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# 2003 Cool-Season Grass Grazing Tolerance Variety Report

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## Introduction

Cool-season grasses such as tall fescue and orchardgrass are the primary pasture grasses in Kentucky. Other species such as perennial ryegrass, festulolium, and prairie brome can be used in pasture systems. Little is known about the effect of variety on the grazing tolerance of these cool-season grass species.

The purpose of this report is to summarize current research on the grazing tolerance of varieties of tall fescue, orchardgrass, perennial ryegrass, and other species when they are subjected to continuous, heavy grazing pressure by cattle within the grazing season. The main focus will be on plant stand survival.

## Description of the Tests

Grass variety tests for grazing tolerance were established in Lexington in the fall of 1999, 2000, 2001, and 2002. The soils at this location are well-drained silt loams and are well suited to tall fescue, orchardgrass, and ryegrass production. Plots were 5 by 15 feet in a randomized complete block design with each variety replicated six times. In each test, 20 pounds of seed per acre (8 pounds/acre for timothy) were planted into a prepared seedbed using a disk drill. Grazing began in April and was continuous until late September. Plots were grazed down to below 4 inches quickly by feeder steers and kept at that height or below for the remainder of the grazing season. Supplemental hay or soybean hulls were fed during periods of slowest growth. Animals were removed from plots after all fall growth had been removed and when little regrowth was expected. Visual ratings of percent stand were made in the fall and spring after each grazing season. Grass plots were fertilized with 60 pounds of actual N per acre in the spring, and other fertilizer (lime, P, and K) was applied as needed.

## Results and Discussion

Weather data for Lexington for 2002 and 2003 are presented in Table 1. Data on percent stand are presented in Tables 2 through 12. Statistical analyses were performed on all entries (including experimentals) to determine if the apparent differences are truly due to variety. Varieties not significantly different from the highest numerical value in a column are marked with one asterisk (*). To determine if two varieties are truly different, compare the difference between the two varieties to the Least Significant Difference (LSD) at the bottom of the column. If the difference is equal to or greater than the LSD, the varieties are truly different when grown under the conditions at a given location. The Coefficient of Variation (CV), which is a measure of the variability of the data, is included for each column of means. Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

Kentucky 31 tall fescue with the endophyte (KY31+) is considered to be the most grazing-tolerant variety and is the grazing-tolerant check entry in all tall fescue trials. The central questions in grazing tolerance among tall fescues are: 1) Can endophyte-free varieties persist as well as KY31+; and 2) Will the new novel, or "friendly," endophyte materials persist as well as other tolerant varieties?

After three seasons, Cattle Club and Duo (festulolium) were comparable to KY31+, as were some endophyte-free experimental lines (e.g., KYFA9301 and KYFA9304) (Table 2). Three novel endophyte lines—Jesup (542), Jesup (584), and GA5 (584)—were comparable to KY31+ as well. The novel endophyte designation of these three lines contains the tall fescue variety (e.g., Jesup) and the particular strain of novel endophyte (e.g., 542 or 584). Jesup (542) is the experimental designation for the commercial variety Max Q. It is logical that the extreme drought of 2002 should have led to greater stand loss in lines without grazing tolerance. The endophyte, therefore, is not essential for persistence or tolerance to grazing abuse, at least for Central Kentucky conditions, where other factors such as soil fertility and topsoil depth are not limiting.

Perennial ryegrass or ryegrass hybrids tended to be more persistent than prairie brome species (Table 7). SpringGreen and Duo festuloliums had greater than 60% stand after three seasons.

Orchardgrass persistence is reported in Tables 9-12. Several commercial varieties of orchardgrass persisted well even after three seasons of heavy grazing, including Boone and Prairie.

Table 13 (fescue, perennial ryegrass, and prairiegrass), Table 14 (orchardgrass), and Table 15 (perennial ryegrass) summarize information about distributors and persistence across locations and years for all varieties in these tests. Varieties are listed in alphabetical order with experimental varieties listed at the bottom. Shaded areas indicate that the variety was not in that particular test (labeled at the top of the column), while clear blocks mean the variety was in the test. A single asterisk (*) means that the variety was not significantly different from the top-yielding variety in that study. It is best to choose a variety that has performed well over several years.

## Summary

These studies indicate that there are varieties of cool-season grasses that can tolerate overgrazing for multiple seasons and still maintain reasonable stands. Some varieties of endophyte-free as well as novel, or "friendly," endophyte tall fescue have been able to maintain equivalent stands to endophyte-infected KY31. There is no "KY31+" equivalent in orchardgrass; that is, no variety has historically been proven to be tolerant of overgrazing. Therefore, conclusions about orchardgrass grazing tolerance are limited. However, some varieties have exhibited good tolerance to grazing abuse even after three seasons.

