IPM in Turf

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Non Crop Vegetation Management
Pesticide Recertification Course
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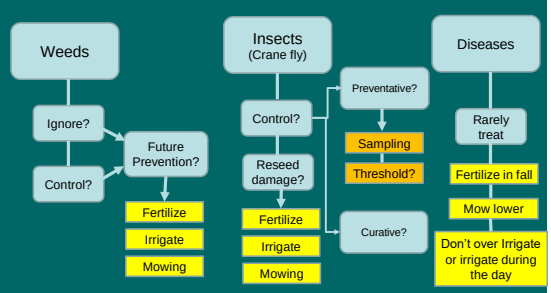
IPM
(Integrated Pest Management)

- Focuses on maintaining plant health and using cultural practices to minimize pest pressure and reduce pesticide applications
- Encourages using pest resistant varieties where applicable.
- Uses thresholds and monitoring to make pesticide application decisions.

Overview

- What are our goals for the lawn?
  - Show lawn?
  - Basic home lawn?
  - Ground cover?
  - Preventing runoff on slopes?
  - Sand based athletic field?

Lawn Goals Affect Pest Actions



Lawn Pests – Overall Goals

- Weeds – break annual spray cycle.
- Insects – only apply insecticides once in 5 – 10 years (or not at all).
- Diseases – minimize disease pressure and do not create problems.

IPM Tools

- Fertilizer
- Irrigation
- Mowing
- Coring
- Dethatching
- Over seeding or slice seeding
- Species and variety selection (with endophytes?)

Why Apply Fertilizer?

Improves the vigor of the lawn

A healthy lawn will:

- Resist weed encroachment.
- Reduces disease pressure.
- Resist insect pests.
- More drought resistant.

Overall, intelligent fertilizer applications will reduce the need for herbicides, insecticides, and water.

Fertilization

"The goal is to use the least amount of fertilizer nitrogen needed to achieve your goals"

When to Fertilize? (1 lb. N/1,000 ft^2)

Figure 1. Fertilizer calendar for irrigated lawns in western Oregon.

Visual turf quality	J	F	M	A	M	J	J	A	S	O	N	D
High				—	—	—		—	—	—		
Medium				—	—	—			—			
Utility					—	—			■ ■ ■ ■			

— = Planned application ■ ■ ■ ■ = Optional application

Horizontal bars indicate time for each application. Adjust timing based on your goals and personal experience with your lawn. Each application is assumed to be at 1 lb N per 1,000 sq ft. On hungry lawns, 1.5 to 2 lb N per 1,000 sq ft can be used to stimulate density and color. Unless lawns are very weak, avoid early-spring applications since grass normally grows vigorously by itself at that time.

What to consider:

- Species of grass
- Age of lawn
- Clipping removal
- Soil type/soil fertility
- Expectations

Ranking Species by Nitrogen Needs

• Perennial Rye • Kentucky bluegrass	Higher (4+ lbs./yr.)
• Annual bluegrass • Tall Fescue	Medium (2 – 3 lbs./yr.)
• Fine fescues • Bentgrasses	Low (0 – 2 lbs./yr.)

What to apply:

- Nitrogen is the key
- Phosphorus only if deficient
- Potassium is rarely needed

