

Lawn Management for Master Gardeners



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Maine Board of
Pesticides Control

Some Benefits of a quality Lawn

- Reduce noise
- Reduce glare
- Reduce surface runoff
- Reduce injury from falls
- Reduce “nuisance” pests and airborne allergens

Essential Components of Lawn Management

- Grass seed selection - different for lawns, golf courses, sport fields & right-of-ways.
- Establishment - soil preparation, sod or seed.
- Maintenance - fertilizer, water, mowing, pest control - weeds, insects & diseases.

Starting from scratch

- Where do you need a lawn?
 - Keep the lawn area as small as possible
- Proper grading and drainage
 - Remove topsoil before making grade changes
 - Should be around a 1 – 2 % grade away from the home, avoid steep grades
 - Avoid wet areas, if a lawn must be planted in wet areas, install drainage tiles



When's the best time?

- If water is available, sod can be installed anytime
- Seeding is best done from August 15 – September 30
 - High soil temps, less weed emergence
- Seeding in May or June is less desirable
 - Low soil temps, large weed flush at same time grass emerges



Harvest Moon = best seeding time

Soil, Soil, Soil

- At Least 6 – 12 inches of sandy loam topsoil is preferable!
- Do a soil test
 - Take 10 – 15 samples/1000 sq ft
 - Take samples about 6 inches deep
 - Mix samples together in bucket and send about a 2 cup composite sample to soil lab



Adjust the soil

- Adjust soil nutrients, pH and organic matter conditions as indicated by a soil test
 - Slow release N fertilizer
 - 1LB/1000 sq ft or less of N,
 - If needed, 1LB/1000 sq ft of P,
 - K only needed if deficient
 - 50LB/1000 sq ft of lime (Calcium is very important)
 - 1 - 2 inches of finished compost as needed to get soil Organic Matter level to 3 - 5% (humus and carbon!)

Soil Test Results				
Soil Nutrient	Low	Medium	Optimum	Excessive
Phosphorus	xxxxxxxxxxxxxxxx			
Potassium	xxxxxxx			
Calcium	xxxxxxx			
Magnesium	xxxxxxxx			
Soil pH	xxxxxxxxxx			
Org. Matter	xxxxxxx			



Site preparation before planting

- Minimize soil disturbance as much as possible
- Use solarization or layers of cardboard and compost
- Use pre-emergent herbicide
- Kill existing turf and slit seed through the dead turf



Turf Selection

- AVOID "Contractor's Blend"!!!!
- Use blend of at least three different grass cultivars or three different species!
- Fine or tall fescues are well adapted to Maine and create low maintenance lawns!
- Ryegrasses establish fast, but are disease and drought prone and need high nitrogen!
- Kentucky bluegrass establishes slow, requires extensive fertilizer & water!
- Bentgrass for golf greens and tees only

Choose the right grass varieties for Maine



Sturdy, medium to high maintenance	45% Kentucky Bluegrass blend 15% perennial ryegrass 20% fine fescues	3 to 4 lb. per 1,000 sq. ft.
Sturdy, low maintenance	55% fine fescue blend 15% perennial ryegrass 20% Kentucky bluegrass blend or 100% tall fescue blend	4 to 5 lb. per 1,000 sq. ft. 7 to 10 lb. per 1,000 sq. ft.
Sturdy	100% fine fescue blend	4 to 5 lb. per 1,000 sq. ft.

