Penn State **Extension**

Cool-Season Turfgrass PEST MANAGEMENT

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College of Agricultural Sciences

Pesticide Education Program

A Study Guide for Cool-Season Turfgrass Pest Management

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For more information about the Penn State Pesticide Education Program, visit their website at:
extension.psu.edu/pesticide-education

Manual Coordinator

Bill Riden, Pesticide Education Specialist,
The Pennsylvania State University

Technical Advisors/Reviewers

Nancy Bosold, Extension Educator,
The Pennsylvania State University

Tom Butzler, Extension Educator,
The Pennsylvania State University

Tanner Delvalle, Extension Educator,
The Pennsylvania State University

Sandy Feather, Extension Educator,
The Pennsylvania State University

Tom Ford, Extension Educator,
The Pennsylvania State University

Jeff Fowler, Extension District Director,
The Pennsylvania State University

Peter Landschoot, Professor of Turfgrass Managment,
The Pennsylvania State University

Dwight Lingenfelter, Program Development Specialist,
The Pennsylvania State University

Ben McGaw, Associate Professor of Turfgrass Science,
The Pennsylvania State University

Kerry Richards, Director of the Pesticide Education Program, The Pennsylvania State University

Editorial Services and Graphic Design

Garo Goodrow, Multimedia Specialist,
The Pennsylvania State University

Sharon Gripp, Information Specialist,
The Pennsylvania State University

Jan Hygnstrom, Project Manager,
University of Nebraska–Lincoln

Introduction

Purpose/Objectives

This study guide is designed to help potential pesticide applicators prepare for the state certification exam in lawn and turf to meet the certification requirements listed in the state and federal guidelines.

How to Use This Study Guide

For best results, follow the steps listed below:

1. Read the objectives listed at the beginning of each chapter.
2. Read the chapter and underline key facts and concepts.
3. Take notes on key ideas and list questions you may have.
4. Write answers to the self-help questions found within each chapter.
5. Check for correct answers and explanations.
6. Check your progress in the "Lesson Completion Log" to help identify areas in which you need additional study.

This study guide reviews the basics of pest management and control. As a professional applicator, you may have training and experience beyond the basic materials presented here.

After studying the pesticide applicator core manual and this manual, you should be prepared to take the core exam and the category exam to become a certified public or commercial pesticide applicator for lawn and turf.

Contents

Turfgrass Problems and Their Management:

Check Your Progress

Use the following Lesson Completion Log to track your progress.
Place a check mark in the box across from each lesson completed. Identify any lessons that need additional follow-up.

Lesson Completion Log		Have read	Need work	I'm ready
Chapter 1: Integrated Pest Management	Part 1: Cultural Control			
	Part 2: Biological Control			
	Part 3: Chemical Control			
	Part 4: Putting It All Together			
Chapter 2: Weed Identification and Management	Part 1: Start Right			
	Part 2: General Weed Management			
	Part 3: Grassy Weed Identification			
	Part 4: Grassy Weed Management			
	Part 5: Broadleaf Weed Identification			
	Part 6: Broadleaf Weed Management			
Chapter 3: Insect Identification and Management	Part 1: General Insect Identification			
	Part 2: Surface Insect Identification and Management			
	Part 3: Subsurface Insect Identification and Management			
	Part 4: Nuisance Insect Identification and Management			
	Part 5: Scouting and Monitoring Turfgrass Insects			
Chapter 4: Disease Identification and Management	Part 1: General Disease Identification			
	Part 2: General Disease Management			
	Part 3: The Most Common Turfgrass Diseases			
	Part 4: A Disease- like Pest Problem			
Chapter 5: The Problem-solving Process	Part 1: The Problem-solving Process			
Chapter 6: Applying the Correct Amount of Pesticide	Part 1: Measure the Treatment Area			
	Part 2: Calibrate Equipment			
	Part 3: Nozzle Terminology			

Chapter 1

Integrated Pest Management (IPM)

Key Terms and Concepts

You should be able to discuss each term or concept after studying this chapter.

- **Biological control**
- **Chemical control**
- **Cultural control**
- **Endophyte**
- **Pest resistance**
- **Preventative application**
- **Reactive (curative) application**
- **Tolerant Turf**

Learning Objectives

After studying this chapter, you will be able to:

1. Identify the three approaches to pest control
2. Explain why cultural practices are key factors in pest management
3. Describe proper cultural practices for healthy turfgrass
4. Explain the phrase, "Healthy turfgrass is tolerant turfgrass"

Introduction

The goal of most turfgrass care programs is to achieve and maintain healthy, vigorous, attractive turfgrass with a minimum of pest problems. Reaching this goal, whether on the home lawn, golf course, or commercial complex, requires the long-term use of a combination of reliable control methods. In addition, monitoring of pest populations is essential to determine if and when control is necessary.

