


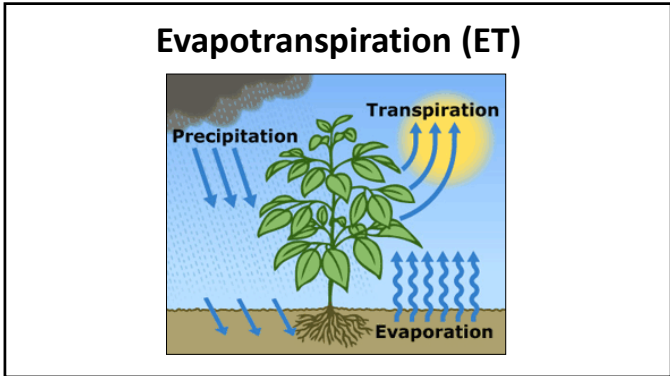
Turf vs. Drought! The Epic Throwdown



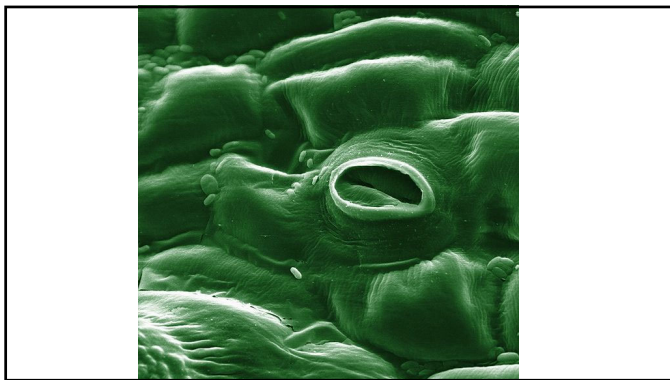
Home lawn suffering from drought on June 13, 2023. Photo by Kevin Frank, MSU.

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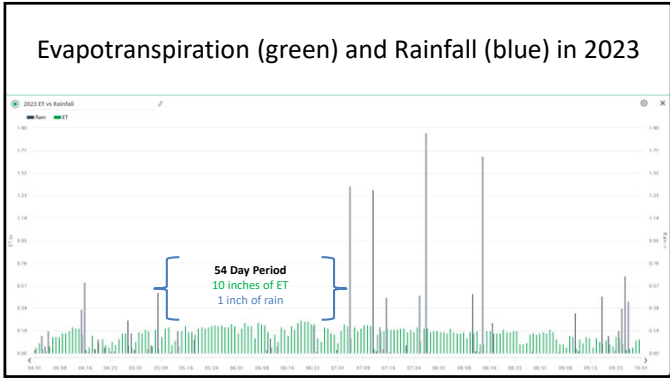
Lawn Water Budget

- Lawn soils holds between 1 (sandy or compacted) and 3 inches (silt loam, good structure) of available water
- Hot, sunny day results in about 0.25 inches of ET (water loss)
- A good soil can last ~2 weeks without rain before the leaves begin to brown
- A soil with a low water content will last only 4 days

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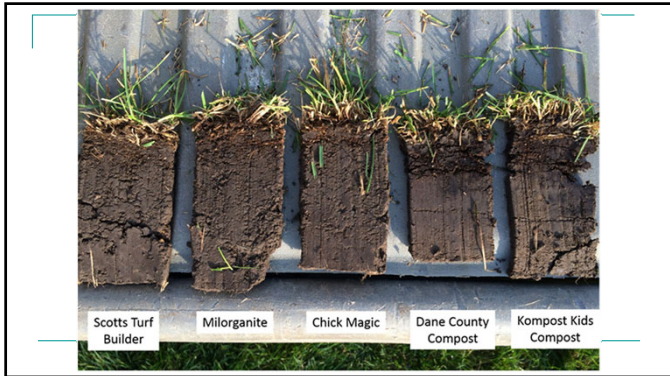
Soils for Drought Prevention

- Deep, uncompacted soils are best
- Core cultivate annually
- Add compost twice per year
 - ¼ inch in spring and fall