	Kentucky Bluegrass	Perennial Ryegrasses	Tall Fescue	Fine Fescue
Growth habit	Rhizomatous	Bunch	Bunch	Bunch
Leaf texture (blade width)	Medium-Fine	Medium	Coarse	Very Fine
Establishment from seed	Slow (approx. 30-90 days)	Fast (approx. 14-21 days)	Fast to Average (21-30 days)	Average (21-50 days)
Seeding rate	1 to 2 lb./1,000 ft. ²	5 to 9 lb./1,000 ft. ²	5 to 9 lb./1,000 ft. ²	3 to 5 lb./1,000 ft. ²
Annual nitrogen fertilizer	3 to 4 lb./1,000 ft. ²	2 to 6 lb./1,000 ft. ²	2 to 4 lb./1,000 ft. ²	1 to 2 lb./1,000 ft. ²
Drought tolerance	Poor	Poor	Some	Some
Shade tolerance (min. 4 hr. of direct sun)	Poor	Poor	Good	Excellent
Wear tolerance (traffic)	Good	Good	Good	Poor
Insect tolerance	Some	Some	Excellent	Good
Disease tolerance	Some	Some	Good	Good

Plant or over-seed with low maintenance grass types

- Fine Fescues 40 - 50% of mix
 - Creeping Red Fescue
 - Hard Fescue
 - Chewing Fescue
- Tall Fescue 100% of mix
- Common Kentucky Bluegrass
- Endophyte enhanced fescues or perennial rye

Example Mix

- 40% Endophyte Enhanced Creeping Red Fescue
- 10% Southport Chewing Fescue
- 30% Endophyte Enhanced Perennial Ryegrass
- 20% Kenblue KBG

After planting care

- Scratch the seed in very shallow
- Roll with a liquid filled roller
- Mulch with weed seed free compost, oat straw or one of the new commercial mixes
- Water, water, water

Low Maintenance Lawn

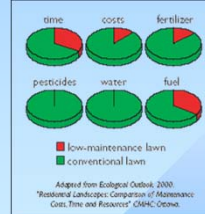
Benefits – 2000 CMHC study of 30 residences

- Residents with low-maintenance lawns spent

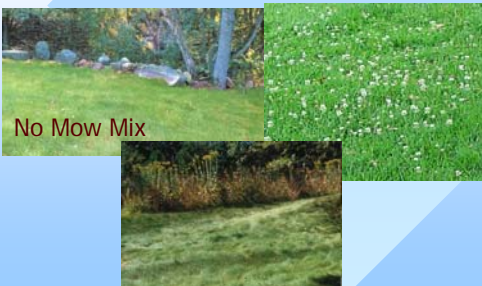
- 50 per cent less time,
- 85 per cent less money, and

- used

- 50 per cent less fuel,
- 85 per cent less fertilizer,
- 100 per cent less water and
- 100 per cent less pesticides per year



How about **low/no** mow grass? How about adding clover?



Low Input Lawn Demonstration Sites

- YardScaping mix does best!
 - Rogers Farm, University of Maine, Orono
 - YardScaping mix did very well
 - Fine fescues also did very well



YardScaping Mix

Seed or sod?

- Sod is generally high input Blue Grass
 - Needs lots of H₂O & N
 - Not shade tolerant
 - Good for slopes, But?
- Seed is more flexible
 - Can adjust for shade
 - Less inputs, etc



Water is essential at this stage

- Seed or sod must be watered until it is established
- Keep seed moist throughout the day
 - May have to water 2 – 3 times/day
 - Keep top ½ inch of soil moist
 - Takes about 3 weeks for KBG & Fescues to fully germinate



Mow after grass is established

- Once grass reaches 2 inches it is time to cut it
- Mowing at this stage reduces weeds
- Cut to 1½ inches for the first 3 mowings
- Then mow at highest mower setting (3 – 4 inches)



Maintenance of established lawns

- Mowing
- Watering
- Aeration & Dethatching
- Soil Amendments
- Pest Management



“High Input” Lawn Maintenance Program (higher risk of runoff)

- Fertilize 4 to 6 times per year (4 to 5 pounds of Nitrogen per 1000 ft.sq./year!)
- Pre-emergence herbicide annually (crab grass and other annual weeds)!
- Broadleaf herbicide annually – 2-3 times (dandelions and other broadleaf weeds)!
- Mow once to twice per week!
- Irrigate during drought!
- Grub or surface insecticide when needed!