This information should be used along with yield and other information (for example, relative maturity in spring) in selecting the best grass variety for each individual use. It is not recommended that tall fescue or orchardgrass be continuously overgrazed, as was done in these trials. While several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing greatly reduces yield and therefore profitability of these varieties. This information should be an indication of those varieties that will better withstand the occasional overgrazing that sometimes becomes necessary in livestock operations.

Good management for maximum life from any grass would be to allow it to become completely established before grazing and to avoid overgrazing it during times of extreme stress, such as drought.

**Table 1. Temperature and rainfall at Lexington during the 2002 and 2003 growing seasons.**

| | 2002 | | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|
| | Temp | | Rainfall | | Temp | | Rainfall | |
| | °F | DEP | IN | DEP | °F | DEP | IN | DEP |
| JAN | 38 | +7 | 2.12 | -0.7 | 26 | -5 | 0.96 | -1.90 |
| FEB | 38 | +3 | 1.28 | -1.9 | 32 | -3 | 3.59 | +0.38 |
| MAR | 45 | +1 | 7.93 | 3.5 | 47 | +3 | 2.09 | -2.31 |
| APR | 58 | +3 | 4.19 | 0.3 | 57 | +2 | 3.14 | -0.74 |
| MAY | 61 | -3 | 4.36 | -0.1 | 63 | -1 | 6.68 | +2.21 |
| JUN | 74 | +2 | 2.45 | -1.2 | 69 | -3 | 4.85 | +1.19 |
| JUL | 78 | +2 | 1.10 | -3.9 | 74 | -2 | 2.68 | -2.32 |
| AUG | 77 | +2 | 0.95 | -3.0 | 75 | 0 | 5.26 | +1.33 |
| SEP | 72 | +4 | 4.90 | 1.7 | 65 | -3 | 4.22 | +1.02 |
| OCT | 55 | -2 | 5.61 | 3.0 | 56 | -1 | 1.61 | -0.96 |
| NOV | 43 | -2 | 3.76 | 0.4 | 50 | +5 | 4.63 | +1.24 |
| **TOTAL** | | | **37.70** | **-1.9** | | | **39.71** | **-0.86** |

DEP is departure from the long-term average for that location.

| Table 2. Percent stand of tall fescue varieties planted October 4, 1999, in a cattle grazing tolerance study at Lexington, Kentucky. | | | | | |
|---|---|---|---|---|---|
| | Percent Endophyte Infection | Percent Stand | | | |
| Variety | | April 2, 2002 | October 11, 2002 | March 26, 2003 | July 22, 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | |
| Duo (festulolium) | 0 | 70 | 69 | 68 | 77* |
| Ky 31+ [1] | 72 | 74 | 61 | 72 | 67* |
| BAR9TMPO | 0 | 62 | 44 | 58 | 50 |
| Cattle Club | 0 | 64 | 57 | 65 | 47 |
| Select | 0 | 64 | 47 | 58 | 46 |
| Festorina | 0 | 53 | 45 | 52 | 38 |
| Stargrazer | 0 | 56 | 43 | 58 | 35 |
| **Experimental Varieties** | | | | | |
| KYFA 9301 | 40 | 75 | 65 | 72 | 70* |
| KYFA 9304 | 33 | 76 | 63 | 68 | 63 |
| KYTF2 | 0 | 73 | 60 | 67 | 61 |
| Jesup (584) | 40 | 75 | 58 | 70 | 60 |
| Ky 31- [1] | 0 | 71 | 55 | 64 | 56 |
| Jesup (542) | 60 | 72 | 60 | 68 | 53 |
| Ga156L (542) | 33 | 71 | 59 | 69 | 51 |
| Ga5 (584) | 33 | 63 | 49 | 61 | 43 |
| Ampac pp7mix | 57 | 53 | 41 | 58 | 41 |
| Ga7clone (542) | 0 | 56 | 38 | 56 | 33 |
| Ampac pp3mix | 0 | 31 | 21 | 26 | 32 |
| BARFaBTR6 | 0 | 38 | 38 | 46 | 32 |
| BARFaBTR7 | 33 | 40 | 36 | 44 | 32 |
| Ampac pp8mix | 0 | 38 | 23 | 27 | 30 |
| Ga153E (542) | 0 | 55 | 30 | 46 | 30 |
| | | | | | |
| Mean | - | 60.49 | 48.30 | 57.73 | 47.58 |
| CV, % | - | 13.93 | 21.05 | 16.89 | 22.47 |
| LSD, 0.05 | - | 9.65 | 11.64 | 11.16 | 12.24 |

* Not significantly different from the highest value in the column, based on the 0.05 LSD.
[1] "+" indicates variety is endophye infected; "-" indicates variety is endophyte free.

