

UNDERSTANDING TURFGRASS SPECIES FOR USE ON ATHLETIC FIELDS & RECREATIONAL AREAS

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Turfgrass selection is perhaps the most important part in developing and maintaining a healthy and vigorous turf stand. There are many choices available to us today and the planning process cannot be underestimated. Over the years, plant breeders have made significant advancements in the development of cultivars within cool season species like Kentucky bluegrass, perennial ryegrass, fine fescue and tall fescue. During this time, seed companies have consistently released varieties with improved growth characteristics, turf quality, resistance to drought, insects and disease, and other important benefits. Deciding which variety or varieties are right for the job at hand can be a daunting task.

In wading through the decision making process for new construction, renovation or maintenance (over-seeding), it is important to review all the elements in which the turf has to perform. The following points should be part of the planning and selection process of the appropriate species and cultivars for the intended use.

Species Selection: Environmental Factors

- Type of sport or use: football, baseball, soccer
- Physical characteristics: soil or sand, climate and environmental stresses and concerns, drainage

- Management issues: wear (goal mouth, centre of field, sidelines)
- Repair and maintenance: time of repair and renovation (during difficult times, during play)
- Maintenance budget
- Maintenance: number of staff, type and number of equipment, cultural practices, irrigation system
- Inputs: fertility, pesticides, irrigation, topdressing material, seed, etc.
- Other uses: concerts, events

Species Selection: Turf Characteristics

- Growing environment: full sun or low light (stadium facilities)

- Wear tolerance, recovery period
- Establishment, turf density
- Turf strength, lateral stability, stable footing
- Disease resistance and winter persistence
- Heat and drought tolerance
- Other: salt tolerance, weed control, etc.

An Insight on Variety Development

With ever increasing environmental, climatic and public demands while maintaining the need for high quality turfgrass athletic and recreational fields, contemporary seed varieties offer turf managers many benefits, agronomic stability and

SEED CHARACTERISTICS BASED ON IMPROVED TURF-TYPE CULTIVARS

Cool Season Species		Leaf Texture	Disease Resistance	Growth Habit	Establishment Rate	Nitrogen Requirements
Bluegrass	Kentucky	Moderate to fine	Good to excellent	Rhizome extensive	Moderate to high	Moderate to high
	Texas Hybrid	Moderate to fine	Good	Rhizome extensive	Slow	Moderate to high
Ryegrass	Perennial	Fine	Moderate to poor	Bunch grass	Very fast	Moderate to high
	Intermediate	Moderate to fine	Moderate to poor	Bunch grass	Very fast	Moderate to high
Fescue	Tall	Moderate to coarse	Moderate to good	Bunch grass	Moderate	Moderate to high
Fine Fescue	Chewings	Fine	Good to excellent	Bunch grass	Moderate to fast	Moderate to low
	Strong Creeping	Moderate to fine	Good to excellent	Rhizomes	Moderate to fast	Low to moderate
	Slender Creeping	Fine	Good to excellent	Rhizomes	Moderate to fast	Low to moderate
	Hard	Fine	Good to excellent	Bunch grass	Slow to moderate	Low to very low
	Blue	Fine	Good to excellent	Bunch grass	Slow to moderate	Very low

Cool Season Species		Water Use (ET Rate)	Drought Tol-Avoidance*	Salinity Tolerance	Shade Tolerance	Heat Tolerance
Bluegrass	Kentucky	Low to moderate	Good to excellent	Moderate	Poor to good	Moderate to high
	Texas Hybrid	Low to moderate	Good to excellent	Moderate	Poor to good	Moderate to high
Ryegrass	Perennial	Moderate to high	Good	Moderate to high	Poor to moderate	Good to excellent
	Intermediate	Moderate to high	Medium	Moderate to high	Moderate	Good
Fescue	Tall	High	Excellent	High	Excellent	Good to excellent
Fine Fescue	Chewings	Low	Good to excellent	Low	Excellent	Moderate to high
	Strong Creeping	Low	Good	Low	Excellent	Good
	Slender Creeping	Low	Good	Low	Excellent	Good
	Hard	Low	Excellent	Low to moderate	Excellent	Good to excellent
	Blue	Low	Excellent	Low to moderate	Excellent	Good

* Drought Tolerance Avoidance



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flexibility. Understanding the major and subtle differences between varieties within a species category is important in the selection process. For example, Kentucky bluegrass is highly apomictic, meaning that plant alteration and variety improvement is a difficult and complex process. This generally results in small differences in agronomic characteristics and range of genetic diversity within varieties categorized in the same 'type' such as Midnight, Aggressive, America and Compact to name a few. Other major cool season species such as perennial ryegrass and fescue (tall and fine) are also organized into types offering different characteristics for specific use.

When selecting a new seed variety from a proven seed company with a well established development and breeding program, you can be sure that the varieties have been thoroughly field tested and evaluated to produce a broad genetic base. NTEP (National Turfgrass Evaluation Program) testing conducted at multiple locations and through independent university sites across the US and Canada, confirms the improved qualities needed for producing a high quality turf. If the variety has no traceable testing history, then it is not worth looking at.