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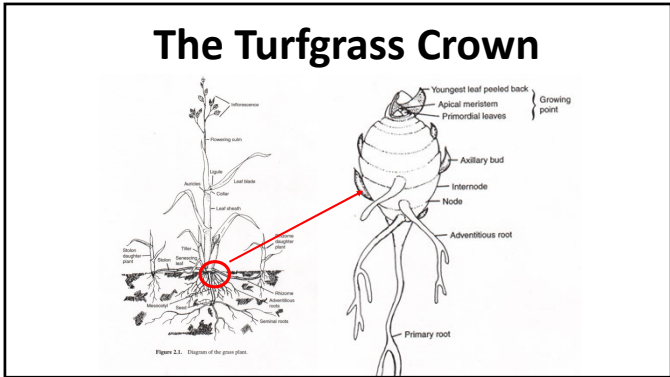
Fertilizer	Bulk density g cm ⁻³	K _{sat} ^a cm h ⁻¹	Plant-available water %
Chick Magic fertilizer	1.14ab	115a	14.9c
Kompost Kids compost	0.87c	71abc	21.6a About 2.6 inches
Dane County compost	0.93c	91ab	21.2a
Milorganite fertilizer	1.13ab	92ab	15.4bc
Purple Cow compost	1.06b	46bc	18.8ab
Purple Cow compost + tea	1.15ab	52bc	15.1c
Scotts Turf Builder	1.16a	22c	15.7bc
Control	1.18a	48bc	14.7c About 1.5 inches

Note: Means connected by the same letters are not statistically different according to Fisher's protected LSD at α = .05.
^a K_{sat} = saturated hydraulic conductivity.

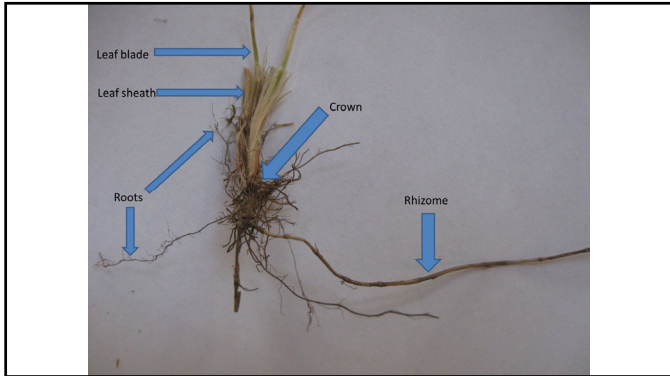
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Bunch-Type Growth Habit

- spread by **tillering**
 - Uniformity is problem long term or at low seeding rates
- Tall fescue & ryegrass

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Rhizomatous Growth Habit



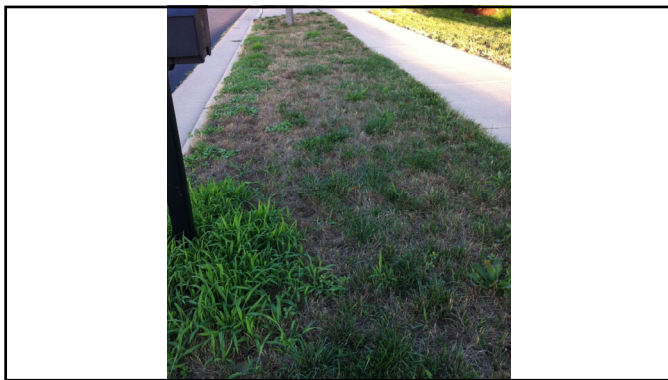
- Rhizomes are:
 - Belowground lateral shoots
 - Storage organs
- Kentucky bluegrass, creeping red fescue

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Quackgrass



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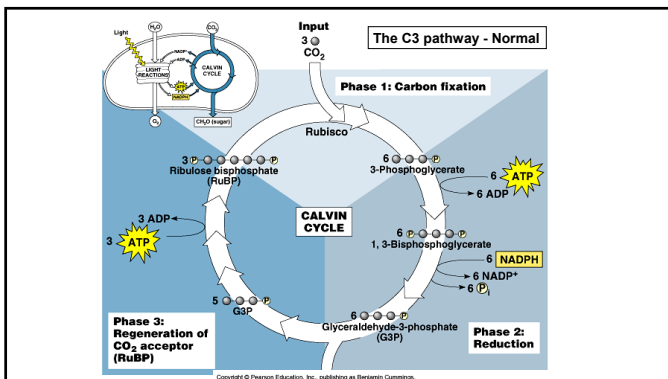
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Drought Survival Strategies