- Synthetic fertilizers work fine
- Organic fertilizers work fine

Fertilizer Effects on Diseases

- Most Common Diseases

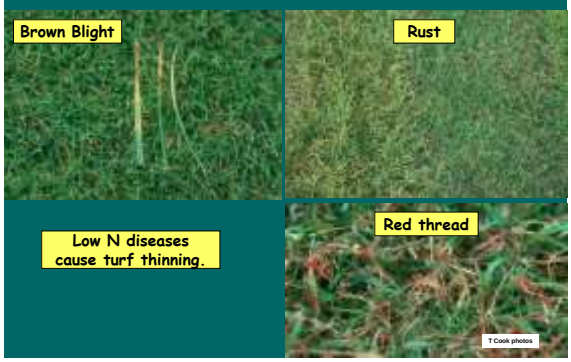
Worse under Low Fertility

  - Red thread
  - Brown blight
  - Rust

Worse under High Fertility

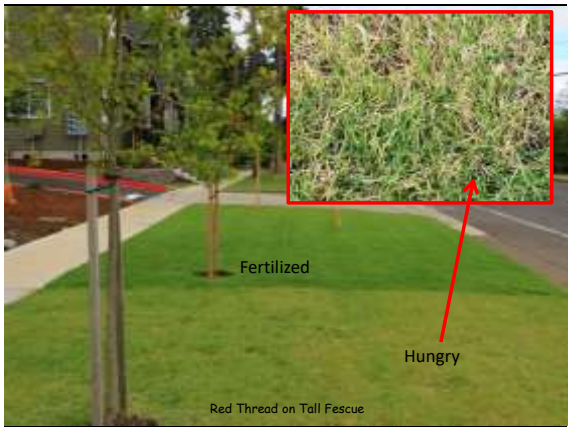
  - Microdochium patch

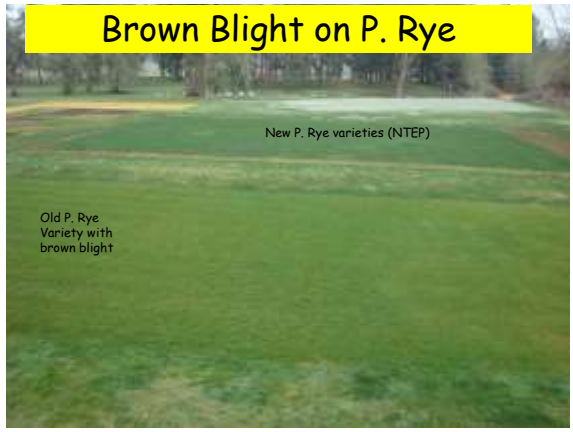
Low N Diseases to Ryegrass in Winter



Low N diseases cause turf thinning.

Red Thread


Fertilized
Hungry
Red Thread on Tall Fescue


Brown Blight on P. Rye
New P. Rye varieties (NTEP)
Old P. Rye
Variety with
brown blight


Brown blight closeup


Stripe Rust on Kentucky Bluegrass
Medium N Fertility
Low N fertility


M. Patch on Tall Fescue
(in low, wet area)


Microdochium patch – after removing leaves.

Conclusions – Fert & Diseases

- Fall (Sept & Oct) applications of fertilizer can go a long way to reducing disease on turf.
- Mow lower rather than higher.
- Remove heavy clippings and leaves from turf.
- Prune trees to limit shade, if possible.

MOWING

Summary:

1. Mowing has more impact on turf quality than any other cultural practice. Frequent mowing with sharp blades, will produce the best turf.
2. Turf is denser at lower optimum heights and with frequent mowing.
3. Turf vigor and rooting is better at moderate heights and intermediate frequency.
4. Bentgrass is at it's best when mowed at 1" or lower and is prone to false crowns when mowed above 1".

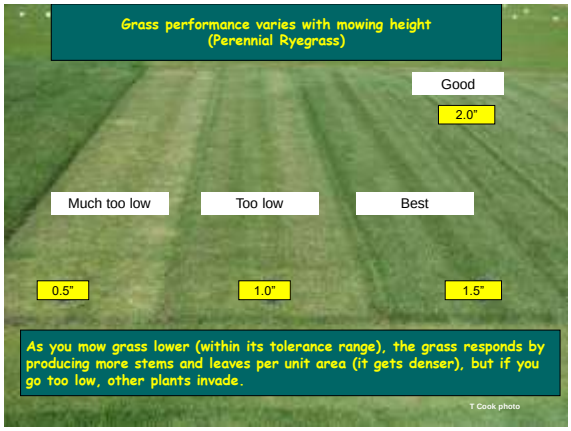
Effects of Mowing on Quality

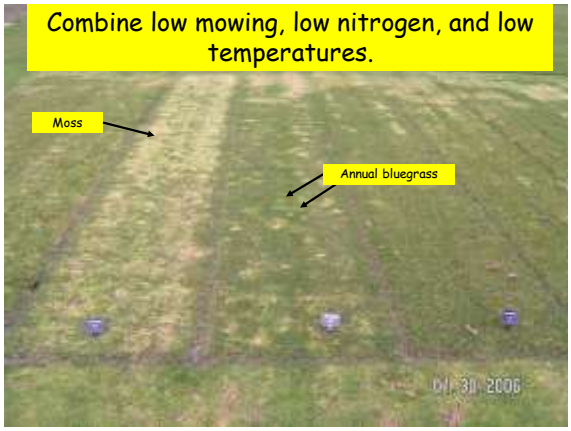
Mowing Effects on Pests

- Impacts disease development (height).
- Impacts weed encroachment by increasing (or decreasing) density (height & frequency) and removing weed flowers before seeding.
- Impacts root mass which will help withstand root feeding insects.

