





Sports fields of all sorts

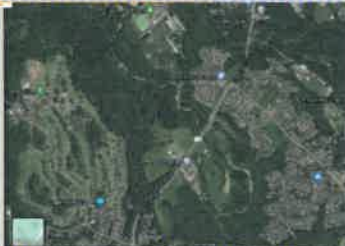


Homes, commercial properties, parks, roadsides...



How Much Land Is In Turfgrass in New York State?

- Major survey done by NYS Ag and Markets in 2003
- 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



We're in a part of the world where it is easy to grow turfgrasses

Meanwhile, in Syracuse...





If you think high quality turfgrass requires a lot of inputs around here, go to Arizona!

Taliesin West, Arizona

What are the potential problems of lawns?

- High water use (if irrigated)
 - Fertilizer inputs
 - Pesticide inputs
 - Mowing/use of fossil fuels
 - Labor
 - Monoculture
- Each is a valid concern, so what do we do?*



Let people know about the benefits of turfgrasses

- Climate regulation
- Soil conservation/erosion prevention
- Nitrogen retention and carbon storage
- Groundwater Recharge
- Water purification and pollutant filtering



Benefits of Turfgrasses (con't)

- Aesthetics, property values
- Athletics
- Recreation
- Utility areas (highways, airports)





Thin lawns,
bare soil =
runoff,
erosion





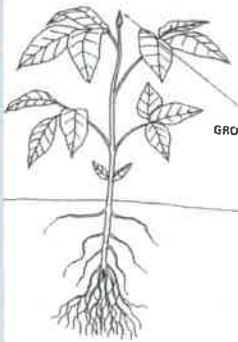


What are turfgrasses?

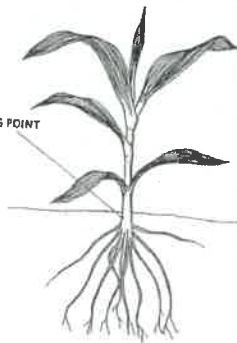


- All are in the Grass Family, Graminae

BROADLEAF (DICOTYLEDON) PLANT



GRASS (MONOCOTYLEDON) PLANT

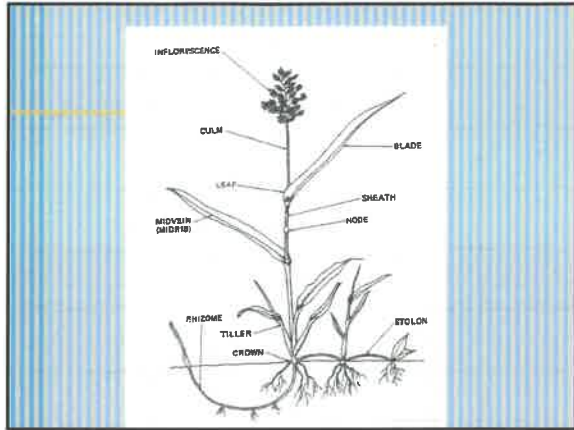


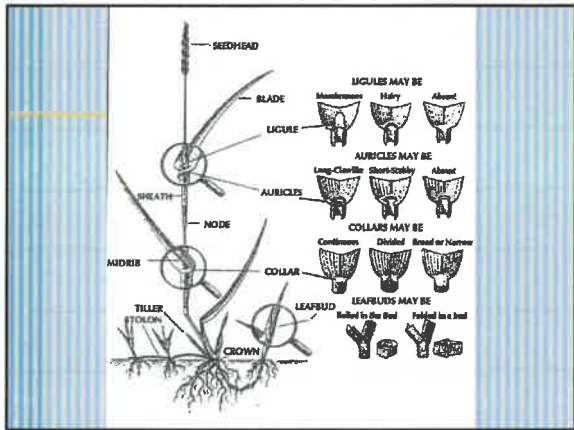
GROWING POINT

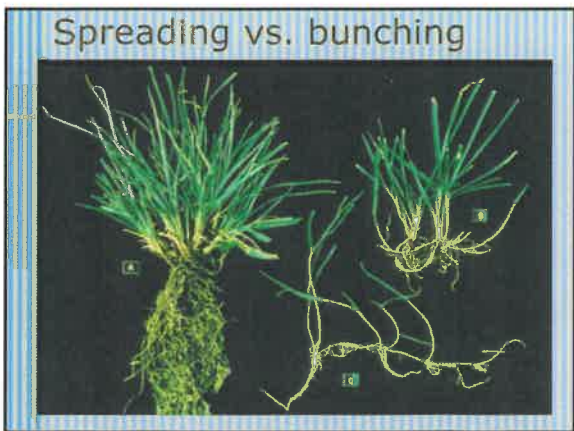
Turfgrass species identification



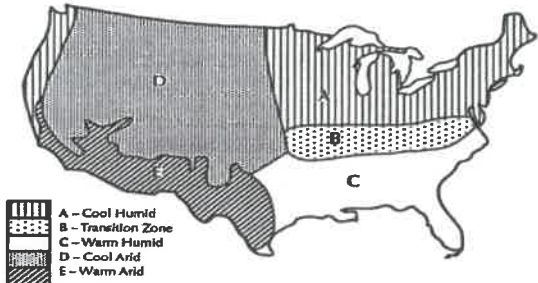
- Your client wants to know what kind of turfgrass is in his lawn. How do you determine this?
- Need to learn some of the important characteristics of turfgrasses, and how to use a turfgrass "key."
- This takes practice!







