

## Choosing The Right Turfgrass For Your Site

David Chinery  
Cornell Cooperative Extension  
Rensselaer County

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## What are turfgrasses?



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## Where do we use turfgrasses?



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### Major sports fields



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### Other sports facilities



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### Homes, commercial properties, parks, roadsides...



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## Why bother worrying about species and variety selection?

- Turf is a long-term investment
- Good results
- Less headaches
- Less pesticides
- Happy customer
- Save money



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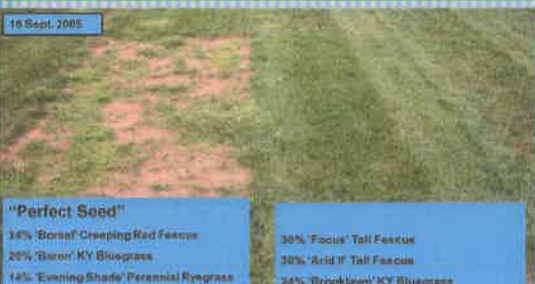
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## Turfgrass selection matters

10 Sept. 2005



### "Perfect Seed"

- 34% 'Bonal' Creeping Red Fescue
- 20% 'Baron' KY Bluegrass
- 14% 'Evening Shade' Perennial Ryegrass
- 10% 'Barriera' Rough Bluegrass
- 3% 'Pantera' Annual Ryegrass
- 7% 'Barverd' Annual Ryegrass
- 6% 'Labyrinth' Tall Fescue

- 30% 'Focus' Tall Fescue
- 30% 'Arid II' Tall Fescue
- 24% 'Brooklawn' KY Bluegrass
- 14% 'Finesse II' Tall Fescue

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## Turfgrasses In New York State 2003

- Major survey done by NYS Ag and Markets with support from NYSTA and private corporations/other organizations
- 3.4 million acres in turf
- 3.1 million acres in private residences, lawn care and golf courses
- Cost \$5 billion to maintain all turf

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## Benefits of Turfgrass

- Erosion control and soil stabilization
- Groundwater recharge and runoff reduction
- Organic chemical decomposition
- Soil improvement and restoration
- Temperature modification
- Noise abatement and glare reduction

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## Benefits of turfgrass (continued)

- Decreased noxious pests, allergy-related pollens, and human disease exposure.
- Safety in vehicle operation
- Lower fire hazard
- Recreational benefits
- Aesthetic benefits
- Property values

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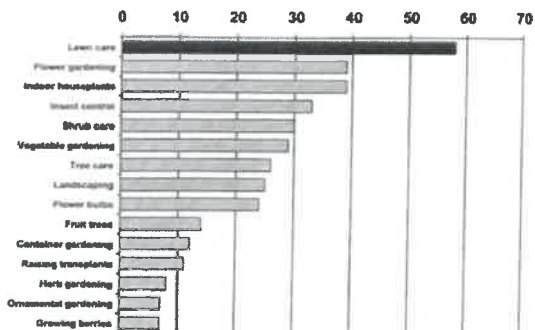
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STRATEGIES OF LOWER MAINTENANCE TURF



US Households participating in lawn and garden activities (in millions)

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## What are turfgrasses?



- All are in the Grass Family, Graminae

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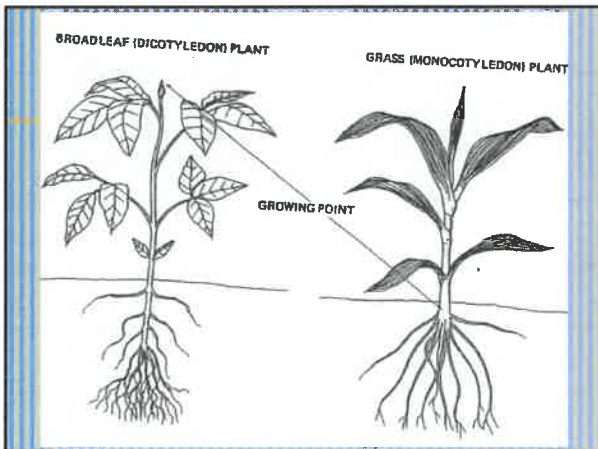
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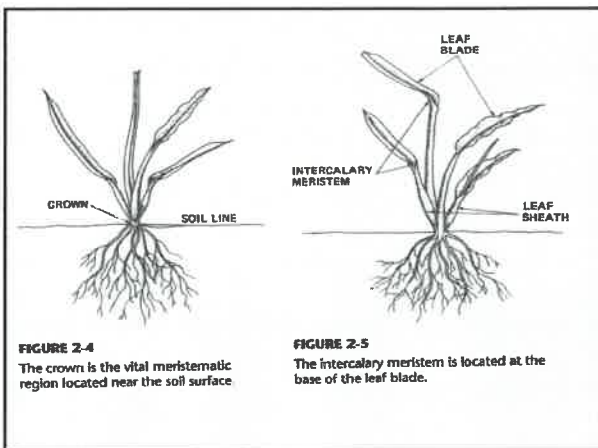
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# Turfgrass species identification



