



TURF-TYPE TALL FESCUE

DROUGHT TOLERANCE AND DROUGHT RECOVERY RATINGS AT THREE DISTINCTLY DIFFERENT GEOGRAPHICAL TURF TRIAL SITES

• Forest Grove, OR • Lewisburg, PA • Haymarket, VA •



March 2008



July 2008



Dakota Tall Fescue, a "Black Beauty" variety.



Tombstone Tall Fescue flagged for its superior drought resistance.

Plant breeder Michael McCarthy's research farm, Forest Grove, Oregon. Oregon is an ideal location for drought tolerance and drought recovery ratings because good Spring rains are always followed by hot, dry, sunny weather from May through September.

2008 FOREST GROVE, OREGON

| VARIETY | TURF QUALITY | COLOR | DENSITY | TEXTURE | DROUGHT TOLERANCE | CUMULATIVE AVG. |
|------------------|--------------|-------|---------|---------|-------------------|-----------------|
| Dorado | 7.5 | 7.6 | 6.4 | 6.2 | 6.8 | 6.9 |
| Dakota | 7.0 | 7.3 | 6.5 | 6.1 | 6.5 | 6.68 |
| Darlington | 7.3 | 7.2 | 6.0 | 6.5 | 6.1 | 6.62 |
| Mustang 4 | 7.2 | 7.0 | 6.3 | 6.6 | 6.0 | 6.62 |
| Montana | 6.5 | 7.0 | 6.4 | 6.2 | 6.0 | 6.42 |
| Crossfire 3 | 7.1 | 7.0 | 6.3 | 6.0 | 5.0 | 6.28 |
| Justice | 6.9 | 7.0 | 5.8 | 5.8 | 5.8 | 6.26 |
| Shenandoah Elete | 6.0 | 6.8 | 6.3 | 5.9 | 5.2 | 6.04 |
| Da Vinci | 5.2 | 6.5 | 5.9 | 5.9 | 5.5 | 5.8 |
| Scorpion II | 6.2 | 5.6 | 6.0 | 6.0 | 5.2 | 5.8 |
| Hunter | 5.6 | 7.1 | 5.5 | 5.5 | 5.1 | 5.76 |
| Falcon 4 | 5.8 | 6.4 | 5.8 | 5.6 | 5.0 | 5.72 |
| Talladega | 5.8 | 5.1 | 5.9 | 6.0 | 5.3 | 5.62 |
| Obsidian | 5.8 | 5.8 | 5.3 | 5.9 | 5.1 | 5.58 |
| Ebony | 5.7 | 6.0 | 5.8 | 5.1 | 5.0 | 5.52 |
| Taos | 5.7 | 5.7 | 5.7 | 5.6 | 4.9 | 5.52 |
| Bonsai | 4.7 | 6.8 | 6.5 | 7.5 | 2.0 | 5.5 |
| Rembrandt | 5.6 | 6.1 | 6.0 | 5.7 | 4.1 | 5.5 |
| Tombstone | 5.1 | 6.0 | 5.7 | 5.5 | 5.2 | 5.5 |
| Onyx | 5.2 | 5.5 | 5.9 | 5.9 | 4.8 | 5.46 |
| Masterpiece | 5.6 | 5.7 | 5.0 | 5.5 | 4.9 | 5.34 |
| Rebel 4 | 6.0 | 5.5 | 5.3 | 5.1 | 4.8 | 5.34 |
| Wolfpack | 5.0 | 5.7 | 5.1 | 5.1 | 5.7 | 5.32 |
| Picasso | 5.3 | 5.7 | 5.1 | 5.7 | 4.6 | 5.28 |
| Olympic Gold | 5.1 | 5.5 | 5.0 | 5.2 | 5.0 | 5.16 |
| Magellan | 5.1 | 5.8 | 5.1 | 5.0 | 4.7 | 5.14 |
| Grande II | 5.0 | 5.1 | 5.0 | 4.9 | 4.3 | 4.86 |
| Labyrinth | 1.9 | 1.0 | 2.5 | 3.5 | 4.6 | 2.7 |
| K-31 | 2.1 | 1.0 | 1.0 | 1.0 | 4.5 | 1.92 |

