



Master Gardener Program

University of California Cooperative Extension 

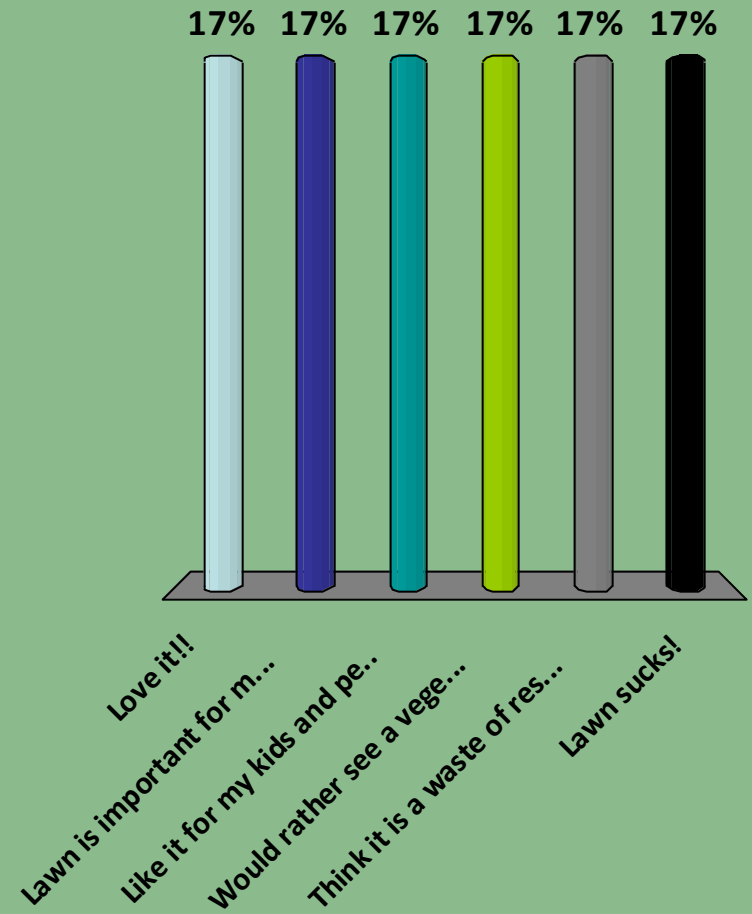
Turf Management for Foothill Communities

Pamela Geisel
Statewide Coordinator
Master Gardener Program
Farm Advisor, Environmental Horticulture



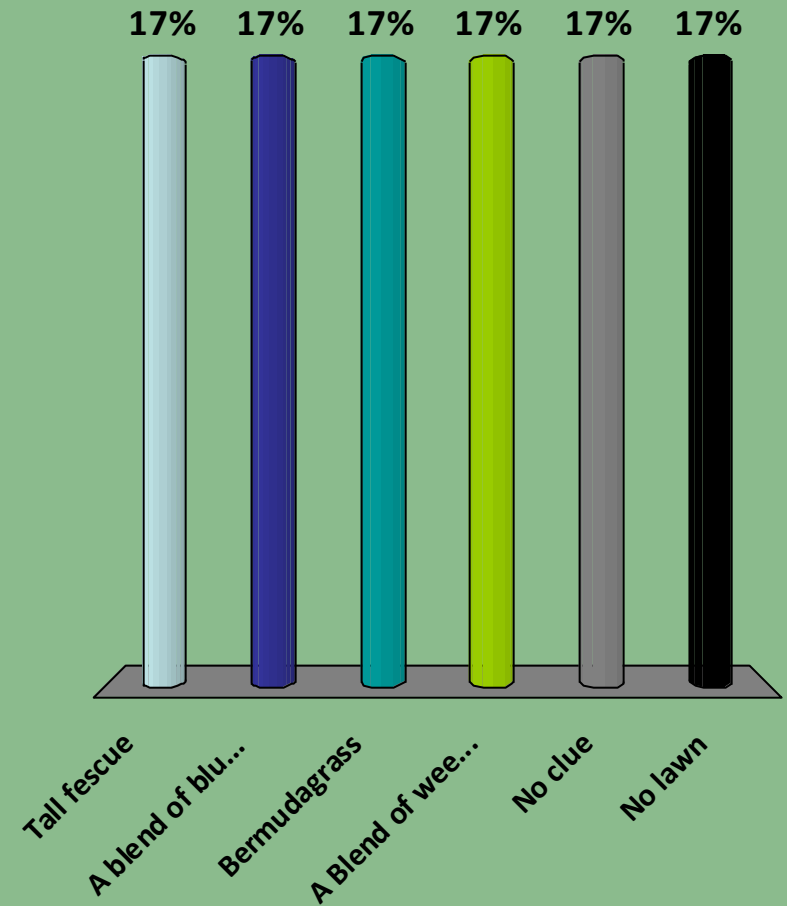
How do you feel about lawns in general?

1. Love it!!
2. Lawn is important for my home and lifestyle
3. Like it for my kids and pets to play on but...
4. Would rather see a vegetable garden.
5. Think it is a waste of resources.
6. Lawn sucks!



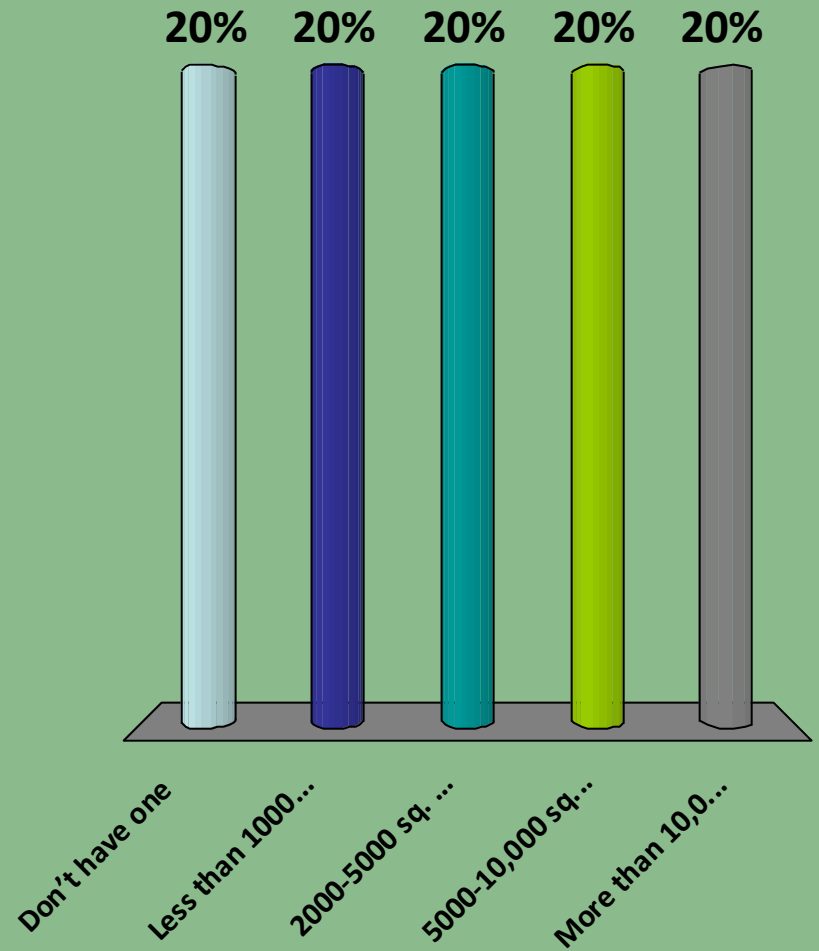
What species of lawn do you have?

1. Tall fescue
2. A blend of bluegrass/ryegrass and fescue
3. Bermudagrass
4. A Blend of weeds and grass
5. No clue
6. No lawn



How Big is Your Lawn?

1. Don't have one
2. Less than 1000 sq. ft.
3. 2000-5000 sq. ft.
4. 5000-10,000 sq. ft.
5. More than 10,000 sq. ft.



Lawns are not bad...Lawns are good....

- Concerns about water use.
- Important for many reasons
 - Playing surface
 - Firesafe landscape
 - Erosion control
 - Climate moderation
 - Water absorption



All About Turfgrass.....

- Lawn establishment
- Turf identification and selection
- Maintenance of new turf
- Maintenance of established turf
- Pest management

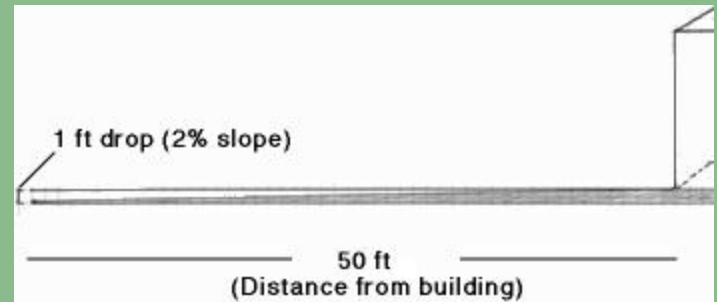


Lawn Establishment

- Seed, sod or stolons
- Choice is dependent upon species, environment, and \$\$\$\$
 - Climate consideration: warm or cool season
 - Ultimate use of the turf
 - Degree of quality and input into maintenance desired

Lawn Establishment

- Soil preparation
 - Remove debris
 - Rake away from buildings
 - Control weeds
 - Starter fertilizer
 - Install irrigation
 - Final grade/settle



Lawn Establishment

- Fertilization

- Starter fertilizer recommended:

- Incorporate to a depth 2 to 4 inches
 - Rate is dependant upon species selection and on material used. Should include high P and K.

- 10-20-10 20 lbs./1000 sq. ft.

- 5-20-10 20 lbs./1000 sq. ft.

- 16-20-0 6 lbs./1000 sq. ft.

Seed or Sod

- Seed can be less expensive initially
- Important to prepare the seedbed correctly
- Sod initially more expensive but instant
- Fewer weed problems



Seedbed Preparation

- Prepare smooth firm seedbed of loose soil
- Divide seed in half and sow in two directions
- Cover seed to a depth of 1/16-1/8th inch
- Tamp with corrugated roller or rake
- Irrigate lightly and often

Purchase Quality Seed

- Single species
- Blends and Mixtures



CONTENT ANALYSIS

%PURE SEED	KIND	ORIGIN	%GERM
59.89	GULF ANNUAL RYEGRASS	OR	99
29.72	IRIKI PERENNIAL RYEGRASS	OR	96
4.94	CREeping RED FESCUE	CAN	95
4.99	SHAMROCK KENTUCKY BLUEGRASS	OR	94
9.99	OTHER CROP		
9.46	INERT MATTER		
9.99	WEED SEED (NO NOXIOUS)		

TEST DATE: 12/91
USE BEFORE: 3/93

APIS 716
LOT NO: ISUNNY-92-2-13

Content analysis of purchased lawn seed





This professional is hydroseeding a lawn



This sloped area has just been hydroseeded

Time and Rate to Plant

Turf Species	Time to Plant	Seeding rate (lbs. seed / 1000 sq. ft.)
Bermudagrass (seeded)	Late spring/early summer	1
Buffalograss	Late spring/early summer	1.5-2
Hard Fescue	Fall or spring	5
Kentucky Bluegrass	Fall or spring	2-3
Perennial Rye	Fall or spring	6-9
Tall Fescue	Fall or spring	8-10

Sodding

- Similar to seed bed but avoid deep footprints or wheel tracks.
- Water just before laying sod (avoid placing roots on hot surface).
- Purchase premium grade sod.
- Install quickly (within 24 hours).