- Your client wants to know what kind of turfgrass is in his lawn. How do you determine this?
- Need to learn some of the important characteristics of turfgrasses, and how to use a turfgrass "key."
- This takes practice!

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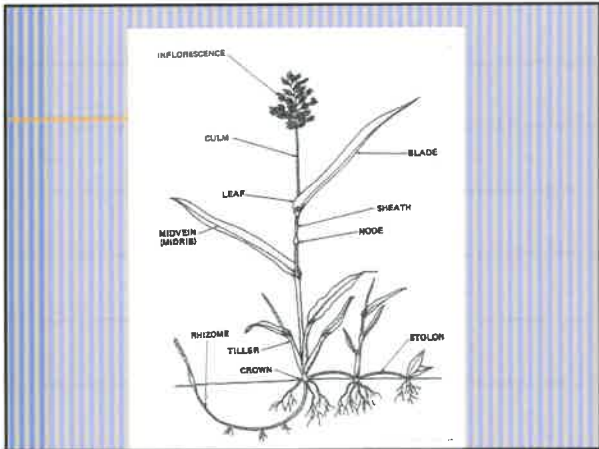
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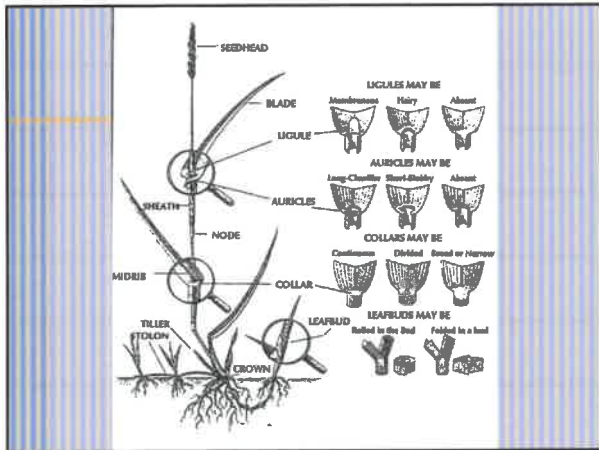
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Spreading vs. bunching



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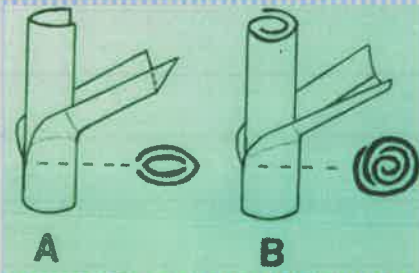
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Rolled vs. folded in the bud



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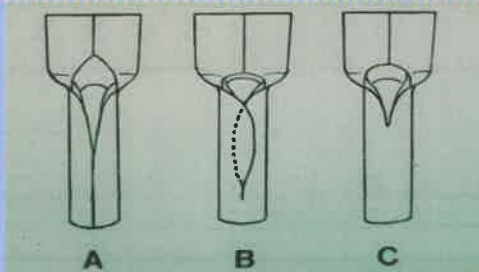
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Leaf sheaths: split, split & overlapping, or v-neck



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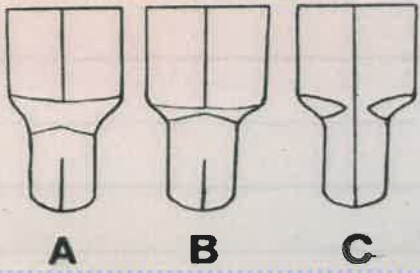
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Collars