Mowing height ranges for lawns

Perennial ryegrass	1.50" – 2.50"
Red & Hard fescue	1.50" – 2.50"
Chewings fescue	0.75" – 2.50"
Tall fescue	2.00" – 3.00"
Creeping bentgrass	0.50" – 0.75"
Col. & Highland bent.	0.50" – 1.50"
Annual bluegrass	0.50" – 2.00"
Ky. bluegrass	1.50" – 2.50"

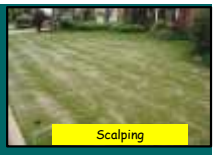




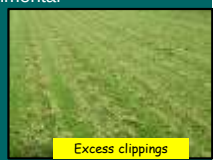
Mowing Too High or Too Low

- Too Low
  - Grasses will thin out resulting in weeds, moss, and other grasses invading.
- Too High and or too infrequent.
  - Grasses will lose density, open up, fall over.
  - Mowing will likely scalp the plant because you remove too much foliage
  - Leave heavy clippings on turf
  - Create a perfect environment for diseases.

Mowing Frequency Guideline



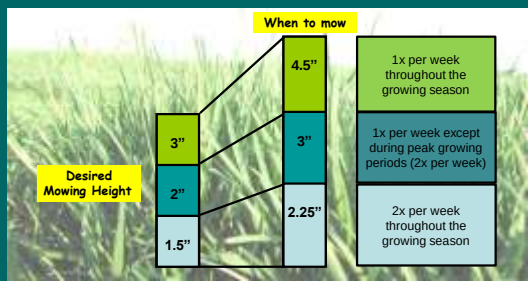
- The one-third rule
  - Prevents scalping
  - Prevents excess clippings
- Scalping…
  - Causes a brown appearance
  - Stops growth and development
  - Depletes carbohydrates
  - Makes turf susceptible to environmental stress
- Excess Clippings …
  - Block light (can kill turf)
  - Increase disease
  - Poor appearance



Mowing

Frequency
(Assuming Irrigation)

- The one-third rule



Mowing too Infrequently

"Honey, I think it's time to mow the lawn." Cartoon by Guy Junker (www. junkertoons.com)

Mowing height ranges for lawns

Perennial ryegrass	1.50" - 2.50"
Red & Hard fescue	1.50" - 2.50"
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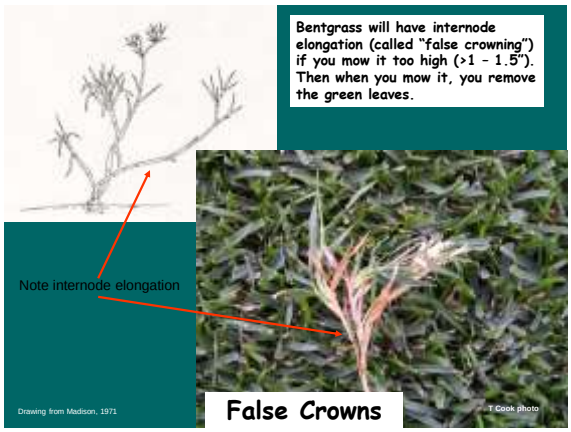


Challenges with bentgrass

- Most rotary mowers do not mow below 1.5 inches.
- Lower mowing requires a smoother surface which may not exist.
- You need some extra equipment to sharpen Reel mowers. ($500)

What about Mowing Frequency?

- Increasing your mowing frequency
  - Increases turfgrass density
  - Reduces leaf width (Finer texture)
  - Reduces weed encroachment (Because of increased density.)