Sod Laying Issues



Sodding

- Start by establishing a straight line lengthwise through the lawn.
- Lay sod on either side with staggered ends.
- Walk on a piece of plywood to avoid developing depressions.
- Optimally lay sod when turf is actively growing.

Warm Season Grasses Available as Sod

St. Augustinegrass

Bermudagrass (hybrid)

Buffalograss

Kikuyugrass

Seashore paspalum

Zoysiagrass

Cool Season Grasses Available as Sod

Bentgrasses (some varieties)

Tall Fescue

Hard fescue (often mixed with Kentucky bluegrass)

Kentucky bluegrass (often mixed with perennial ryegrass and/or fine fescues)

Perennial ryegrass (often mixed with Kentucky bluegrass)

Red fescue (often mixed with Kentucky bluegrass)

What about Sprigging, Stolons or Plugs?



What Turf Species Should I Choose?

- Depends on Climate
- Depends on Use
- Depends on Desired Level of Maintenance

Climate

- Transition Zone
 - High summer temperatures/Cool winter temperatures
 - Bermudagrasses
 - Kentucky Bluegrass
 - Ryegrass
 - Zoysia
 - St Augustine
 - Tall fescue
 - Red fescue
 - Hard fescue
 - Buffalograss
 - California Native Bent Grasses

Turfgrass Use



Desired Maintenance Level

- Mowing
- Irrigation
- Fertilization
- Dethatching
- Aeration

High Maintenance



Creeping Bentgrass

Hybrid Bermuda

Perennial ryegrass

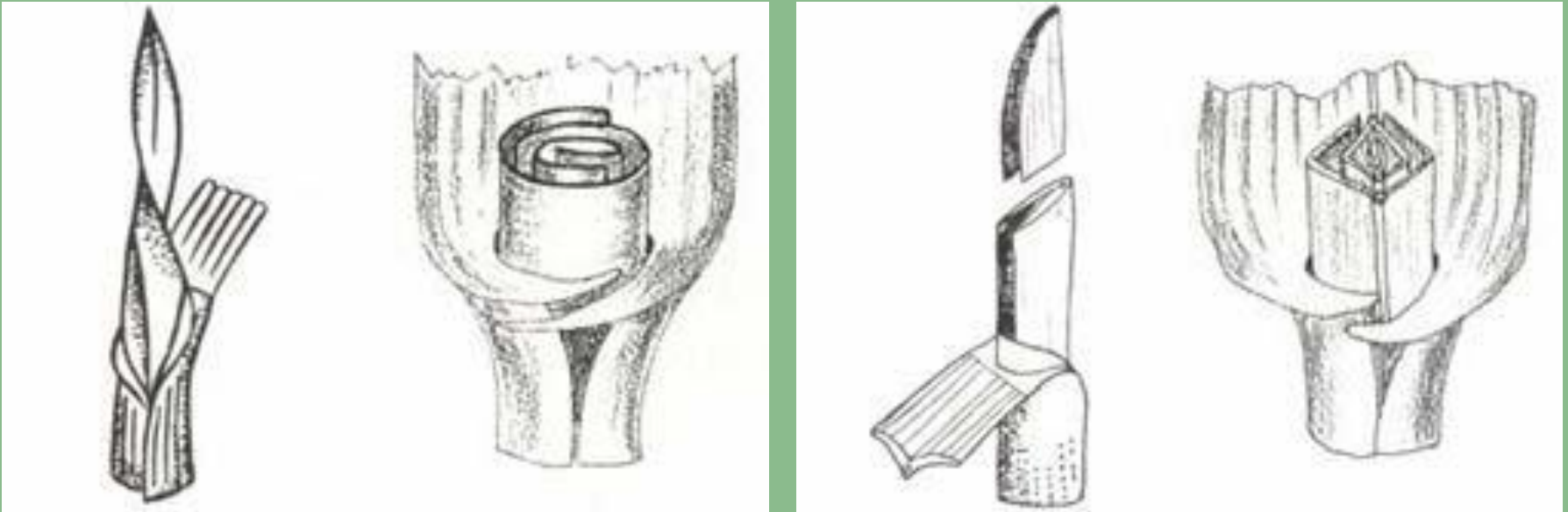
Zoysiagrass

Tall fescue

Common Bermudagrass

Low Maintenance

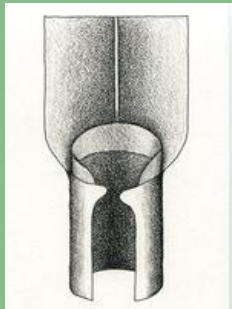
How Do I Identify My Turf?



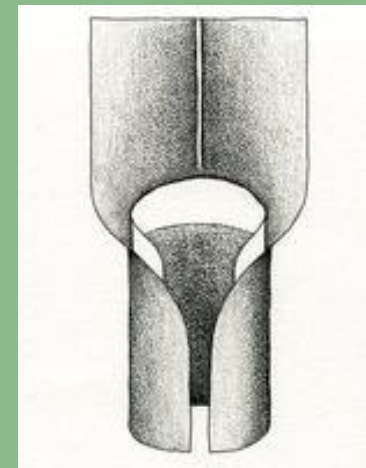
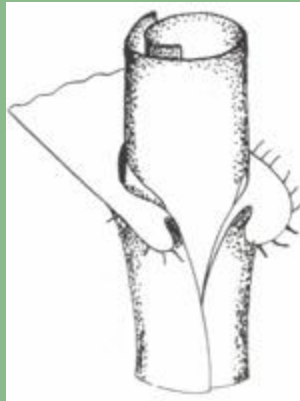
Rolled or folded in the bud?

<http://www.ipm.ucdavis.edu/TOOLS/TURF/TURFSPECIES/keystart.html>

How Do I Identify My Turf?



Auricle present or absent?



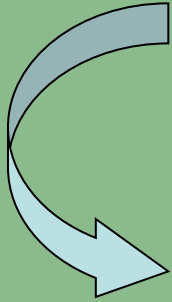
Auricle long or short?

Ligule is membranous or fringed?

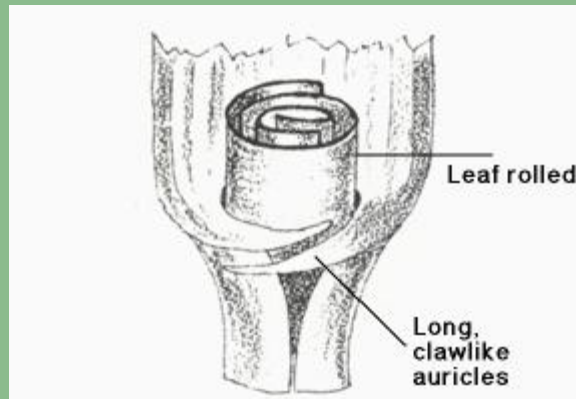
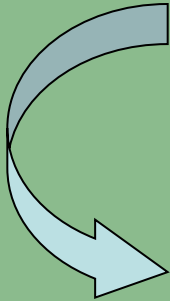
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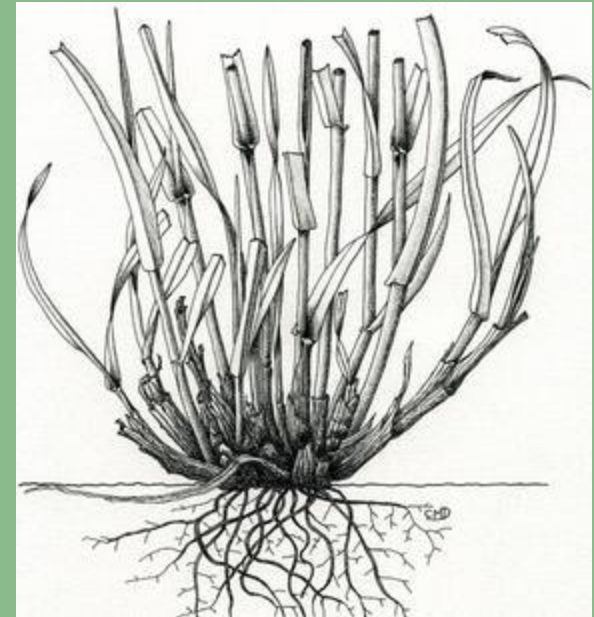
Auricle present or absent?



Auricle long ?



Collar of Annual Ryegrass



What would I choose for this climate zone?

- Tall Fescue
- Blend of Kentucky Blue/Rye and Red Fescue
- Common Bermudagrass (hybridized seed)
- Buffalograss
- California Native Bent Grasses (ground cover)
- Hard Fescue (ground cover)

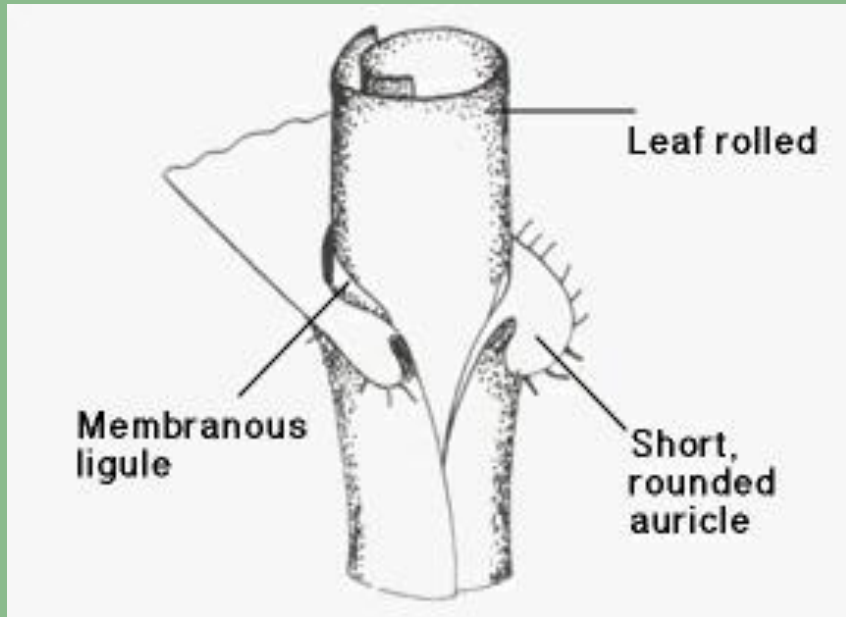
Tall Fescue (*Festuca arundinacea*)

- Well adapted to sun or partial shade.
- Good weed and disease resistance.
- Tolerates warm summers and stays green during cool, but not severe winter conditions.
- New varieties finer in texture
- Good for general lawn use



Tall Fescue Drawbacks

- Bunch grass-slow recovery
- Difficult to manage warm season grass invasion
- Course texture



Blended Kentucky Blue/Rye and Red Fescue

(Poa pretensis, Lolium perenne, Festuca rubra)

- Moderate to high maintenance.
- Tolerate cold winters but low tolerance for heat.
- Moderately drought tolerant. can go dormant if drought stressed.
- Moderate wear tolerance, recovering quickly from some abuse.



