



# 2001 Alfalfa Grazing Tolerance Variety Report

R.F. Spitaleri, J.C. Henning, G.D. Lacefield, and C.T. Dougherty

## Introduction

Alfalfa (*Medicago sativa*) is historically the highest yielding, highest quality forage legume grown in Kentucky. It forms the basis of Kentucky's cash hay enterprise and is an important component in dairy, horse, beef, and sheep diets. Recent emphasis on its use as a grazing crop and the release of varieties reported to be tolerant of heavy and even continuous grazing have raised the following question: Do varieties differ in tolerance to overgrazing?

This report summarizes current research on the grazing tolerance of alfalfa varieties when subjected to continuous, heavy grazing pressure during the grazing season. Although some yield data are presented, the focus is on plant stand survival.

## Description of the Tests

Alfalfa variety tests for grazing tolerance were established in Lexington in the fall of 1997, 1998, 1999, and 2000. The soils at this location are well-drained silt loams and are well suited to alfalfa. Plots were 5 x 15 feet in a randomized complete block design with each variety replicated six times. In each test, 20 pounds of seed per acre were planted into a prepared seedbed using a disk drill. All seed lots were treated with metalaxyl and inoculated if not supplied with these treatments. Grazing was continuous from April until October. Supplemental hay was fed during periods of slowest growth. Visual ratings of percent stand were made in the fall and spring after each grazing season. Pests (weeds and insects) were controlled so they would not limit yield or persistence. Fertilizers (lime, P, K, and Boron) were applied as needed. Included in each trial were Alfagraze as the grazing-tolerant check variety and Apollo as the grazing-susceptible check variety.

## Results and Discussion

Weather data for Lexington are presented in Table 1. In 2001, temperature and precipitation were close to normal.

Data on percent stand are presented in Tables 2 through 5. Statistical analyses were performed on all alfalfa yield data (including experimentals) to determine if the apparent differences are truly due to variety or just due to chance. 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.

Two years of grazing were sufficient to severely deplete the stands of Apollo and show differences among most commercial varieties (Tables 2, 3, 4). In the 2000 seeding, stands of Apollo were depleted (after one year of grazing). Apollo is the grazing-susceptible check variety, and its depletion is an indication of heavy grazing pressure.

Table 6 summarizes information about distributors, fall dormancy, disease resistance, and persistence across years and locations for all varieties in these tests.

## Summary

These studies indicate alfalfa varieties have been developed that express tolerance to overgrazing without going out of stand, compared to standard hay-type alfalfas. In addition, newer grazing-tolerant varieties have significantly improved yields over Alfagraze. It should be noted, however, that although these varieties were abused during the growing season, they were allowed to rest and regrow after September 15 to prepare for winter.

This information should be used along with yield and pest resistance information in selecting the best alfalfa variety for each individual use. It is *not* recommended that alfalfa be continuously grazed as was done in this trial. While several varieties expressed tolerance to the level of grazing pressure used in these trials, overgrazing greatly reduces yield and therefore profitability of these alfalfas.

Good management for maximum life from grazing alfalfa would include:

- allowing grazing alfalfa to become completely established before grazing
- using rotational grazing where animals harvest available forage in seven days or less followed by resting for 28 days before regrazing
- adding any needed fertilizer and lime
- removing grazing livestock from alfalfa fields from mid-September to November 1 to replenish root reserves.

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**Table 1. Temperature and rainfall at Lexington during the 1998, 1999, 2000, and 2001 growing seasons.**