Integrated pest management (managing with a combination of control methods) relies on cultural, biological, and chemical controls. However, these methods must be evaluated before use for their potential effectiveness as well as their cost and environmental consequences.

Integrated pest management (IPM) is based on several key premises.

1. No single pest control method will be successful over the long term.
2. Continuous monitoring is needed to evaluate the status of pests and the turfgrass.
3. The mere presence of a pest does not justify taking action for control.
4. Eradication (complete elimination) of pests is not necessary and is generally impossible.
5. Healthy turfgrass can withstand greater damage or pressure from pests and recovers more quickly when problems do occur.

Successful turfgrass management requires an additional component—a professional manager. A professional manager must have the knowledge and skills to carry out a number of key tasks:

- Maintain the turfgrass properly
- Identify problems correctly
- Decide if action is required
- Select the appropriate control method(s)
- Decide the correct timing of control method(s)
- Use the control method(s) properly

In this chapter, we will look at the three general control methods: cultural, biological, and chemical.

Part One: Cultural Control

The Essential Tasks

Manipulating the planting, growth, and maintenance of turf or a landscape to make it less attractive to a pest and reduce pest activity is cultural control. The goal of cultural control is to keep the desirable turfgrasses healthy so that weeds, diseases, and other pests have trouble gaining a foothold. Pest activity that does occur is masked by vigorously growing turf. Healthy turfgrass is tolerant turfgrass. That is, healthy turfgrass can withstand some pest problems without losing its quality and attractiveness. Healthy turfgrass is also more capable of recovering when problems do occur. Proper care of turfgrass can actually reduce pest problems. Likewise, turfgrass may become more susceptible to problems when it does not receive basic care.

Healthy turfgrass begins with the selection of high-quality turfgrass seed or sod that is well-suited to the site, followed by sound planting practices. After that, proper cultural practices such as mowing, watering, and fertilizing are essential to maintaining attractive, healthy turfgrass.

Choosing the Turfgrass

As a turfgrass manager, you often have not had the opportunity to control what grasses were selected. However, if a new lawn or turf area is to be established or renovated, you may get your chance. Carefully consider the best turfgrass to meet the environmental and site conditions as well as the probable level of maintenance. Each turfgrass species is suited for a specific environment.

Examples:

- Fine (red) fescue tolerates shady, cool areas. However, it rapidly becomes stressed in hot, sunny areas and may be attacked by chinch bugs.
- Ryegrasses and Kentucky bluegrasses do best in full sun. They become susceptible to disease in heavily shaded areas.
- Improved turf-type tall fescues grow well in sun and shade and tolerate drought as well as the wear and tear of human activity.

Each turfgrass species has many cultivars selected for specific uses. Cultivars are types of plants, including turfgrasses that have been developed through extensive breeding programs. Many of these cultivars have been tested for insect and disease resistance. Selection of resistant cultivars can reduce or almost eliminate the chances of certain insect or disease problems.

Going one step further, some perennial ryegrasses and turf-type tall fescues have been developed that have a built-in defense mechanism. This defense mechanism is called an endophyte. Endo- means within, and -phyte means plant. Endophyte, then, refers to a turfgrass plant that has fungus within it that is toxic to some insects. Turf stands with 40% or more endophytic stems have been shown to eliminate problems from most surface insects such as chinch bugs, billbugs, and sod webworms.

When purchasing seed, the package often contains a mix of several species. Carefully read the label for the germination rate, date of test, percentage of weed seed, and percentage of other crop seed. Cheap seed is never a bargain. Never purchase a mix containing more than 2% inert matter, or any noxious weed seeds. Avoid grass seed mixes with annual ryegrass, which germinates and grows quickly but usually dies over the winter. Certified seed is a specific variety or varieties of turfgrass. Buying certified seed is a guarantee from the seller that you will get the variety of seed listed on

Establishing a new lawn or turfgrass area gives you the opportunity to select the best turfgrass to meet the environmental and site conditions. Always consider the probable level of maintenance. Each turfgrass species is suited for a specific environment.