Blended Kentucky Blue/Rye and Red Fescue Drawbacks

- Disease susceptibility
- Requires frequent irrigation (every 1-3 days).
- Struggling turf susceptible to weed invasion.



Common/Hybrid Bermudagrass

Cynodon spp

- Low to high maintenance.
- Seeded bermudagrass requires only moderate nitrogen and infrequent watering.
- Hybrid varieties are higher maintenance.
- Bermudagrass has a low tolerance for shade and cold temperatures.
- Bermudagrass has a high tolerance for salinity.



UC Verde Buffalograss

- Maximum height of 4 to 6 inches
- Seedless, and does not produce any seed heads.
- 1/4 inch of water per week, resulting in up to a 75% reduction in water consumption
- Slow growing, and expensive to install



Buffalograss versus tall fescue

California Native Bent Grass

Agrostis pallens

- Medium leaf texture
- Thrives in full sun and partial shade
- Withstands low mowing heights
- Strong sod mat provides effective weed barrier
- Extremely drought tolerant
- Uniform growth habit
- Excellent wear recovery due to self repairing rhizomes



Native Mow Free™

Western Mokolumne fescue- *Festuca occidentalis*

- Idaho fescue- *Festuca idahoensis*

- Molate fescue- *Festuca rubra*

- Contains two native fine fescues and one highly naturalized variety.
- Excellent shade and cold tolerance.
- Deep green glossy leaves.
- Slow growing, narrow leafed grass with blades that are very lax and flexuous.
- Provides soil stabilization for sloped areas.



Compliments of Delta Bluegrass Co.

Lawn Maintenance

- Mowing
- Fertilization
- Irrigation
- Dethatching
- Aeration
- Pest Management

Mowing Equipment

- Reel type mowers are suited to fine bladed grasses
 - Bermudagrass (hybrid or common)
 - Bent grasses
 - Hard Fescue
 - Red Fescue



A reel mower that is pushed by hand

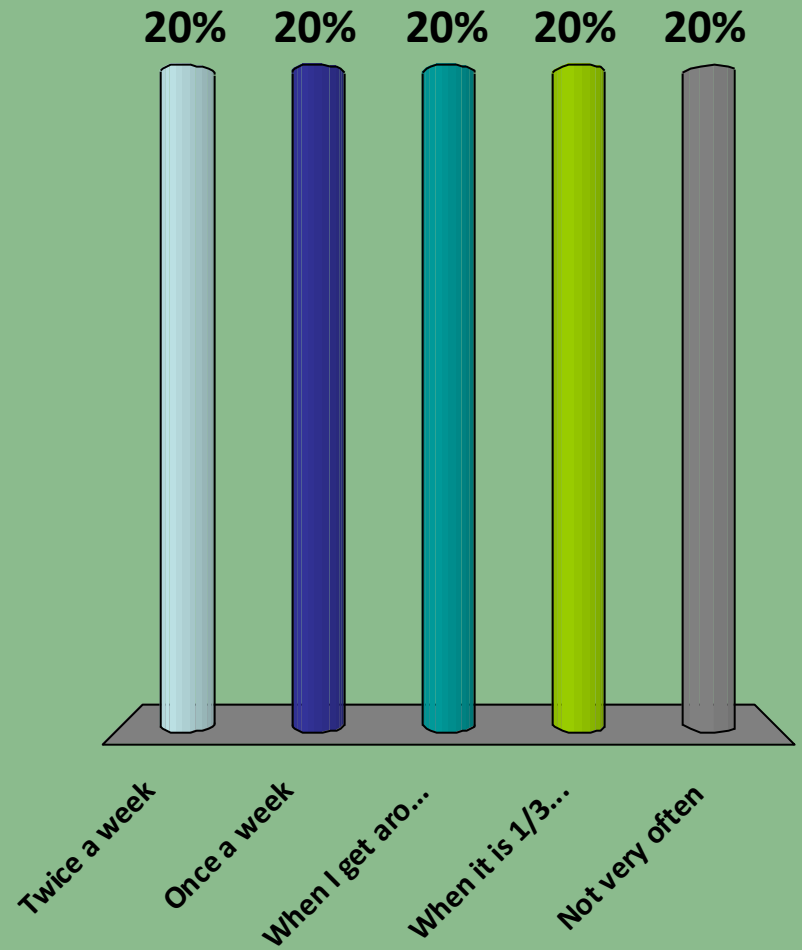
Mowing Equipment



- Rotary Mower best on tall course grasses or uneven mowing surfaces
 - Tall Fescue
 - Perennial Rye
 - Kentucky Blue
 - Red Fescue
 - Common Bermuda

If you have a lawn...how often do you mow your lawn in summer?

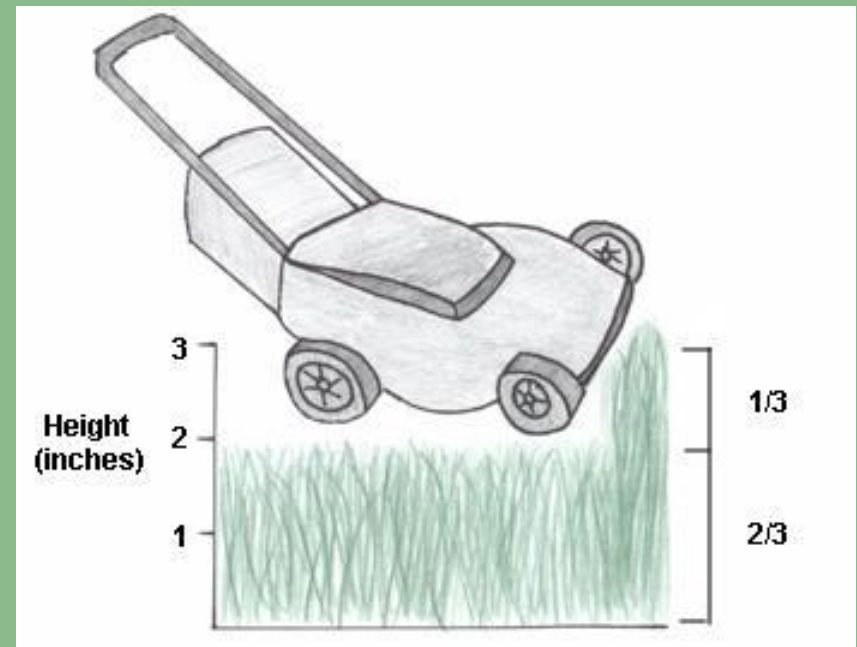
1. Twice a week
2. Once a week
3. When I get around to it
4. When it is 1/3 higher than the desired mowing height
5. Not very often



Follow the Golden Rule of Mowing.....

“Mow when turf is $\frac{1}{3}$ rd higher than desired height of cut”.

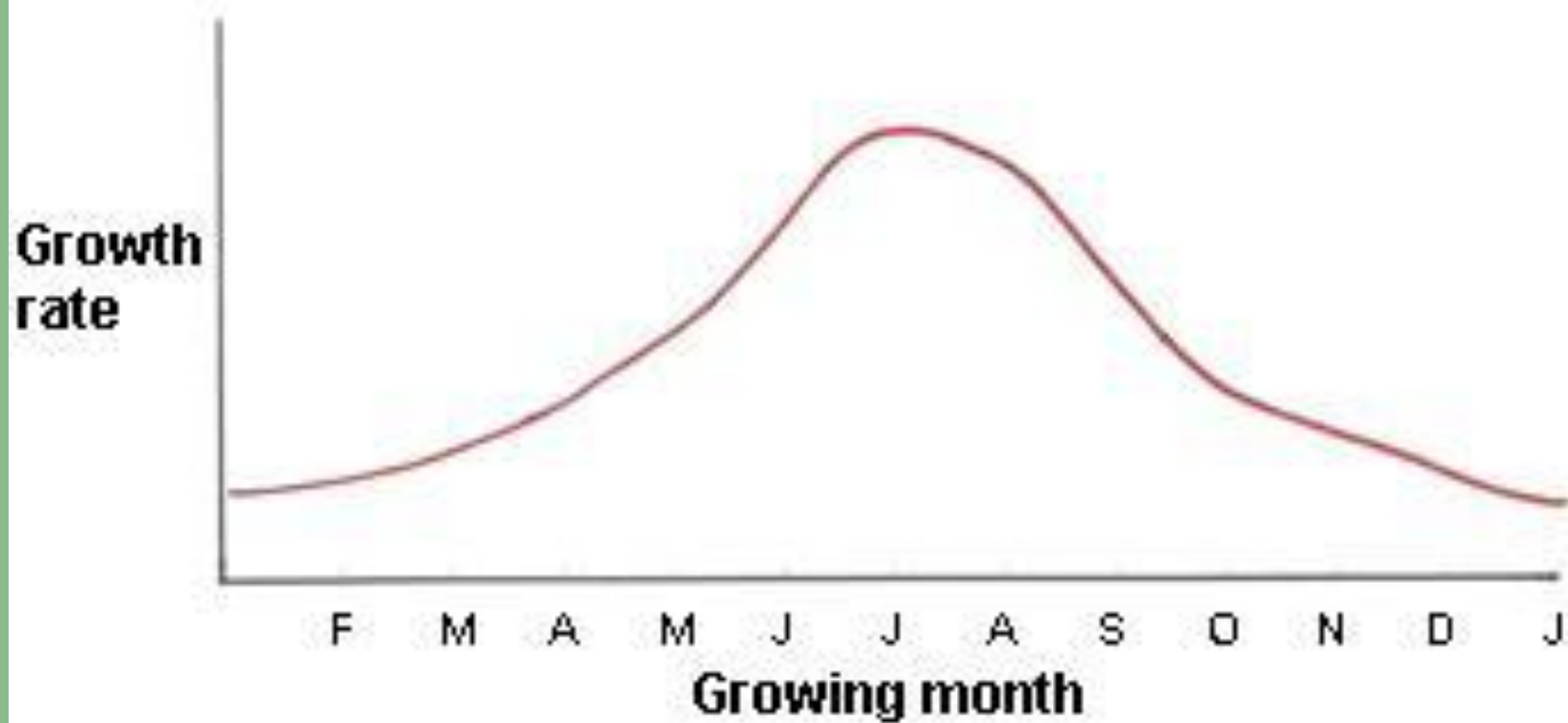
- Optimum mowing height
- Frequency



Recommendations for mowing warm-season grasses

Turf species	Set mower to:	Mow when turf reaches:
Bermudagrass (seeded)	1 - 1 1/2 inches	1 1/2 - 2 1/4"
Bermudagrass (hybrid)	1/2 - 1 inch	3/4 - 1 1/2
Buffalograss	1 - 2 inches	1 1/2 - 3 inches

