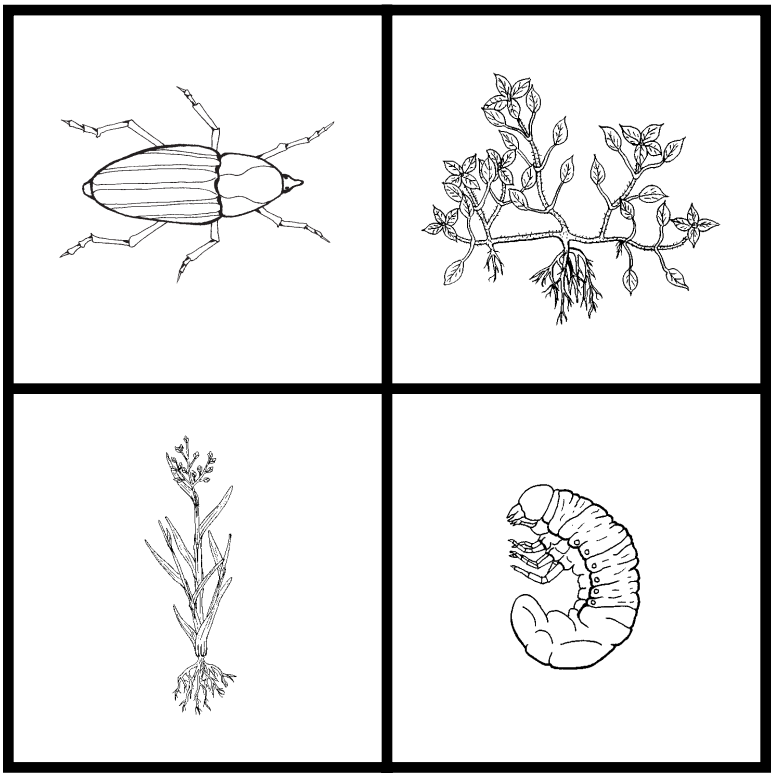
A HOMEOWNER'S GUIDE TO ENVIRONMENTALLY SOUND LAWNCARE

Maintaining a Healthy Lawn the IPM Way



Massachusetts Department of Agricultural Resources
Pesticide Bureau

This ***Homeowner's Guide to Environmentally Sound LawnCare*** was developed by the Massachusetts Department of Agricultural Resources for use in *Massachusetts*. It should be noted that much of the information and recommendations contained within are particular to conditions found in Massachusetts. This guide may not be applicable to other states or regions of the country.

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WHAT IS THIS GUIDE?

This guide will show you how to maintain a healthy lawn in a way that minimizes the need to use pesticides including insecticides, herbicides, and fungicides. While everyone appreciates a lush lawn, no one wants pesticides to be used unnecessarily. Pesticides may provide benefits, but may also pose risks to people, pets, and the environment. This guide shows you how to maintain a nice lawn while reducing your reliance on pesticides.

WHAT IS IPM?

This guide focuses on *Integrated Pest Management*, or IPM, as an approach to lawncare. IPM involves the use of ecologically-based, common sense methods to maintain a healthy lawn. Too often pesticides are applied on a routine basis without any thought as to whether they are actually needed, or whether there is a way to a prevent the need for these chemical controls. In contrast, IPM focuses on maintaining lawns in a manner that prevents and minimizes pest problems. If pest problems do occur, IPM deals with them in an environmentally responsible manner.

With IPM, pest prevention entails maintaining a strong, healthy lawn. This involves proper techniques and approaches to *mowing*, *watering*, *fertilization*, and grass *seeding*. Just as healthy people are less susceptible to getting sick, healthy lawns are less apt to be overcome by weeds, insects or disease.

IPM also involves periodic *monitoring* of the lawn in order to determine if damaging pests are present. To do this, you first have to be able to *identify* damaging pests from non-damaging or *beneficial* species. You must also determine whether the pest is present at a level, or *threshold*, where it can cause significant damage. The presence of a few pests does not always mean there is a problem.

If pests are found at damaging levels, IPM calls for a variety of approaches to be considered when dealing with the problem. These include biological, mechanical, and chemical controls. *Biological controls* include the use of beneficial insects, diseases and parasites to control pests. *Mechanical controls* include traps and/or hand removal. *Chemical controls* refer to the use of chemical pesticides. The controls chosen are the ones which work the best and pose the least risk to people and the environment.

While all this may sound somewhat complicated, this guide will explain, in simple terms, how to maintain your lawn the IPM Way.

TABLE OF CONTENTS

I. IPM PRACTICES FOR MAINTAINING A HEALTHY LAWN

An IPM approach to lawncare begins with practices that will maintain a healthy lawn. A healthy lawn, in turn, will withstand the stress imposed by insects, weeds, diseases, and use. These on-going practices are often quite simple and involve proper mowing and watering, as well as good soil management as described in the sections below. The following are key practices that need to be maintained on an on-going basis to sustain a healthy lawn and to avoid the need for treatment.

A. Grass Selection.

If you plan to establish new turf, or need to overseed existing areas of your lawn, choose grass seeds that are the most suited to your site conditions. Seed selection should be based on the suitability of the seed to the conditions of your lawn area(s), including soil characteristics, light, use, and desired level of maintenance. In the Northeast, a *mixture* of cool-season grasses is recommended. Note that seed labeled *endophytic* tends to be tolerant of environmental stresses and is resistant to some of the more common insect pests, including billbugs, chinch bugs, and sod webworms.