**Table 3. Percent stand of tall fescue and timothy varieties planted September 19, 2000, in a cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Percent Endophyte Infection | Percent Stand | | | |
|---|---|---|---|---|---|
| | | April 2, 2002 | October 14, 2002 | March 26, 2003 | October 31, 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | |
| KY 31+ [2] | 60 | 76 | 74 | 73 | 64* |
| Select | 0 | 69 | 65 | 66 | 59* |
| Kokanee | 0 | 54 | 48 | 53 | 54 |
| Cattle Club | 14 | 68 | 74 | 68 | 53 |
| Hoedown | 14 | 65 | 66 | 63 | 48 |
| Stargrazer | 0 | 65 | 53 | 60 | 41 |
| Tuukka (timothy) | 0 | 46 | 6 | 15 | 6 |
| **Experimental Varieties** | | | | | |
| KYFA 9401 | 0 | 74 | 68 | 69 | 70* |
| KYFA 9304 | 0 | 73 | 73 | 69 | 70* |
| KYFA 9301 | 0 | 75 | 70 | 66 | 67* |
| KYFA 9403 | 0 | 71 | 67 | 66 | 67* |
| KYFA 9402 | 0 | 76 | 71 | 67 | 64* |
| KY 31- [2] | 0 | 77 | 66 | 67 | 62* |
| KYTF2 | 0 | 69 | 63 | 68 | 59* |
| AGRFA 110 | 0 | 68 | 70 | 58 | 53 |
| R4663 [1] | 100 | 53 | 43 | 48 | 31 |
| Q4508 [1] | 80 | 70 | 71 | 65 | 26 |
| | | | | | |
| Mean | - | 67.48 | 61.65 | 61.17 | 52.79 |
| CV, % | - | 10.15 | 16.76 | 13.68 | 19.24 |
| LSD, 0.05 | - | 7.87 | 11.87 | 9.61 | 11.67 |

* Not significantly different from the highest value in the column, based on the 0.05 LSD.
[1] Novel endophyte tall fescue.
[2] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

**Table 4. Percent stand of tall fescue varieties planted September 12, 2001, in a cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Percent Endophyte Infection | Percent Stand | | | |
|---|---|---|---|---|---|
| | | April 4, 2002 | October 15, 2002 | March 24, 2003 | October 27, 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | |
| Spring Green (festulolium) | 0 | 90 | 80 | 90 | 81* |
| Ky 31+ [1] | 100 | 90 | 88 | 90 | 74* |
| Felina | 0 | 90 | 86 | 89 | 71 |
| Cattle Club | 0 | 90 | 82 | 90 | 70 |
| Maximize | 0 | 90 | 84 | 90 | 70 |
| Select | 0 | 90 | 83 | 90 | 69 |
| Festival | 0 | 90 | 84 | 90 | 68 |
| Johnstone | 0 | 90 | 79 | 89 | 68 |
| Stargrazer | 0 | 90 | 78 | 89 | 61 |
| Carmine | 0 | 90 | 79 | 88 | 60 |
| Resolute | 29 | 14 | 16 | 47 | 17 |
| **Experimental Varieties** | | | | | |
| KYFA 9301 | 0 | 90 | 84 | 90 | 74* |
| KYFA 9304 | 0 | 90 | 88 | 90 | 73 |
| KY 31- [1] | 0 | 90 | 85 | 90 | 71 |
| HM4 [2] | 71 | 90 | 78 | 88 | 69 |
| K5666V | 0 | 90 | 65 | 88 | 63 |
| PP10 | 0 | 90 | 59 | 85 | 60 |
| | | | | | |
| Mean | - | 85.54 | 76.42 | 86.67 | 65.83 |
| CV, % | - | 1.39 | 9.61 | 3.85 | 9.10 |
| LSD, 0.05 | - | 1.37 | 8.44 | 3.84 | 6.88 |

* Not significantly different from the highest value in the column, based on the 0.05 LSD.
[1] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
[2] Novel endophyte tall fescue.