Photo: Bill Riden, The Pennsylvania State University,

the label. Similarly, only purchase high quality, certified sod that is free from noxious weeds and excessive amounts of other crop or weed plants.

Proper Planting Practices

Once you have chosen your turfgrass, the soil must be prepared for planting. When a new home is built, the topsoil usually is scraped off, leaving the subsoil. In addition, trucks and machinery at the site can compact the subsoil, making it hard and unsuitable for planting. The subsoil also lacks the nutrients and organic matter necessary for healthy turfgrass growth.

To provide a good home for turfgrass roots, perform the following tasks **before planting:**

- Use a rotary tiller to cultivate the soil
- Add topsoil if needed
- Add organic matter

Once the seedbed is properly prepared, seed at the proper rate or lay high-quality sod. Then fertilize and water to start the young plants growing.

Proper Cultural Practices

Once you have selected and planted the proper turfgrass, follow proper cultural practices to keep it healthy

Mowing

Proper mowing is critical to healthy turfgrass. Two key factors to consider when mowing include cutting height and frequency.

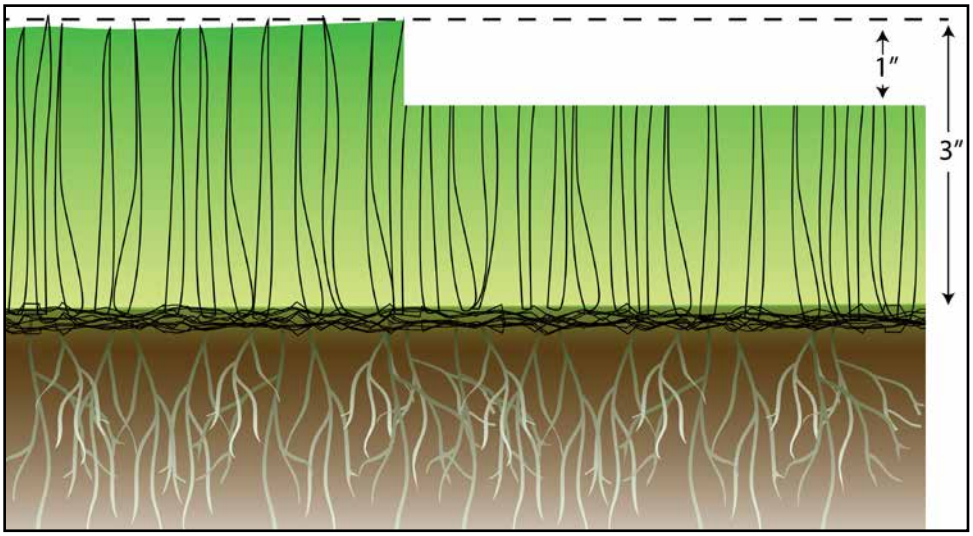
The cutting height depends on the time of year and the species of turfgrass you are mowing. Raise the cutting height during hot, dry weather when turfgrass is stressed. Taller turfgrass helps avoid drought stress by increasing the humidity and keeping temperatures at the soil level cooler. The taller turf that results from higher mowing also shades out germinating weeds and sun-loving insects. Proper mowing encourages deeper rooting and denser turfgrass, which chokes out weeds.

Turfgrass should be mowed frequently so that no more than 1/3 of the leaf blade is removed. For example, turfgrass that has grown to three inches should have no more than 1 inch removed, and would now be at least two inches in length. Scalping, or mowing too short, weakens the turfgrass and makes it more susceptible to disease and other stresses.

For best results, mower blades should be sharp and properly set

Watering

Monitor your turfgrass. Do not wait until it turns brown to water it! The first sign of drought is a loss of springiness and a wilted, generally dull appearance. Proper watering means watering deeply, 1 to 1½ inches per watering, and infrequently, such as once a week. Light, frequent watering encourages shallow roots, which are less capable of supporting the turfgrass plant during dry periods. Water sprinklings that keep moisture only on the leaf surfaces encourage disease



Proper mowing is critical to healthy turfgrass. Never remove more than 1/3 of the leaf blade at each mowing.

Illustration: Garo Goodrow, The Pennsylvania State University

Managing Thatch

Thatch is a layer of living and decomposing turfgrass roots, stems, and leaves on the soil surface. Turfgrass clippings do not contribute significantly to thatch if the turfgrass is properly mowed. A thin layer of thatch (less than ½ inch) is not a serious problem. However, excessive thatch can cause problems.