When seeding and/or overseeding, it is important to improve underlying soil conditions by adding compost and other organic matter, as well as appropriate nutrients. A starter fertilizer with a high *phosphorous* content may be used to encourage early growth. Until the grass becomes established, maintain good contact between the seed and the soil by keeping the area moist, yet not overwatered. Plan to seed when the weather is cool in the Spring or, preferably, in the Fall when there is less competition from weeds. The **Grass Variety Chart** *pullout* at the end of this guide, describes how to choose the right variety of grass species for your lawn, seed characteristics, and required level of maintenance.

B. Soil Preparation and Management.

Maintaining proper soil conditions is an essential component to keeping a lawn healthy. Enriched soil will provide the necessary nutrients to the turf so that it may 'out compete' weeds and resist other pest problems. Avoid the conventional step programs offered by some lawncare companies and lawn chemical manufacturers. Instead, follow a program that is customized to the needs of *your* lawn. As described below, this requires that you gather some site-specific information, but the results will be well worth it.

1. Soil Testing:

A *soil test* is key to determining your soil's nutrient levels, and fertilizer needs. Contact a Soil and Plant Tissue Testing Laboratory in your area for details on fees and how to take soil samples. In Massachusetts, the *Soil Testing Lab* of the University of Massachusetts conducts soil tests for homeowners for a modest fee (refer to the Resources and References section of this guide for contact information).

Soil tests report on the level of *nutrients* present in your soil including nitrogen, phosphorus, and potassium. These various type of nutrients are described below, under the Fertilizing section (#3). The results of a soil test will tell you if fertilizer products are needed, and what type. In general, soil testing laboratories will make recommendations on how to amend your soil conditions based on your needs.

In addition to reporting on nutrient levels, soil tests report on *pH* levels. *pH* is a measure of how *basic* or *acidic* your soil is. A high pH, greater than 7, indicates that the soil is basic. A pH less than 7 indicates that the soil is acidic. Grasses grow best in slightly acidic soils with a *pH* of 6 - 6.5. Soil testing laboratories will provide you with recommendations based on the results of your *pH* measure.

2. Liming:

Most soil in New England is acidic. It is common to have to raise the pH of soils on lawns. *Lime* is a calcium based compound which is added to soils which are too acidic as determined through a soil test. Lime can be purchased at most garden centers. When renovating a lawn, mix lime into the top 4-6 inches of soil before seeding. Lime is generally applied to lawns at a rate of about 50 pounds per 1000 square feet. This should, however, be determined for your lawn by a *pH* test. It is best to apply lime in the Fall. If soil is very acidic, and large amounts of lime are needed, split the application and apply half in the Fall and half in the Spring. Do not apply lime unless there is a need, and keep lime away from plants which need acidic soil such as azaleas or rhododendrons. If your lawn needs lime, apply when the air is calm to avoid dust, and try to time your applications just before it rains so that the lime may be watered down into the soil. Avoid getting lime in your eyes or on your skin.

3. Fertilizing:

All grasses require certain amounts of nutrients including *nitrogen* (N), *phosphorous* (P), and *potassium* (K). Fertilizer products must be added to the soil periodically to make up for low nutrient levels. Fertilizer products can be fast acting, slow acting, or a combination of the two.

The **Guaranteed Analysis** is a description on the product label which provides specific information about the quantities of nutrients in each fertilizer. The three numbers on the Guaranteed Analysis refer to the *type* of nutrient (N, P, K, respectively), as well as the *amount* of nutrient in the formulation. For example, if you are about to purchase a fertilizer, the numbers **4-1-2** tell you that the fertilizer product contains 4% of *nitrogen*, 1% of *phosphorous*, and 2% of *potassium*.

Of the various nutrients, *nitrogen* is the most important for maintaining a healthy lawn. However, in excessive amounts it can increase disease problems, reduce a lawn's tolerance to high and low temperatures, and cause moisture stress due to overstimulation of growth. Do not over apply nitrogen.

Before you purchase a fertilizer product that contains *nitrogen*, make sure you read the **Guaranteed Analysis** and apply the appropriate type and level of nitrogen to your lawn. There are two basic forms of nitrogen contained in fertilizer products : *fast-acting* or Water Soluble Nitrogen (WSN), and *slow-acting* or Water Insoluble Nitrogen (WIN). WSN and WIN nitrogen fertilizers each have advantages and disadvantages. Many fertilizer products contain a mixture of the two types. The product you choose should be based on the needs of your lawn. The following chart compares some of the characteristics between WSN and WIN nitrogen fertilizer products. Based on the information in this chart, choose a fertilizer product that contains the appropriate proportion of WIN and WSN to meet the needs of your lawn as revealed through a soil test.

NITROGEN FERTILIZERS : WSN & WIN COMPARISONS

Type of N	Rate of Release	Response Rate (greenup)	Duration of Response	Potential to leach into ground water	Cost	Potential to "burn" grass	Examples of Nitrogen Fertilizers
WSN	Fast	Rapid-flushes of green - up and growth.	Short (6-8 weeks)	High	Low	High	• ammonium nitrate • ammonium sulfate • ammonium phosphate • urea • potassium nitrate.

WIN	Slow	Slow color response.	Long	Low	High	Low	• Ureaformaldehyde (UF)
							• isobutylidene diurea (IBDU)
							• sulfur-coated urea (SCU)
							• organic fertilizers:
							  • pelletized sewage sludge
							  • Fish meal
							  • Seed meal

The *timing* and *rate* of fertilizer applications are important considerations which depend on a number of factors. For example, the *nitrogen* requirements of the turf species, the proportion of WSN and WIN in the fertilizer, your expectations for turf quality, time limitations, and the use of your lawn are all factors which need to be taken into account when making this decision.

