

## Heat Tolerant Bluegrasses

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- ▶ Turfgrass breeders have made significant progress in selecting for heat tolerance in many Kentucky bluegrasses
- ▶ All Kentucky bluegrasses have a hybrid origin
- ▶ Selection of the best Kentucky bluegrass depends upon many factors

Recent attention has been given to heat tolerant or hybrid bluegrasses as though this is a new concept. Improved heat tolerance has been a basic goal for many years in Kentucky bluegrass breeding and all Kentucky bluegrasses have a probable hybrid origin, achieved in nature generations ago by the natural crossing of different bluegrass species. Much of the talk recently has centered around hybrids between Texas x Kentucky bluegrass, but hybrids between many bluegrass species have been looked at over the years and it is probable our different bluegrass types originated from different crosses in the past. Kentucky bluegrass (*Poa pratensis*) is known as a compilospecies since it can cross with most other bluegrass species and the resultant plants are considered a form of Kentucky bluegrass. For each new bluegrass cultivar, the strengths and weaknesses as maintained turf must be considered first, whether it is labeled as a hybrid or not.

When examining heat and drought tolerance, various components must be examined including the function of evapotranspiration in cooling and the varying environments in the United States. Different disease organisms may also present problems in summer stress areas. Summer Patch resistance should be examined for any bluegrass chosen for improved heat tolerance, as well as checking for brown patch resistance. Bluegrasses also vary in their tolerance of alkaline soil conditions and their level of winter active growth, which is more important in Southern locations. Three types of Kentucky bluegrass have consistently performed well under heat and drought stress in various tests in the United States. These are the America-types, which includes SR 2284, Kingfisher and



Showcase, the Midnight-types, which includes Arcadia and Quantum Leap and the Mid-Atlantic-types, which have primarily been discontinued due to poor seed yields.

In a study at University of California at Riverside they compared turfgrass quality, leaf firing and wilting of two tall fescues, Dynasty and KY-31, two Kentucky bluegrasses, Apollo (an America-type) and Envicta (a BVMG-type), and two heat tolerant bluegrasses, Thermal Blue and Dura Blue. In this drought study the tall fescues maintained the highest quality and the Kentucky bluegrasses examined had equivalent or slightly higher quality than the heat tolerant bluegrasses. A different result was obtained at Kansas State in a growth chamber study, with limited root growth due to the turf being in containers. Thermal Blue stayed green for 14 days, at 104 degrees F for 14 hours/day and 86 degrees for the 10 hours/night, while Dynasty tall fescue went dormant and Apollo Kentucky bluegrass was rated half green. At Rutgers University they conducted a study of drought tolerance in Kentucky bluegrass, Texas bluegrass and hybrids. The duration of drought (42 days) and the heat in the greenhouse was critical in seeing differences in drought resistance between selections. And yet Midnight, which is one parent of many of these crosses, was still equivalent to many hybrids in drought resistance. They did note many of the hybrids grew significantly faster during recovery, which would require more mowing. Many hybrids had significantly less drought resistance than the original parents - either Kentucky bluegrass or Texas bluegrass. And due to the unexpected, Rutgers is currently looking for a genetic marker for drought resistance in these hybrids.

Examination of data from the 2000 Kentucky bluegrass NTEP, which included two heat tolerant bluegrasses, BH 00-6002 and BH 00-6003, demonstrated that BH 00-6002 had equivalent drought resistance to many Kentucky bluegrasses at Rutgers in 2001, including most of the America-types such as SR 2284, Kingfisher and Showcase and many of the Midnight-types, including Arcadia. However, BH 00-6003 had significantly less drought resistance in this trial than almost all of the Kentucky bluegrasses. In Wyoming in 2002 researchers looked at wilting during drought and BH 00-6002, with many of the America-type demonstrated more wilting, with BH 00-6003 and Quantum Leap showing less wilting. In Wichita, Kansas in the 2003 data varieties such as SR 2284 and Rampart, a Julia-type, performed better than BH 00-6002.

In the 2003 data Schedule C of the NTEP, which is the low maintenance trials, Kingfisher, Quantum Leap, SR 2284 and Arcadia all had significantly higher turf quality ratings than BH 00-6002, while Rampart and Ulysses had equivalent ratings and BH 00-6003 was lower.

Heat tolerant or hybrid bluegrasses may increase options now and in the future for homeowners, sod growers and sports turf managers. Many of these hybrid bluegrasses exhibit very extensive rhizomes, which can be an advantage for recovery after stress but may cause them to crowd out tall fescues or less aggressive Kentucky bluegrasses in blends. As with all Kentucky bluegrasses you need to examine data from sites near you and compare the hybrid bluegrasses with other heat tolerant bluegrasses before you make planting decisions. Some of the initial releases of hybrid bluegrasses had establishment problems. Production of high quality seed with good establishment has become a major goal in evaluating these hybrids. New hybrid bluegrasses are currently being evaluated for performance in high stress environments and may be on the market soon.

### 2000 Kentucky bluegrass NTEP Drought and Heat Data

Variety	Bluegrass Type	NJ Drought-Wilting 2001	WY Drought-Wilting 2002	KS Turf Quality	OH - Turf Quality No irrigation	UT Turf quality Low maintenance
<b>SR 2284</b>	<b>America</b>	<b>6.7</b>	<b>5.0</b>	<b>5.7</b>	<b>6.7</b>	<b>5.4</b>
Midnight	Midnight	6.0	7.3	4.6	6.9	5.3
<b>Rampart</b>	<b>Julia</b>	<b>4.0</b>	<b>5.3</b>	<b>5.6</b>	<b>3.9</b>	<b>5.2</b>
<b>Kingfisher</b>	<b>America</b>	<b>7.0</b>	<b>6.7</b>	<b>5.0</b>	<b>6.8</b>	<b>5.1</b>
<b>Showcase</b>	<b>America</b>	<b>7.3</b>	<b>6.0</b>	<b>4.7</b>	<b>6.1</b>	<b>5.0</b>
<b>Quantum Leap</b>	<b>Midnight</b>	<b>4.3</b>	<b>7.0</b>	<b>4.3</b>	<b>6.7</b>	<b>5.0</b>
BH 00-6002	Texas hybrid	7.0	5.0	5.0	6.2	4.9
<b>Arcadia</b>	<b>Midnight</b>	<b>5.7</b>	<b>6.0</b>	<b>2.3</b>	<b>6.6</b>	<b>4.8</b>
BH 00-6003	Texas hybrid	3.7	6.3	3.9	4.4	4.8
<b>Cheetah</b>	<b>Aggressive</b>	<b>5.3</b>	<b>4.3</b>	<b>4.4</b>	<b>6.1</b>	<b>4.7</b>
<b>Ulysses</b>	<b>Julia</b>	<b>4.3</b>	<b>6.0</b>	<b>4.4</b>	<b>4.6</b>	<b>4.7</b>
Envicta	BVMG	6.7	5.3	3.6	5.7	4.7
Princeton 105	Aggressive	5.0	7.0	4.9	5.2	4.7
<i>LSD@5%</i>		<i>1.6</i>	<i>2.3</i>	<i>3.8</i>	<i>1.2</i>	<i>1.5</i>