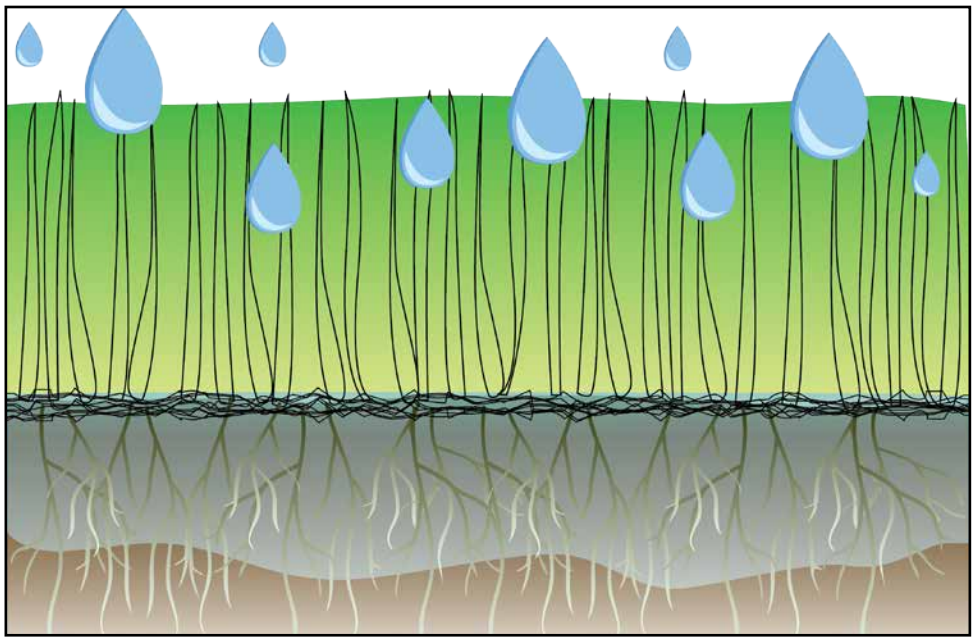
Examples:

- Thick thatch provides a hospitable environment for surface insects such as chinch bugs, billbugs, sod webworms, and cutworms.
- Thick thatch can lead to disease problems such as "patch" diseases.
- Turfgrass growing on thick thatch often is shallow-rooted and more susceptible to drought.
- Thatch can interfere with pesticide applications by preventing the pesticide from reaching soil pests, such as grubs.

You can prevent thatch problems by selecting turfgrass types that are not prone to developing thatch. Core aeration also will help by encouraging healthy plant growth and the breakdown of thatch. In addition, be sure to fertilize at the proper rate. Over-fertilizing can increase thatch.

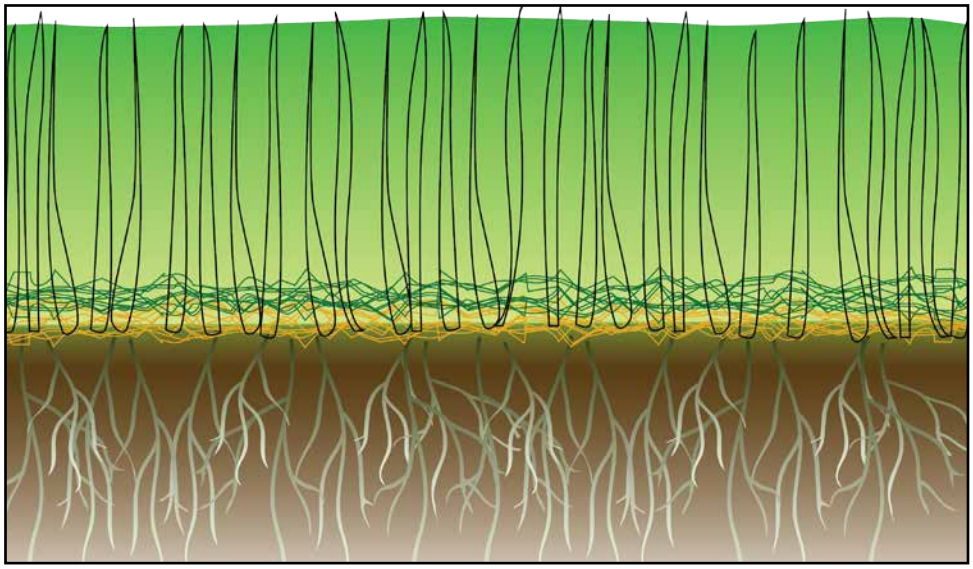
Managing Compaction

Compaction of the soil where turfgrass is being grown is the result of excessive traffic on the area. This can be foot traffic caused by athletes using sports fields or people frequently walking on a given area (not staying on a sidewalk). Sometimes the use of machinery on an area can cause compaction especially under wet soil conditions. Although compaction may not immediately kill the turfgrass, it does restrict the growth and weakens the plant making it more vulnerable



Proper watering means watering deeply. Avoid keeping the foliage wet for prolonged periods. This encourages turf disease development.