“Low Input” Lawn Maintenance Program (less risk of runoff)

- Select or introduce lower maintenance turf species. (Tall or Fine Fescues)
- Use slow release fertilizers, no more that 2 pounds of Nitrogen per 1000 sq.ft./year.
- Mow high (3 – 4 inches)
- Don't irrigate, let go dormant.
- Use pesticides (herbicides and insecticides) only when needed (monitor/ sample pest populations before applying).

Even with maintenance start from the ground up

- Minimum of 6 – 12 inches topsoil is ideal
 - May need to build topsoil by topdressing with high quality soil and/or compost
- Soil test every 1 - 3 years



Soil
a lawn's
foundation

Nutrient tips

- Soil test!!!!
- Measure carefully
- How much
 - 1 - 2 lbs N/1000 sq ft
 - 0 – 1 lb for low input grasses
- When
 - late Labor Day – Columbus Day
 - not when ground is frozen



Soil Test Results				
	Low	Median	Optimum	Excessive
Soil Nitrogen	xxxxxxxxxxxxxxxx			
Phosphorus	xxxxxxxxxxxxxxxx			
Potassium	xxxxxxxx			
Calcium	xxxxxxx			
Magnesium	xxxxxxxx			
Soil pH	xxxxxxxxxxxx			
Org. Matter	xxxxxxx			

Nutrient tips Con't

- Adjust soil pH to 5.5 – 6.5 with lime
 - Pelletized dolomitic limestone preferred unless soil test shows excess magnesium
- Unless soil test indicates deficiency, **skip the phosphorous!**
- Apply potassium only when a soil test indicates need



Select slow release fertilizers

Table 1

Characteristics of Common Turfgrass N Sources

Classification, burn potential, leaching potential, low temperature response, and residual effect on common turfgrass N sources.

Fertilizer Source	N Content %	Leaching Potential	Burn Potential	Low Temp. Response	Residual Effect
Inorganic					
Ammonium nitrate	33-34	High	High	Rapid	Short
Calcium nitrate	16	High	High	Rapid	Short
Ammonium sulfate	21	High	High	Rapid	Short
Organic-Natural					
Activated sewage sludge	6	Very Low	Very Low	Very Low	Long
Manures	3-10	Very Low	Very Low	Very Low	Long
Other natural products	3-10	Very Low	Very Low	Very Low	Long
Synthetic					
Urea	45-46	Moderate	High	Rapid	Short
Urea solutions	12-14	Moderate	High	Rapid	Short
Sulfur coated urea	14-30	Low	Low	Moderate	Moderate
Resin coated urea	24-35	Low	Low	Moderate	Long
Isobutylidene diurea (IBDU)	30-31	Mod. Low	Low	Moderate	Moderate
Methylene ureas and Ureaformaldehyde	38	Low	Low	Low	Mod. Long to Long

*some products may contain urea in addition to the ureaformaldehyde component.



Mow properly

- Mow high at 3 - 4 inches or highest setting
- Mow regularly
- Keep mower sharp
- Return clippings
- Vary mowing pattern



Mower exhaust = 11 cars' exhaust
One hour of mowing = driving 400 miles
Mowers spew 87 lbs of greenhouse gases and 40 pounds of other pollutants annually

Add organic matter

- Top dress with 1/8 - 1/4 inch of compost
 - reduces thatch
 - improves nutrient and water holding capacity
- Some composts may be high in nutrients
 - use a source that has been tested
 - test the soil after application
 - watch for development of layers and high phosphorus levels



No endorsement intended or implied

Water only when needed

- Deepen the roots by holding off on watering in the spring until you see signs of stress (turf has a blue or purple cast)
- Water deeply 3/4 - 1 1/2 inches per week
 - Don't water every day (use a rain gauge)
 - 1 - 2 times a week is best
 - Water early in the morning (to reduce disease)
- To reduce water needs allow the turf to go dormant in the summer
 - apply 1/4 - 1/2 inch water every 3 weeks



Let it breathe

- Keep thatch under 1/2 inch
- Cut back on pesticide use
- Core aerate in the late summer or early spring



How do you use your lawn?