Climactic regions vs. species



Warm Season Turfgrasses

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



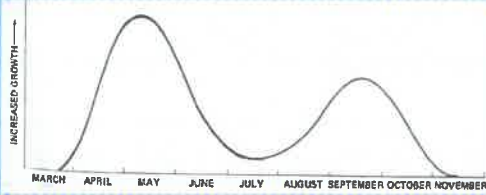
Bermudagrass

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

Typical Kentucky Bluegrass growth cycle



Optimum Root Growth 55-62 degrees F

Optimum Shoot Growth 60-75 degrees F

Plant Growth and Root Depth



Why bother worrying about species and variety selection?


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






Chinch Bug Treatment

- Management primarily using insecticides
- Some cultivars differ
- 'Baron' and 'Newport' Kentucky Bluegrass and 'Pennfine' and 'Manhattan' perennial ryegrass show some resistance
- Endophytes



Endophytes

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



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?

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

Turfgrass selection matrix

16 Sept. 2000





Kentucky Bluegrass

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

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

Midnight

Rhizomatous growth habit



Kentucky bluegrass history

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



Perennial ryegrass

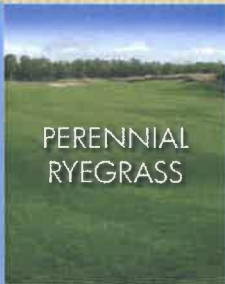


Perennial Ryegrass

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



Perennial ryegrass



- Limited recuperation
- Greater mowing requirements
- Does not form a sod
- Can be overwhelming to others
- Note: Annual ryegrass

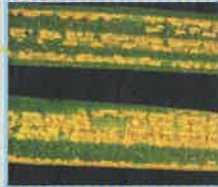
Perennial Ryegrass History

- 'Linn' - old variety - stemmy, clumpy, ugly; still sold, comes in last in NTEP (see photo)
- 1960's - 'Manhattan,' 'Pennfine'
- Today breeding for good color, disease resistance, drought tolerance, endophyte, moderate growth rate



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)



Barenbrug RPR

- RPR = "regenerating perennial ryegrass"
- Spreads by stolons 6 to 8 inches
- Touted as having good recovery from traffic
- On the market, seed is very expensive!!



Annual ryegrass

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

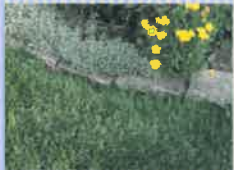


Tall Fescue

• TALL FESCUE •



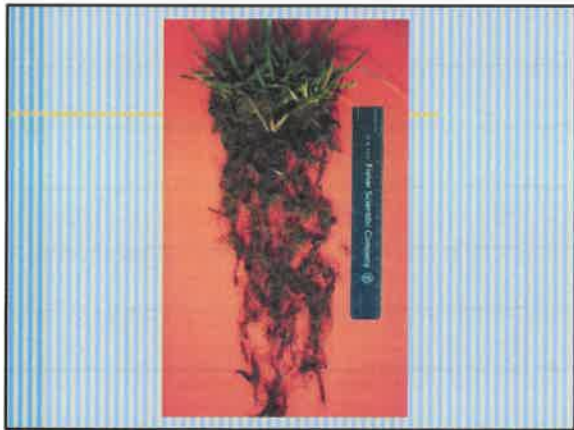
Tall fescue



Tall Fescue

- Bunch-type grass
- Old types are coarse textured
- May need more mowing
- Intolerant of close mowing
- Doesn't make a lot of thatch
- Good wear-tolerance
- Good shade tolerance
- Fairly rapid establishment
- Less expensive seed
- Drought tolerant
- Improved disease resistance
- Endophytes





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



Shade tolerant tall fescues

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



Can we use genetics to overcome turfgrass diseases?