The table below guides you through a fertilization pro gram based on the assumption that most grasses require 2-4 lbs. of *nitrogen* per 1000 square feet each season. Depending on your soil conditions you may require more or less nitrogen. Use the lowest product rate possible that will meet your own expectations and produce a healthy turf.

4. Equipment:

It is important to keep your lawn equipment in good working order, especially equipment used to apply fertilizers and pesticides. Poorly functioning application equipment can result in improper amounts of product being applied possibly causing harm to you, your lawn and the environment.

Fertilizer bags generally contain information on the correct settings to use with different models of spreaders. Read all directions and precautions on the bag *before* you apply any product, including fertilizers, lime, and pesticides. Always adjust your spreader to the recommended setting so that it will deliver the appropriate amount of fertilizer.

C. <u>Mowing.</u>

The following recommendations offer a simple, yet effective, approach to maintaining a healthy lawn based on mowing practices.

1. Height:

Mow high to encourage dense, well rooted turf which will tolerate environmental stress, including pests, as well as reduce the need for fertilizer and pesticides. The ideal grass height for most lawns is 2-3 inches. Shorter mowings will prevent the roots from developing. Turf with a poorly developed root system is unable to obtain sufficient water and nutrients from the soil. This will require you to water and fertilize more often.

2. Frequency:

Reduce the grass height by 1/3 at a time to avoid stress on the grass. In the Spring and Fall when grass is growing quickly, you may need to mow more than once a week. If the lawn grows very high, try to reduce the length over a few mowings rather than shocking the turf by cutting it all at once.

3. Timing:

Mow when the lawn is dry in order to minimize chances of spreading diseases.

4. Equipment:

Keep mower blades sharp! Dull mower blades tear the turf and put stress on it. This can result in a brownish appearance of the lawn, and may make it more susceptible to pests and diseases.

5. Clippings:

Keep your clippings! Unless there is an excessive amount of clippings, clippings should not be removed. Leftover clippings are a good source of food or nutrients for your soil.

NITROGEN FERTILIZER GUIDE

# Times per Year You Choose to Fertilize	When To Fertilize (Time of Year)	How Much and What Type of Nitrogen
• 1 time	• Fall	• WIN with a high organic content for slow release throughout the season
• 2 times	• Early May • September	• Over 50% total N as WIN applied at a rate of 1.5-2.5 lbs. N /1000 ft^2.
• 3 times	• Mid April • Mid-late June • September	• 20%-50% total N as WIN applied at a rate of 1-1.5 lbs.N /1000 ft^2.
• 4 to 5 times	• Start in April and every 6-8 weeks thereafter	• Up to 20% total N as WIN applied at a rate of 1 lb. N / 1000 ft^2.

D. Watering.

Efficient use of water is important in order to encourage deep rooted turf. In the Northeast, there is generally sufficient rainfall so that watering of lawns is not necessary. If you wish to maintain your lawn's green appearance, you may need to water the lawn during a hot, dry summer to avoid the onset of dormancy (i.e., an inactive stage of growth and *reversible* dying back of grasses).

1. Timing:

Water your lawn just before it begins to wilt. Learn to recognize the signs that mean a lawn needs watering. These include a bluish-green color to the grass, rolling or folding blades of grass, footprints which remain on the lawn for several minutes when walked on, or soil which appears dry at approximately 6 inches below the surface (use a garden spade or other probe to test). Watering at this time will prevent permanent injury to the lawn. Water early in the morning in an effort to minimize the spread of disease, and evaporation of water into the air. At this time the grass is already wet from dew and the sun is still low. Lawns can also be watered at night *except* during long periods of hot, humid weather. Excessive watering under humid conditions is likely to promote diseases, such as the growth of certain fungi.

2. Frequency:

How frequently you water may depend on such factors as type of soil, weather conditions, type of grass and the extent of their root system. The drought tolerance of the main types of grasses range from high drought tolerance for *fine leaf fescues*, to the low drought tolerance of *perennial ryegrass; tall fescue* and *Kentucky bluegrass* fall somewhere in between a high and low level of tolerance (refer to the **Grass Variety Chart** *pullout* at the end of this manual for more information about grass species).

3. Amount:

Water deeply in order to encourage deep roots which can take up water on their own. Approximately 1 inch of water should be used to wet the soil to a depth of 4-6 inches. Do not overwater! Overwatering is often a problem associated with automatic irrigation systems, as well as in small, tightly planted backyards that offer little air circulation. Overwatering may cause restricted rooting, and result in lawns that are too lush and cannot withstand traffic.

E. Pest Control Basics.

Even healthy lawns sometimes develop pest infestations. The following measures are all part of an IPM approach to dealing with pest problems.

1. Pest Identification:

The decision of whether and how to control a pest depends on your ability to know what the pest is. Learn to identify the main pests that appear in your yard and become familiar with their life cycles. Control measures for dandelions will be very different from grub controls. Similarly, grubs at the early stages of life (grub larvae) may require different controls from those of adults. Proper pest identification is essential to implementing an effective IPM program.

2. Monitoring:

Monitoring your lawn entails keeping an eye out for, and on, any pests that may be present. You should look for the presence of pests, note any changes in pest population, and be aware of problem areas. You may want to keep a logbook. (Refer to the **IPM Seasonal Checklist** *pullout* in this guide for more information on when and how to monitor for pests).