| MON        | 1998        |             |            |             | 1999        |             |            |             | 2000        |             |            |             | 2001        |             |            |             |
|------------|-------------|-------------|------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|------------|-------------|
|            | Temp        |             | Rainfall   |             | Temp        |             | Rainfall   |             | Temp        |             | Rainfall   |             | Temp        |             | Rainfall   |             |
|            | °F          | DEP         | IN         | DEP         | °F          | DEP         | IN         | DEP         | °F          | DEP         | IN         | DEP         | °F          | DEP         | IN         | DEP         |
| JAN        | 41          | +10         | 3.96       | +1.10       | 36          | +5          | 5.64       | +2.78       | 32          | +1          | 3.48       | +0.62       | 31          | 0           | 0.9        | -1.9        |
| FEB        | 41          | +6          | 2.54       | -0.67       | 40          | +5          | 2.32       | -0.89       | 43          | +8          | 4.97       | +1.76       | 40          | +5          | 3.2        | 0           |
| MAR        | 46          | +2          | 3.40       | -1.00       | 40          | -4          | 3.27       | -1.13       | 48          | +4          | 3.47       | -0.93       | 40          | -4          | 2.7        | -1.7        |
| APR        | 54          | -1          | 6.20       | +2.32       | 56          | +1          | 1.87       | -2.01       | 53          | -2          | 4.10       | +0.22       | 59          | +4          | 1.7        | -2.2        |
| MAY        | 67          | +3          | 6.14       | +1.67       | 65          | +1          | 1.35       | -3.12       | 67          | +3          | 2.96       | -1.51       | 66          | +2          | 4.9        | +0.4        |
| JUN        | 73          | +1          | 10.81      | +7.15       | 74          | +2          | 3.89       | +0.23       | 73          | +1          | 3.22       | -0.44       | 71          | -1          | 2.0        | -1.6        |
| JUL        | 75          | -1          | 7.98       | +2.98       | 80          | +4          | 1.00       | -4.00       | 74          | -2          | 3.42       | -1.58       | 75          | -1          | 5.6        | +0.6        |
| AUG        | 76          | +1          | 0.29       | -3.64       | 75          | 0           | 1.31       | -2.62       | 74          | -2          | 3.38       | -0.55       | 76          | +1          | 4.8        | +0.8        |
| SEP        | 74          | +6          | 0.61       | -2.59       | 69          | +1          | 1.03       | -2.17       | 66          | -2          | 5.47       | +2.27       | 65          | -3          | 3.0        | -0.2        |
| OCT        | 58          | +1          | 2.41       | -0.16       | 57          | 0           | 1.91       | -0.66       | 59          | +2          | 0.92       | -1.65       | 56          | -1          | 3.6        | +1.1        |
| NOV        | 47          | +2          | 2.09       | -1.28       | 51          | +6          | 1.70       | -1.69       | 43          | -2          | 1.59       | -1.80       | 51          | +6          | 2.8        | -0.6        |
| <b>AVG</b> | <b>59.3</b> | <b>+2.7</b> | <b>4.2</b> | <b>+0.5</b> | <b>58.5</b> | <b>+1.9</b> | <b>2.3</b> | <b>-1.4</b> | <b>57.5</b> | <b>+0.8</b> | <b>3.4</b> | <b>-0.8</b> | <b>57.3</b> | <b>+0.7</b> | <b>3.2</b> | <b>-0.5</b> |

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

**Table 2. Dry matter yields (tons/acre) and percent stand of alfalfa varieties sown September 2, 1997, at Lexington, Kentucky, in a grazing tolerance study.**

| Variety  | Percent Stand |              |              |             |
|--|---------------|--------------|--------------|-------------|
|  | Nov 9, 1999   | Mar 21, 2000 | Oct 20, 2000 | Apr 2, 2001 |
| <b>Commercial varieties — available for farm use</b>       |               |              |              |             |
| Alfagraze  | 70.0*         | 73.3*        | 58.3*        | 49.2*       |
| ABT 205  | 70.0*         | 73.3*        | 45.0         | 40.8*       |
| ABT 405  | 70.0*         | 73.3*        | 36.3         | 34.2        |
| Amerigraze 401+ Z  | 66.7          | 63.3         | 30.8         | 25.8        |
| Wintergreen  | 58.3          | 66.7         | 18.3         | 28.3        |
| Grazeking  | 58.3          | 61.7         | 14.2         | 20.0        |
| Haygrazer  | 51.7          | 56.7         | 16.8         | 19.2        |
| Apollo   | 51.7          | 53.3         | 9.2          | 15.8        |
| <b>Experimental varieties — not available for farm use</b> |               |              |              |             |
| ZG9632   | 80.0*         | 80.0*        | 54.2*        | 54.2*       |
| ZG9633   | 73.3*         | 71.7*        | 48.3*        | 48.3*       |
| ZG9631A  | 75.0*         | 80.0*        | 51.7*        | 46.7*       |
| ZG9641   | 76.7*         | 80.0*        | 52.5*        | 44.2*       |
| ZG9640   | 70.0*         | 70.0*        | 35.0         | 31.7        |
| BARUSA 96-54   | 56.7          | 66.7         | 14.2         | 20.0        |
| A9201  | 60.0          | 63.3         | 8.0          | 14.2        |
| A9303  | 48.3          | 55.0         | 6.3          | 15.0        |
| Mean   | 64.8          | 68.0         | 31.2         | 31.7        |
| CV, %  | 9.3           | 13.4         | 35.7         | 36.7        |
| LSD, 0.05  | 10.7          | 10.5         | 12.8         | 13.4        |