- Do you tread lightly? or
- Do you rough it up?
- What areas need help?



Problems are inevitable



Where are the problem areas?

- High traffic
- Compaction
- Shade
- Pest problems



#1 Killer of grass



To much shade?

- Must have at least 6 hours of direct sunlight to grow lawn grasses
- Trees in shaded areas must be thinned and lower branches pruned
- Better yet leave the trees and plant shade tolerant ground cover



Ground covers

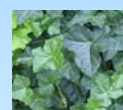
- Non-native



Periwinkle or Myrtle
May be invasive



Pachysandra



English Ivy
May be invasive

Ground Covers

- Native



Bunchberry



Wintergreen/
checkerberry



Partridgeberry

Integrated Pest Management

- Grow stress-free turf



Is this stress free turf?

- Accept a few weeds or insects



- Keep an eye on the lawn



Integrated Pest Management



- Identify the pest



- Pull it out or mow it off

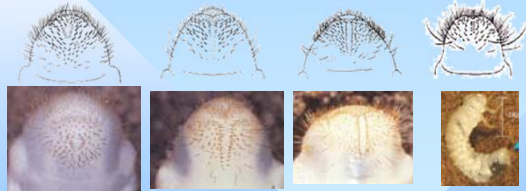


- Irrigate



Pest Identification is crucial

White grub rastral patterns



Japanese beetle

European chafer

May/June beetle

Rose chafer

Integrated Pest Management



- Encourage biological controls



- Use pesticides as a last resort



- Read and follow labels carefully



No endorsement intended or implied

Weed Management-
weeds are indicators of "problems"



Common broadleaf weeds



Plantain



Hawkweed



Creeping
Charlie/
Ground Ivy

Common grassy weeds



Nutsedge



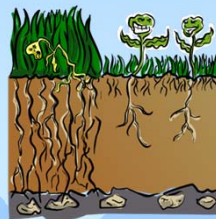
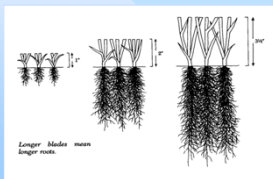
Crabgrass



Quackgrass

Weed control approach

- Mow as high as possible!



Weed Control Approach (BASIC STRATEGY - dense, tall turf tends to reduce weed invasion)

- Mow high, 3 - 4inches **MINIMUM**
- Promote root growth – fertilize in late summer/early fall
- Reduce wear and compaction - encourage foot traffic away from turf; core aerify twice per year
- Overseed or slit-seed open areas ASAP
 - **Seed is the best weed control!**
- Spot treatment with herbicides *only when necessary*

Are there alternatives?

- Corn gluten meal has demonstrated pre-emergent herbicide activity

- Rather expensive and a weak herbicide
- Most effect comes from the nitrogen released as the meal breaks down - added fertility thickens turf and reduces weed germination (9% Nitrogen!)
- Weed flammers and spikes “Punto”
- Hot water foam and steamers
 - Mostly used in cities where herbicides have been banned