Turfgrass	Overall Resistance	Drought Avoidance	Drought Tolerance
COOL-SEASON			
Kentucky bluegrass	Good	Fair	Good
Perennial ryegrass	Fair	Good	Poor
Fine fescues	Very Good*	Fair	Excellent
Tall fescue	Very Good	Excellent	Fair
WARM-SEASON			
Bermudagrass	Excellent	Excellent	Very Good
Zoysiagrass	Very Good	Good	Excellent
Buffalograss	Excellent	Excellent	Excellent

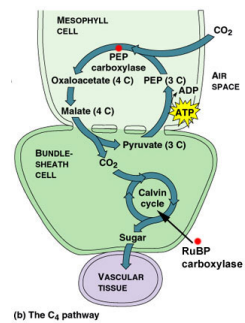
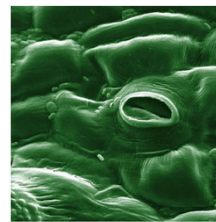
Adapted from Fry and Huang, 2004

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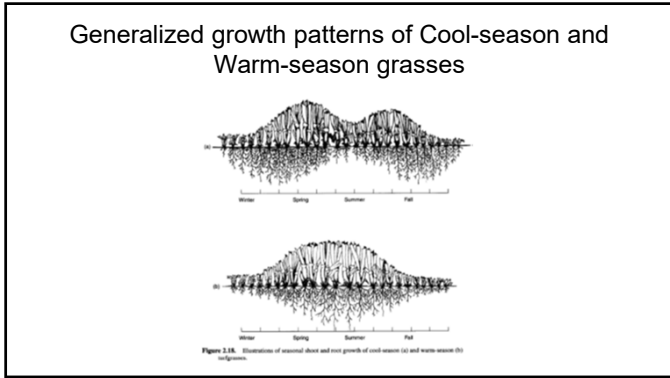
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The C4 pathway