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

**Table 3. Percent stand of alfalfa varieties sown September 15, 1998, at Lexington, Kentucky, in a grazing tolerance trial.**

| Variety  | Percent Stand |              |             |
|--|---------------|--------------|-------------|
|  | Nov 9, 1999   | Nov 20, 2000 | Apr 2, 2001 |
| <b>Commercial varieties — available for farm use</b>       |               |              |             |
| Alfagraze  | 88.3*         | 4.5          | 32.0        |
| WL 326 GZ  | 85.0*         | 18.3         | 28.3        |
| Gold Plus  | 85.0*         | 5.8          | 26.3        |
| Pro Gro  | 86.7*         | 5.2          | 25.5        |
| Baralfa 54   | 88.3*         | 7.7          | 24.7        |
| Spreador 3   | 83.3          | 22.5         | 24.2        |
| Wintergreen  | 86.7*         | 22.5         | 23.3        |
| Pioneer 98   | 88.3*         | 13.5         | 18.3        |
| Amerigraze 401+ Z  | 86.7*         | 12.2         | 17.5        |
| Apollo   | 90.0*         | 12.0         | 14.5        |
| <b>Experimental varieties — not available for farm use</b> |               |              |             |
| ZG9740   | 88.3*         | 65.0*        | 68.3*       |
| ZG9741   | 90.0*         | 55.0*        | 61.7*       |
| Mean   | 87.2          | 20.4         | 30.4        |
| CV, %  | 5.06          | 48.16        | 52.9        |
| LSD, 0.05  | 0.51          | 11.34        | 18.6        |

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

**Table 5. Percent stand of alfalfa varieties sown September 19, 2000, at Lexington, Kentucky, in a grazing tolerance trial.**

| Variety  | Percent Stand |              |
|--|---------------|--------------|
|  | Apr 9, 2001   | Oct 17, 2001 |
| <b>Commercial varieties — available for farm use</b>       |               |              |
| Alfagraze  | 89.2          | 75.8*        |
| 115 Brand  | 90.0          | 65.0*        |
| Feast  | 89.2          | 61.7         |
| Amerigraze 401+Z   | 90.0          | 56.7         |
| ABT405   | 89.2          | 54.2         |
| ABT350   | 88.3          | 33.3         |
| Haygrazer  | 88.3          | 31.7         |
| Apollo   | 83.3          | 20.0         |
| <b>Experimental varieties — not available for farm use</b> |               |              |
| FOO-501  | 88.3          | 74.2*        |
| ZG9840   | 90.0          | 70.0*        |
| CW 54056   | 87.5          | 50.8         |
| 5M85   | 90.0          | 12.5         |
| Mean   | 88.6          | 50.5         |
| CV, %  | 2.99          | 19.5         |
| LSD, 0.05  | 3.06          | 11.4         |