The simple presence of a pest does not mean a treatment has to be made. There may be a certain level of damage that is tolerable, and not worth using a pesticide to control. The level at which pests should be controlled is referred to as a *threshold*, or the level of *pest tolerance*. For more information on threshold levels for the various lawn pests, refer to the tables under sections II and III of this manual which describe *Insect Management* and *Weed Management* control measures.

3. Mechanical Controls:

Manual or mechanical controls offer a non-chemical approach to correct pest problems. For example, mechanical interventions may include the use of a weedwhacker to manage weeds, or the use of insect traps. The effectiveness of manual and/or mechanical methods and techniques depends on the type and number of pests occurring in your yard.

4. Biological Controls:

Biological treatments offer a non-chemical approach to managing pests. Biological controls may involve the use of the following :

a) Beneficial Insects:

Many insects that occur naturally in your yard have the potential to keep low-to-mid size populations of a pest in check. Learn to recognize these *beneficials* since their presence may mean that the pest will be controlled without your intervention. For example, the *big-eyed bug* is a natural predator of the *chinch bug*. Other examples of beneficial

insects are ladybugs, tiny non-stinging wasps, spiders, and ants. Beneficials insects are *very susceptible* to pesticides. Use of *broad-spectrum insecticides* (pesticides used against *insect* pests) affect more than just the pest; they are often just as detrimental to beneficial insects. If you are considering a chemical treatment, be aware that using a pesticide may eliminate natural controls along with the pest.

b) Biological Control Products:

An increasing number of pest control products are being marketed which contain living organisms that act against pests. Biological products include beneficial insects, pest diseases, and parasites of pests which are released or applied in order to attack and control target pests. These biological products often work only during certain life stages of the pest, or under certain environmental conditions. While many biological controls pose fewer risks to the environment than chemical pesticides, their use may require more planning on your part.

Bacteria:

Certain bacteria cause disease in insects. Strains of a type of bacteria named *Bacillus thuringiensis* (Bt) are effective against caterpillars such as the sod webworm. These bacteria produce a chemical that causes the insect to stop feeding. This biological control product may be bought and sprayed onto the lawn. Similarly, milky spore or *Bacillus popilliae*, causes Japanese beetle grubs to appear "milky" and then, eventually, to stop feeding and die. The effectiveness of milky spore varies depending on soil temperatures, as well as on its availability to the pest.

Fungi:

A type of fungus, *Beauvaria bassiana*, occurs naturally in the soil and infects chinch bugs and billbugs. It is especially prevalent in cool, wet springs. Infected insects may be seen with "cottony-looking" strands of fungus on them. This fungus may also be obtained commercially.

Nematodes:

Nematodes are tiny, worm-like organisms found in the soil. Nematodes penetrate into the insect causing death. Applied correctly, certain nematode products may be useful in treating sod webworm, and billbugs. Research is also underway to develop nematode products for use against grubs.

5. Chemical Controls:

P*esticide* is the generic name given to any substance designed to repel, mitigate, or kill a given pest. Pesticides are toxic by design; they should be used carefully and applied strictly according to label directions. The use of chemical pesticides may be considered in order to manage the most stubborn of pests. The most common types of pesticides for use in lawncare include *insecticides* which are specially formulated to control insects, *herbicides* designed to control weeds, and *fungicides* which control fungi.

If you choose to use a pesticide, select a chemical which poses the lowest risk to public health and the environment. Learn about the different types and uses of chemical pesticides so that you can make a wise selection. For more information about pesticides, refer to The **Resources and References for Homeowner Lawncare** section at the end of this guide. Several of the references listed offer information on pesticide use and safety.

For starters, here is some basic information about pesticides and their use as it relates to lawncare :

- *Pesticide Labels*

  If you choose to use a pesticide, remember that they are toxic substances. Pesticides should be used with great caution. **ALWAYS READ AND FOLLOW THE LABEL DIRECTIONS** carefully.

- *Selective vs. Non-Selective*

  Selective pesticides are formulated in such a way that they only impact the target pest. *Non-selective* pesticides affect something other than the target pest, for example, chemicals which kill all surrounding vegetation besides a target weed. Read the pesticide product label for information on whether the chemical product is either a selective or non-selective pesticide.

- *Pre-Emergent vs Post-Emergent*

  Herbicides are classified into *pre-emergent* and *post-emergent* products. Pre-emergent herbicides are applied to the soil *prior to* germination of the weed; they are used mainly for controlling annual weeds. Pre-emergent herbicides may act as *contact* controls, affecting only those areas that they cover, or as a *systemic* control, applied to the soil and absorbed into the entire plant. Post-emergent herbicides are used to control weeds that are already present.

II. IPM PRACTICES FOR INSECT MANAGEMENT

This section provides some important information by which to manage pest problems specific to *insects*.

Table # 1: Insect Pest Description. This table provides an illustration and description of the most common insect pests found in turf and lawns throughout the Northeast.

Table # 2: Insect Pest Management. This table describes management methods used to control specific insect pests.