2008 LEWISBURG, PENNSYLVANIA

| VARIETY | TURF QUALITY | COLOR | DENSITY | TEXTURE | DROUGHT TOLERANCE | CUMULATIVE AVG. |
|------------------|--------------|-------|---------|---------|-------------------|-----------------|
| Dorado | 8.2 | 8.4 | 7.2 | 8.0 | 7.8 | 7.92 |
| Dakota | 7.8 | 8.0 | 7.0 | 7.2 | 7.5 | 7.5 |
| Montana | 7.6 | 8.1 | 6.9 | 7.0 | 7.1 | 7.34 |
| Darlington | 7.5 | 7.9 | 7.0 | 6.7 | 7.2 | 7.26 |
| Mustang 4 | 6.9 | 7.5 | 7.1 | 7.8 | 6.2 | 7.1 |
| Shenandoah Elete | 6.5 | 7.7 | 6.4 | 6.8 | 6.8 | 6.84 |
| Crossfire 3 | 6.7 | 7.5 | 6.0 | 6.1 | 6.7 | 6.6 |
| Falcon 4 | 6.2 | 7.0 | 6.7 | 7.0 | 6.0 | 6.58 |
| Justice | 7.0 | 6.7 | 6.8 | 6.5 | 5.6 | 6.52 |
| Scorpion II | 6.7 | 6.5 | 6.7 | 6.3 | 5.5 | 6.34 |
| Hunter | 5.9 | 7.8 | 6.5 | 5.6 | 5.8 | 6.32 |
| Rebel 4 | 5.7 | 7.0 | 5.6 | 7.0 | 6.1 | 6.28 |
| Magellan | 6.1 | 6.0 | 8.0 | 6.0 | 5.2 | 6.26 |
| Talladega | 6.2 | 6.4 | 6.5 | 6.0 | 5.7 | 6.16 |
| Taos | 5.4 | 6.5 | 6.1 | 6.4 | 6.4 | 6.16 |
| Olympic Gold | 6.0 | 6.2 | 6.3 | 5.8 | 5.5 | 5.96 |
| Obsidian | 5.8 | 6.2 | 5.9 | 5.8 | 5.7 | 5.88 |
| Picasso | 6.0 | 6.1 | 5.7 | 5.9 | 5.6 | 5.86 |
| Bonsai | 3.5 | 5.7 | 7.9 | 8.3 | 3.5 | 5.78 |
| Wolfpack | 5.1 | 6.0 | 5.6 | 5.3 | 6.5 | 5.7 |
| Da Vinci | 5.1 | 5.9 | 6.2 | 6.2 | 5.0 | 5.68 |
| Rembrandt | 5.0 | 6.2 | 6.7 | 6.1 | 4.3 | 5.66 |
| Ebony | 5.0 | 5.7 | 6.3 | 6.0 | 5.1 | 5.62 |
| Masterpiece | 5.4 | 5.9 | 6.6 | 6.4 | 3.8 | 5.62 |
| Tombstone | 5.2 | 6.0 | 6.0 | 5.9 | 4.4 | 5.5 |
| Onyx | 4.6 | 5.9 | 5.8 | 5.9 | 4.1 | 5.26 |
| Grande II | 4.0 | 5.2 | 5.1 | 5.1 | 4.2 | 4.72 |
| Labyrinth | 1.5 | 2.1 | 1.5 | 3.0 | 3.3 | 2.28 |
| K-31 | 1.5 | 2.0 | 1.0 | 1.0 | 4.0 | 1.9 |

Rating scale: 1 - 9, 9 = Best.

The highlighted tall fescues are Black Beauty varieties currently in production.

SOD STRENGTH TEST AT LATHAM RESEARCH FARM, HAY MARKET, VIRGINIA

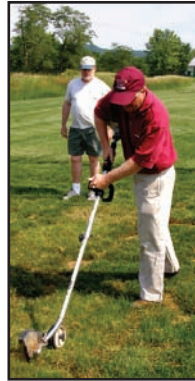
On June 3, 2008 Dr. Erik Ervin and Dr. Xunzhong Zhang of the Virginia Polytechnic Institute and State University performed a "Sod Strength" and "Photochemical Efficiency" Test on the tall fescue varieties in this trial and the grasses which exhibited the best ratings for drought tolerance and drought recovery also rated higher in sod strength and photochemical efficiency.



Dr. Xunzhong Zhang & Dr. Erik Ervin of Virginia Tech.



Dr. Xunzhong Zhang performed the photo-chemical efficiency test on all the tall fescues in the test plots. Grasses are placed between the two halves of the black rubber clamp of the fluorometer and laser light is fired through a gun into a target built into the opposite side of the clamp.



Dr. Erik Ervin separates each plot with the hand cutter. Each piece of sod is carefully lifted from the plot and is carried to the sod tensile strength machine.



Dr. Xunzhong Zhang (right) explains tests during Virginia Tech Field Day, Blacksburg, VA.



Once the sod is plated and locked down, it is stretched until it tears and the pounds at which it separates is recorded.