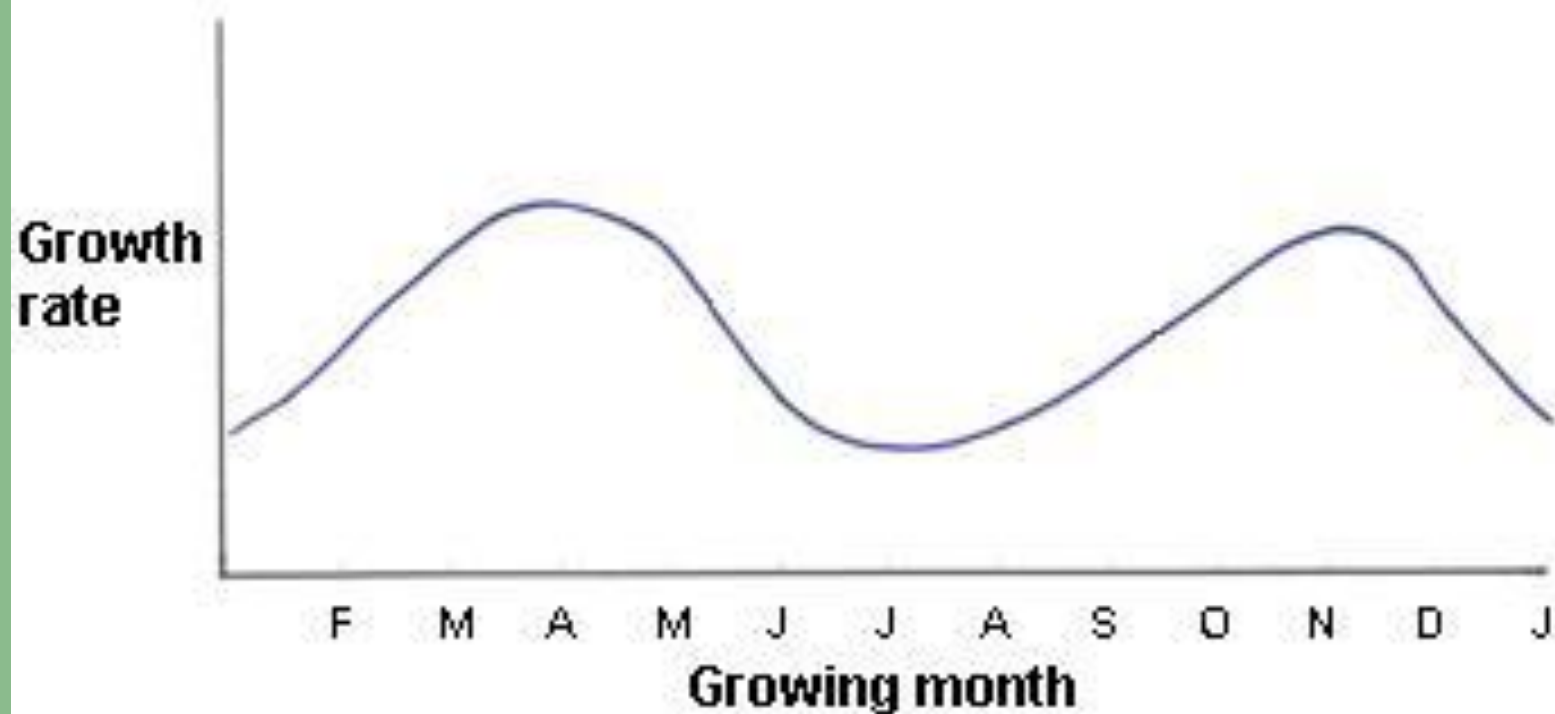
Growth pattern for warm-season grasses



Recommendations for mowing cool-season grasses

Turf Species:	Set Mower to:	Mow When Turf Reaches:
Tall Fescue	1 ½ -3 inches	2 ¼-4 ½ inches
Perennial Ryegrass	1 ½ -2 ½ inches	2 ¼- 3 ¾ inches
Kentucky Bluegrass	1 ½ -2 ½ inches	2 ¼- 3 ¾ inches
Red Fescue	1 ½ -2 ½ inches	2 ¼- 3 ¾ inches

Growth pattern for cool-season grasses



How Often to Mow.....

- Dependent upon the rate of growth
 - Species
 - Climate
 - Inputs such as irrigation and fertilization



Mowing

- Mowing contributes to pest problems when:
 - Turf is mown too short
 - Turf is mown too high
 - When blades are dull
 - Mown too infrequently (scalping)



Too Short....

- Keeps the turf canopy too open which allows for more light to reach soil resulting higher soil temperatures
- Doesn't allow for proper carbohydrate reserves which results in poor recuperative ability.



Too Tall.....

- Tall canopy shades out blades closer to the crown of the plant.
- Decrease in air circulation around plant resulting in more moisture being retained.
- More contact between blades.
- Aesthetic quality may be compromised.



Too Infrequently.....

- Results in scalping which results in:
 - Open canopy.
 - Loss of carbohydrate reserves in plant.
 - Inability to recover from stress.
 - Opens turf to more weeds.

Dull Mower Blades

- Dull blades make ragged cuts which have more freshly cut surface area to support fungal growth.



Lawn Fertilization

- Healthy, dense lawns are more resistant to diseases, insects and weeds.
- Have better recuperative ability.
- All turfgrasses require nitrogen, maybe phosphorus, potassium and iron on a regular basis.
- Sulfur may also be required.

Optimum Fertilization

- Apply 4-6 lbs of actual nitrogen per 1000 sq. ft. per year.
- Apply no more than 1 lbs. per application
- Sandy soils benefit from lighter, but more frequent applications.
- Fertilizers should be applied only during active growth periods.
- Direct correlation with increase weeds/low N

What about Potassium?

- Potassium may help prevent disease because it increases the turfgrass resistance to adverse environmental conditions.
- Potassium is incorporated into cell wall structure to increase rigidity.

What to Fertilize With?

TURF BRAND

Fertilizer

28 - 3 - 3

GUARANTEED ANALYSIS

Total nitrogen (N)28%

0.5% Ammoniacal nitrogen

15.1% Urea nitrogen

11.9% Other water soluble nitrogen

0.5% Water insoluble nitrogen

Available phosphate (P_2O_5)3%

Soluble potash (K_2O)3%

Derived from: monoammonium phosphate, urea, methylene urea, muriate
of potash

KEEP OUT OF REACH OF CHILDREN

Recommended Fertilizer Rates:

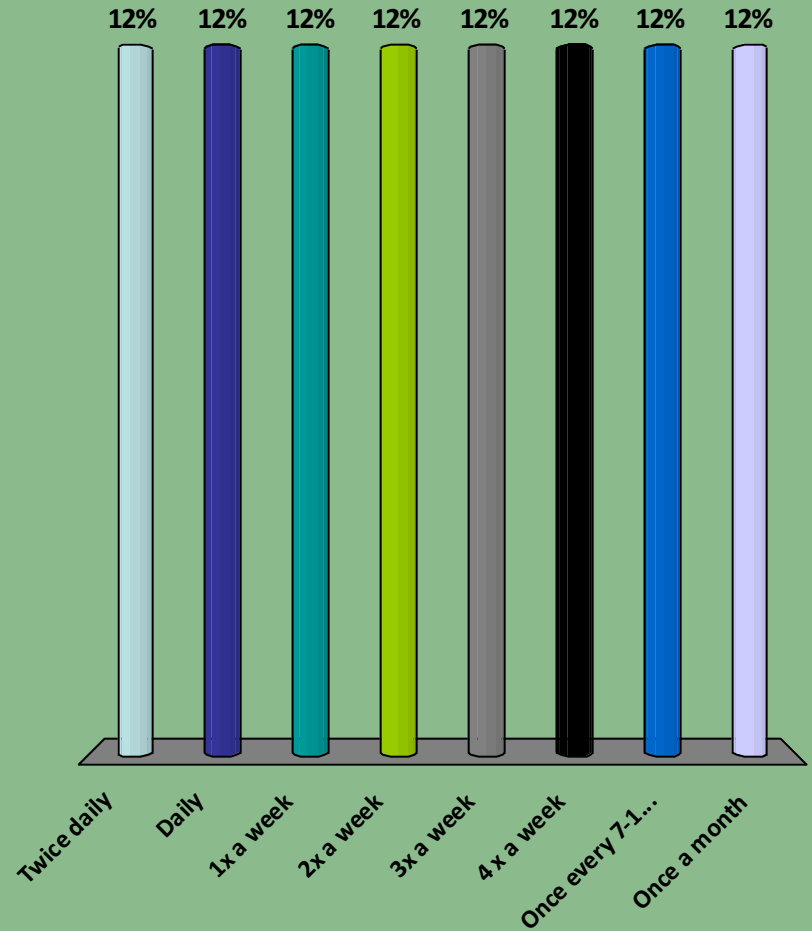
Grass Type	Fertilizer Requirements lbs. actual N/1000 sq. ft. per year
Warm Season Grasses	2-4 (seeded) 4-6 (hybrid)
Buffalograss	1-2
Cool Season Grasses	3-6
Red fescue	1-2
Hard fescue	1-2

Turfgrass Irrigation



How often do you water your lawn in summer?

1. Twice daily
2. Daily
3. 1x a week
4. 2x a week
5. 3x a week
6. 4 x a week
7. Once every 7-10 days
8. Once a month



Urban Drool



Urban Drool.....



Principles of Turfgrass Irrigation

- How should water be applied?
- How much water should be applied?
- How often should water be applied?

How Should Water Be Applied?

- Never faster than absorbed by soil.
- Factors affecting application rate:
 - Soil texture
 - Soil structure
 - Slope
 - Drainage
 - Compaction



How Much Water Should be Applied?

- Depends upon water-holding capacity of the soil.
- The amount of moisture already present in soil.
- Drainage (removal of excess water from soil).
- Weather conditions-basing irrigation on Eto

How Often Should Water be Applied?