**Table 5. Percent stand of tall fescue and Kentucky bluegrass varieties planted September 19, 2002, in cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Percent Endophyte Infection | Seedling Vigor [1] | Percent Stand | |
|---|---|---|---|---|
| | | | March 24, 2003 | October 30, 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | |
| Select | 0 | 4 | 90 | 83* |
| Jesup Max Q [2] | 50 | 4 | 90 | 81* |
| Ky 31+ [3] | 60 | 5 | 90 | 81* |
| Orygun | 0 | 5 | 90 | 80* |
| Festival | 0 | 4 | 88 | 78 |
| Ky bluegrass uncertified | 0 | 2 | 90 | 74 |
| Kenblue | 0 | 2 | 89 | 69 |
| **Experimental Varieties** | | | | |
| EC 411 | 0 | 5 | 90 | 84* |
| HM 11 | 0 | 4 | 89 | 84* |
| KYFA 9304 | 0 | 5 | 89 | 84* |
| KY 31- [3] | 0 | 5 | 90 | 83* |
| KYFA 9301 | 0 | 5 | 90 | 83* |
| HM | 0 | 3 | 89 | 81* |
| | | | | |
| Mean | - | 3.94 | 89.62 | 80.32 |
| CV, % | - | 10.12 | 1.82 | 4.93 |
| LSD, 0.05 | - | 0.46 | 1.88 | 4.57 |

* Not significantly different from the highest value in the column, based on the 0.05 LSD.
[1] Based on score of 1 to 5 with 5 being the most vigorous.
[2] Contains Max Q endophyte.
[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

**Table 6. Percent stand of tall fescue, perennial ryegrass (PRG), and Kentucky bluegrass (BG) varieties planted September 25, 2002, in a cattle grazing tolerance study at Princeton, Kentucky.**

| Variety | Percent Stand | |
|---|---|---|
| | April 3, 2003 | December 2, 2003 |
| **Commercial Varieties—Available for Farm Use** | | |
| Calibra (PRG) | 90 | 85* |
| Jesup Max Q | 90 | 79* |
| Ky 31+ [1] | 90 | 78* |
| Select | 90 | 78* |
| Festival | 90 | 76 |
| Certified Kenblue (BG) | 90 | 23 |
| **Experimental Varieties** | | |
| EC411 (PRG) | 90 | 83* |
| KY31- [1] | 90 | 81* |
| FA2845 | 90 | 80* |
| KYFA 9301 | 90 | 79* |
| KYFA 9304 | 90 | 79* |
| FA 2720 | 90 | 78* |
| AGRFA 104 | 90 | 78* |
| AGRFA 114 | 90 | 78* |
| FABE 9301A | 90 | 78* |
| PBR | 86 | 78* |
| AGRFA 106 | 90 | 77* |
| FA 2651 | 90 | 77* |
| FA 2458 | 90 | 75 |
| HM11 | 90 | 75 |
| AGRFA 111 | 90 | 70 |
| HM | 88 | 70 |
| HB96 (BG) | 6 | 13 |
| KYPP 9901 (BG) | 86 | 12 |
| HB95 (BG) | 5 | 10 |
| | | |
| Mean | 82.83 | 67.50 |
| CV, % | 1.56 | 11.44 |
| LSD, 0.05 | 1.47 | 8.83 |

* Not significantly different from the highest value in the column, based on the 0.05 LSD.
[1] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

**Table 7. Percent stand of perennial ryegrass, festulolium, and prairie brome (*Bromus wildenowii*) varieties planted September 19, 2000, in a cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Species | Percent Endophyte Infection | Percent Stand | | | |
|---|---|---|---|---|---|---|
| | | | April 2, 2002 | October 14, 2002 | March 26, 2003 | October 31, 2003 |
| **Commercial Varieties** | | | | | | |
| Duo | festulolium | 0 | 71 | 61 | 70 | 66* |
| Spring Green | festulolium | 0 | 70 | 66 | 74 | 63* |
| Linn | perennial ryegrass | 0 | 75 | 58 | 72 | 48 |
| Citadel | perennial ryegrass | 0 | 58 | 56 | 64 | 38 |
| Grasslands Matua | prairie brome | 0 | 67 | 35 | 53 | 5 |
| Polly 2 | perennial ryegrass | 0 | 39 | 16 | 27 | 3 |
| **Experimental Varieties** | | | | | | |
| AGR LP 103 | perennial ryegrass | 71 | 73 | 73 | 73 | 63* |
| AGR LH 101 | perennial ryegrass | 100 | 63 | 43 | 50 | 28 |
| AGR BW 101 | prairie brome | 0 | 71 | 58 | 70 | 11 |
| | | | | | | |
| Mean | - | | 64.98 | 51.67 | 61.39 | 36.04 |
| CV, % | - | | 10.26 | 21.25 | 13.06 | 29.93 |
| LSD, 0.05 | - | | 7.78 | 12.81 | 9.35 | 12.59 |

* Not significantly different from highest value in the column, based on the 0.05 LSD.