No endorsement intended or implied



Turf Insect Pests

- Surface or thatch pests
- Root-feeding pests



White grubs



Sod Webworm

Integrated Pest Management – Insect Pests

- White Grubs
- Chinch Bugs
- Sod Webworms
- Billbugs

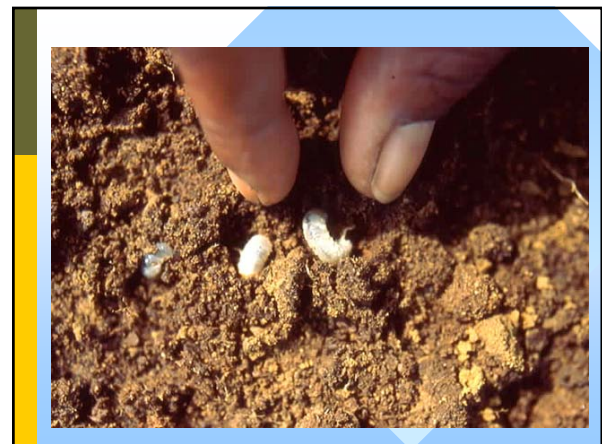
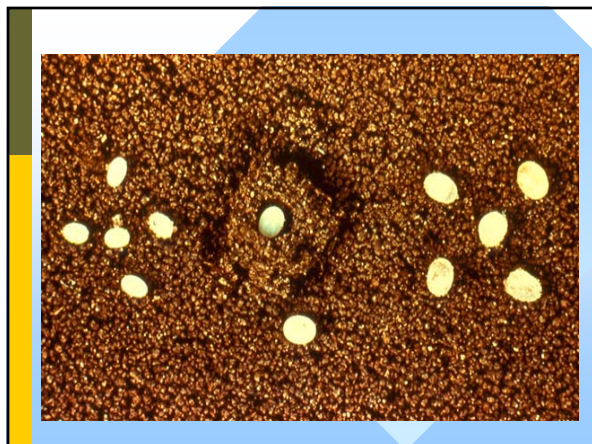


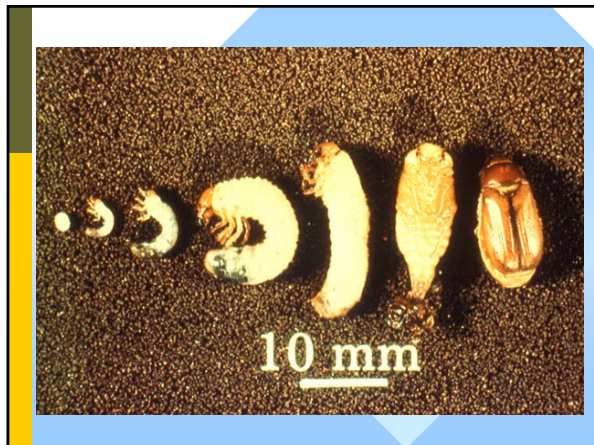
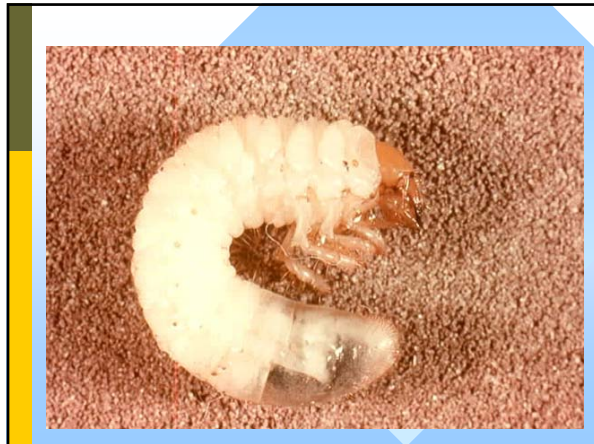
White Grubs

© D.J. Sweeney, 2004

Grub biology

- One generation per year
- Grubs active in spring (April-May) and fall (mid August through October)
- European Chafers active through the winter under snow
- Adults active in summer months





Pest Identification is crucial

White grub rastral patterns

Japanese beetle	European chafer	May/June beetle	Rose chafer




New grub species

- Asiatic garden beetle
- Grubs are slightly smaller than Japanese beetle and European chafer
- Adults are drawn to bright lights at night

© C. Laub


© C. Laub

Photo: D. Shuster

Japanese beetles

- Most widely distributed species in New England
- Most grubs are susceptible to insecticides
 - Some resistance to imidacloprid (Merit)
 - Many new products coming out
 - Latest Grub-ex product contains acelepryn
- Adults feed on over 300 species of ornamental plants