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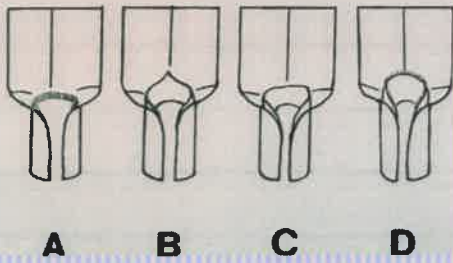
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Ligules



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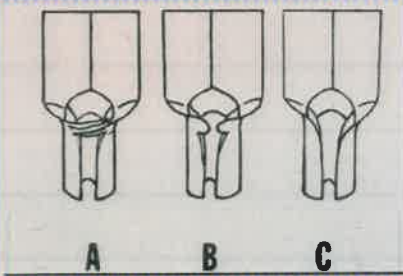
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Auricles



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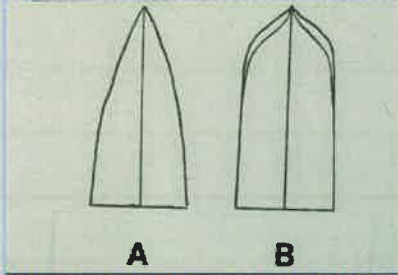
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### Leaf tips



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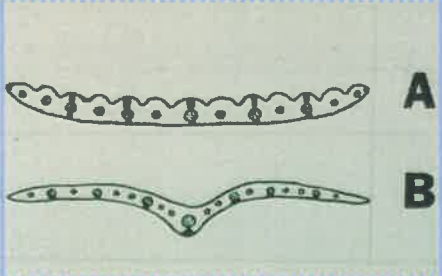
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### Leaf cross section: flat vs. keeled



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### A grass identification example



Kentucky bluegrass

- \*leaves fine textured, parallel sided with boat-shaped tip
- \*folded in the bud-shoot
- \*lines along mid-vein visible by transmitted light
- \*ligule very short, truncate
- \*rhizomatous

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## What do roots do?

- Absorb water
- Absorb nutrients
- Anchor plant
- Produce hormones

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## Fibrous root facts

- Macroscopic
- Healthy = white
- Live 6 months to 2 years
- Most live <1 year
- 55 degrees F
- 80% in top 6-8 inches of soil
- Root depth is dependent on height of cut
- Warm season species root 5-7 feet
- Cool season species root to a 2 foot maximum

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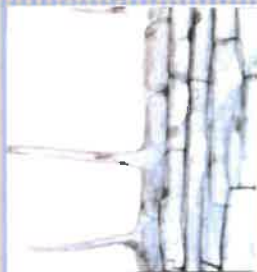
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## What are root hairs?

- Microscopic
- Several billion on a mature grass plant
- Surface area on a mature grass plant = 4000 sq. ft.
- Increases surface area immensely
- Absorbs water and nutrients



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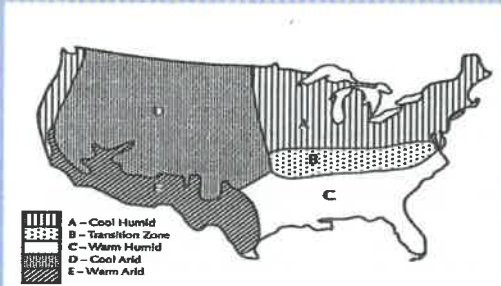
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## Climactic regions vs. species



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## Warm Season Turfgrasses

- Bermudagrass
- Bahiagrass
- St. Augustinegrass
- Carpetgrass
- Centipedegrass
- Zoysiagrass



Bermudagrass

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## Cool Season Grasses



- Kentucky bluegrass
- Annual bluegrass
- Roughstalk bluegrass
- Perennial ryegrass
- Annual ryegrass
- Tall fescue
- Hard fescue
- Chewings fescue
- Creeping red fescue
- Creeping bentgrass
- Colonial bentgrass

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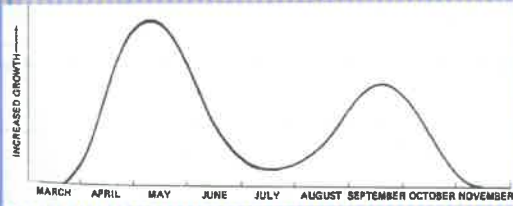
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## Typical Kentucky Bluegrass growth cycle