**Table 8. Percent stand of perennial ryegrass varieties sown September 12, 2001, in a cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Ploidy | Percent Endophyte Infection | Percent Stand | | | |
|---|---|---|---|---|---|---|
| | | | April 4, 2002 | October 15, 2002 | March 28, 2003 | October 27, 2003 |
| **Commercial Varieties** | | | | | | |
| Grand Daddy | tetraploid | 0 | 90 | 81 | 88 | 82* |
| Lasso | diploid | 0 | 90 | 71 | 90 | 82* |
| Linn | diploid | 0 | 90 | 80 | 88 | 80* |
| Aries | diploid | 17 | 88 | 76 | 85 | 78* |
| Quartet | tetraploid | 0 | 77 | 66 | 85 | 73* |
| Polly 2 | tetraploid | 0 | 83 | 51 | 83 | 64 |
| PP 11 | mixture | 0 | 54 | 26 | 66 | 45 |
| Maverick Gold | diploid | 0 | 34 | 16 | 58 | 28 |
| | | | | | | |
| Mean | | - | 75.83 | 58.25 | 80.42 | 66.35 |
| CV, % | | - | 15.07 | 15.22 | 12.16 | 12.61 |
| LSD, 0.05 | | - | 13.39 | 10.39 | 11.46 | 9.81 |

* Not significantly different from highest value in the column.

| Table 9. Percent stand of orchardgrass and prairie brome (*Bromus wildenowii*) varieties planted September 19, 2000, in a cattle grazing study at Lexington, Kentucky. | | | | |
|---|---|---|---|---|
| | Percent Stand | | | |
| Variety | April 2, 2002 | October 14, 2002 | March 26, 2003 | October 30, 2003 |
| **Commercial Varieties** | | | | |
| Boone | 76 | 75 | 75 | 70* |
| Prairie | 73 | 70 | 70 | 68* |
| Haymate | 61 | 55 | 62 | 53 |
| Benchmark | 73 | 69 | 68 | 52 |
| **Experimental Varieties** | | | | |
| OG 9705G | 73 | 75 | 77 | 73* |
| 'CAS -LG31' | 74 | 63 | 69 | 68* |
| KYO7G 23-335 | 69 | 66 | 69 | 66* |
| K5568K | 33 | 21 | 24 | 23 |
| K5632M (prairie brome) | 52 | 18 | 57 | 11 |
| K5633D (prairie brome) | 47 | 29 | 53 | 9 |
| | | | | |
| Mean | 63.08 | 54.08 | 62.33 | 49.26 |
| CV, % | 17.44 | 18.21 | 15.19 | 24.65 |
| LSD, 0.05 | 12.80 | 11.46 | 11.01 | 14.12 |
| * Not significantly different from the highest value in the column | | | | |

| Table 10. Percent stand of orchardgrass varieties planted September 12, 2001, in a cattle grazing tolerance study at Lexington, Kentucky. | | | | |
|---|---|---|---|---|
| | Percent Stand | | | |
| Variety | April 4, 2003 | October 15, 2003 | March 24, 2003 | October 27, 2003 |
| **Commercial Varieties** | | | | |
| Tekapo | 90 | 88 | 90 | 73* |
| Prairie | 90 | 85 | 90 | 73* |
| Athos | 90 | 83 | 90 | 72* |
| Haymate | 90 | 85 | 90 | 72* |
| Hallmark | 90 | 86 | 90 | 70* |
| Benchmark | 90 | 86 | 90 | 69* |
| Crown Royale | 90 | 86 | 89 | 68* |
| Mammoth | 90 | 83 | 90 | 68* |
| Takena | 90 | 83 | 89 | 68* |
| Albert | 90 | 86 | 90 | 67 |
| Megabite | 90 | 83 | 89 | 58 |
| Amba | 90 | 76 | 87 | 53 |
| **Experimental Varieties** | | | | |
| OG 9705g | 90 | 86 | 90 | 70* |
| | | | | |
| Mean | 90 | 84.17 | 89.55 | 67.56 |
| CV, % | 0 | 6.39 | 1.40 | 8.46 |
| LSD, 0.05 | 0 | 6.21 | 1.45 | 6.60 |
| * Not significantly different from the highest value in the column. | | | | |