(b) The C4 pathway

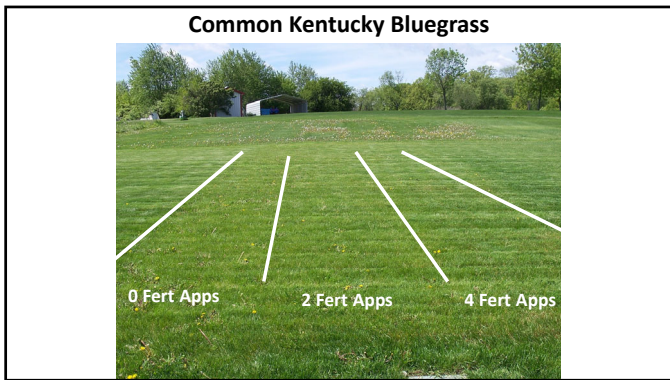
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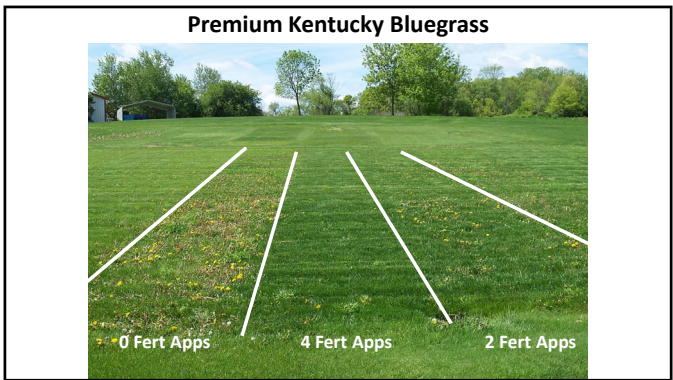
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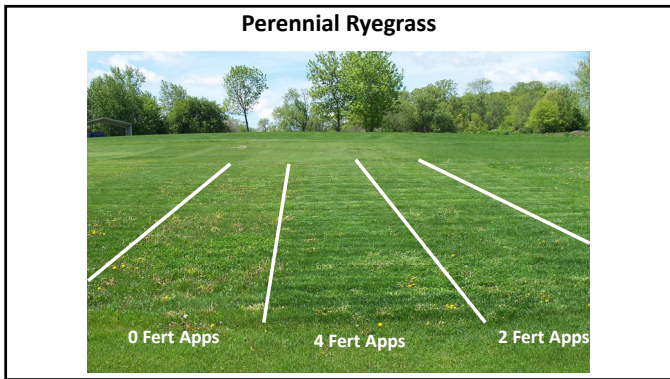
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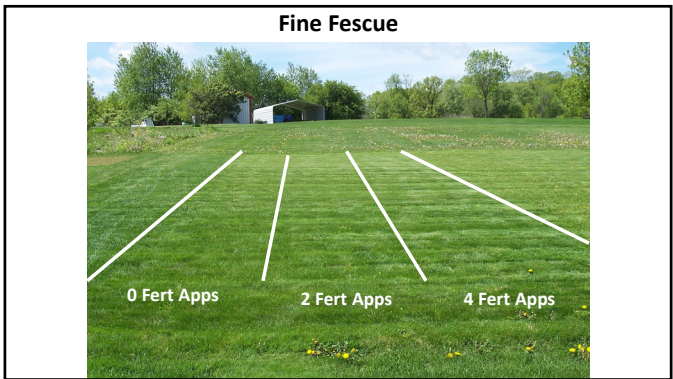
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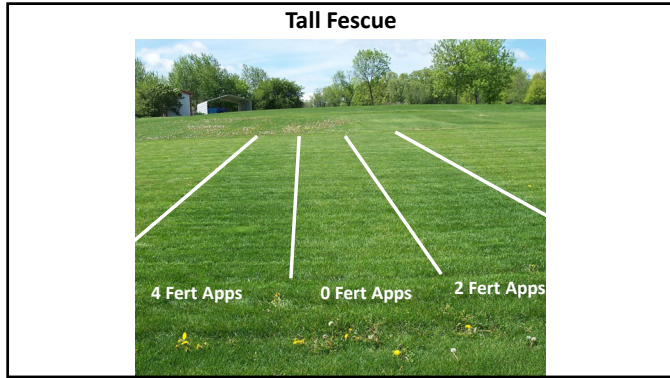
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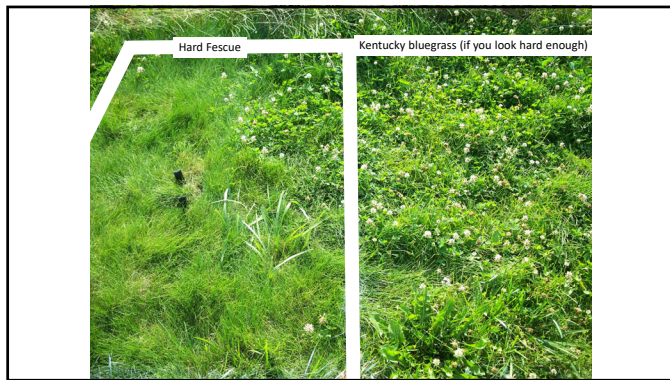
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Drought Survival Strategies

Turfgrass	Overall Resistance	Green Color Retention	Recovery After Turning Brown
Kentucky bluegrass	Good	Fair	Good
Perennial ryegrass	Fair	Good	Poor
Fine fescues	Very Good*	Fair	Excellent
Tall fescue	Very Good	Excellent	Fair

Adapted from Fry and Huang, 2004

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Water Use vs. Irrigation Requirement

- Tall fescue has a greater ET rate than Kentucky bluegrass
- Kentucky bluegrass has a higher irrigation requirement
- How is this possible?