Mowing Frequency – Effects on Biomass

- Surprisingly, the more frequently you mow, the less total biomass you have.
- In other words, if you add up the biomass for 2 mowings in a week, it is less than the total you get if you only mow once.
- Biomass spikes up after 15 days.

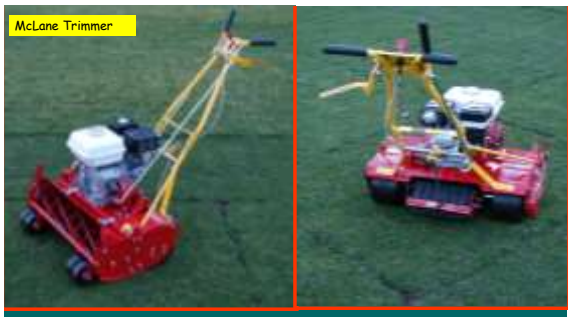
Mowing During Establishment

- Increase your mowing frequency
  - Increase turfgrass density
  - Weed control
    - Keeps flowers from forming

Mulching reduces the need for fertilizer inputs by as much as 25%

1990's

Convertible Mulch or Catch mowers introduced

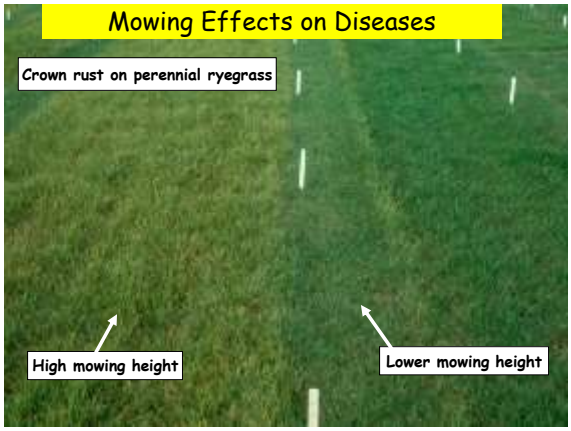


Current technology for reel mowers

Push Real Mowers Great for Mowing Small Bentgrass Lawns

Leaf shredding on ryegrass due to a dull or poorly adjusted blade. Before ryegrass, shredding was a minor problem.

Mowing Effects on Diseases



Irrigation

- Effects on Diseases
- Effects on Insects
- Effects on Weeds

Irrigation

- Impacts plant health
- Impacts disease environment
- Impacts grass density (weeds)
- Less important for crane fly assuming you don't lose turf during the summer.

2 Basic Concepts

- Turf will take as much water as you give it.
- Declining soil moisture levels will progressively lower the water use rate by up to 80% *(Beard 2004)*

Basic Irrigation Questions

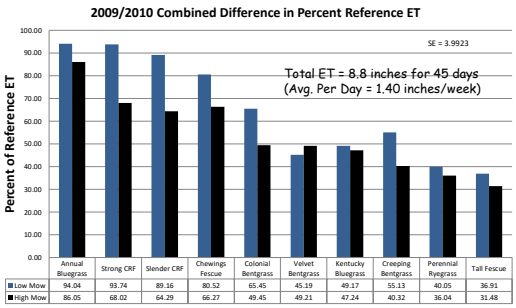
1. **How much water is needed?**
2. **How often should it be applied?**
   > **Daily or weekly?**

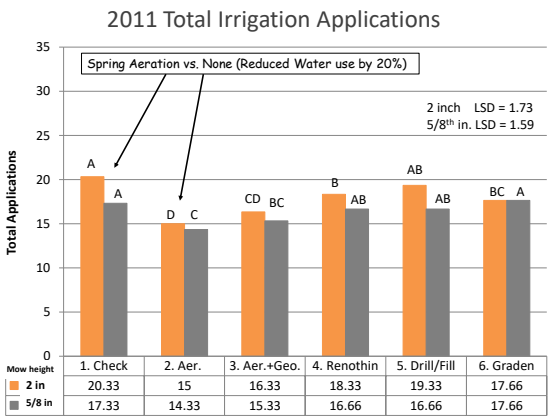
Water required for turf *
Corvallis, OR

	ET/month	ET/ wk.	Avg. Monthly Rainfall
May	3.04"	0.76"	2.0"
June	3.91"	0.98"	1.3"
July	5.46"	1.37"	0.4"
Aug	4.77"	1.19"	0.5"
Sept	3.31"	0.83"	1.5"
Totals	20.49"	1.03"	

*Based on evaporation correlations

SUMMARY





How often?

