Winter Survival of Experimental Bermudagrasses in the Upper Transition Zone

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Abstract
A winter with very cold temperatures in 2017–2018 allowed for good separation of standard and experimental bermudagrasses for freezing tolerance. When evaluated in May 2018, survival of commonly used cultivars was: Tifway, 0%; Latitude 36, 20%; Northbridge, 25%. Some experimental progeny had up to 98% winter survival on the same rating date.

Keywords
bermudagrass, turfgrass, cold hardiness

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Winter Survival of Experimental Bermudagrasses in the Upper Transition Zone

Mingying Xiang, Jack Fry, and Yanqi Wu¹

Summary
A winter with very cold temperatures in 2017–2018 allowed for good separation of standard and experimental bermudagrasses for freezing tolerance. When evaluated in May 2018, survival of commonly used cultivars was: Tifway, 0%; Latitude 36, 20%; Northbridge, 25%. Some experimental progeny had up to 98% winter survival on the same rating date.

Rationale
Winter survival is the limiting factor in selecting and developing new bermudagrass cultivars for use in the transition zone. Latitude 36 and Northbridge were released by Oklahoma State University in 2010, based in part on their improved cold hardiness. The bermudagrass breeding program continues to develop experimental bermudagrasses that may soon be released as cultivars. More information is needed on the hardiness of these experimental genotypes relative to standard cultivars.

Objective
The objective of this study was to compare new, experimental bermudagrasses to existing cultivars for winter survival in Kansas.

Study Description
On July 19, 2016, vegetative plugs of 60 new bermudagrass progeny, along with the standard cultivar Latitude 36, NorthBridge, TifTuf, Tifway, and Patriot were planted at the Rocky Ford Turfgrass Research Center in Manhattan, KS. Bermudagrass progeny came from the breeding program at Oklahoma State University.

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Plots measured 4 × 4 ft and were replicated 3 times. The soil type was a silty clay loam (fine, smectitic, mesic, Aquertic Argiudoll) with a pH of 7.3. Plots were mowed 3 times per week at 0.625 in. using a triplex reel mower. Nitrogen (N) from urea was applied twice during the summer to provide 1 lb of N at each application. Ronstar was applied in April 2018 to prevent annual grassy weeds, and Trimec was applied at the same time to remove broadleaves. The first freezing temperature occurred on October 27, 2017, and bermudagrasses started to lose color. After December 25, 2017, there were 17 days on which the low temperature was < 10°F; the lowest temperature occurred on January 1, 2018 (-8°F). Data were collected on winter injury on a 0 to 100% scale on May 25, 2018. Data were analyzed using PROC GLM, and results are presented in Table 1.

**Results**
In 2018, progeny showed a wide range of variability in cold hardiness. Tifway, an industry standard, exhibited 0% survival in May 2018, whereas Latitude 36 and NorthBridge had winter survival of 20% and 25%, respectively. Several new, experimental bermudagrass progeny exhibited > 90% winter survival on the same rating date.

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**Table 1. Winter survival of bermudagrass progeny and standard cultivars on May 25, 2018, in Manhattan, KS**

| Entry   | Survival (%) |
|---------|--------------|
| OSU1656 | 98.3         |
| OSU1666 | 96.7         |
| OSU1675 | 93.3         |
| OSU1680 | 93.3         |
| OSU1629 | 90.0         |
| OSU1406 | 88.3         |
| OSU1337 | 86.7         |
| OSU1433 | 86.7         |
| OSU1649 | 86.7         |
| OSU1657 | 85.0         |
| OSU1682 | 83.3         |
| OSU1664 | 81.7         |
| OSU1687 | 80.0         |
| OSU1673 | 78.3         |
| OSU1257 | 75.0         |
| Entry     | Survival (%) |
|-----------|--------------|
| OSU1628   | 73.3         |
| OSU1639   | 73.3         |
| OSU1662   | 71.7         |
| OSU1601   | 68.3         |
| OSU1620   | 68.3         |
| OSU1625   | 63.3         |
| OSU1641   | 63.3         |
| OSU1695   | 63.3         |
| OSU1435   | 61.7         |
| OSU1636   | 60.0         |
| OSU1439   | 56.7         |
| OSU1644   | 53.3         |
| OSU1631   | 51.7         |
| OSU1696   | 50.0         |
| OSU1604   | 46.7         |
| OSU1674   | 46.7         |
| OSU1403   | 43.3         |
| OSU1691   | 43.3         |
| OSU1402   | 38.3         |
| OSU1409   | 38.3         |
| OSU1318   | 36.7         |
| OSU1614   | 36.7         |
| OSU1408   | 35.0         |
| OSU1645   | 35.0         |
| OSU1617   | 28.3         |
| OSU1423   | 26.7         |
| OSU1605   | 26.7         |
| OSU1412   | 25.0         |
| OSU1640   | 23.3         |
| OSU1425   | 21.7         |
| OSU1634   | 21.7         |
| OSU1669   | 21.7         |
| OSU1607   | 20.0         |
| OSU1610   | 20.0         |
| OSU1606   | 18.3         |
| OSU1420   | 15.0         |
| OSU1615   | 15.0         |
| OSU1611   | 13.3         |
| Entry     | Survival (%)<sup>a</sup> |
|-----------|--------------------------|
| OSU1603   | 8.3                      |
| OSU1612   | 8.3                      |
| OSU1417   | 5.7                      |
| OSU1310   | 5.0                      |
| OSU1616   | 3.3                      |
| OSU1418   | 2.7                      |
| OSU1415   | 0.7                      |
| Patriot   | 30.0                     |
| NorthBridge | 25.0                    |
| DT-1      | 22.7                     |
| Latitude 36 | 20.0                    |
| Tifway    | 0.0                      |
| LSD<sup>b</sup> | 23.6                  |

<sup>a</sup>Winter survival was rated visually on a 0 to 100% scale; results are averaged over three replicates.

<sup>b</sup>To determine statistical differences among entries, subtract one entry’s mean from another entry’s mean. Statistical differences occur when this value is larger than the corresponding LSD value ($P < 0.05$).

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**Figure 1.** Overhead photos of new bermudagrass progeny and standard cultivars taken above a single, representative plot on May 28, 2018, in Manhattan, KS.
Figure 2. Dr. Yanqi Wu, turfgrass breeder at Oklahoma State University, and Dr. Mingyong Xiang, recent Ph.D. graduate at Kansas State University, rate plots in Manhattan, KS, in May 2018.