Most importantly, parent plants for new varieties have survived the test of time growing in different locations. Over the years, well established breeding programs have selected turfgrass clones from hundreds of locations across North America and other regions around the globe. During a site visit, the plant breeder will identify and collect desirable turf samples. Plants identified for collecting have noticeable characteristics that would be beneficial to incorporate into breeding projects – leaf texture, density, vertical growth, specific disease and insect resistance, drought tolerance, salt tolerance, etc. Specific areas are targeted for collecting where plants have been growing and surviving for generations under harsh conditions.

Collected plants are brought back to the research farm for evaluation. Commonly referred to as "germplasm," they are added to the already established collection. After a few years of evaluation, only the best 1-2% of all plants collected will be con-

sidered for use in breeding a new variety; 98-99% are discarded. Typically, it takes 10-12 years to breed and commercially release a new improved variety for use on professional turf surfaces.

In the breeding and development of a new variety, existing plants from proven varieties are used. Additionally, new clones or germplasm are crossed with a selection of the new material that has been identified for improved agronomic qualities and characteristics (disease resistance, drought tolerance, vigorous growth, wear and recovery, uniformity, density etc.). Thus the new variety would have a broader genetic base developed using 20 parent plants and therefore be superior and less likely to suffer from catastrophic failure.

The detail and investment that go into the development of a variety gives turf managers confidence that there are significant agronomic advantages and benefits in working with an improved seed variety. NTEP.org and private independent research data is a good reference point for identifying proven new varieties in the Kentucky bluegrass, perennial ryegrass and fescue species.

Understanding Kentucky Bluegrass Cultivars

Kentucky bluegrass is the primary species for athletic fields and recreational turfgrass use in North America. With proper management, it forms a fine-textured, high quality, long lasting turf stand. The rhizomes of Kentucky bluegrass increase stability, improve traction and provide good recovery to damaged and bare areas. Kentucky bluegrass can be used as a monostand, but to maximize the genetic base, it is advantageous to select a polystand or blend of types.

It first must be understood that, in contrast to all other cool season turf grasses,

Kentucky bluegrass is highly apomictic. This means that almost every seed (usually over 95%) is an identical copy of the mother plant, which means that there is very little genetic diversity within a variety. This is because most varieties fall into similar groups or classifications. To maximize diversity, it is best to blend together similar varieties from different categories. For example, there is little agronomic benefit for an athletic field to be seeded con-



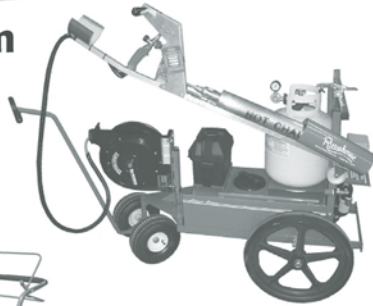
taining five varieties similar to Midnight. The best approach would be to blend top varieties able to tolerate very low cutting heights from within the Compact Elite, the America Elite, the Aggressive type and possibly within the Early Spring Greening categories.

Improved Drought Tolerance of Texas Hybrids

Recently, much attention has been given to the development of heat and drought tolerance in Kentucky bluegrass. Known as hybrid bluegrass (Texas hybrids), these new cultivars have proven to perform equivalent to tall fescue varieties in a number of different trial locations. Other studies have also concluded that under limited irrigation cycles, Texas hybrids perform better and maintain greater turf quality than tall fescue cultivars (which had higher water use). Along with improved heat and drought tolerance, other benefits include extensive rhizomes for improved wear and recovery, lower water usage and good performance under lower maintenance conditions.

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**Perennial/Intermediate Ryegrass:
A Good Companion to Kentucky Blue**

Perennial ryegrass is a fine textured species with the potential to develop into a high quality, hardwearing turf stand. Its fast establishing characteristics combined with high quality, colour, texture and close mowing tolerance make perennial ryegrass ideal for athletic sports field use. These qualities are why perennial ryegrass is best used in a sports field seed mixture as a companion to Kentucky bluegrass.

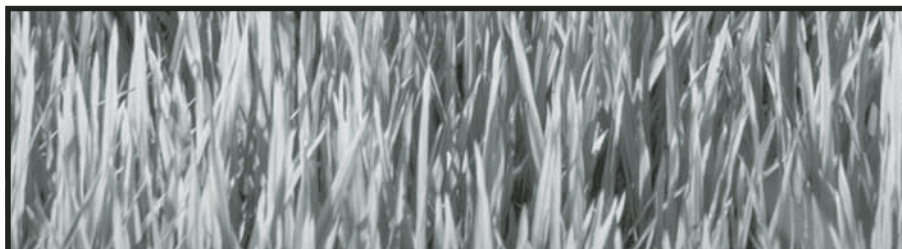
It is also important to remember that by blending the two species, genetic diversity is increased maximizing each species' strengths and weaknesses. Adding perennial ryegrass will speed up establishment, assisting with natural weed control. It is also resistant to different diseases than Kentucky bluegrass such as necrotic ring spot.