- Hose and sprinkler:
  - Once or twice per week
- In ground system:
  - More than once per week
  - Less than seven times per week

Irrigation Trial – 2016 & 2017

Irrigation Frequency

1" per week applied 1 time/week

Practical Ideas to Reduce Water Use

- Adjust your irrigation amounts monthly.
- If you are watering every day, change to every other day.
- Wait as long as you can before turning on the system in the spring.
- Quit irrigating on Labor Day.

Practical Ideas to Reduce Water Use

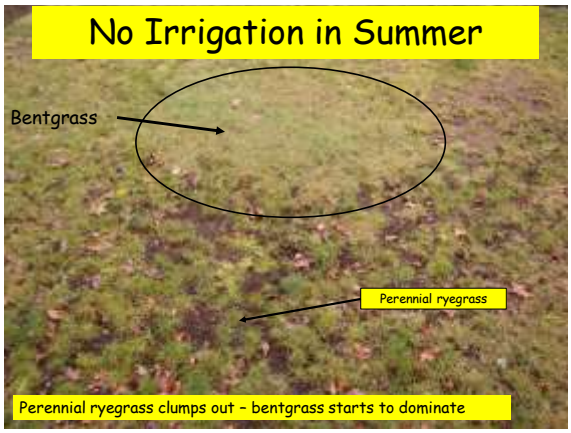
- Core in April to increase rooting.
- Manage organic layer by dethatching.
- Adequate nitrogen before summer – healthy turf is more drought resistant.

Irrigation Effect on Diseases

Most common causes of disease problems during the summer.

- Over irrigated in shade
- Irrigation during the day
- High levels of nitrogen (high leaf succulence).
- Mowed too high.

No Irrigation in Summer



Perennial ryegrass clumps out – bentgrass starts to dominate

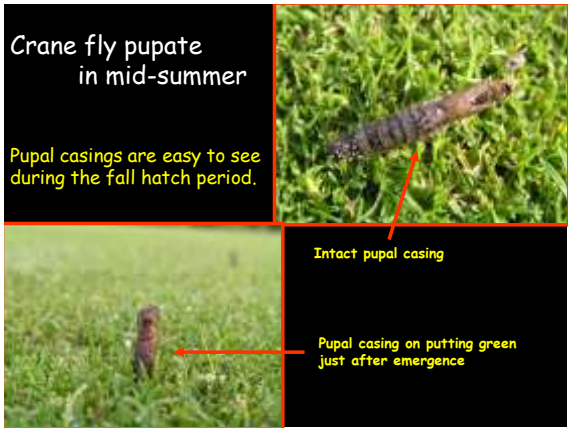
Insects: European crane fly

Adult doesn't cause damage and only lives for a couple of days

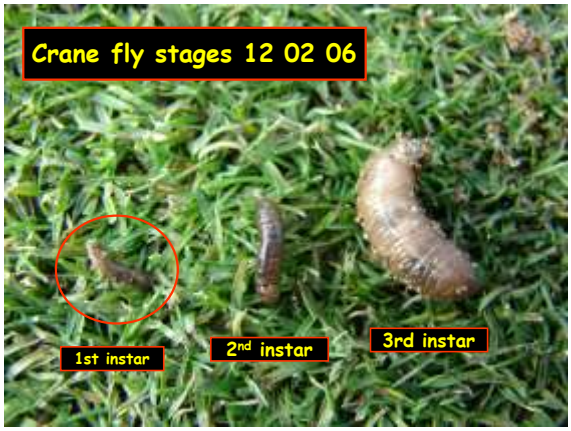
Larvae does all the damage

Crane fly pupate in mid-summer

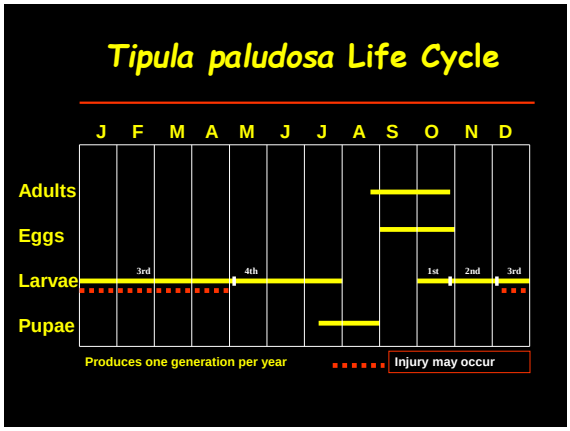
Pupal casings are easy to see during the fall hatch period.