Optimum Root Growth 55-62 degrees F

Optimum Shoot Growth 60-75 degrees F

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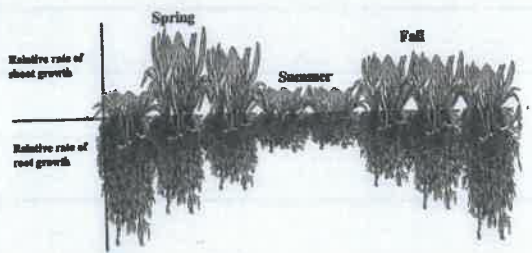
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## Plant Growth and Root Depth



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## Endophytes

- "inside plant"
- First discovered from "ryegrass staggers" disease in livestock; caused by the fungus, *Neotyphodium*
- An example of symbiosis



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## More on endophytes

- Fungus produces a substance toxic to surface-feeding insects
- Turf breeders inject the fungus into seedlings
- Found in some ryegrass and fescue varieties
- Increased disease and drought resistance claims are debatable
- Should remain viable in seed for 12 to 18 months
- *Acremonium lolii* is a popular endophyte
- Plants with endophyte may lose them, with time

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## What do those names mean?

- What is a turfgrass variety?
- What is a turfgrass cultivar?
- Names are written with single quotes or in italics
- 'Merion' Kentucky bluegrass
- 'Jaguar II' tall fescue
- 'L-93' creeping bentgrass

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## Kentucky bluegrass



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## Kentucky Bluegrass

- Strong rhizomes
- Good wear tolerance
- Drought tolerant
- Cold tolerant
- Mixes well with others
- Improved pest resistance
- Some shade tolerance

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## Kentucky bluegrass

- Tolerance of close mowing
- Slow germination/establishment
- May take 2 months to make dense stand
- High water usage
- Thatch production
- No endophytes
- Note: Roughstalk bluegrass, annual bluegrass



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## Rhizomatous growth habit



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## Kentucky bluegrass history

- Where is it from?
- 'Merion' was the first cultivar, in 1947
- Now over 200 cultivars



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## What are the "types" of Kentucky bluegrass?

- 7 to 12 different "groups" or "types" of Kentucky bluegrass (depends on who is counting)
- Groupings based on various characteristics (lump similar ones together)
- Put 3 to 4 cultivars from 3 to 4 different groups together to maximize performance of the entire planting

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## Some KBG Groups

- Aggressive
- Baron (or BVMG)
- Bellevue
- Midwest or Common
- Mid-Atlantic
- Compact
- Other
- America
- Julia
- Midnight
- Shamrock
- Cheri

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## Annual Bluegrass

- ***Poa annua***
- Both winter annual and perennial subtypes
- Light -medium green
- Can flower and set seed when mowed very low
- Flowers from Oct. through Apr.



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## Annual Bluegrass

- Usually very short and small
- Can be a problem on golf courses and lawns
- Desirable or a weed?
- Researchers at Penn State are developing cultivars of annual bluegrass to intentionally plant and grow



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## Perennial ryegrass



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## Perennial Ryegrass

- Bunch-type grass
- Quick germination and establishment
- No thatch
- Good heat and drought tolerance
- Mixes well with others
- Some close mowing tolerance
- Endophytes



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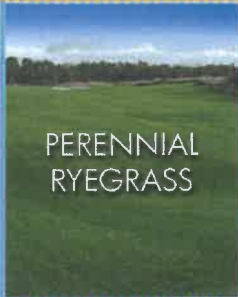
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## Perennial ryegrass



- Limited recuperation
- Winter injury potential
- Greater mowing requirements
- Does not form a sod
- Can be overwhelming to others
- Little resistance to gray leafspot
- Note: Annual ryegrass

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## Perennial Ryegrass History

- 'Linn' – old variety – stemmy, clumpy, ugly, still sold, comes in last in NTEP
- 1960's – 'Manhattan,' 'Pennfine'
- Today breeding for good color, disease resistance, drought tolerance, endophyte, moderate growth rate
- Cornell has new trial with 130 cultivars
- No real emphasis on low-maintenance per se
- PR is still viewed as a higher-maintenance turfgrass

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## Rust and brown patch resistance

- Rust can be a major problem in our area
- 'Brightstar II,' 'Omega III,' and 'Palmer III' have shown good rust resistance (Cornell)
- 'Citation III' is rust resistant (Cornell)



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## Annual ryegrass

- Fast germinating
- Inexpensive
- Full sun
- What might be a major drawback?