- Depends upon type of grass and rooting depth
 - Deep, infrequent is best when possible
- Soil physical properties
- Climate (rainfall, humidity, temperature, and wind movement).
- Frequency is most associated with disease development.



Using ET to determine your irrigation schedule (inches per day)

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec
7 Sierra	-	-	-	.10	.13	.16	.20	.17	.13	.09	-	-
11 South Deserts	.09	.13	.19	.25	.33	.38	.37	.31	.28	.20	.12	.06
4 North Valley	.03	.06	.10	.15	.21	.25	.25	.21	.16	.11	.05	.02

Using Reference ET

- Helps to estimate the actual daily and seasonal water use to schedule irrigation.
- Plants may use more (solid plantings may use 10-20 percent more water)
- Most plants can be maintained at much less
- May only use 50-80% of ET.

Using Reference ET

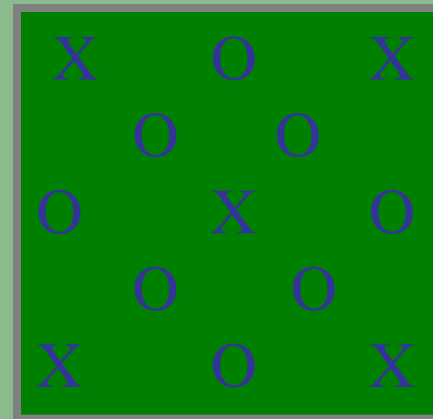
- Turfgrass example:
- Determine the type of lawn—cool or warm season
- Determine the sprinkler output.
 - Lawn water audit

Doing a Lawn Water Audit

- Set six straight-sided cans of the same type between sprinkler heads
- Run sprinkler for 20 minutes

Catch Can Tests Can Help:

- Determine sprinkler output or application rate.
- Uniformity

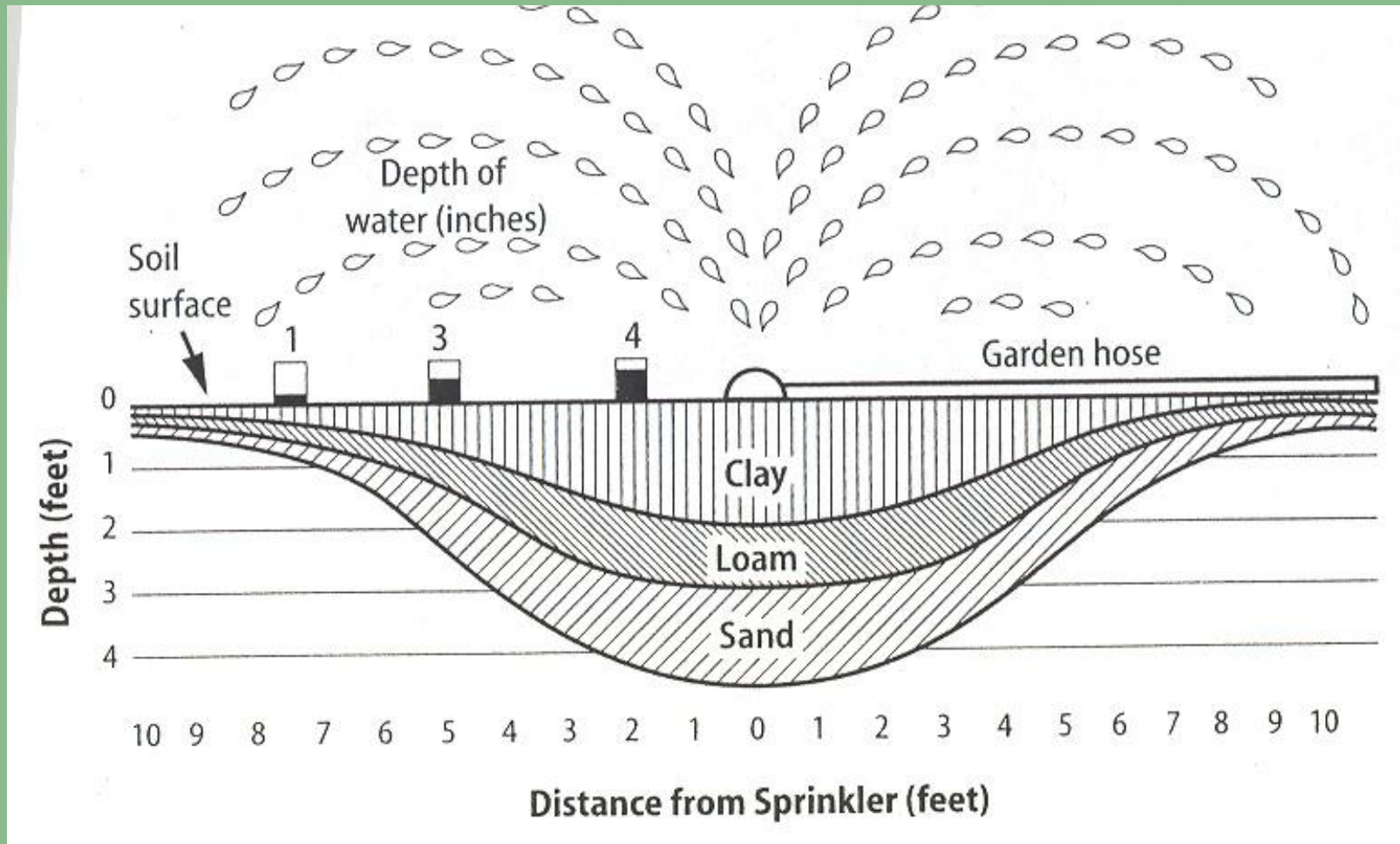


Lay out of catch-can test showing placement of Catch-cans (O) and sprinkler heads (x). Spread cans uniformly every 10-15 ft. between sprinkler heads.

Doing a Lawn Water Audit

- Measure water depth in each can.
- Average the amount.
 - If more than 15-20 percent depth difference in an individual can-there is a uniformity problem that will need correction.

Irrigation Uniformity



Doing a Lawn Water Audit

- Multiply by 3 to determine inches per hour. (20 minute test)
- Divide by 60 to get inches per minute.

Irrigation Uniformity

- Requires “head to head” coverage
- Requires “matched precipitation rate” heads
- Requires modification for wind
- Can change over time with age and wear.

Determine how long to water the lawn each week.

- $ET(\text{ref}) \times .Kc$ (crop coefficient)
 - Cool season grass is 0.8; warm season is 0.6
 - $.25 \text{ in/day} \times 0.8 Kc = .20 \text{ inches per day}$

Determine how long to water the lawn each week.

- Using your application rate information:
 - $.50 \times 3/60 = 0.025$ inches per minute
 - $.20 / .025 = 8$ minutes per day
 - 8 minutes per day \times 7 days = 56 min. per week
 - $56 / 3 = 19$ minutes 3 times per week.

Or Use Irrigation Guide: Minutes to Irrigate:

Warm Season Turfgrasses					Cool Season Turfgrasses			
Minutes to irrigate per week if hourly sprinkler output is:					Minutes to irrigate per week if hourly sprinkler output is:			
	0.5 in.	1.0 in.	1.5 in.	2.0 in.	0.5 in.	1.0 in.	1.5 in.	2.0 in.
JAN	19	9	6	5	31	15	10	8
FEB	38	19	13	9	43	22	14	11
MAR	69	35	23	17	79	39	26	20
APR	101	50	34	25	124	62	41	31
MAY	132	66	44	33	164	82	55	41
JUN	164	82	55	41	207	103	69	52
JUL	170	85	57	43	231	115	77	58
AUG	145	72	48	36	198	99	66	50
SEP	113	57	38	28	141	70	47	35
OCT	69	35	23	17	96	48	32	24
NOV	32	16	11	8	40	20	13	10
DEC	13	6	4	3	20	10	7	5

Most Problems Stem from Poor Irrigation Practices

- Broken valves
- Insufficient water pressure
- Poor distribution
- Insufficient or excessive water
- Frequency
- Soil Compaction
- Drainage



Thatching

- What is Thatch?
- Why is it a problem?



Do All Grasses Produce Thatch?

Thatch Formation of Cool Season Turfgrass Species

Species

- Kentucky Bluegrass
- Turf-Type Perennial Ryegrass
- Hard Fescue
- Chewings Fescue
- Creeping Fescue
- Tall Fescue**
- Creeping Bentgrass

Thatch Formation

Medium to high
None
Medium
Medium to high
Low to medium
Low to none
Medium to high