European crane fly adults emerge in fall




Crane fly larvae spend their entire life in a 3" zone of soil beneath turf. They generally feed at night consuming both roots and shoots.
3"


Tipula paludosa Life Cycle
J F M A M J J A S O N D
Adults
Eggs
Larvae
Pupae
3rd
4th
1st
2nd
3rd
Produces one generation per year
Injury may occur


2006 - Richardson Hall
High larval populations (50+/sq. ft.) results in turf thinning. Do not spray after April 1st as they are done feeding and the damage is done.


Crane Fly Damage
Treat?
April 11th 2017


A few crane fly larvae in an otherwise healthy lawn do not require treatment

Monitoring Schedule

No History: Start in January

Prior History: Start in December

SAMPLE EVERY TWO WEEKS

Practical monitoring for 3rd instar larvae

Curative control in mature lawns

Treatment threshold for 3rd instar larvae:

25-50 larvae/sq ft
(6 – 12 in 6" by 6" hole)

plus

visible turf thinning

Crane fly thoughts:

1. Crane fly damage is worse when they first invade a new area.
2. Damage is usually sporadic in a given area.
3. Healthy turf can tolerate more damage
3. Monitoring can reduce insecticide use up to 80% (vs. Preventative sprays)

Fall plantings can have bad crane fly infestations

Cultural Crane Fly Control

•Keep your lawn healthy.
•Stop watering on Labor Day.

Water required for turf *
Corvallis, OR

	ET/month	ET/ wk.		Avg. Monthly Rainfall
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Totals	20.49"	1.03"		

*Based on evaporation correlations

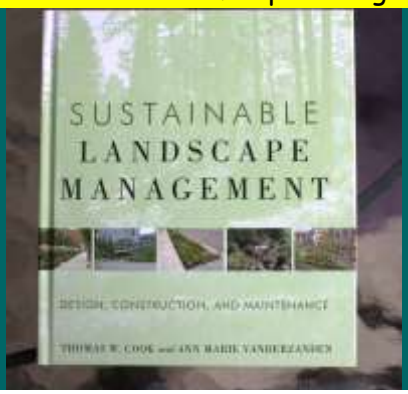
What about weeds?

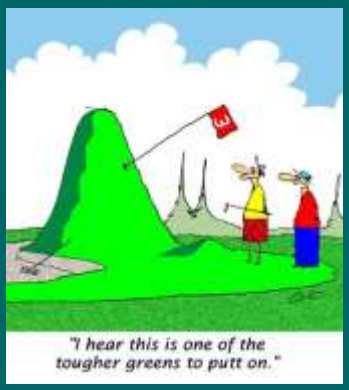
- First, ask yourself whether the “weeds” are a problem.
- If they are, make 2 spray applications (ideally in the fall) and kill ALL your weeds.
- Do not use weed and feed products – they are only about 50% effective.

Preventing Weeds

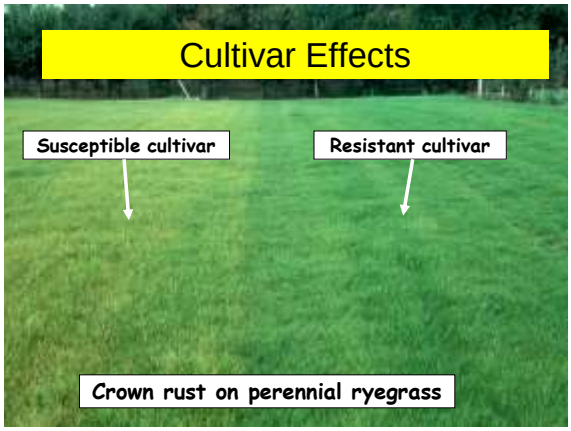
- Keep lawn dense
  - Consistent mowing at appropriate height
  - Enough fertilizer to maintain density
  - Enough water in the summer to keep plants from dying.