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

**Table 4. Percent stand of alfalfa varieties sown March 27, 2000, at Lexington, Kentucky, in a grazing tolerance trial.**

| Variety  | Percent Stand |              |
|--|---------------|--------------|
|  | May 3, 2001   | Oct 17, 2001 |
| <b>Commercial varieties — available for farm use</b>       |               |              |
| Alfagraze  | 68.3          | 23.3*        |
| Feast  | 67.5          | 19.7         |
| 115 Brand  | 75.0          | 13.3         |
| Amerigraze 401+Z   | 52.5          | 5.8          |
| Apollo   | 43.3          | 4.3          |
| <b>Experimental varieties — not available for farm use</b> |               |              |
| ZG9834   | 65.0          | 33.3*        |
| ZG9830   | 73.3          | 29.2*        |
| GA-AG-MPX  | 71.7          | 27.0*        |
| A9811  | 65.0          | 24.7*        |
| ZG9840   | 59.2          | 16.7         |
| Mean   | 64.1          | 19.7         |
| CV, %  | 22.1          | 48.5         |
| LSD, 0.05  | 16.5          | 11.1         |

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

**Table 6. Characterization and persistence of alfalfa varieties under heavy grazing pressure across years and locations.**

|  |                           | Variety Characteristics <sup>1</sup> |    |    |    |     |     | Lexington             |          |          |          |          |          |          |          |          |          |          |          |
|--|---------------------------|--------------------------------------|----|----|----|-----|-----|-----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|  |                           | Disease Resistance <sup>2</sup>      |    |    |    |     |     | 1997 <sup>3</sup>     |          |          |          | 1998     |          |          |          | 1999     |          | 2000     |          |
| Variety  | Proprietor/KY Distributor | FD <sup>4</sup>                      | BW | FW | AN | PRR | APH | Nov <sup>5</sup> 1999 | Mar 2000 | Nov 2000 | Apr 2001 | Nov 1999 | Mar 2000 | Nov 2000 | Apr 2001 | May 2001 | Oct 2001 | Apr 2001 | Oct 2001 |
| <b>Commercial varieties — available for farm use</b>       |                           |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          |          |
| 115 Brand  | Monsanto Global Seed      | 3                                    | HR | HR | R  | HR  | R   |                       |          |          |          |          |          |          |          | *        |          | *        | *        |
| ABT205   | several                   | 2                                    | HR | HR | HR | HR  | R   | *                     | *        |          | *        |          |          |          |          |          |          |          |          |
| ABT350   | several                   |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          | *        |
| ABT405   | several                   | 4                                    | HR | HR | HR | HR  | R   | *                     | *        |          |          |          |          |          |          |          |          |          | *        |
| Alfagraze  | America's Alfalfa         | 2                                    | MR | R  | MR | LR  | -   | *                     | *        | *        | *        | *        | *        |          |          | *        | *        | *        | *        |
| Amerigraze401+Z  | ABI/America's Alfalfa     | 4                                    | HR | HR | HR | HR  | R   |                       |          |          |          | *        | *        |          |          |          |          |          | *        |
| Apollo   | ABI/America's Alfalfa     | 4                                    | R  | R  | LR | R   | -   |                       |          |          |          | *        | *        |          |          |          |          |          |          |
| Baralfa54  | Barenbrug                 | 5                                    | R  | HR | HR | HR  | -   |                       |          |          |          | *        | *        |          |          |          |          |          |          |
| Feast  | ABI/AgriPro               | 3                                    | HR | HR | MR | HR  | R   |                       |          |          |          |          |          |          |          | *        |          | *        |          |
| Gold Plus  | MBS Inc.                  | 4                                    | HR | HR | HR | HR  | R   |                       |          |          |          | *        |          |          |          |          |          |          |          |
| Grazeking  | FFR/Southern States       | 5                                    | MR | HR | HR | R   | S   |                       |          |          |          |          |          |          |          |          |          |          |          |
| Haygrazer  | Great Plains Research     | 4                                    | HR | HR | R  | R   | MR  |                       |          |          |          |          |          |          |          |          |          |          | *        |
| ProGro   | MBS Inc.                  | 4                                    | HR | HR | R  | HR  | MR  |                       |          |          |          | *        | *        |          |          |          |          |          |          |
| Spredor 3  | Novartis                  | 1                                    | HR | HR | R  | MR  | S   |                       |          |          |          |          |          |          |          |          |          |          |          |