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## Tall fescue



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## Tall Fescue

- Bunch-type grass
- Old types are coarse textured
- May need more mowing
- Intolerant of close mowing
- Good wear-tolerance
- Good shade tolerance
- Fairly rapid establishment
- Inexpensive seed
- Drought tolerant
- Improved disease resistance
- Endophytes

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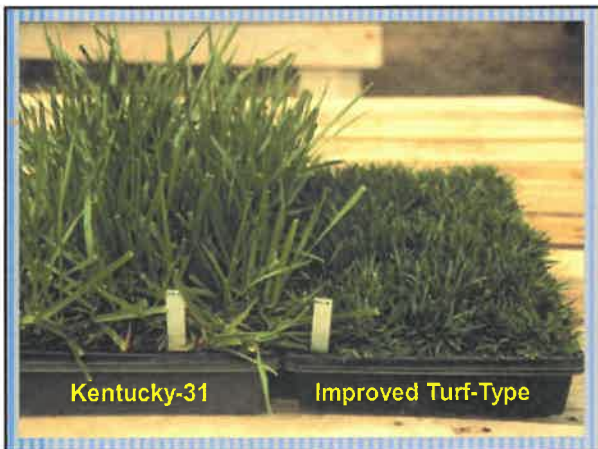
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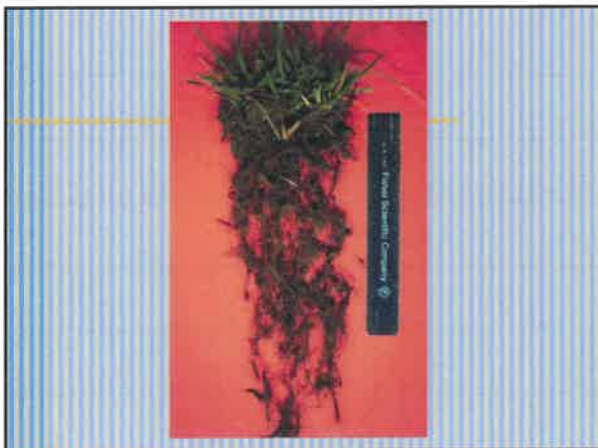
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## The first "turf-type" tall fescue

- 'Rebel' was released in the late 1970's
- Denser, darker green
- Later, dwarf types introduced
- Had dwarf roots, performance variable



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## Shade tolerant tall fescues

- Cultivars including 'Arid,' 'Adventure,' 'Apache,' and 'Trident'
- Rossi - 'Marksman,' 'Houndog V,' 'Palisade,' 'Austin'



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## Fine fescues: a fine group



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### Fine Fescues: Strong Creeping Red Fescue

- Aggressive rhizomes
  - Fairly broad, medium green blades
  - Good drought tolerance
  - Slow growth
  - Moderate establishment
  - Tolerates low PH and fertility
  - Endophytes
  - May exclude weeds (allelopathy)
  - Looks good with KBG and PR
- Cultivars include 'Audubon,' 'Revere' and 'Pennlawn'

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### Creeping red fescue (*Festuca rubra* subsp. *Rubra*)



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### Slender Creeping Red Fescue

- Not as spreading as Strong
- Medium leaf blade width
- Medium to light green
- Prefers better growing conditions
- Does not fair well in NTEP trials
- Better in Europe
- Cvs: 'Marker', 'Dawson'
- *F. rubra* subsp. *litoralis*

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### Fine Fescues: Chewings Fescue

- Most improved through breeding
- Bunch-type; very little spreading
- Limited recuperation
- Tolerates low mowing
- Excellent shade tolerance
- Slow growth
- Tolerates low pH and fertility
- Moderate establishment rate
- Can out-compete others if more than 10-20% by weight in a mixture
- Cvs: 'Highlight,' 'Jamestown II,' 'Dover'

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### Chewings fescue (*Festuca rubra* subsp. *commutata*)



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### Fine Fescue: Hard Fescue