No endorsement intended or implied



European chafers

- Active in mostly in coastal areas of Maine
 - Bangor area has been heavily infested last 3 years
- Life cycle two weeks EARLIER than JB's
- Least sensitive to cold temperatures
 - Feeds all winter under snow covered grass
- Most damaging species (grub for grub)



Monitoring Grubs

- Most grub damage happens in September - October or April - May
- Turn over 1 sq. ft patch of turf, count grubs or Cup cutter plug (0.1 sq. ft.)
- Threshold:
 - Japanese beetles 8 - 15 / sq. ft.
 - European chafers 4 - 10 / sq. ft.
 - May / June beetles 3 - 8 / sq. ft.
 - **These levels are doubled on irrigated turf**



Cultural controls for grubs

- Avoid use of bluegrass
- Let turf go dormant in July/August
- $\frac{3}{4}$ - $1\frac{1}{2}$ inches of water every 5-7 days
- High pressure water injection (done on golf courses)

Water reduces grub damage



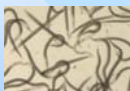
- Water deeply $\frac{3}{4}$ - $1\frac{1}{2}$ inches per week
 - Don't water every day (use a rain gauge)
 - 1 - 2 times a week is best
 - Water early in the morning (to reduce disease)
- Light watering (Synergizing) on very hot afternoons is also acceptable
- Avoid irrigation 24 hours prior to sporting events

Nematodes for grub control

- *Heterorhabditis bacteriophora*
- *Heterorhabditis zealandica*
 - **These work on white grubs**
- *Steinernema carpocapsae* - Do NOT use for grubs under any circumstances!!!

Entomopathogenic nematodes

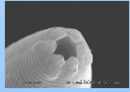
- "living hypodermic needles"
- Very sensitive to high temperatures and sunlight
- MUST be watered in immediately



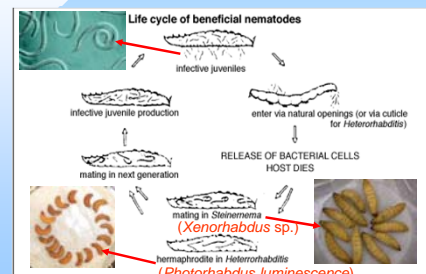
Infective juveniles



Female



Life Cycle of Entomopathogenic Nematodes



Wax worms infected with ---



Heterorhabditis sp

Steinernema sp



Beneficial nematode products



No endorsement intended or implied

Bacteria

- *Bacillus popilliae* (milky disease)
 - Inconsistent in Maine
 - When it works - only effective against Japanese Beetles
 - Most researchers say it just does not work!



Healthy grub (left) and a milky disease infected grub (right). Note color of blood chamber where the tip of the leg was pinched off.

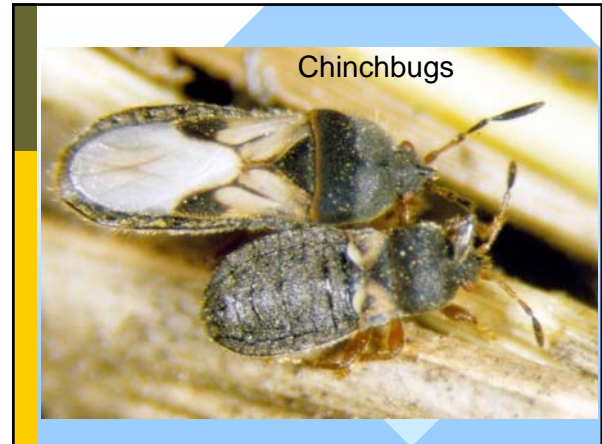
Have you seen this?