Thatch Removal Options



A thatching rake

Thatch Removal Options



Topdressing to Reduce Thatch



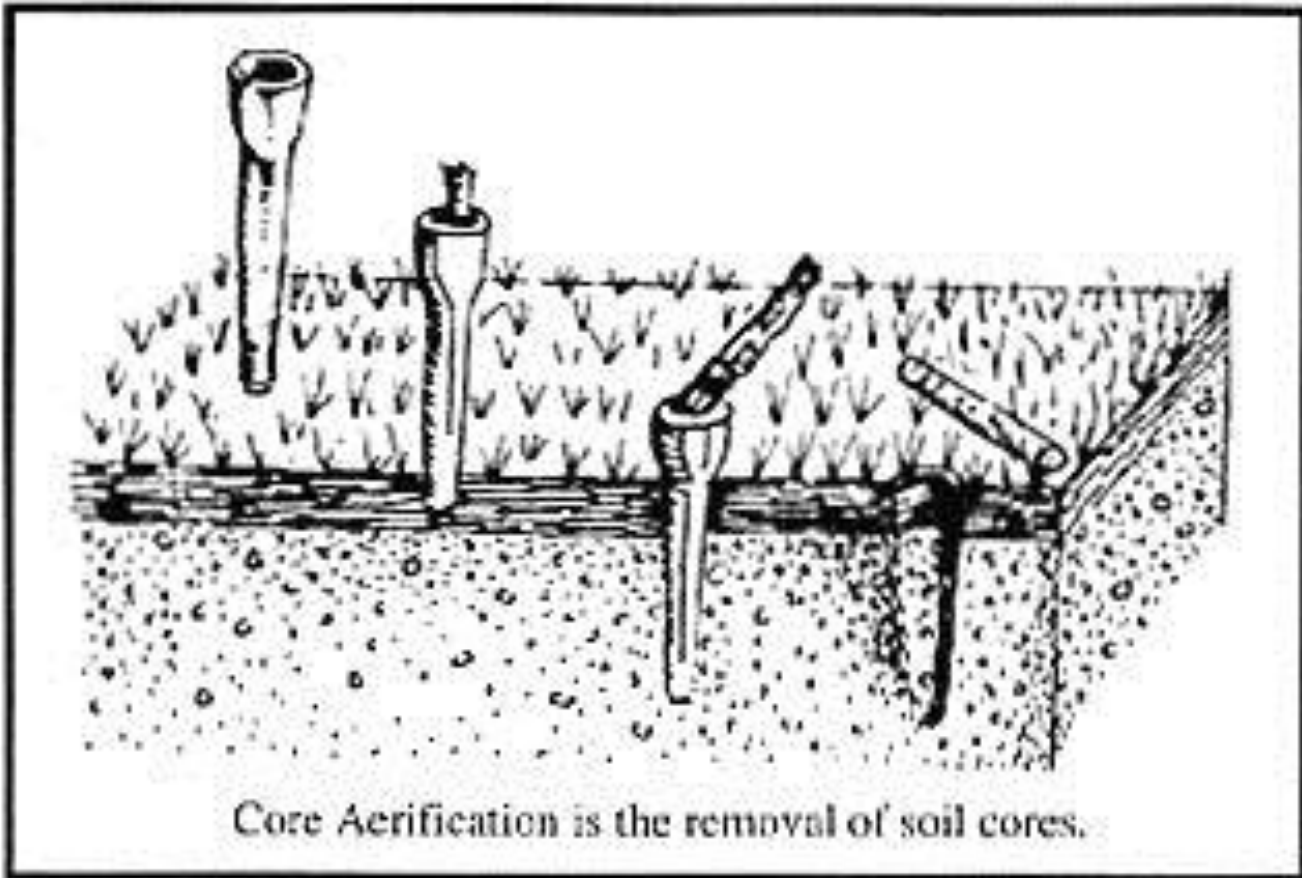
Dethatching: When and How Often

- When spongy or more than ½” deep.
- Best time of year is mid-to-late spring or early fall.
- Bermudagrass, bentgrass, and Kentucky bluegrass may need it yearly.
- Tall fescue and perennial ryegrass may only need it every few years.



Core Aerification

Process of Core Aerification



Core Aerification is the removal of soil cores.

Aeration to Reduce Compaction

- Soften the soil a few days before aerate by watering.
- Remove soil cores that are 1/4 - 1/2 inch in diameter, 4 - 6 inches apart, and about 3 to 4 inches deep.
- Leave cores on the lawn.
- Fertilize and irrigate as necessary. (especially P&K).



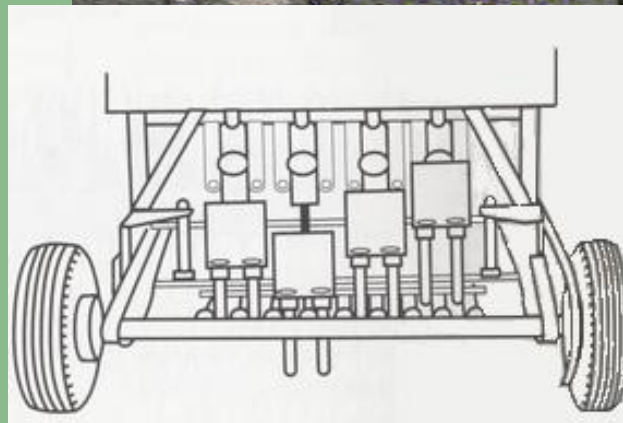
Equipment



A roller-type aerifier



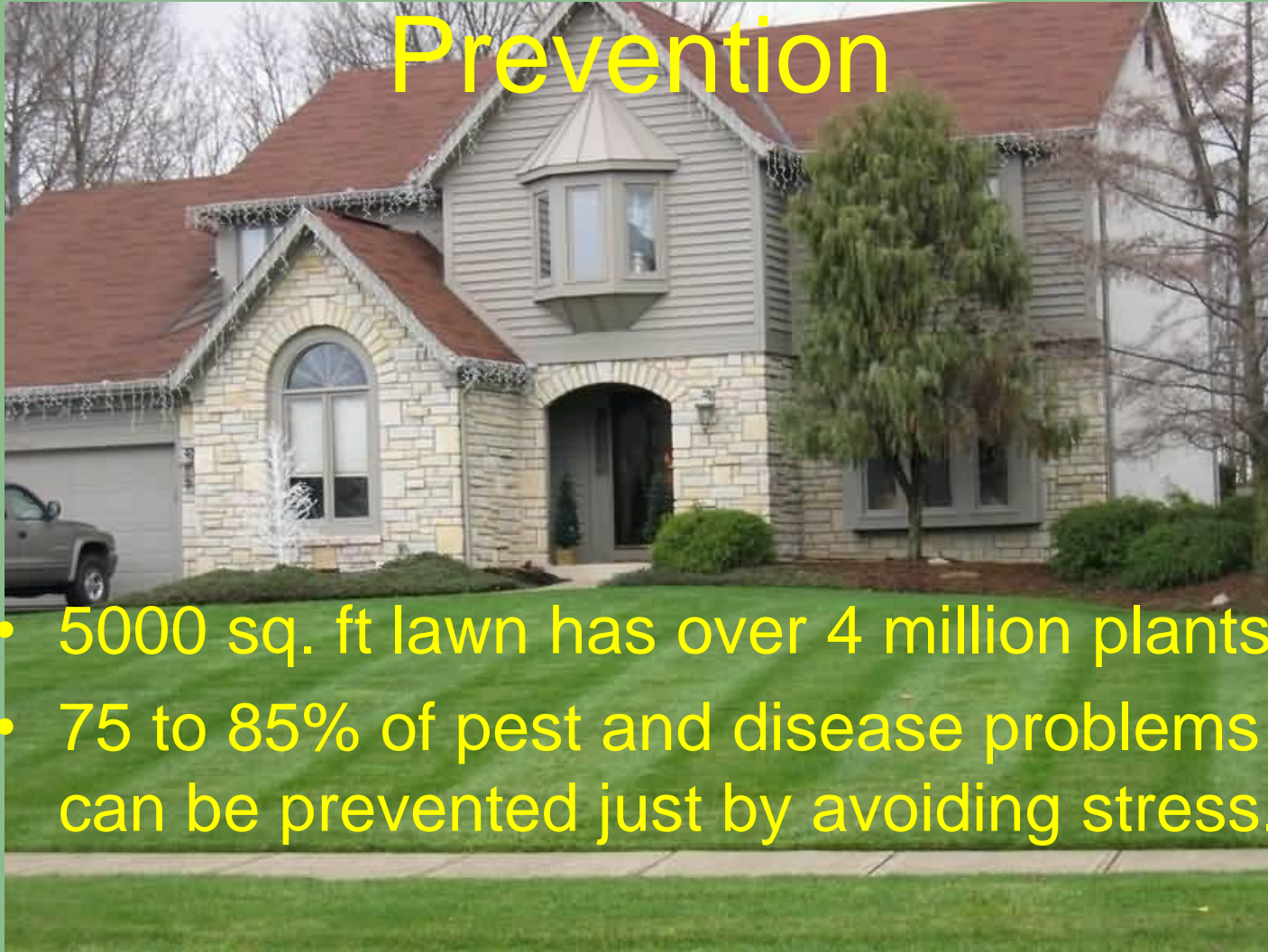
roller-type aerifier



Timing of Aerification

- If you see areas damaged from too much traffic or if water puddles or runs off without soaking in, soil may be compacted
- Aerify during the spring when grasses are actively growing.
- Avoid aerifying during the summer months when high temperatures may be detrimental to lawns.

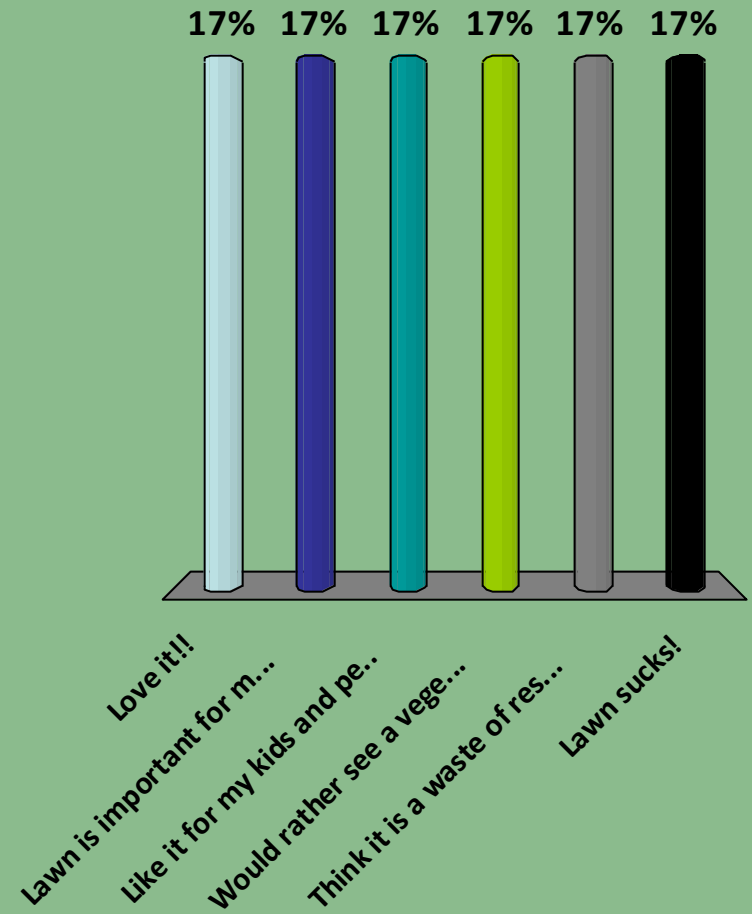
Proper Maintenance is Prevention



- 5000 sq. ft lawn has over 4 million plants.
- 75 to 85% of pest and disease problems can be prevented just by avoiding stress.

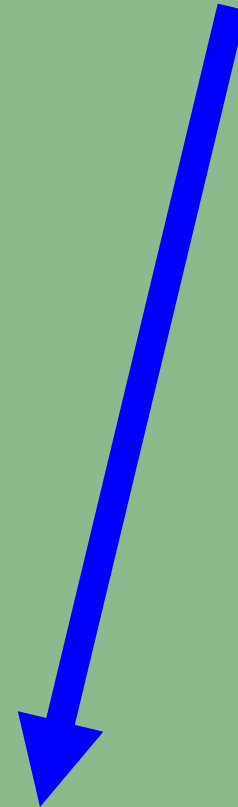
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6. Lawn sucks!



Pest Management

- Insects
- Diseases
- Abiotic Disorders
- Weeds
- Vertebrates*



<http://ucipm.ucdavis.edu/tools/turf>

The UC Guide to Healthy Lawns - Windows Internet Explorer

http://www.ipm.ucdavis.edu/TOOLS/TURF/

File Edit View Favorites Tools Help

Google Search

Google Image Result for http... UCANR Portal The UC Guide to Healthy ...