**Table 11. Percent stand of orchardgrass and Kentucky bluegrass varieties planted September 19, 2002, in a cattle grazing tolerance study at Lexington, Kentucky.**

| Variety | Seedling Vigor [1] October 31, 2002 | Percent Stand | |
|---|---|---|---|
| | | March 25, 2003 | October 30, 2003 |
| **Commercial Varieties** | | | |
| Certified.Potomac | 5 | 90 | 76* |
| Crown Royale Plus | 5 | 89 | 74* |
| Uncertified.Potomac | 5 | 89 | 74* |
| Haymate | 4 | 83 | 73 |
| Benchmark | 4 | 87 | 68 |
| Tekapo | 3 | 75 | 67 |
| Niva | 4 | 82 | 67 |
| Prairie | 5 | 85 | 65 |
| Ky bluegrass uncertified | 1 | 88 | 57 |
| Abertop | 2 | 63 | 36 |
| **Experimental Varieties** | | | |
| Dg9911 | 4 | 85 | 80* |
| Dg9930b | 4 | 84 | 79* |
| Benchmark Plus | 5 | 90 | 78* |
| GA-Og1 | 5 | 88 | 71 |
| | | | |
| Mean | 3.89 | 84.22 | 68.79 |
| CV, % | 9.81 | 3.45 | 9.24 |
| LSD, 0.05 | 0.44 | 3.36 | 7.33 |

* Not significantly different from the highest value in the column.
[1] Based on scale of 1 to 5 with 5 being the most vigorous.

**Table 12. Percent stand of orchardgrass and Kentucky bluegrass (KBG) varieties planted September 25, 2002, in a cattle grazing tolerance study at Princeton, Kentucky.**

| Variety | Percent Stand | |
|---|---|---|
| | April 3, 2003 | December 2, 2003 |
| **Commercial Varieties** | | |
| Tekapo | 89 | 83* |
| Niva | 90 | 79* |
| Crown Royale Plus | 90 | 76 |
| Certified Potomac | 90 | 74 |
| Benchmark | 90 | 73 |
| Haymate | 90 | 73 |
| Prairie | 90 | 71 |
| Hallmark | 84 | 68 |
| **Experimental Varieties** | | |
| Benchmark Plus | 90 | 76 |
| GA-Og1 | 90 | 66 |
| KYPP 9901 (KBG) | 89 | 53 |
| | | |
| Mean | 89.32 | 71.74 |
| CV, % | 1.22 | 6.75 |
| LSD, 0.05 | 1.26 | 5.62 |

* Not significantly different from the highest value in the column.

**Table 13. Persistence of tall fescue, perennial ryegrass (PRG), prairie brome (*Bromus wildenowii*), festulolium, and timothy varieties under heavy grazing pressure across years and locations.**