TABLE # 1: INSECT PEST DESCRIPTIONS

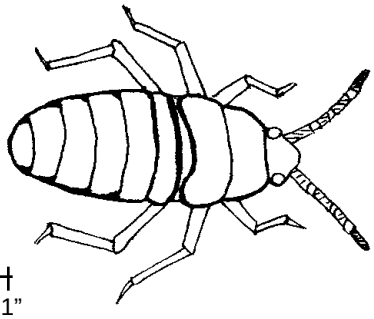
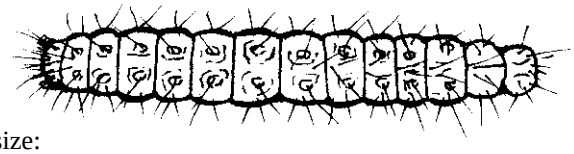
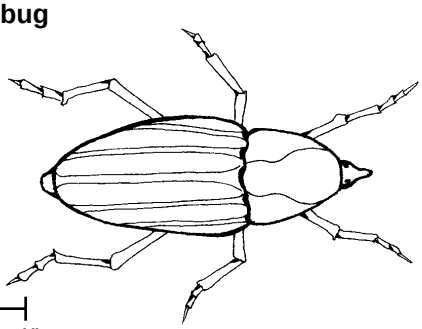
Insect Pest	Description
White grub  size: 1/8" 1"	White grubs are the immature stages of a number of beetles such as the Japanese beetle, European chafer, Asiatic Garden beetle, Oriental beetle, and June beetle. All are cream-white colored with a hard brown head capsule and 3 pairs of legs. All curl into a characteristic "C-shape." Depending upon the type, they may be 1/8-1 inch long.
Chinch bug Nymph  adult size: 1/5" 1"	Adults have black and white markings on their wings and are about 1/5 inch long. The nymph (immatures) appear similar but do not have wings and often have red or orange markings. DO NOT confuse this pest with the "big-eyed" bug which is a natural predator of the chinch bug. The two look similar but the big-eyed bug has large, bulging eyes. If at least 50% of the "bugs" are big-eyed then the population may be reduced naturally.
Sod webworm  size: 0" 1/8" 1"	Adults are tan-colored moths, sometimes having a small dark line on the top of each wing. They have a long "snout" and are cigar-shaped when at rest. They are often seen flying upward as you walk on the lawn, especially on a Spring evening. The caterpillars range from 1/8 - 1 inch long, are greenish-grey and have dark spots along the body. In larger caterpillars, the head capsule is light brown with some dark markings.
Bluegrass Billbug  size: 0" 1/4" 1"	Adults are grayish-black, approximately 1/4 - 1 inch in length with a long, narrow snout. Larvae are white-cream colored with a hard, brown head capsule and have no legs. They are approximately 1/16-1/4 inch long.

TABLE # 2 : INSECT PEST MANAGEMENT

Insect	Damaging Stage	Damage	Monitoring Technique	Lawncare Prevention Practices	Biological Controls	Chemical Controls
White Grub	Larvae Grub	Feed on roots causing grass to die. Skunks may tear up lawn in search of grubs. Appear April-May August-October	Cut 3 sides of a square, 6 inches per side and flip back the sod. Remove grubs from soil around roots and in ground and place in a container to be counted. Flip turf back in place, press along edges, and water to re-knit patch of turf. Pest tolerance levels usually fall around 8-10 grubs/foot	Renovate or plant alternate groundcover	"Milky disease", *Bacillus popilliae.*	Use insecticides to treat April 15-May 10 or August 1-20 (slower acting chemicals around August 11, faster acting ones after August 15)
Chinch bug	Young bugs	Suck juices from grass causing regular, dead patches, especially in sunny, dry areas with sandy soil. Appear June-end of July	Spread grass and look for scurrying insects. Flotation method: Remove both ends of a coffee can and pound into the ground 2-3 inches. Fill the can with water and watch for insects floating to the top. Do not confuse the pest with bigeyed bugs, the natural predator.	Water lawn adequately. Plant endophytic grasses.	If you find at least 50% big-eyed bugs then the population should be naturally reduced. Fungi- *Beauvaria bassiana*	If necessary, apply chemicals in mid June.
Sod webworm	Caterpillars	Small, yellow-brown patches on leaf blades that enlarge into dead patches, especially in sunny areas in July-August.	Look for moths flying above the turf in the evening earlier in the season or for larval excrement later on. Irritating drench: On a hot, sunny day, prepare a solution of 1-2 tablespoons lemon-scented dish detergent in 1-2 gallons of water. Pour this onto a 2 feet X 2 feet space along the edge of a damaged area. Count the number of caterpillars that come to the surface within 5 minutes. Rinse turf with clear water to avoid burning.	Renovate using endophytic grasses or plant alternate groundcovers.	*Bt. biological pesticides.* Parasitic nematodes	Apply insecticides 2-3 weeks after the peak of moth flight activity. Apply late in the day. Water in lightly.
Bluegrass billbug	Larvae	Dead grass, especially along edges of paved areas. Resembles salt damage but appears in late July-August.	Watch for adults scurrying along paved areas near mostly bluegrass lawns on sunny days in late May-mid June. If you count more than 12 adult billbugs in 5 minutes, it may indicate damage by larvae (8-12/ft^2) about 6 weeks later. Fine, saw dusty "frass" (insect excrement) at the base of grass plants are evidence of larval feeding Pest tolerance levels usually fall around 12 adults/5 min.8-12 larvae/ft^2	Renovate with endophytic grasses or plant alternate groundcovers.	Parasitic nematodes. *Beauvaria bassiana* (fungus) biological pesticide	Treat small larvae in June with pesticides.

III. IPM PRACTICES FOR WEED MANAGEMENT

This section provides some important information by which to manage pest problems specific to *weeds*.

Table # 1: Weed Description. This table provides an illustration and description of the most common weeds found in turf and lawns throughout the Northeast.

Table # 2 : Weed Management. This table describes management methods by which to control specific weeds.