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Fine Fescue Did Not Fare Well in Droughts of 2012 or 2024



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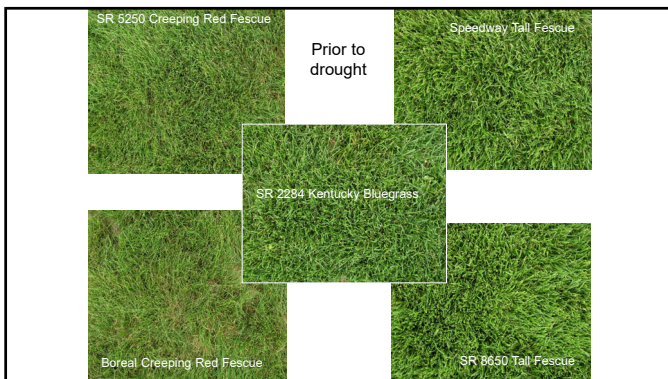
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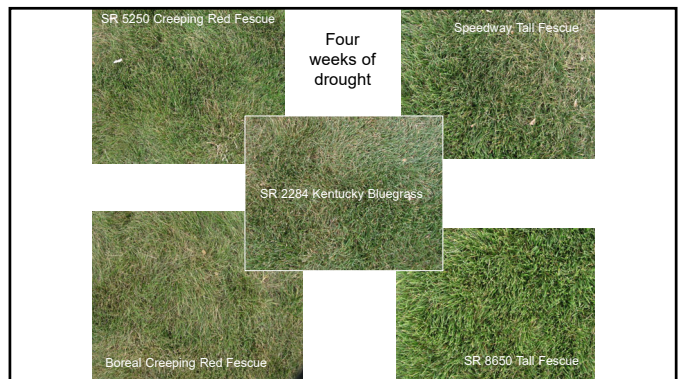
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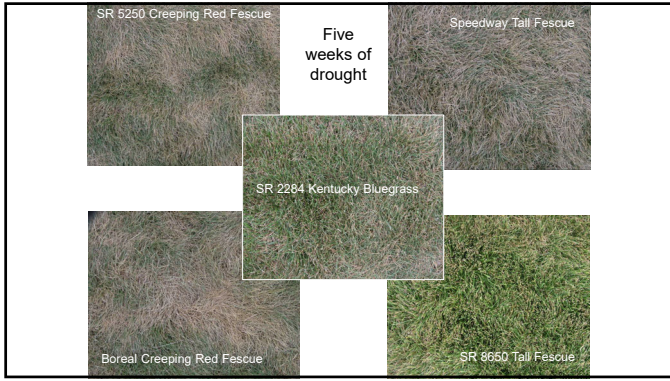
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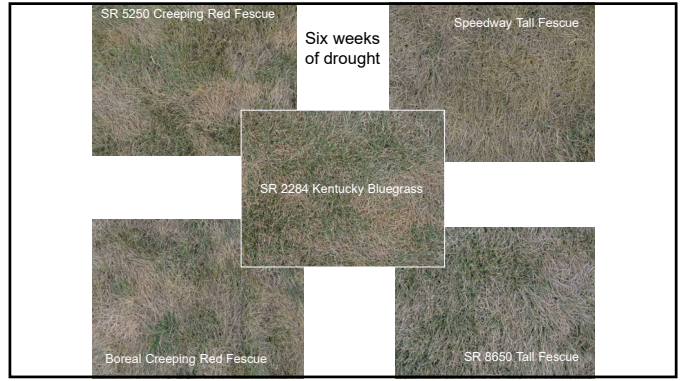
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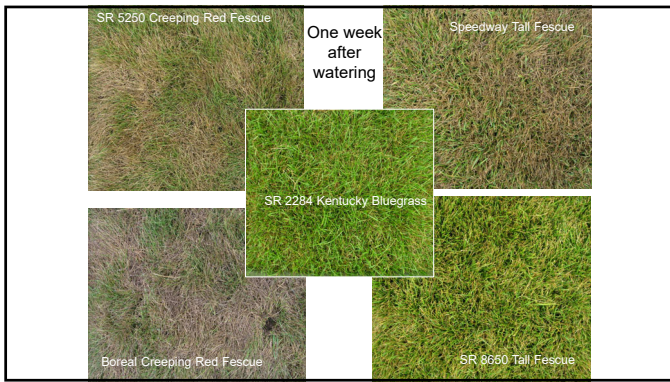
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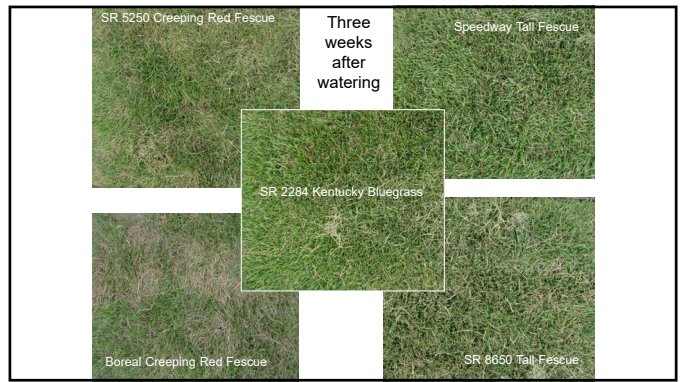
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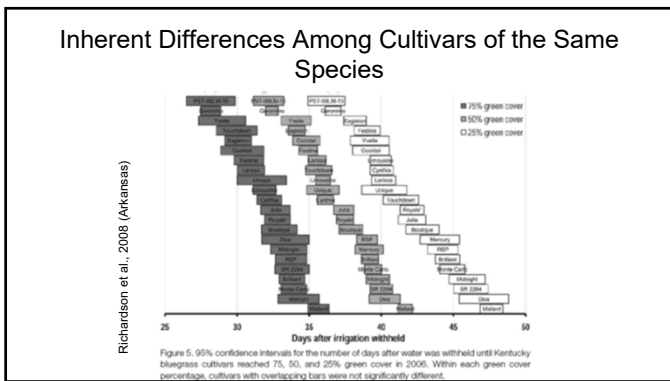
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Qualified Cultivars