Tachinid fly (the so-called "winsome fly") laying an egg on a Japanese beetle adult

Istocheta (= *Hypercteina*) *aldrichi*
 Introduced into US from Japan in 1922
 Adults emerge Late June/July, feed on honeydew, nectar
 Lay up 100 eggs in two weeks
 Eggs hatch 1 day later, dig into beetle
 Kills beetle in 5-6 days
 Just before death, beetle digs into ground where fly spend winter as pupa





Hairy Chinch Bug

- Small (<1/4" long) red to black, white wings
- Adults and nymphs suck grass sap causing injury
- 1-2 gens/yr. Overwinters as adult in protected areas near turf.
- Damage: irreg. Yellow patches 2-3' diam. Usu. During hot dry weather in mid-summer & early fall (S. ME) or July (C. and N. ME). Looks like draught damage.

Chinch Bug Prevention and Monitoring

- Prevention: Irrigate regularly during hot, dry months
- Monitoring:
 - insert bottomless coffee can into turf, fill with water, poke turf w/stick.
 - Visual inspection - esp. when turf seems to be under drought stress
- Threshold: 15 bugs/6" diam. can

Biological Control -Chinchbugs

- Endophytes
- Protect big-eyed bugs
- *Beauveria bassiana*???

Big-eyed bug →

Cultural Control - Chinchbugs

- Use endophytic grass cultivars (fescues and ryegrasses)
- Minimize thatch – Core aeration
- Avoid drought stress

Let it breathe

- Keep thatch under 1/2 inch
- Cut back on pesticide use
- Core aerate in the late summer or early spring



Core Aeration Guidelines

- Do not aerate during the heat of the summer
- Aerate when the soil is moist but not wet
- Leave cores on the ground and drag them in
- Seed bare areas at the same time as coring
- Irrigate after coring & dragging to facilitate recovery



Insect Control Approach (BASIC STRATEGY - use resistant turf species and create deep root systems)

- Fescues and Ryegrasses with endophytes are resistant to surface feeding insects.
- Endophytes also make grasses more disease resistant and help exclude weed competition



- **Morning Star**
- High Endophyte level for natural insect resistance (+90%)
- Excellent disease resistance
- Beautiful, dark green color
- Fine leaf texture
- Superb summer and fall density
- Excellent drought tolerance
- Seeding rate: 6-8 lbs./1,000 sq. ft.

No endorsement intended or implied



Simple slit seeding of endophytic grasses into an existing lawn resulted in a 30 to 50% stand of endophytic grasses - enough to control surface insects!

Sod Webworms

Spring damage



Adult bluegrass webworm

Larva and frass

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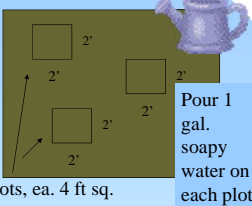
Sod Webworms

- Adults: moth. No damage.
- Larvae: up to 1" long whitish worm w/ rows of sm. black spots. Make silk-lined tunnels in thatch, feed on grass blades.
- 2 generations/yr. Overwinters in soil as a caterpillar
- Damage: turf thinning or irregular dead patches mostly mid-late August.
- Seldom cause damage that warrants treatment



Sod Webworm Monitoring

- Mark 2 or 3 damaged and undamaged areas (2'x2') of turf. Drench each area with soapy water (1 oz/gal water). Wait 5 mins, then count larvae.





Pour 1 gal. soapy water on each plot

3 plots, ea. 4 ft sq.

Threshold

- If unacceptable damage seen and 4-6 larvae/4 ft²

Bluegrass Billbug



Adult and larva



Larva in crown

© D. J. Shekar, 2004

Cultural management for surface feeders

- Use endophytic cultivars (fescues and perennial ryegrasses) - for some webworms?
- Manage thatch
- Minimize drought stress (!)

Entomopathogenic Fungi

Beauveria spp. "White" Fungus
Naturalis-T®

Metarhizium spp. "Green" Fungus
(Met-52)

One drawback to the fungal controls is that they are not selective and will harm beneficial insects and pollinators


No endorsement intended or implied




A bluegrass billbug adult (above) and Japanese beetle larva (right) infected with *Beauveria*.