Thanks to Tom Cook for providing slides.





Cultivar Effects



Cultivar Effects

Traffic in shaded area

Remove grass and replace with hardscape

Benefits of Aerification

1. Alleviates compaction
2. Creates channels for new roots to grow
3. Surface management on sports fields
4. Break up subsurface or plow layer

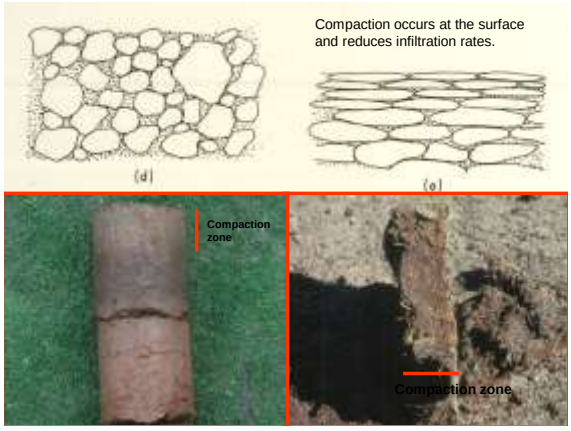
The Top "5" Problems

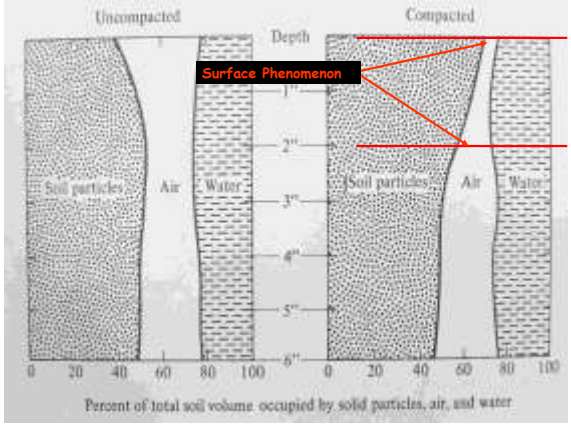
Soil

1. Compaction
2. Thatch/organic buildup
3. Creating a plow pan
4. Bad construction
5. Sod grown on fine textured soil

Sand

1. Surface sealing
2. Thatch/organic buildup
3. Glup development
4. Profile packing
5. Sod grown on fine textured soil

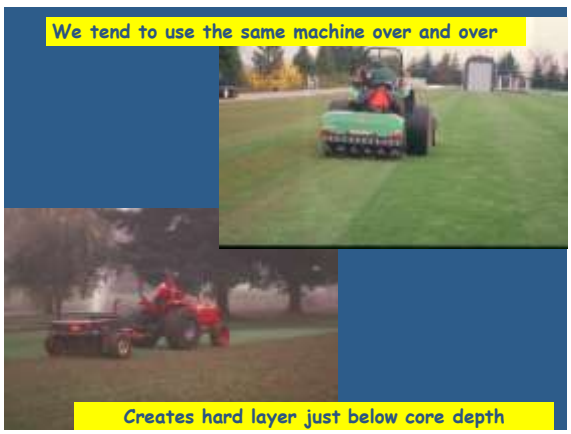




Traffic compacts soil and reduces infiltration rates


Thatch builds up rapidly on compacted soils.
Heavy thatch holds lots of water.

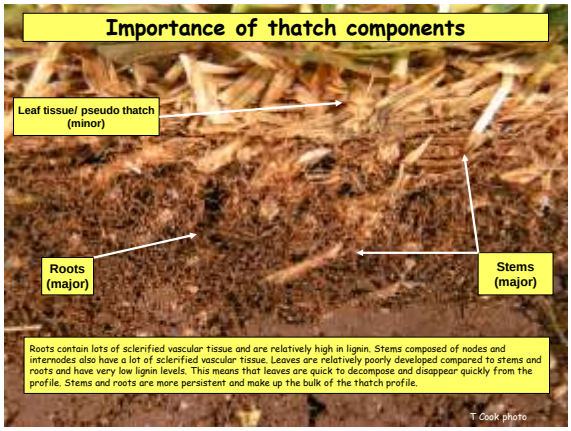

Thatch accumulation can lead to complete surface sealing even over porous rootzones.