Single species evaluation notes for meaningful comparisons. Comparing water use within a species allows turf managers, homeowners, and governments to use the most drought tolerant turfgrass almost certainly the quality in such environments. Use the tools below to find the right turf to make every drop count.

FINE FESCUES

Chewings fescue Creeping Red fescue Hard fescue

Name	Producer
Enchantment	Pure Seed
Heathland	TMI
Shadow III	Pure Seed

KENTUCKY BLUEGRASS +
PERENNIAL RYEGRASS +
TALL FESCUES +

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Qualified Cultivars

Single species evaluation notes for meaningful comparisons. Comparing water use within a species allows turf managers, homeowners, and governments to use the most drought tolerant turfgrass almost certainly the quality in such environments. Use the tools below to find the right turf to make every drop count.

FINE FESCUES +
KENTUCKY BLUEGRASS -

Name	TMI
Artesia	TMI
Bedazzled	TMI
Desert Moon	Pure Seed
Full Moon	Pure Seed
Sonora	Pure Seed
Tirem	Pure Seed
WaterWorks	TMI

Kentucky Bluegrass is one of the most common and valuable turfgrasses in North America. Known for its smooth boat shaped leaves and rich dark green color, this versatile cool season turf is found throughout the cool season turf range.

PERENNIAL RYEGRASS +
TALL FESCUES +

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Qualified Cultivars

Single species evaluation notes for meaningful comparisons. Comparing water use within a species allows turf managers, homeowners, and governments to use the most drought tolerant turfgrass almost certainly the quality in such environments. Use the tools below to find the right turf to make every drop count.

FINE FESCUES +
KENTUCKY BLUEGRASS +
PERENNIAL RYEGRASS -

Gray Hawk	PureSeed
Manhattan 5	TMI
Manhattan 7	TMI
Pacifico	PureSeed
Sun Hawk	PureSeed
Rainwater PR	TMI
Reservoir	BrettYoung
Molalla	Vista Seed Partners

Fast germination and aggressive growth make Perennial Ryegrass popular on playing fields and in high traffic turf applications like public parks. Found through most of the cool season turf range, Perennial Ryegrass is also used to overseed warm season turf.