© D. J. Shekar, 2004

Fire ant queen with *Metarhizium anisopliae* fungus.



Other biorationals

! *Bacillus thuringiensis* *bui bui*

Excellent grub control but not commercially viable as yet

! *Saccharopolyspora spinosa* - spinosyns (=Conserve)

Effective on surface feeding insects

No endorsement intended or implied

Lawn disease management

- Avoid sod
- Improve air circulation
- Water in early morning only
- Reduce thatch with aeration
- Plant resistant varieties
- Convert shady areas to ground covers
- Apply nitrogen



Dollar Spot



Red Thread



Brown Patch

Other disease-like problems

- Mushrooms
 - Buried wood
 - Infected soil
- Moss
 - Too wet
 - Too shady
 - Too acid
 - Too compacted
 - Low fertility
 - Scalping



#1 Killer of grass



Vertebrate problems

- Birds
 - Starlings, crows, grackles
- Moles
 - Eastern or star-nosed
- Skunks, squirrels, raccoons



If you must apply pesticides apply properly & be cautious

- Only treat infested areas
- Spot treatments conserve beneficial organisms
- Avoid use of combination products like weed & feed



Prevent Environmental Contamination

- Avoid misapplication to impervious surfaces
 - Use drop spreaders
 - Sweep up misapplications
 - Pervious surfaces become impervious when frozen!



Prevent Environmental Contamination



- Do not apply to saturated soils or when 0.5 inch or more rainfall expected
- Reduce urban runoff – install more pervious surfaces (turf, prairie, woodlots, turf pavers, etc.)
- Add vegetative buffers

Prevent Environmental Contamination

- **Choose pesticides and nutrients with low runoff potential based on their physical and chemical properties**
- **Use slow release N fertilizers**
 - Water insoluble N, Composts, sulfur coated
- **Use wettable powder pesticides, pesticides with lower water solubilities and stronger soil adsorption properties**
- **Use the Windows Pesticide Screening Tool**

Prevent runoff

- Does it puddle up?
- Does it runoff fast?
- Do you have vegetative buffers?



The beauty of buffers

- No buffer – High runoff & high pollution potential. Lots of mowing!



- Good buffer – Reduced runoff, less pollution, cleaner water and lower maintenance too!

Vegetative Buffers

- **Buffers can significantly reduce pesticide and nutrient runoff**
- **Untreated (no fertilizer or pesticides) turf buffers as little as 8 feet wide can significantly reduce nutrient and pesticide losses to surface waters**

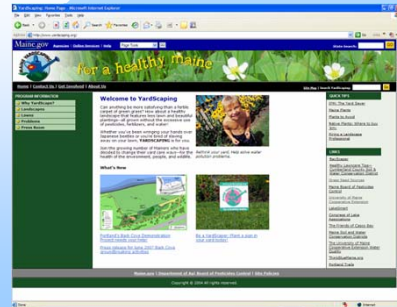
A 50 foot buffer is most often recommended as the minimum

25-foot untreated buffer zone required next to waters and wetlands

- Applies to all terrestrial **"broadcast"** pesticide applications
 - Except stinging insect and arthropod vector control, and
 - Man-made Ag wetlands, e.g., Cranberry bog areas
- Variances may be granted if the Board approves and protections are reasonably equivalent



Where to learn more



<http://www.yardscaping.org>

Where to learn more

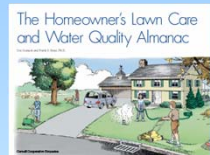


<http://www.gotpests.org>

Other resources



<http://www.thinkfirstspraylast.org/ppt/MasterGardener/index.htm>



<http://www.gardening.cornell.edu/lawn/almanac>



<http://ecommons.cornell.edu/handle/1813/3574>

YardScaping... Protecting the beauty of Maine