| Variety | Proprietor/KY Distributor | 1999 [1] | | 2000 | | 2001 | | 2002 | 2002 |
|---|---|---|---|---|---|---|---|---|---|
| | | Oct 2002 [2] | Jul 2003 | Oct 2002 | Oct 2003 | Oct 2002 | Oct 2003 | Oct 2003 | Dec 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | | | | | |
| Aries HD (PRG) | Ampac Seed Company | | | | | * | | | |
| BAR 9TMPO | Barenbrug USA | | | | | | | | |
| Carmine | DLF-Jenks | | | | | | | | |
| Calibra (PRG) | Donley Seed | | | | | | | | * |
| Cattle Club | unknown | | | * | | * | | | |
| Citadel (PRG) | Donley Seed | | | | | | | | |
| Duo (festulolium) | Ampac Seed Company | * | * | * | | | | | |
| Felina (festulolium) | DLF-Jenks | | | | | * | | | |
| Festival | Pickseed West Inc. | | | | | * | | | |
| Festorina | Advanta Seeds | | | | | | | | |
| Grand Daddy (PRG) | Smith Seed Services | | | | | * | | | |
| Hoedown | Jenks Seed Connection | | | * | | | | | |
| Jesup Max Q | AgResearch (USA) | | | | | | | * | * |
| Johnstone | Willamette Seed Co./Public | | | | | | | | |
| Kokanee | Ampac Seed Company | | | | | | | | |
| KY31+ (endophyte infected) | KY Agric. Exp. Sta./Public | * | * | * | * | * | * | * | * |
| Lasso (PRG) | DLF-Jenks | | | | | * | | | |
| Linn (PRG) | Public | | | | | * | | | |
| Matua (prairie brome) | AgResearch (USA) | | | | | | | | |
| Maverick Gold (PRG) | Ampac Seed Company | | | | | | | | |
| Maximize | Turf-Seed, Inc. | | | | | * | | | |
| Orygun | | | | | | | | * | |
| Polly II (PRG) | FFR/Southern States | | | | | | | | |
| Quartet (PRG) | Ampac Seed Company | | | | | | | | |
| Resolute | Ampac Seed Company | | | | | | | | |
| Select | FFR Cooperative | | | * | * | * | | * | * |
| Spring Green (festulolium) | Turf-Seed, Inc. | | | * | | * | * | | |
| Stargrazer | FFR/Southern States | | | | | | | | |
| Tuukka (timothy) | Ampac Seed Company | | | | | | | | |
| **Experimental Varieties** | | | | | | | | | |
| AGRLP 103 (PRG) | AgResearch (USA) | | | * | | | | | |
| AGRLH 101 (PRG) | AgResearch (USA) | | | | | | | | |
| AGRBW 101 (prairie brome) | AgResearch (USA) | | | | | | | | |
| AGRFA 104 | AgResearch (USA) | | | | | | | | * |
| AGRFA106 | AgResearch (USA) | | | | | | | | * |
| AGRFA 114 | AgResearch (USA) | | | | | | | | * |
| AGRFA 110 | AgResearch (USA) | | | * | | | | | |
| AGRFA 111 | AgResearch (USA) | | | | | | | | |
| Ampac pp3 mix | Ampac Seed Company | | | | | | | | |
| Ampac pp7 mix | Ampac Seed Company | | | | | | | | |
| Ampac pp8 mix | Ampac Seed Company | | | | | | | | |
| BARFaBTR 6 | Barenbrug USA | | | | | | | | |
| BARFaBTR 7 | Barenbrug USA | | | | | | | | |
| EC 411 | Emerald Commodities, Inc. | | | | | | | * | * |
| FA 2458 | AgResearch (USA) | | | | | | | | |
| FA 2651 | AgResearch (USA) | | | | | | | | * |
| FA 2720 | AgResearch (USA) | | | | | | | | * |
| FA 2845 | AgResearch (USA) | | | | | | | | * |
| FABE 9301A | Barenbrug USA | | | | | | | | * |
| GA 153E 542 | GA Agric. Exp. Sta./Experimental | | | | | | | | |

**Table 13. Persistence of tall fescue, perennial ryegrass (PRG), prairie brome (*Bromus wildenowii*), festulolium, and timothy varieties under heavy grazing pressure across years and locations.**

| Variety | Proprietor/KY Distributor | 1999 [1] | | 2000 | | 2001 | | 2002 | 2002 |
|---|---|---|---|---|---|---|---|---|---|
| | | Oct 2002 [2] | Jul 2003 | Oct 2002 | Oct 2003 | Oct 2002 | Oct 2003 | Oct 2003 | Dec 2003 |
| GA 156L 542 | GA Agric. Exp. Sta./Experimental | * | | | | | | | |
| GA 5 584 | GA Agric. Exp. Sta./Experimental | | | | | | | | |
| GA 7 clone 542 | GA Agric. Exp. Sta./Experimental | | | | | | | | |
| HB95 | DLF Jenks | | | | | | | | |
| HB96 | DLF Jenks | | | | | | | | |
| HM | FFR Cooperative | | | | | | | * | |
| HM4 | FFR Cooperative | | | | | | | | |
| HM11 | FFR Cooperative | | | | | | | * | |
| Jesup 542 | GA Agric. Exp. Sta./Experimental | * | | | | | | | |
| Jesup 584 | GA Agric. Exp. Sta./Experimental | * | | | | | | | |
| K5666V | Ampac Seed Company | | | | | | | | |
| KY31- (endophyte free) | KY Agric. Exp. Sta./Experimental | | | * | * | * | | * | * |
| KYPP 9901 | KY Agric. Exp. Sta./Experimental | | | | | | | | |
| PP10 | Ampac Seed Company | | | | | | | | |
| PP11 | Ampac Seed Company | | | | | | | | |
| KYFA 9301 | KY Agric. Exp. Sta./Experimental | * | * | * | * | * | * | * | * |
| KYFA9304 | KY Agric. Exp. Sta./Experimental | * | | * | * | * | | * | * |
| KYFA9401 | KY Agric. Exp. Sta./Experimental | | | * | * | | | | |
| KYFA9402 | KY Agric. Exp. Sta./Experimental | | | * | * | | | | |
| KYFA9403 | KY Agric. Exp. Sta./Experimental | | | * | * | | | | |
| KYTF 2 | KY Agric. Exp. Sta./Experimental | * | | * | * | | | | |
| PBR | Barenbrug USA | | | | | | | | * |
| Q4508 | Wrightson Seed Ltd. | | | * | | | | | |
| R4663 | Wrightson Seed Ltd. | | | | | | | | |

[1] Establishment year.
[2] Date of visual estimation of percent stand.
* Not significantly different from the most persistent variety in the test. Shaded boxes indicate that the variety was not in the test. Open boxes indicate the variety was in the test but persistence was significantly less than the top-ranked variety in the test.