- 'Padre 2,' 'Rembrandt,' 'Winning Colors,' and 'Picasso' have some brown patch resistance

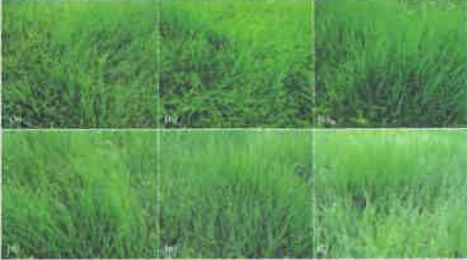


Rhizomatous tall fescues (RTF)

- Some tall fescue cv's develop rhizomes when not densely planted
- Claims of 90 – 95% rhizome development have been made



Fine fescues: a fine group





Fine Fescues: 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'

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



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'

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



Fine Fescue: Hard Fescue

- Bunch-type; very little spreading
- Limited recuperation
- Fine texture, color may be gray-green
- 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'



From the Maryland "Grade Report"

🌿 Hard fescue has excellent tolerance to summer heat through dormancy. While dormant, however, the species is very susceptible to traffic and should therefore not be mowed between early June and early October during the heat of the mid-Atlantic summer.

🌱 Hard fescue develops dense sod, but produces a shallow root system under some conditions. Although it is a good species to use for erosion control, it may not be the ideal species to plant on steep slopes where slope failure may be a concern.

💰 Hard fescue is moderately expensive due to a high sowing rate. Seed per pound, however, is affordable and only marginally more expensive than tall fescue seed.

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'

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



What mixture of fine fescues should we use?

- | | |
|----------------------------------|----------------------------------|
| ■ Full sun lawn: | ■ Shady lawn: |
| ■ 40% hard fescue | ■ 20% hard fescue |
| ■ 40% Chewings fescue | ■ 40% Chewings fescue |
| ■ 20% strong creeping red fescue | ■ 40% strong creeping red fescue |

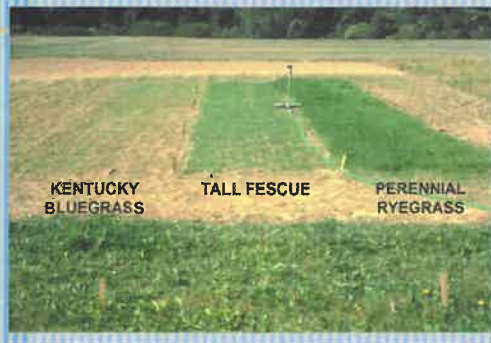
University of Minnesota, 2018

To learn more about fine fescues:

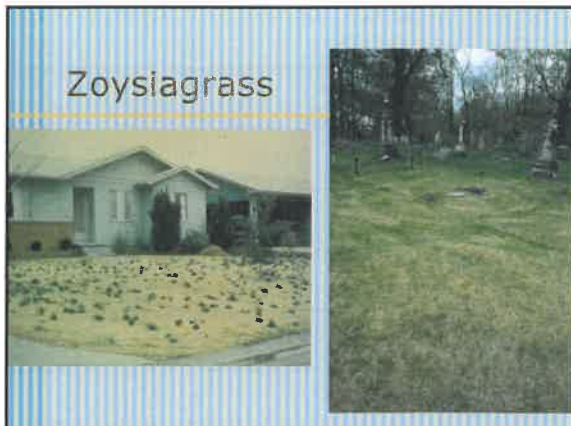
[Fine fescues: A review of the species, their improvement, production, establishment, and management - Braun - 2020 - Crop Science - Wiley Online Library](#)



Turfgrass selection



Zoysiagrass



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

White clover



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



Albany Hudson Electric Trail, Schodack



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?



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

After site and situation evaluation, what next?

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



Turfgrass Blend

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

Turfgrass Mixture

- the combination of two or more species together.

Bluegrass selection matters

16 Sept. 2005



"Perfect Seed"

34% Boreal Creeping Red Fescue	30% Fescue Tall Fescue
20% Baron KY Bluegrass	30% Ajia V Tall Fescue
14% Evening Shade Perennial Ryegrass	24% Brookview KY Bluegrass
10% Barbers Rough Bluegrass	14% Firenze II Tall Fescue
7% Fontana Annual Ryegrass	
1% Barvest Annual Ryegrass	
6% Labretti Tall Fescue	

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

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

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

Next, think about cultivars

What grasses should we grow where?

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

Turfgrass Species and Variety Guidelines for NYS



CORNELL TURFGRASS 2015

National Turfgrass Evaluation Program

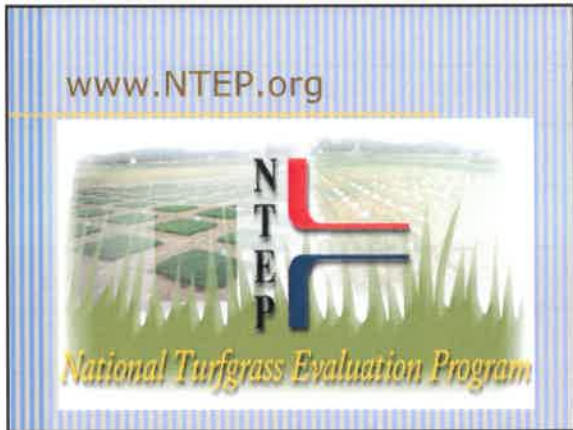
- NTEP
- Started about 40 years ago by USDA
- Unbiased, voluntary
- Seed producers pay to be in it
- Has cooperating growers at sites across the country
- Cornell!