University of California • Agriculture and Natural Resources

UC IPM Online
STATEWIDE INTEGRATED PEST MANAGEMENT PROGRAM

UC IPM Home

[Search](#)

How to Manage Pests

Home & garden
Agriculture
Natural environments
Exotic & invasive
Weather data & products
Degree-days
Interactive tools & models

Identification Galleries

Natural enemies
Weeds

Educational Resources

Publications & more
Workshops and events
Training programs
Pesticide information

Research and IPM

Grants programs
Funded-project results

● What's new

How to Manage Pests

The UC Guide to Healthy Lawns

for home gardeners and managers of parks, school grounds, and other low-maintenance turf

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All you need to know to grow a lawn using little or no pesticide

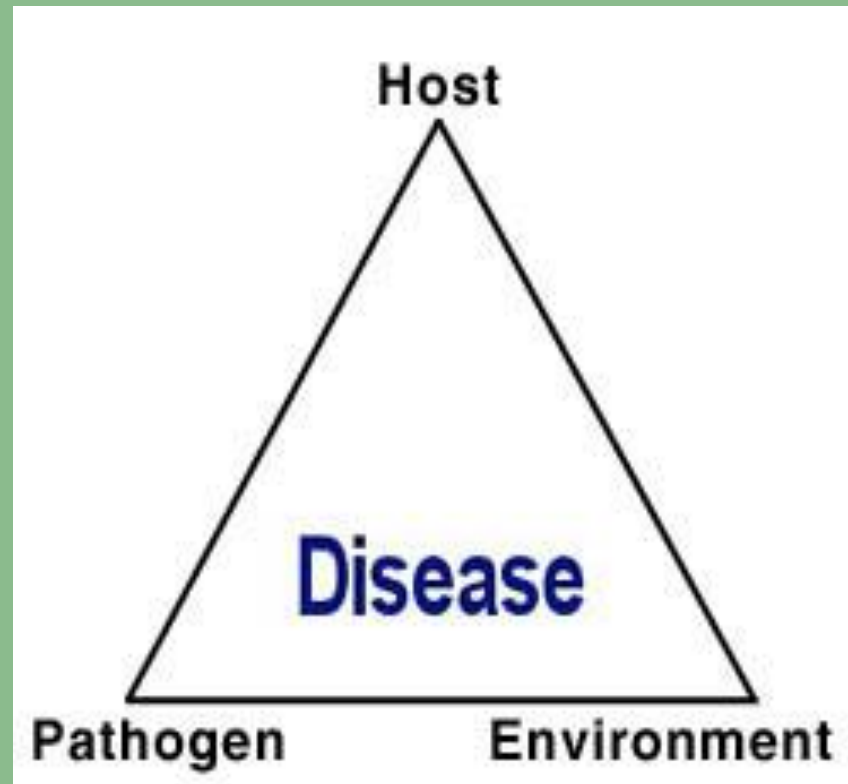
	Choose and identify your turf species		Lawn care for new lawns
	Prepare the site and plant turf		Lawn care for established lawns
	Lawn renovation		Manage pests and diagnose problems

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What Causes Disease and Pest Problems?

- Environment
- Pathogen/pest
- Host
- Time



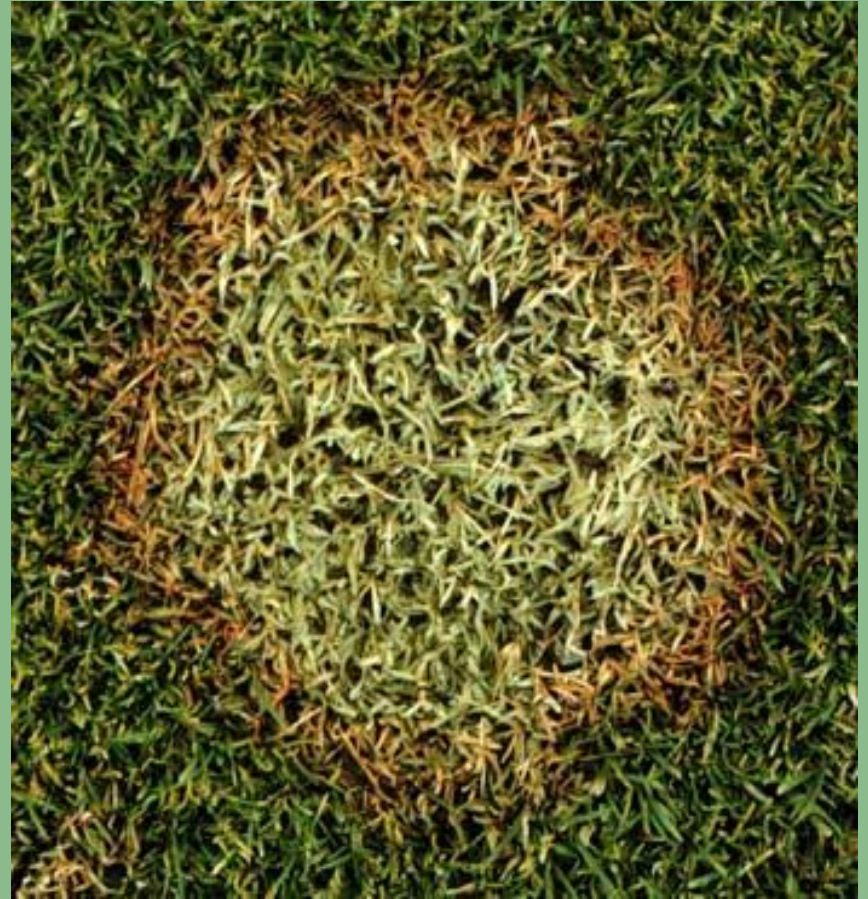
Pest and Disease Development

- Environmental and Management Factors
 - Species Selection
 - Temperature
 - Irrigation
 - Fertilization
 - Soil Reaction pH
 - Mowing
 - Aeration
 - Vertical Mowing
 - Pesticide Application

Identifying the Problem

Difficult

- Timing
- Secondary pests
- Symptoms resemble other problems
 - Fertilizing
 - Mowing practices
 - Dog urine
 - Pesticides
 - Temperature
 - Thatch
 - Incorrect water



Abiotic Disorders in Turf

- Compaction
- Dog injury
- Dull mower blades
- Fertilizer mishap
- Herbicide injury
- Item damage
- Nutrient deficiencies
- Poor watering practices
- Scalping
- Shade



Specific Disease Problems

- Pink Snow Mold or Microdochium Patch



Turfgrass killed by Fusarium patch

Specific Disease Problems

- Pink Snow Mold or Microdochium Patch



Specific Disease Problems

- **Rust** (*Puccinia striiformis*, *P. graminis*, *P. coronata*, and *Uromyces* spp.)



Rust

Symptoms

- Affected leaves and stems turn yellow
- Covered with reddish-brown pustules with dusty spores.
- Yellow spots start small but the entire leaf may soon turn yellow.
- The entire turf may take on a rusty color and look thin and weak.
- Orange spores rub off when leaves are handled.

Susceptible Species

- Bluegrass
- **Fescues**
- Ryegrass
- Annual bluegrasses

Rust

Conditions Favoring Disease

- Moderately warm air temperatures (70° to 75°F)
- Extended periods of leaf wetness
- Nitrogen deficiency increases susceptibility

Cultural Controls

- Maintain turfgrass vigor by following proper irrigation and fertilization.
- Mow regularly and remove the clippings to reduce spores
- Rust can be managed by following proper cultural practices, and fungicides should not be needed.

Rust

When to Treat

- Fungicides are usually not needed to control this disease

- Treatments
- AZOXYSTROBIN
- CHLOROTHALONIL
- MANCOZEB
- MYCLOBUTANIL
- PROPICONAZOLE
- THIOPHANATE-METHYL
- TRIADIMEFON
- TRIFLOXYSTROBIN

Rhizoctonia Patch



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Rhizoctonia Patch

SYMPTOMS

- Small patches or rings.
- May enlarge to many feet across.
- Center areas may recover resulting in rings.
- Leaves and leaf sheaths become water-soaked, wilt, turn light and die.
- Stems, crowns, and may also be infected.
- When roots are not involved, plants often recover.

SUSCEPTIBLE SPECIES

- Bentgrasses
- bermudagrasses
- bluegrasses
- **Fescues**
- Ryegrasses
- Zoysia
- Annual bluegrass.



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Rhizoctonia Patch

CONDITIONS FAVORING DISEASE

- A soil-inhabiting fungus- in the soil or in/on turf.
- Develops fungicide-resistant Sclerotia.
- Excess thatch
- High temperatures (75°-95°F)
- High humidity
- Soft, lush growth
- Common in warm, inland areas.

CULTURAL CONTROL

- Reduce shading
- Improve soil aeration and water drainage.
- Irrigate only when needed (4 to 6 inches).
- Avoid nitrogen fertilization that results in a soft foliage growth.
- Maintain thatch at less than 0.5 inch.

Rhizoctonia Patch

WHEN TO TREAT

- Fungicides on golf greens with history of infestations.
- May be necessary on seedling turf.
- Other infestations may be managed best by improving water and fertility management.

Registered Materials

- AZOXYSTROBIN Heritage
- CAPTAN Captan
- CHLOROTHALONIL Daconil 2787
- FENARIMOL Rubigan
- FLUTOLANIL Prostar
- IPRADIONE Chipco 26019
- MANCOZEB Fore
- MYCLOBUTANIL Eagle WSP
- PCNB Terraclor Turfcide
- THIOPHANATE-METHYL Fungo Flo
Scotts Systemic Fungicide
- THIRAM Spotrete
- TRIADIMEFON Bayleton

Fairy Ring (*Marasmius oreades*, *Lepiota* spp.)



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Fairy Ring

Symptoms

- Dark green band that develops in a circle (4-8 inches up to 35 ft.) in moist turf.
- Mushrooms
- May be an area of sparse, brown grass caused by lack of water.
- Weeds commonly invade

Susceptible Species

- All grasses are susceptible.
- *Marasmius oreades* is the species of fungus that most often in central/northern California.

Fairy Ring

Conditions Favoring Disease

- Develops in soils high in undecomposed organic matter containing lignin.
- Adding woody uncomposted material plant materials favors fairy ring.

Cultural Controls

- Apply adequate N.
- Aerate soil
- Water heavily in holes; soil wetting agents may improve water penetration.
- Dethatch-develops in turf with heavy thatch.
- Replace infested soil.

Fairy Ring

When to Treat

- Soil fumigation used to be the only chemical remedy.
- Effective alternative chemicals have recently been introduced.