Perennial ryegrass is also endohypte enhanced which improves tolerance to insects such as bill bugs. Mixed with Kentucky bluegrass, the ryegrass component ranges from 10-50% dependent on application. The percentage of perennial ryegrass used in a mixture should be based on the desired time period from time of seeding to planned use. If the establishment period is limited, then a greater percent of ryegrass is recommended.

Intermediate ryegrass has been introduced over the last eight years and offers some excellent benefits. Based on the principals of an annual plant, intermediate ryegrass has been developed to produce a high quality turf stand similar to perennial turf type ryegrass. Characteristics include: germination under cool soil conditions, rapid establishment and improved turf quality over traditional annual ryegrass. Intermediate is an excellent overseeding tool for high traffic areas and is less competitive in a mixture with Kentucky bluegrass than perennial ryegrass.

Fescues Offer Alternatives To Environmental & Climatic Challenges

Turf-type tall fescue has traditionally been used on non-irrigated low-maintenance sports fields in transition zones and cooler climates. Tall fescue has two primary factors that need to be considered – improved disease resistance and poor establishment. Generally speaking, tall fes-



KENTUCKY BLUEGRASS CLASSIFICATIONS

Type	Description	Variety
Compact	Low, compact growth High quality turf for tees & fairways 1/2 inch cutting height Resistance to leaf spot	Alpine, Moonshadow, Explorer, Argos
Compact-Midnight	Very dark green color Good heat tolerance Characteristics of compact type Variable resistance to summer patch	Quantum Leap, Blue Velvet, Midnight
Compact-America	Fine leaf, high density High disease resistance Good shade performance Characteristics of compact type	America, Langara
Aggressive	Aggressive lateral growth High shoot density Very wear tolerant	Touchdown, Limousine, Orfeo
BVMG	Medium-good turf Medium low growth Medium leaf width Not ideal for tee or fairway use	Crest, Marquis, Cannon
Shamrock	Good resistance to leaf spot Good turf quality and sod strength Bill bug susceptible Strong rhizome development	SR2100, Shamrock, Moonshine, Brooklawn
Julia	High density Good summer performance Very high wear tolerance	Rampart, Ulysses, Avalanche, Julia
Texas x Kentucky Hybrids	Heat tolerant Extensive rhizomes Drought tolerant with good recovery Wear tolerant	Bandera, Spiffire, Fire and Ice, Longhorn

Note: This chart is for general observation only. Individual performance of varieties within each classification may vary widely and require comprehensive regional test results to determine the best performance. To see the chart in its entirety, please visit www.pickseed.com.

cue is very wear tolerant once fully established, but getting it established before traffic and wear is introduced is an issue. This characteristic also affects the ability of tall fescue to recover quickly after heavy wear. Recent developments have seen the introduction of tall fescue cultivars with rhizomes improving establishment and wear tolerance. Tall fescue performs best when combined with 5-10% of Kentucky bluegrass

Fine fescue cultivars offer some good alternatives for non-irrigated athletic fields and recreational turf areas. Chewings fescue, strong red fescue and slender red fescue can be utilized in low-maintenance situations. Improved Chewings and red fescue have seen recent advances in traffic tolerance, improved heat and drought tolerance, germination rate, cool temperature growth (spring and fall) and shady location performance. Improved fine fescue cultivars also have the additional benefits of endophytes and should be seeded in a blend with Kentucky bluegrass and perennial ryegrass for best performance.

Endophytes Offer Significant Benefits

The availability of endophyte improved turfgrass cultivars is an important part of Integrated Pest Management practices that can help reduce inputs. Endophytes are a fungi that have a symbiotic relationship with some grasses, spreading through seed infection. The presence of endophytes in turfgrass has been demonstrated to provide many benefits including resistance to surface-feeding insects, increased disease resistance and increased stress tolerance.

Currently, the species of turfgrass with endophytes that are available on the market include perennial ryegrass, tall fescue, Chewings fescue, strong creeping red fescue, slender creeping red fescue and hard fescue. In some of these species, most cultivars available will have high levels of viable endophytes. Attempts have been made to find or introduce endophytes into other turf species such as Kentucky bluegrass but so far these associations have not been stable and have not led to marketable cultivars.

There are many factors to be considered in the construction and maintenance of an athletic or recreation field. Seed cultivar selection is one of many inputs that can impact the long-term success and quality of the turf stand. As outlined, there are many different aspects that are critical in the selection of the proper turfgrass species and cultivar for each specific turf site. Proper selection of turf cultivars can be the most important decision you have to make! ♦

References: Articles Dr Leah Brilman, Ph.D. (Heat Tolerant Bluegrasses, The Importance of Endophytes, Versatile Red fescues).

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