We tend to use the same machine over and over
Creates hard layer just below core depth


Deep tines break up plow layer


Or better yet, use deep hollow tines


T. Cook Photo
GRASS
THATCH
SOIL
Thatch is a layer of organic material between the green grass and the soil. Thatch is composed of living and dead stems and roots. Leaves make up only a very small percentage of thatch. Sometimes leaves will form a layer of pseudo thatch at the juncture of the thatch and the green grass. Pseudo thatch disappears quickly.
T Cook photo



Factors that increase thatch buildup

Thatch prone species:
Ky. Bluegrass, fine fescues, bentgrasses

Acidic soils:
pH below 6

Anaerobic soils:

Dry soils:

High/low N fertility:

High mowing heights.:

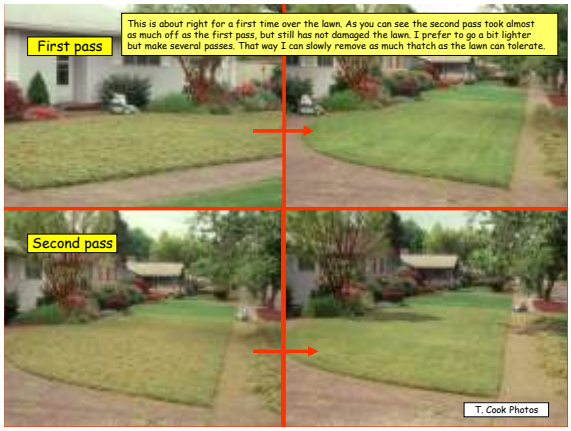
There are many factors that affect thatch accumulation. Grass type is a major factor. Beyond grass type, conditions that prevent decomposition from occurring (acid soils, anaerobic soils, dry soils, low nitrogen) or stimulate accumulation faster than decomposition can occur (high nitrogen, high mowing heights.) will result in thatch buildup.

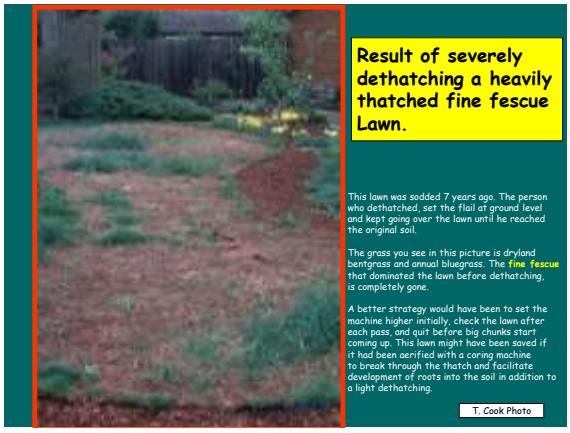
Mechanical Thatch Control

Timing:
Target April to mid-May

Strategy:
Set flail at or above ground level.
Make one to three passes.
Remove debris
Scalp down remaining grass.
Fertilize with Nitrogen @ 1-2 lb N/1000

Spring is a good time to dethatch because conditions are optimum for rapid recovery and you are preparing the lawn for the coming growing season. The object is to thin out the lawn and remove as much thatch as possible without destroying the stand of grass. I try to evaluate after each pass to make sure I quit before it is too late. Scalping after all debris is removed forces new growth to come from basal crown buds. Fertilizer stimulates new growth and rapid recovery.





Result of severely dethatching a heavily thatched fine fescue Lawn.

This lawn was sodded 7 years ago. The person who dethatched, set the flail at ground level and kept going over the lawn until he reached the original soil.

The grass you see in this picture is dryland bentgrass and annual bluegrass. The **fine fescue** that dominated the lawn before dethatching, is completely gone.

A better strategy would have been to set the machine higher initially, check the lawn after each pass, and quit before big chunks start coming up. This lawn might have been saved if it had been aerified with a coring machine to break through the thatch and facilitate development of roots into the soil in addition to a light dethatching.

T. Cook Photo