TABLE # 1 : WEED DESCRIPTIONS

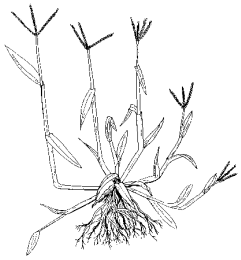
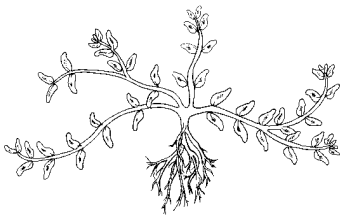
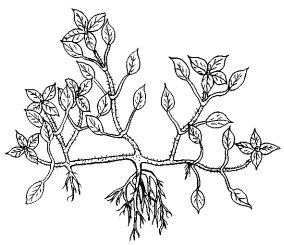
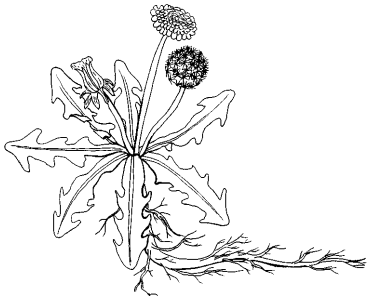
LEAF TYPE	ANNUAL WEEDS: live for 1 year and spread exclusively by seed.	PERENNIAL WEEDS: come up repeatedly each year.
GRASSY weeds have fine leaves that resemble turf-type grasses. **BROADLEAF** weeds have wider leaves, resembling most other plants.	• **SUMMER ANNUALS** germinate in the Spring, flower and set seed in the Summer, and die in the early frosts of Fall. **Crabgrass:** Light green-yellowish leaves.  **Prostate Spurge:** A low-growing weed common in dry, compacted areas. Leaves somewhat succulent. A white, milky substance oozes from the stem when broken.  • **WINTER ANNUALS** germinate in late Summer or early Fall, flower and set seed the following Spring, and die before the heat of Summer. **Annual bluegrass:** Small and has a light green color.  **Common chickweed:** Light green, tear-shaped leaves. White, branching stems. Small, white flowers with five split petals. 	**Quackgrass:** Leaves are dull grey-green and 8-10 inches tall unless mowed.  **Dandelion:** Often very deeply cut leaves at the base of the plant. Yellow flowers. Seed are dispersed in the wind. 

TABLE # 2 : WEED MANAGEMENT

Weed *	Life Cycle	Leaf Type	Lawncare Preventative Practices **	Chemical Control ***
• Crabgrass • Goosegrass • Foxtails • Barnyard-grass	Summer Annual	Grassy	Do not aerate when crabgrass is germinating as it will bring weed seeds to the surface. Hand-pull, removing at least part of the root.	Apply a selective pre-emergence herbicide 10-14 days prior to germination in the Spring (late April-early May). For crabgrass, apply up to the time the forsythia in your yard ends bloom (in Massachusetts). Goosegrass germinates 3-4 weeks later.
• Pineapple-weed • Yellow woodsorrell • Prostrate Spurge	Summer Annual	Broad-leaved	Mow high to shade out germinating and emerging weeds.	Apply a post-emergence herbicide once weeds have emerged; at the 2-5 leaf stage for crabgrass and at an early stage for all other grassy and broadleaf weeds.
• Annual bluegrass	Winter Annual	Grassy	Mow flowerheads to prevent seed production. Correct compaction as many of these weeds are associated with that problem.	Apply a selective pre-emergence herbicide 10-14 days prior to germination in Fall; usually around September, but often not effective due to a long germination period.
• Chickweed • Shepherd's Purse • Yellow rocket	Winter Annual	Broad-leaved		Apply a selective post-emergence herbicide in the Spring just before lawns start to regrow so turf grass can move into the newly killed area.
• Yellow nutsedge • Quackgrass • Nimbleweed • Bromegrass	Perennial	Grassy	Remove clumps, including ENTIRE root system. Aim to control during the first year of growth.	Spot treat with a non-selective herbicide. Be aware that this will kill both the weed and the turfgrass as well.
• Dandelions • Plantain • Ground ivy • Cinquefoil	Perennial	Broad-leaved	Mow high so turf can out compete weeds. Mow flowerheads to prevent seed production.	Spot treat with a selective post-emergence herbicide in the Spring or, preferably, in the Fall.

* For more information on weed descriptions and/or additional weed illustrations consult your local garden center or local library.

** The lawncare practices listed here are considered controls once weeds have invaded. For a more general list of preventative practices for maintaining a healthy lawn, refer to section I of this guide.

*** It should be noted that at the time of publication very few, if any, biological control products are available to the public for weed control. However, the homeowner is urged to keep abreast of any technological advances made in this area since biological controls offer a lower risk alternative to pesticide use.

IV. IPM PRACTICES FOR DISEASE MANAGEMENT

A variety of diseases can effect your lawn throughout the season. Often, turf diseases appear as circular patches on your lawn. It is difficult to determine the specific cause and type of lawn disease without extensive training or laboratory tests. For this reason, it is beyond most homeowners' abilities to properly treat diseased lawns. In general, IPM programs for controlling diseases in turf involve *maintaining a healthy lawn*. For more information on how to maintain a healthy lawn, refer to Section I of this guide.