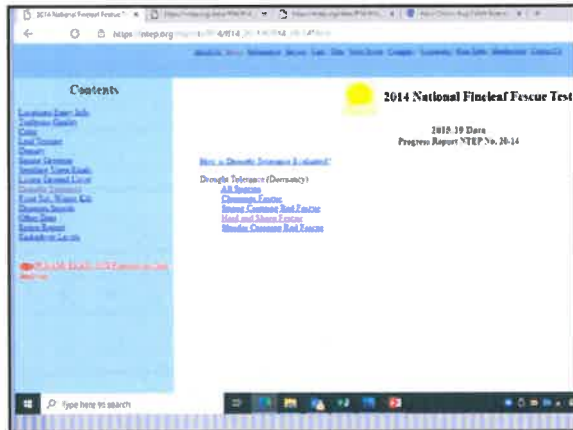


Creeping bentgrass, Michigan State University 2007









DROUGHT TOLERANCE (DORMANCY) RATINGS OF HARD AND SHEEP FESCUE CULTIVARS 2016 DATA


DROUGHT TOLERANCE (DORMANCY) RATINGS 1-9; 9=NO DORMANCY 1/

NAME	M11	M12	MEAN
GLADIATOR (TP498)	6.3	7.7	7.0
BEACON	7.3	6.3	6.8
DILPE-FL/5806	6.7	6.3	6.5
RESOLUTE (7M7)	7.7	5.3	6.5
JETTY (8PG-PL 106)	7.0	5.7	6.3
DILPE-FL/3068	7.2	5.0	6.1
HIND-14	6.0	6.0	6.0
SWORD	6.3	5.0	5.7
HONDIUS	5.7	4.7	5.2
QUATRO	5.0	5.3	5.2
PST-48ND	5.7	4.3	5.0
LSD VALUE	1.5	2.4	1.4
C.V. (%)	14.5	26.7	20.7

CHINCH BUG RATINGS OF HARD AND SHEEP FESCUE CULTIVARS 1/
2016 DATA

CHINCH BUG DAMAGE RATINGS 1-9; 9=NO DAMAGE 2/
NAME NJ1

ABSOLUTE (7H7)	0.7
GLADIATOR (TM456)	0.3
JETTY (PP3-FL 108)	0.0
SHARD	0.0
QUATRO	7.3
DLFPS-FL/3085	6.7
PLININUS	6.7
PIVOT-14	6.0
DLFPS-FL/3080	5.7
SEACON	4.7
PST-48ND	4.7
LSO VALUE	3.4
C.V. (%)	31.5





■ "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"

Where can you get good turfgrass varieties?

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



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
 Contents for use only in establishing turf
 XYZ Seed Co. Augusta, NY 12545

XYZ Brand Lawn Seed Mixture

Pure Seed	Origin	Germination
80%	Kentucky Bluegrass	80%
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Germination

XYZ Brand Lawn Seed Mixture

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Other Crop Seed

XYZ Brand Lawn Seed Mixture

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7.96%	Inert matter

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

Weed Seed

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
 Contents for use only in establishing turf
 XYZ Super Seed Co. Anytown, NY 12345

Inert Matter

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
 Contents for use only in establishing turf
 XYZ Super Seed Co. Anytown, NY 12345

Other info

See other examples
of lawn seed labels



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		

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		

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		

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

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

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

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

■ 6.0

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

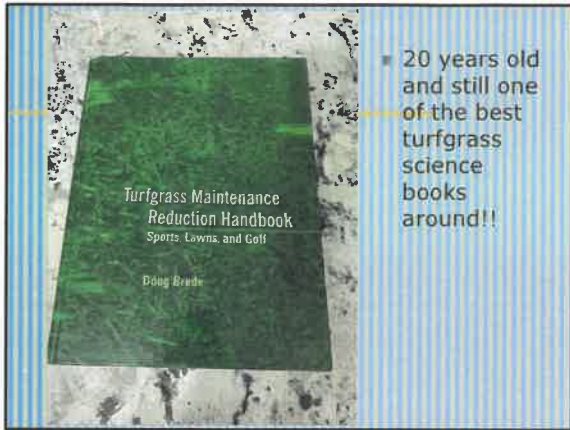
- Lawn Master Playground Mix
- 49% Vantage PR
- 14% Fine Fescue (no cultivar)
- 34% Annual Ryegrass (no cultivar)

■ 3.5

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

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

■ 1.0



■ 20 years old
and still one
of the best
turfgrass
science
books
around!!