- Bunch-type; very little spreading
- Limited recuperation
- Fine texture, gray-green color
- More drought and heat tolerant than others
- Tolerates low pH and fertility
- Slow growth, low grower
- Moderate establishment rate
- Weed suppressive
- Good for low maintenance
- Cvs: 'Biljart,' 'Rescue 911,' 'Scaldis'

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Hard fescue  
(*Festuca longifolia*)



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Fine Fescues: Sheep Fescue

- Bunch-type, very minor rhizomes
- Limited recuperation
- Fine texture, blue-green color
- Excellent drought and heat tolerance (maybe the best!)
- Tolerant of low pH and fertility
- Slow growth
- Shade tolerant
- Moderate germination
- Cvs: 'Azay,' 'Bighorn,' 'Quatro'

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Sheep fescue  
(*Festuca ovina* subsp. *ovina*)



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**Evaluation of new fine fescues  
– allelopathy and competition  
at work for weed suppression**



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**Dr. Weston's Trials**

- 'Columbra,' 'Intrigue,' 'Sandpiper,' were very suppressive
- 'Rescue 911' and 'Reliant II' also good
- 'Sylvia High' and 'RS158' not very suppressive
- M-tyrosine is the chemical involved; inhibits cell growth/cell wall formation

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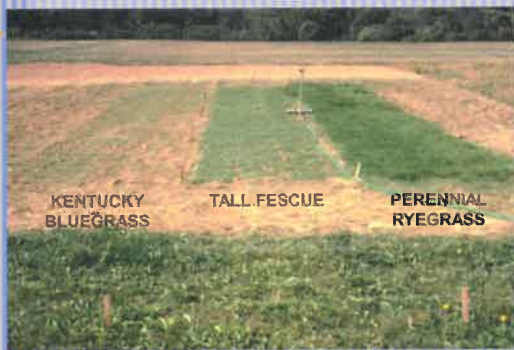
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**Turfgrass selection**



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## Creeping bentgrass



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## Creeping Bentgrass

- Creeps aggressively via stolons
- Heat tolerant (with water)
- Cold tolerant
- Some shade tolerance
- Close mowing tolerant
- Very fine texture with close mowing
- Disease-prone
- High N requirements
- Produces thatch
- Demands irrigation
- Slow establishment
- Note: Colonial bentgrass
- Roundup Ready bentgrass maybe out by 2005 (??)

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## Zoysiagrass



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## Zoysiagrass characteristics



- Aggressive root system
- Drought tolerant, tough
- Warm season grass
- Does not blend well with others
- Established by plugs
- You either like it or you don't
- Seeded zoysias are coming

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## White clover



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## White clover

- Once common in seed blends
- Bee stings, grass stains, poor footing
- Drought tolerant, N-fixing
- Non-compatible with 2,4-D
- Use 0.05 lb. of seed per 1,000 square feet



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## What grasses should we grow where?

- Site evaluation
- Local climate
- Visual quality expected
- Use of site
- Inputs/care available
- Budget
- Seed availability
- Should we grow turfgrass everywhere?




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## Importance of linking quality and use to management

Dr. Frank S. Rossi, Cornell University

		Level of Use		
		A lot	Some	Little
Level of Visual Quality	Excellent	Trees and Greens Major Athletic Fields	Public Building lawns Estate lawns	Framing of structures or natural sites
	Good	Child Play Areas	Home Lawns Golf Fairway	Hospital or commercial building turf
	Fair	Outdoor exhibit areas	Overflow parking areas used infrequently	Roadside Turf

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## After site and situation evaluation, what next?

- Decide which species you want to grow, in which proportions




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## Turfgrass Blend

- a combination of two or more varieties of the same grass species.

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## Turfgrass Mixture

- the combination of two or more species together.