DROUGHT TOLERANCE AND DROUGHT RECOVERY RATINGS 2005 - 2009 AT LATHAM RESEARCH FARM, HAY MARKET, VIRGINIA

This was the original VA-2 test site for the National Turfgrass Evaluation Program, located at the Virginia Beef Sod Farm. The only site never irrigated in the NTEPS. Only natural rainfall. Total 54 ratings for germination, establishment, color, texture, density, growth rate, disease resistance, drought tolerance and recovery, and over-all turf quality. Drought ratings shown here. Rating scale: 1 - 6, 6 = Best.

| PLOT NO. | VARIETY | DROUGHT TOLERANCE 07/18/06 (First Rating) | DROUGHT TOLERANCE 08/14/07 (Second Rating) | CUMULATIVE MEAN DROUGHT TOLERANCE |
|----------|--------------------|---|--|-----------------------------------|
| 43 | DAKOTA | 4.67 | 3.33 | 4.00 |
| 58 | CAYENNE | 4.00 | 2.67 | 3.34 |
| 32 | MONTAUK | 3.67 | 2.67 | 3.17 |
| 6 | PALADIN | 4.00 | 2.33 | 3.17 |
| 4 | RAD TF19 (Montana) | 4.00 | 2.33 | 3.17 |
| 9 | REBEL PRO | 3.67 | 2.33 | 3.00 |
| 50 | REBEL SENTRY | 3.67 | 2.33 | 3.00 |
| 60 | WETSEL CLASS ACT 2 | 3.33 | 2.67 | 3.00 |
| 20 | DESIRE | 3.67 | 2.00 | 2.84 |
| 28 | FALCON IV | 3.67 | 2.00 | 2.84 |
| 19 | TOMBSTONE | 3.33 | 2.33 | 2.83 |
| 53 | LESCO TRANSITION | 3.00 | 2.33 | 2.67 |
| 22 | SIXPOINT | 3.00 | 2.00 | 2.50 |
| 3 | TAOS | 3.00 | 2.00 | 2.50 |
| 24 | CHIPPER | 3.00 | 1.67 | 2.34 |
| 45 | EBONY | 2.67 | 2.00 | 2.34 |
| 35 | JAGUAR 4G | 3.00 | 1.67 | 2.34 |
| 55 | LEXINGTON | 3.00 | 1.67 | 2.34 |
| 21 | REBEL JR. | 2.67 | 2.00 | 2.34 |
| 49 | INFERNO (JT99) | 3.33 | 1.33 | 2.33 |
| 16 | TURNBERRY | 2.67 | 1.33 | 2.00 |
| 12 | FIRENZA | 2.33 | 1.33 | 1.83 |
| 56 | REBEL IV | 2.33 | 1.33 | 1.83 |
| 41 | PIEDMONT | 2.00 | 1.33 | 1.67 |
| 37 | SHELBY | 2.00 | 1.33 | 1.67 |

| PLOT NO. | VARIETY | DROUGHT RECOVERY 09/21/06 (First Rating) | DROUGHT RECOVERY 10/28/07 (Second Rating) | CUMULATIVE MEAN DROUGHT RECOVERY |
|----------|--------------------|--|---|----------------------------------|
| 43 | DAKOTA | 5.33 | 5.00 | 5.17 |
| 6 | PALADIN | 4.33 | 6.00 | 5.17 |
| 32 | MONTAUK | 4.67 | 5.33 | 5.00 |
| 41 | PIEDMONT | 4.67 | 5.33 | 5.00 |
| 9 | REBEL PRO | 5.33 | 4.67 | 5.00 |
| 45 | EBONY | 5.00 | 4.67 | 4.84 |
| 35 | JAGUAR 4G | 5.00 | 4.67 | 4.84 |
| 3 | TAOS | 4.00 | 5.67 | 4.84 |
| 20 | DESIRE | 5.33 | 4.33 | 4.83 |
| 50 | REBEL SENTRY | 4.67 | 4.67 | 4.67 |
| 49 | INFERNO (JT99) | 4.33 | 5.00 | 4.67 |
| 53 | LESCO TRANSITION | 4.00 | 5.33 | 4.67 |
| 37 | SHELBY | 5.00 | 4.33 | 4.67 |
| 16 | TURNBERRY | 4.33 | 5.00 | 4.67 |
| 60 | WETSEL CLASS ACT 2 | 5.00 | 4.33 | 4.67 |
| 24 | CHIPPER | 5.00 | 4.00 | 4.50 |
| 28 | FALCON IV | 4.67 | 4.33 | 4.50 |
| 4 | RAD TF19 (Montana) | 4.33 | 4.67 | 4.50 |
| 21 | REBEL, JR. | 5.33 | 3.67 | 4.50 |
| 19 | TOMBSTONE | 4.00 | 5.00 | 4.50 |
| 12 | FIRENZA | 4.00 | 4.67 | 4.34 |
| 55 | LEXINGTON | 3.00 | 5.67 | 4.34 |
| 56 | REBEL IV | 4.33 | 4.33 | 4.33 |
| 22 | SIXPOINT | 3.67 | 4.33 | 4.00 |
| 58 | CAYENNE | 3.33 | 4.00 | 3.67 |

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