TALL FESCUES +

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Qualified Cultivars

Single species evaluation notes for meaningful comparisons. Comparing water use within a species allows turf managers, homeowners, and governments to use the most drought tolerant turfgrass almost certainly the quality in such environments. Use the tools below to find the right turf to make every drop count.

FINE FESCUES +
KENTUCKY BLUEGRASS +
PERENNIAL RYEGRASS +
TALL FESCUES -

Name	
2nd Millennium	TMI
Aquaviva	TMI
Bonsai 2x	TMI
Lifeguard	Pure Seed
Raindance	Pure Seed
Relentless	Pure Seed
Saballo	Pure Seed
Sun Fire	Pure Seed
Amity	Vista Seed Partners
Zigzag	Vista Seed Partners
Reservoir	BrettYoung

Tall fescue is a hardy and adaptable species of cool season turf that is well known for drought tolerance. A versatile, durable turf with good through tolerance, tall fescues are found through the majority of the cool season turf range and provide an alternative to warm season turf in many areas.

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Searching for new species, or genes

One approach to understand mechanisms of plant tolerance to stresses has been to examine plants adapted to extremely stressful environments. Several cool-season grass species have recently been identified growing in geothermally heated areas in Yellowstone National Park. One of the two predominant grass species in thermal areas is *Agrostis scabra* (thermal bentgrass).

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Huang and Xu, 2007

Soil temperature at a 5-cm depth was approximately 45° C at a thermal site in Yellowstone National Park (A) where thermal *Agrostis scabra* plants grow, showing healthy roots and leaves. Heat-sensitive creeping bentgrasses (B) is compared to heat-tolerant thermal *A. scabra* (C) where both species were exposed to elevated air/soil temperatures in a growth chamber.

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How much to irrigate?

- To keep grass green – usually 1 inch per week
- To keep crown alive apply 0.25 inches of water every 7 to 14 days

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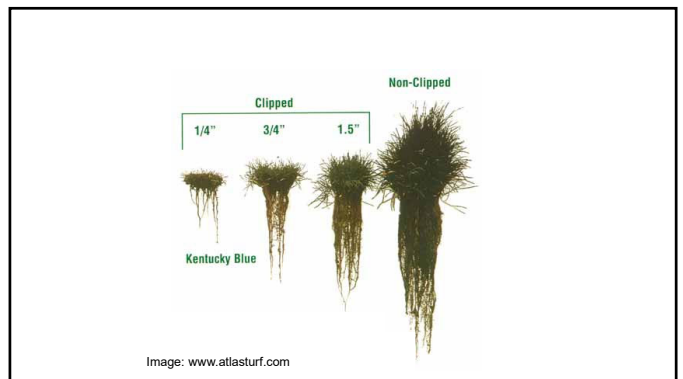
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A354

Lawn

establishment & renovation

John C. Siler

A healthy lawn provides shade, reduces energy costs, and improves air quality. It also provides a place for recreation and a place to relax. But lawn care is not as simple as it seems. It requires a lot of knowledge and experience to establish a new lawn or renovate an existing one in poor condition.

Lawn establishment versus renovation

Establishment is the process of creating a new lawn from scratch. Renovation is the process of improving an existing lawn that is in poor condition.

A355

Watering your lawn

Doug Soldat and John Siler

Watering a lawn properly can reduce weeds, provide a place for play or other recreation, and enhance property value. For applying too much water can harm your lawn, and overwatering can lead to disease, and degrade the environment.


In many cases lawn watering is unnecessary in Wisconsin.

To water or not to water?

In many cases lawn watering is unnecessary in Wisconsin. Most lawn grasses, especially Kentucky bluegrass, will survive periods of drought better than most other grasses. They survive by allowing their leaves to die while keeping their crowns alive, a condition called summer dormancy. The crown is the growing point from which roots and leaf blades emerge. It is located just below the soil surface.

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Turf vs. Drought! The Epic Throwdown



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Home lawn suffering from drought on June 13, 2023. Photo by Kevin Frank, MSU.

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