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### Turfgrass selection mixers

16 Sept. 2005



#### "Perfect Seed"

34% Boreal Creeping Red Fescue  
28% Bann KY Bluegrass  
14% Evening Shade Perennial Ryegrass  
10% Barriera Rough Bluegrass  
7% Pantara Annual Ryegrass  
7% Berverdi Annual Ryegrass  
8% Lalsermh Tall Fescue

30% Focus Tall Fescue  
30% And Y Tall Fescue  
24% Brooklawn XY Bluegrass  
14% Tivessa Y Tall Fescue

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Full sun, well-drained soil, light-mod traffic, 2-3 lb.N/yr., mow 2- 3 in., perhaps irrigation

Seed or seed mixture	Quality desired
100% Kentucky bluegrass	Excellent
80-90% Kentucky bluegrass + 10-20% Perennial Ryegrass	Excellent/Good
70-80% KBG + 0-15% PR + 15-20% chewings or hard fescue; or 100% PR	Good
100% tall fescue	Good/Fair

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Partial shade, well-drained soil, light to no traffic, 2-3 lb.N/yr., mow 2-3 in., perhaps irrigation

Seed or seed mixture	Quality desired
35-50% Kentucky bluegrass + 50-65% Fine Fescue	Excellent/Good
100% Fine Fescue	Good
100% Tall Fescue	Good/Fair

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Heavy shade, well-drained soil, light to no traffic, 1-2 lb.N/yr., mow 2.5-3.5 in., NO irrigation

Seed or seed mixture	Quality desired
100% Fine Fescue	Good

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## Next, think about cultivars

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## What grasses should we grow where?

- See "Turfgrass Species and Variety Guidelines for New York State 2015"
- <http://turf.caes.cornell.edu/resources/turfgrass-species-and-variety-guidelines-for-nys/>

### Turfgrass Species and Variety Guidelines for NYS



CORNELL TURFGRASS  
2015

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## National Turfgrass Evaluation Program

- NTEP
- Started about 30 years ago by USDA
- Unbiased, voluntary
- Seed producers pay to be in it
- Has cooperating growers at sites across the country
- Cornell!



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Creeping bentgrass, Michigan State University 2007



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[www.NTEP.org](http://www.NTEP.org)



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<ul style="list-style-type: none"> <li>▪ <b>Cool Season Grasses</b></li> <li>▪ Bentgrass - Fairway/Tee</li> <li>▪ Bentgrass - Putting Green</li> <li>▪ Fineleaf Fescue</li> <li>▪ Ky. Bluegrass - High Input</li> <li>▪ Ky. Bluegrass - Low Input</li> <li>▪ Perennial Ryegrass</li> <li>▪ Tall Fescue</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ky. Bluegrass - Low Input</li> <li>▪ Locations/Entry Info.</li> <li>▪ Turfgrass Quality</li> <li>▪ Color</li> <li>▪ Leaf Texture</li> <li>▪ Density</li> <li>▪ Spring Greenup</li> <li>▪ Seeding/ison/Estab.</li> <li>▪ Living Ground Cover</li> <li>▪ Drought Tolerance</li> <li>▪ Frost Tol./Winter Kill</li> <li>▪ Diseases/Insects</li> <li>▪ Other Data</li> <li>▪ Data by Locations</li> <li>▪ Entire Report</li> </ul>
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TABLE 11. SPRING GREENUP RATINGS OF KENTUCKY BLUEGRASS CULTIVARS

2004 DATA

SPRING GREENUP RATINGS 1-9; 9=COMPLETELY GREEN

NAME	NJ1	NJ2	NY1	OH1	OK1	PA1	MEAN
WASHINGTON	9.0	8.7	6.7	5.3	5.3	7.7	6.6
AVALANCHE (PST-1701)	8.7	7.3	7.0	5.7	5.3	6.0	6.5
JEFFERSON	8.0	7.7	6.3	6.3	4.7	5.3	6.3
BEDAZZLED	7.0	6.0	6.3	6.3	4.7	6.0	6.3

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- "Everybody, it seems, wants to buy and plant the #1 variety in the trials."
- "The real purpose of the national trial is not to pick the prettiest variety but to weed out the dogs." Doug Brede in his "Turfgrass Maintenance Reduction Handbook"




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## Where can you get good turfgrass varieties?

- Big box?
- Local suppliers?
- Trade show contacts?
- Internet?