The following recommendations describe key decisions and practices available to homeowners for managing lawn diseases :

- Plan your landscape so as to provide good air circulation which will allow turf to dry rapidly.
- Prune trees and shrubs to allow for better light and ventilation.
- Select disease resistant grass seed that is adapted to the conditions of your site.
- Avoid overwatering as waterlogging turf can lead to a variety of disease problems.
- Be aware that herbicide use can increase susceptibility to disease. Use herbicides, and/or any other pesticide product, *only* when a problem exists that cannot be managed through other non-chemical control measures.
- Water early in the morning in an effort to minimize the spread of disease and evaporation of water into the air. At this time, the grass is already wet from dew and the sun is still low. Lawns can also be watered at night *except* during long periods of hot, humid weather; excessive watering under humid conditions is likely to promote diseases, such as the growth of certain fungi.
- Mow only when the grass is dry.

Notes

V. RESOURCES AND REFERENCES FOR HOMEOWNER LAWNCARE

Contacts

- Master Gardener Association of Western Mass.
  Berkshire Botanic Garden, Lenox, MA.
  Tel. : 413-298-5355.
  Tuesdays only : 9am-1pm; May 1-October 1.
  Tel. in Springfield : 413-734-2655.
  Wednesdays only: 10am - noon; June 18 - September 24.

- Arnold Arboretum
  Jamaica Plain, MA.
  Information provided on *woody plants* only.
  Tel.: 617-524-1718, x127 - www.arboretum.harvard.edu
  Mondays: 1-3pm; all year.

- Massachusetts Horticultural Society
  Waltham, MA.
  Tel. : 617-893-0049 - www.masshort.org
  Mondays 1-3pm; all year.

- Tower Hill Botanic Garden
  Worcester County Horticultural Society
  Boylston, MA.
  Tel. : 508-869-6111, x10 - www.towerhillbg.org
  Wednesdays: 2-4pm; all year.

- Massachusetts Department of Agricultural Resources
  Pesticide Bureau
  251 Causeway Street Suite 500, Boston MA 02114.
  Tel.: 617-626-1700 - www.mass.gov/agr

- Mass. Association of Lawn Care Professionals (MALCP)
  200 Hanscom Drive -Suite 314, Bedford, Massachusetts 01730
  Tel.: 781-274-7373.

- National Pesticide Telecommunications Network (NPTN).
  Tel.: 800-858-7378 - http://npic.orst.edu
  EPA-sponsored hotline regarding all aspects of pesticides.

- Soil Testing Lab.
  West Experiment Station
  University of Massachusetts
  Amherst, MA 01003-2082.
  Tel.: 413-545-2311 - www.umass.edu/plsoils/soiltest

- Consult your local garden center for information about products and application.

Suggested Readings & Other References

- Scotts Guide to the Identification of Dicot Turf Weeds, O.M. Scott and Sons, Marysville, Ohio 43040

- Scotts Guide to the Identification of Grasses, O.M. Scott and Sons, Marysville, Ohio 43040

- Smiley, R.W., P.H. Dernoeden, and B.B. Clarke. 1993. Compendium of Turfgrass Diseases. American Phytological Society, St. Paul, MN. 1-800-328-7560.

- Tashiro, H. 1991. Turfgrass Insects of the United States and Canada. Cornell University Press.

- Turf IPM Facts : a packet of over 50 fact sheets on all aspects of lawn care. Bulletin Distribution Center, Draper Hall, University of Massachusetts, Box 32010, Amherst, MA 01003-2010. Call 413-545-2717 for current price.

Notes

VI. PULLOUTS ❋

A. GRASS VARIETY CHART: CHOOSING THE RIGHT GRASS SPECIES FOR YOUR LAWN

Grass Species	Leaf Texture	Perferred Environmental Condition	Tolerance	Comments	Nitrogen (N) Requirement	Level of Maintenance
Kentucky Bluegrass	Fine-med Texture. dark green.	Well drained, sunny areas. High nutrient requirements.	• Cold-high • Wear-high • Shade-low • Drought-low	• Forms good sod • High accumulation of thatch	2-4 lbs N/1000 feet^2	High
Perennial Ryegrass	Fine-medium leaf texture	Well drained soils. Moderate fertility.	• Heat-low • Wear-high • Shade-low • Drought-low	• Germinates rapidly. established quickly. Good for over seeding. • Competes with other grasses so use alone or in mix with 20% rye. • Many cultivars contain beneficial fungal endo-phytes. • Low accumulation of thatch.	2-4 lbs N/1000 feet^2	Medium
Tall Fescue	Medium coarse leaf texture.	Well drained soils. Open sunny areas	• Heat-high • Shade-moderate • Drought-high	• Slow to establish. • Low accumulation of thatch.	2.5-3lbs N/1000 feet^2	Low
Fine Fescues-Creeping Red Chewings Hard Fescue.	Narrow leaves. Mid-dark green.	Drier, shaded, less fertile areas.	• Heat-low • Drought-high • Humidity-low • Low pH-high	• Slow to establish. • Low accumulation of thatch.	1-2lbs N/1000 feet^2	Low

❋ *Pullouts may be suitable for posting; tear along the dotted line*

Notes

B. IPM SEASONAL CHECKLIST

This checklist provides some general guidelines for managing your lawn throughout the season under an IPM approach. As the homeowner, you can judge better the need and timing of a given practice. This checklist is to be used within the context of this guide.