Treatments

- AZOXYSTROBIN Heritage
- METHYL BROMIDE*
Brom-O-Gas
 - COMMENTS: Complete soil sterilization. Use 400 lb/acre, 1 lb/100 sq ft, or 10 lb/1000 sq ft.
 - *Requires permit

Insect Pests in Turf



Monitoring for Turfgrass Insect Pests

- For determining treatment thresholds
 - Monitoring methods
 - Pyrethrum test
 - Soap test
 - Flotation test
 - Cup Cutter

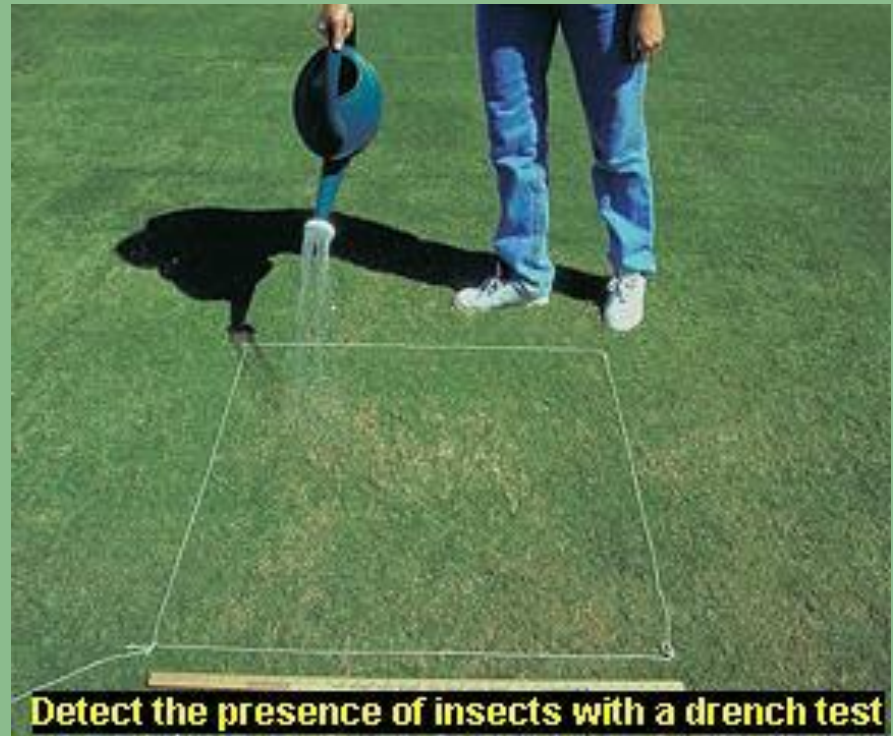


Pyrethrum Test

- Useful for cutworms, webworms, southern chinch bug, fiery skipper larvae and billbug adults.
 - Mix 1 Tablespoon of 1-2% pyrethrum insecticide in 1 gallon water.
 - Identify and determine threshold.

Soap Test

- Same Spread over 1 sq. yard with sprinkling can.
- as pyrethrum test but substitute 1-2 fluid ounces of dishwashing soap per gallon.



Flootation Test

- Useful for leaf feeding insects.
 - 6 inch diameter can with ends removed.
 - Pound into soil 2-3 inches. Fill with water and wait 5-10 minutes for insects to float to surface.

Treatment Thresholds

- Billbugs: 1 or more grub per sq. ft.
- BTA: 40 groups per sq. ft. or 4 per cup cutter.
- Cutworms/armyworms: 5 larvae per sq. yard
- Sod webworms: 15 larvae per sq. yard
- Southern chinch bug: 3 per can or 135 per sq. yard.

Common Pest Problems

- Sod Webworms
- Cutworms and Armyworms
- Masked chafers or White grubs
- Black Turfgrass Ataenius (BTA)
- Flea Beetles

Sod Webworms



Sod Webworm Adult



Sod Webworm

- **SUSCEPTIBLE SPECIES**

Bluegrasses and bentgrasses often suffer the most damage, while perennial ryegrasses and turf-type tall fescues infected with endophytes (symbiotic fungi) and warm season turfgrasses are more resistant.

Sod Webworm

DAMAGE

- First instars are leaf skeletonizers.
- Later instars notch or cut off leaf blades and pull into burrow.
- Heavily infested turf (more than 100/sq yd) appears moth eaten.
- Significant damage can occur on drought-affected grass

BIOLOGICAL CONTROL

- *Steinernema carpocapsae* nematodes
- *Bacillus thuringiensis* subsp. *kurstaki* (Bt), can be used
- Breaks down rapidly in sunlight, washes readily off leaves, and is ineffective against late instar larvae.

Sod Webworm

CULTURAL CONTROL

- Thatch removal can assist in removing sod webworm habitat.
- Control of clover and dichondra may help minimize damage

WHEN TO TREAT

- Monitor in June to early October.
- Treat when 5 larvae per sq. yd. on stressed greens or 15 larvae per sq. yd.

Sod Webworms

- ACEPHATE (Orthene)
- CARBARYL* 80WSP (Chipco Sevin)
- SPINOSAD (Conserve SC)
- AZADIRACTIN (Ornazin, Etc.)
- Cyfluthrin (Tempo)
- Steinernema Carpocapsae (Scanmask)
- Bacillus Thuringiensis
- Trichlorfon (Dylox) 80

Cutworms/Armyworms



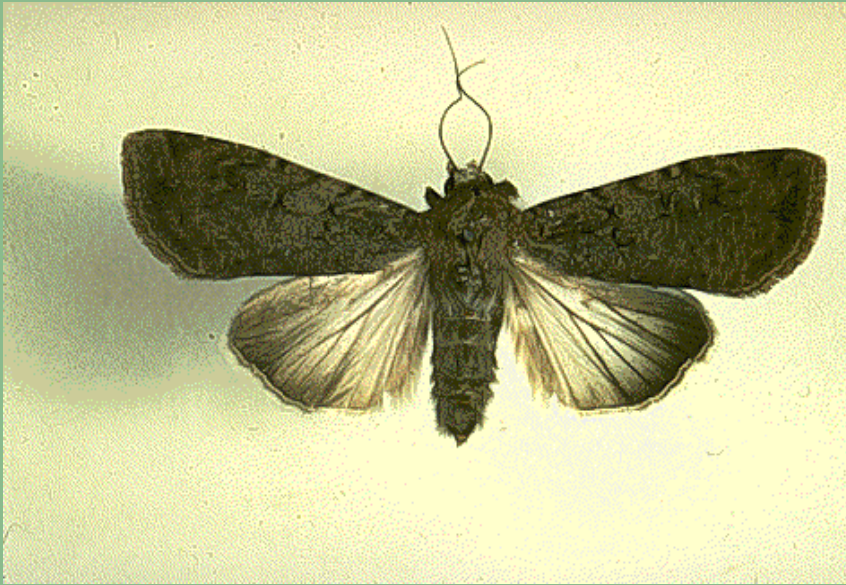
Cutworms

- Solitary feeders
- Larvae grow to about 2 inches
- Curl up when disturbed.



Armyworms

- Feed as a group.
- Prefer damp areas.



Cutworms/Armyworms

- All turf species are affected.
- Active mid-March-October.
- Prefer areas with heavy thatch.
- Most feeding occurs at night on leaves or crown.
- Look for closely clipped areas especially around aeration holes.

Cutworms/Armyworms

BIOLOGICAL CONTROL

- Larvae are parasitized by braconid wasps (*Apanteles* spp.) and by tachinid flies.
- *Steinernema carpocapsae*
- *Bacillus thuringiensis* subsp. *kurstaki* (Bt) use only during the first and second instars.

CULTURAL CONTROL

- Remove thatch
- Avoid wet areas by irrigating according to Eto.

Cutworms and Armyworms

WHEN TO TREAT:

Threshold levels are five larvae per square yard.

- ACEPHATE (Orthene)
- CARBARYL* (Chipco Sevin)
- CYFLUTHRIN (Tempo)
- SPINOSAD (Conserve SC)
- AZADIRACTIN (Ornazin,
- STEINERNEMA
CARPOCAPSAE
(Scanmask)
- BACILLUS THURINGIENSIS

Masked Chafer or White Grubs



Susceptible Turf Species

- Susceptible Hosts:
 - All turfgrass species
 - Warm season grasses tend to be the most tolerant of grub feeding.

Masked Chafer Damage

- Feed on roots resulting in irregular dead areas.
- Spongy feel to turf.
- Turf to be rolled back like a carpet.
- Most damage in late summer or early fall.
- Presence of vertebrate predators.



Masked Chafer



- *Heterorhabditis bacteriophora* are commercially available parasitic nematodes that can effectively control masked chafers, which are not effectively controlled by *Steinernema carpocapsae*.

Control of Masked Chafer

- Threshold levels on greens are low: one grub per square foot.
- Treatment should be undertaken.
- Other turfgrass sites, up to six grubs per sq. ft .can be tolerated.
- Adult activity generally occurs during the period from mid-June to July. Optimum timing for treatment is 3 to 4 weeks following peak adult activity

Masked Chafer Control

- IMIDACLOPRID (Merit, Marathon)
- CARBARYL* (Chipco Sevin)
- HETERORHABDITIS BACTERIOPHORA
COMMENTS: Apply during late spring/early summer before adults emerge, or early fall when most chafers are in the susceptible stages.
- TRICHLORFON (Dylox)

Weeds in Turf

- Eliminate most weeds before you plant.
- Choose a competitive turf species.
- Proper lawn maintenance will keep weeds at tolerable levels without need for herbicides.



Managing Serious Weed Problems

- Correctly identify weeds.
- Choose appropriate management practices.
- Weed will provide a clue to underlying lawn problem.
- Very weedy lawns may require renovation.
- If herbicides are needed, use as part of an IPM program.

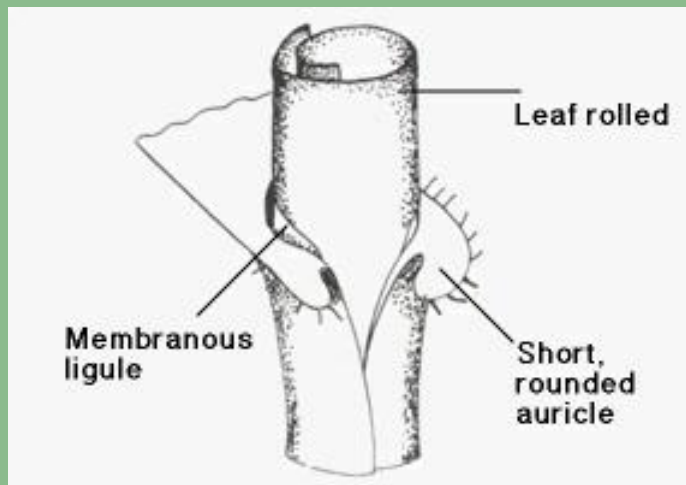


Special Thanks to the UCIPM Program

The UC Guide to Healthy Lawns

Refer to the following sections of this guide for more information:

- [Choosing and identifying your turf species](#)
- [Preparing the site and planting turf](#)
- [Renovating lawns](#)
- [Caring for new lawns](#)
- [Caring for established lawns](#)





Thank You
Any Question?