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## How to Read a Seed Label

Name of Seed Variety

XYZ Brand Lawn Seed Mixture

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients

1.69% other crop seed  
.35% Weed seed  
7.96% Inert matter

Tested January 1999 Lot #1002 U.S. Protected varieties  
Comments for use only in establishing turf  
XYZ Super Seed Co. Anytown, NY 12343

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### XYZ Brand Lawn Seed Mixture

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients

1.69% other crop seed  
.35% Weed seed  
7.96% Inert matter

Tested January 1999 Lot #1002 U.S. Protected varieties  
Comments for use only in establishing turf  
XYZ Super Seed Co. Anytown, NY 12343

Germination

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**XYZ Brand Lawn Seed Mixture**

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients

1.69%	other crop seed	Other Crop Seed
.35%	Weed seed	
7.96%	Inert matter	

Tested January 1999      Lot #1002      U.S. Protected varieties  
 Contains for use only in establishing turf  
 XYZ Super Seed Co.      Anytown, NY 12345

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**XYZ Brand Lawn Seed Mixture**

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients

1.69%	other crop seed	Weed Seed
.35%	Weed seed	
7.96%	Inert matter	

Tested January 1999      Lot #1002      U.S. Protected varieties  
 Contains for use only in establishing turf  
 XYZ Super Seed Co.      Anytown, NY 12345

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**XYZ Brand Lawn Seed Mixture**

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients

1.69%	other crop seed	Inert Matter
.35%	Weed seed	
7.96%	Inert matter	

Tested January 1999      Lot #1002      U.S. Protected varieties  
 Contains for use only in establishing turf  
 XYZ Super Seed Co.      Anytown, NY 12345

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**XYZ Brand Lawn Seed Mixture**

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
10%	Perennial Ryegrass	85%

Other ingredients:  
 1.69% other crop seed  
 .35% Weed seed  
 7.96% Inert matter

Tested January 1999      Lot #1007      U.S. Protected varieties  
 Contents for use only in establishing turf  
 XYZ Super Seed Co.      Amherst, NY 12345

Other info.

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See other examples of lawn seed labels




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**Scotts "Family: The Premium Grass Seed Mixture"**

% seed	Variety	Orig.	Germ
29.41%	Abbey Kent. Bluegr.	OR	87%
24.78%	Boreal Creeping Red Fescue	CN	85%
24.52%	Pennant II Per. Rye	OR	92%
19.48%	PS8990 Per. Rye	OR	92%
0.45%	Other crop seed		
1.35%	Inert matter		
0.01%	Weed seed		
0%	Noxious weed seed		

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### Grasslands "Sunny Lawn Seed Mixture"

Pure seed	Variety	Orig	Germ
33.95%	Rodeo II Per.Ryegrass	OR	90%
29.10%	Park Kent. Bluegrass	MN	85%
19.40%	Baron Kent. Bluegrass	WA	85%
14.55%	Boreal Red Fescue	CN	85%
0.19%	Crop seed		
2.72%	Inert matter		
0.09%	Weed seed		
0%	Noxious weeds		

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### Grasslands "Contractor's Mix"

% seed	Variety	Orig	Germ
48.82%	Dimension Perennial Ryegrass		90%
39.94%	Boreal Creeping Red Fescue	CN	85%
9.93%	Kentucky Bluegrass		85%
0.60%	Other crop seed		
0.06%	Weed seed		
1.25%	Inert matter		

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### Grass seed: You get what you pay for!



- Doug Brede describes a project in which grass seed mixes were grown and then rated for quality
- Scale of 1-9; 1 was very poor, 9 was excellent
- Seed varieties vs. quality in "discount store" seed mixes

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### Seed varieties vs. quality in "discount store" seed mixes

- Alliance Perennial Ryegrass
  - 25% Brightstar PR
  - 25% Saturn PR
  - 25% Charger PR
  - 25% Quickstart PR
- 7.7
- Quality rated 9 to 1 (high to low)
  - Study by Turf Seed, Inc. Oregon, 1993

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### Seed varieties vs. quality in "discount store" seed mixes

- Mowless Tall Fescue
  - 33% Silverado
  - 33% Eldorado
  - 33% Coronado
- 6.0

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### Seed varieties vs. quality in "discount store" seed mixes

- Lawn Master Playground Mix
  - 49% Vantage PR
  - 14% Fine Fescue (no cultivar)
  - 34% Annual Ryegrass (no cultivar)
- 3.5

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Seed varieties vs. quality in  
"discount store" seed mixes

- Speedy Green  
Perennial  
Ryegrass
- 0.05% Linn PR
- 88% Annual  
Ryegrass

■ 1.0

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