**Table 14. Persistence of orchardgrass, perennial ryegrass, Kentucky bluegrass (BG), and prairie brome (*Bromus wildenowii*) varieties under heavy grazing pressure across years and locations.**

| Variety | Proprietor/KY Distributor | 2000 | | 2001 | | 2002 | 2002 |
|---|---|---|---|---|---|---|---|
| | | Oct 2002 | Oct 2003 | Oct 2002 | Oct 2003 | Oct 2003 | Dec 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | | | |
| Abertop | Pennington Seed Inc. | | | | | | |
| Albert | University of Wisconsin | | | * | | | |
| Amba | DLF-Jenks | | | | | | |
| Athos | DLF-Jenks | | | * | * | | |
| Benchmark | FFR/Southern States | * | | * | * | | |
| Boone | KY Agric. Exp. Sta./Experimental | * | * | | | | |
| Crown Royale | Grassland Oregon | | | * | * | | |
| Crown Royale Plus | Donley Seed Co. | | | | | * | |
| Hallmark 1996 [3] | James VanLeeuwen | | | * | * | | |
| Haymate | FFR/Southern States | | | * | * | | |
| Kentucky Bluegrass | public | | | | | | |
| Mammoth | DLF—Jenks | | | * | * | | |
| Megabite | Turf—Seed Inc. | | | * | | | |
| Niva | DLF—Jenks | | | | | | * |
| Potomac certified | | | | | | * | |
| Prairie | Turner Seed Company | * | * | * | * | | |
| Takena | Smith Seed Services | | | * | * | | |
| Tekapo | Modern Forage Systems/Oldfields Seed | | | * | * | | * |
| **Experimental Varieties** | | | | | | | |
| Benchmark Plus | FFR Cooperative | | | | | * | |
| 'CAS-LG31' | DLF—Jenks | | * | | | | |
| DG 9911 | Pennington Seed Inc. | | | | | * | |
| DG 9930b | Pennington Seed Inc. | | | | | * | |
| GA-OG1 | Pennington Seed Inc. | | | | | | |
| K5568K | Ampac Seeds | | | | | | |
| K5632M (prairie brome) | Ampac Seeds | | | | | | |
| K5633D (prairie brome) | Ampac Seeds | | | | | | |
| KYO7G 23-335 | KY Agric. Exp. Sta./Experimental | * | * | | | | |
| KYPP 9901 (KBG) | KY Agric. Exp. Sta./Experimental | | | | | | |
| OG9705G | FFR Cooperative | * | * | * | * | | |

[1] Establishment year.
[2] Date of visual estimation of percent stand.
* Not significantly different from the most persistent variety in the test. Shaded boxes indicate that the variety was not in the test. Open boxes indicate the variety was in the test but persistence was significantly less than the top-ranked variety in the test.
[3] Seed for this test came from fields planted on dates indicated.

| Table 15. Persistence of perennial ryegrass, festulolium, and prairie brome (*Bromus wildenowii*) varieties under heavy grazing pressure across years and locations. | | | | | |
|---|---|---|---|---|---|
| | | 2000 [1] | | 2001 | |
| Variety | Proprietor/KY Distributor | Oct 2002 [2] | Oct 2003 | Oct 2002 | Oct 2003 |
| **Commercial Varieties—Available for Farm Use** | | | | | |
| Aries | | | | * | * |
| Duo (festulolium) | | * | * | | |
| Citadel | | | | | |
| Grand Daddy | | | | * | * |
| Grasslands Matua (prairie brome) | | | | | |
| Linn | | | | * | * |
| Lasso | | | | * | * |
| Maverick Gold | | | | | |
| Polly 2 | | | | | |
| Quartet | | | | | * |
| Spring Green (festulolium) | | * | * | | |
| **Experimental Varieties** | | | | | |
| AGR LP 103 | | * | * | | |
| AGR LH 101 | | | | | |
| AGR BW 101 (prairie brome) | | | | | |
| PP 11 | | | | | |

[1] Establishment year.
[2] Date of visual estimation of percent stand.
* Not significantly different from the most persistent variety in the test. Shaded boxes indicate that the variety was not in the test. Open boxes indicate the variety was in the test but persistence was significantly less than the top-ranked variety in the test.



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