| Wintergreen  | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | R   |                       |          |          |          | *        |          |          |          |          |          |          |          |
| WL326GZ  | W-L Research Inc.         | 4                                    | HR | HR | HR | HR  | HR  |                       |          |          |          | *        | *        |          |          |          |          |          |          |
| <b>Experimental varieties — not available for farm use</b> |                           |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          |          |
| 5M85   | Forage Genetics Int'l     |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          | *        |
| A9201  | FFR Cooperative           | 4                                    | HR | HR | HR | HR  | R   |                       |          |          |          |          |          |          |          |          |          |          |          |
| A9303  | FFR Cooperative           | 4                                    | R  | HR | R  | HR  | R   |                       |          |          |          |          |          |          |          |          |          |          |          |
| A9811  | FFR Cooperative           |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          | *        | *        |          |          |
| BARUSA96-54  | Barenbrug                 |                                      | R  | HR | HR | HR  | HR  |                       |          |          |          |          |          |          |          |          |          |          |          |
| CW54056  | Cal/West Seeds            |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          | *        |
| FOO-501  | FFR Cooperative           |                                      |    |    |    |     |     |                       |          |          |          |          |          |          |          |          |          |          | *        |
| GA-AG-MPX  | University of Georgia     | 2                                    | HR | HR | R  | R   | R   |                       |          |          |          |          |          |          |          | *        | *        |          |          |
| I97PE98  | Pioneer                   | 2                                    | -  | -  | HR | MR  | MR  |                       |          |          |          | *        | *        |          |          |          |          |          |          |
| ZG9631A  | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | HR  | *                     | *        | *        | *        |          |          |          |          |          |          |          |          |
| ZG9632   | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | HR  | *                     | *        | *        | *        |          |          |          |          |          |          |          |          |
| ZG9633   | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | HR  | *                     | *        | *        | *        |          |          |          |          |          |          |          |          |
| ZG9640   | ABI Alfalfa               | 4                                    | HR | HR | HR | HR  | HR  | *                     | *        |          |          |          |          |          |          |          |          |          |          |
| ZG9641   | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | HR  | *                     | *        | *        | *        |          |          |          |          |          |          |          |          |
| ZG9740   | ABI Alfalfa               | 4                                    | HR | HR | HR | HR  | HR  |                       |          |          |          | *        | *        | *        | *        |          |          |          |          |
| ZG9741   | ABI Alfalfa               | 4                                    | HR | HR | HR | HR  | HR  |                       |          |          |          | *        | *        | *        | *        |          |          |          |          |
| ZG9830   | ABI Alfalfa               | 3                                    | HR | HR | HR | HR  | HR  |                       |          |          |          |          |          |          |          | *        | *        |          |          |
| ZG9834   | ABI Alfalfa               | 2                                    | HR | HR | HR | HR  | HR  |                       |          |          |          |          |          |          |          | *        | *        |          |          |
| ZG9840   | ABI Alfalfa               | 4                                    | HR | HR | HR | HR  | HR  |                       |          |          |          |          |          |          |          | *        |          | *        | *        |

<sup>1</sup> Variety Characteristics: FD=Fall Dormancy BW=Bacterial Wilt FW=Fusarium Wilt AN=Anthracnose PRR=Phytophthora Root Rot APH=Aphanomyces Root Rot.

<sup>2</sup> Disease Resistance: S=Susceptible LR=Low Resistance MR=Moderate Resistance R=Resistance HR=High Resistance.

<sup>3</sup> Establishment Year.

<sup>4</sup> Fall Dormancy: 2=Vernal 3=Ranger 4=Saranac 5= DuPuits.

<sup>5</sup> Date of measurement of percent stand.

Shaded boxes indicate that the variety was not in the test.

Open boxes indicate the variety was in the test, but its persistence was significantly less than the top-ranked variety in the test.

\* Not significantly different from the top-ranked variety in the test.