Illustration: Garo Goodrow, The Pennsylvania State University



Thatch build-up results from the build-up of dead roots and crowns of the turgrass plants. Turfgrass clippings do not contribute significantly to thatch build-up.

Illustration: Garo Goodrow, The Pennsylvania State University

This profile picture shows excessive thatch buildup. Excessive thatch can cause many problems for the turf manager, making insect and disease problems more difficult to solve.

Photo: USGA Green Section

to other problems such as weeds, insects, and diseases.

General problems caused by compaction may include the following items.

- Decreased water infiltration and percolation into and through the soil
- Poor soil drainage
- Lower oxygen levels in the soil
- Reduced microorganism activity in the soil
- Reduced turfgrass root growth
- Reduced wear tolerance of the turfgrass
- Greater difficulty establishing new turfgrass stands
- Slower recovery from injury

Look for these symptoms of soil compaction in turfgrass.

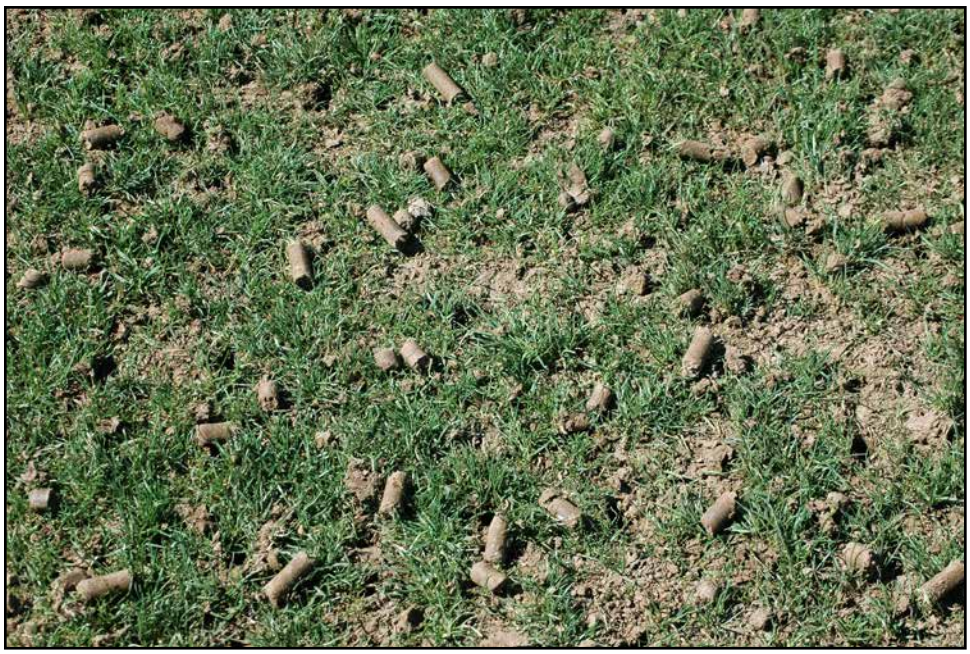
- Shallow roots
- Reduction of growth
- Thinning of turf stand
- General yellowing of turf
- Invasion of weeds adapted to compacted soils (for example, knotweed, crabgrass, annual bluegrass, goosegrass, and clover)

Aeration is used to alleviate soil compaction and can reduce thatch. Aeration is the process of removing plugs of soil from the turf area. Aerators use hollow tines (usually 3-4 inches in length and ¼ to ¾ inches in width) to remove plugs from the soil.

Aeration is done during periods of cool weather (early to mid-spring or late summer to early fall) to ensure rapid recovery of the grass. Adequate moisture is necessary for penetration of the aerator tines and for removal of the plugs. The plugs are broken apart and left on the surface after they have dried.

Core Aerifier

Photo: Bill Riden The Pennsylvania State University



Aerification Plugs

Photo: Bill Riden The Pennsylvania State University

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