Throughout Season	**Spring mid March-April**	✔	**Summer June-July-August**	✔	**Fall September-October**	✔	**Winter**	✔
Observe your lawn regularly. Note Changes. Keep records of all management practices.	Rake away areas of dead grass. Reseed thin and bare areas. If necessary, control crabgrass with pre-emergence herbicides. Use postemergence herbicides on winter annuals. Monitor for white grubs. Use insecticides to treat April 15-May 10 if necessary. Later spring (May). Mow rapidly-growing lawns more often. Mow high. Monitor for white grubs. Use insecticides to treat April 15-May 10, if necessary. Monitor for Bluegrass billbugs. If necessary, use pre or postmergence herbicides for crabgrass, depending upon its stage of development. Dig out smaller patches of broadleaf weeds. If necessary, spot treat with a broadleaf weed killer.		Monitor for bluegrass billbugs adults. Monitor for chinch bugs and big-eyed bugs. Monitor for sod webworms. Monitor for japanese beetle grubs. If necessary apply a slow-acting pesticide around August 11 and faster acting chemicals after August 15. Mow high and when flowerheads appear to reduce the invasion of crabgrass. Mow at 3 inches. Avoid mowing semi-dormant and dormant turf. Water deeply and infrequently just before grass wilts.		Monitor for Japanese beetle grubs, but it may be too late to treat. Mow as soon as flowerheads appear for broadleaf weeds. If necessary, use pre-emergence herbicides in early Fall, prior to germination of winter annuals. Fertilize in early Fall. Do a pH test and adjust accordingly. Renovate and reseed lawn. Mow rapidly-growing grass more frequently.		Try to avoid piling lots of snow on areas of grass. Use sand or cat litter as an alternative to deicing salts which may cause damage to your lawn.	

Notes

C. IPM Problem Solver: What's Wrong With My Lawn?

Problem	What You See	Corrective Practices
Winter desiccation	Large areas of straw-colored grass, especially in areas with little snow cover.	Rake well. Reseed thin areas.
Water and ice damage	Straw-colored and rotting areas, especially in low areas where water freezes.	Improve drainage and slope to divert water. Reseed thin areas.
Salt damage	Yellow or dead grass, especially along drives or paths where salt has been applied.	Use sand or cat litter as an alternative to deicing salts.
After Spring Greenup:		
Compaction	Hard soil results in thin turf with poor roots.	Core aerate in late Summer/early Fall. Add organic matter when renovating or reseeding. Reroute traffic to lessen further damage.
Low nutrient levels	Yellow, slow growing lawn.	Maintain a proper fertility program. Test soil pH and adjust, if necessary.
Mis-application of fertilizers	Brown streaks lined with extra green growth where overlaps occurred. Yellow streaks in missed areas.	Recalibrate your spreader. Shut off spreader when making turns.
Household and other chemicals	Sudden scorched areas at site of leak or spill.	Be careful when pouring or disposing of many household chemicals as gas, paint thinners, pesticides, etc.
Too much water Too little water	Stunted growth. Root and crown rots. Wilt (blue-green color, footsteps visibly remaining).	Water less. Correct drainage problems. Water deeply (6 inches) when needed, preferably early in the day.
Shade	Lawn thin.	Selective pruning of tree branches. Increase mowing height. Decrease fertilizer rate. Plant shade tolerant grasses of other ground covers.
Mowing	• Grass looks brown. • Dry bald spot. • Large areas of dry brown lawn in middle of Summer. • Clumps of clippings on lawn.	• Sharpen mower blades. • Avoid scalping lawn raise height of mower to 2-3 inches. • Mow infrequently or not at all when grass becomes semidormant. • Mow more often and on dry days.
Disease Problems	Circular spots in lawn, of varying sizes. In the morning dew, strands of "cottony," "web-like" mycelium or actual mushrooms may be present. Usually seen April through early June and/or September and October.	• Water in the morning. • Mow when grass is dry. • Promote good air circulation in your landscape plans. • Plant disease resistant cultivars.
White grubs	Increasing patches of thinning turf. Presence of skunks and of many crows. Usually seen April through early June and/or in September and October.	Monitor to determine how many grubs are present. A healthy lawn can withstand 8-10 grubs/feet^2. Treat as necessary using the Least Toxic method available.
Chinch bugs	Drought-stress like areas on dry, sunny spots appearing during hot periods in July and August.	Monitor to determine population level. Treat as necessary using the Least Toxic method available.
Bluegrass billbugs	Adults scurrying across pavement in May and early June. Yellow areas along the edge of driveways or paths in July or early August.	Monitor. Least Toxic treatments should be considered only if adult activity exceeds 5/min or there are over 8-12 larvae/feet^2.
Sod webworm	Damaged areas, especially on steep, dry slopes and banks seen July-August. Adults fly above lawn on late June-August evenings.	Monitor to determine population level. Treat as necessary using the Least Toxic method available.

Notes

MASSACHUSETTS
DEPARTMENT OF AGRICULTURAL RESOURCES

ADDITIONAL PUBLICATIONS & ONLINE RESOURCES

(To request a copy of any publication please call 617-626-1700)

◊ **Water Well-Being Publications**

- **The Manual**- One stop shopping for information about responsible pesticide & fertilizer use
- **Crabgrass**- *What to do when your lawn has crabgrass*
- **Fertilizer**- W*hen to fertilize your lawn to get results*
- **Watering your lawn**- *Tips on how to water your lawn properly*

◊ **Integrated Pest Management Kit For Building Management Kit For Building Managers:** *How to implement an Integrated Pest Management Program In Your Building(s).*

ONLINE RESOURCES

◊ Department of Agricultural Resources Website
www.mass.gov/agr/

- **Water Well Being**
  www.mass.gov/waterwellbeing
- **Pest Fact Sheet Directory**
  www.mass.gov/agr/pesticides/pestfacts/index.htm
- **Home Gardening Page**
  http://www.mass.gov/agr/gardening/index.htm
- **Massachusetts Prohibited Plant List.**
  http://www.mass.gov/agr/farmproducts/Prohibited_Plant_Index2.htm