

# **PROGRESS REPORT ON SEED PRODUCTION RESEARCH**

prepared by

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for

**PRESENTATION AT THE GRASS-LEGUME SEED INSTITUTE  
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## **Kentucky Bluegrass Trials**

Kentucky bluegrass variety trials seeded in 1996-99 have data reported this year. The trial seeded in the fall of 1998 on the Magnusson farm has seed yield and other data reported for the first time. This trial includes four of the most advanced experimental lines from our breeding program. It should be noted these are first year yields and although the stands are good, some plots had not filled in entirely and the plots were not burned in 1999. Abbey had higher seed yields than all other strains, but all four experimentals performed well. These four experimentals and 2828S are in 0.5-acre seed increases on the Magnusson farm. Seed was harvested from 2828S, 3073S and 484S in 2000 and may be seeded in larger increases in 2001.

The trial seeded in 1999 has 16 of our experimentals and 8 experimentals from Rutgers. Although there is no seed yield data, the mildew data is quite interesting. Most of the Rutgers material had little mildew and is typical of the better disease resistance found in the plant material coming from this program. If seed yields of this material are good, we have an agreement for a joint release between the University of Minnesota and Rutgers University for seed production in Minnesota.

## **Perennial ryegrass**

The perennial ryegrass breeding program has also advanced to the point of producing large seed increases of selected populations. Two of these populations have increased winter hardiness and comparable turf quality to currently available varieties. One of the strains, P101, has resistance to Assure II and other related herbicides so quackgrass can be selectively controlled in the seed production fields. Three experimental populations were harvested in 2000 and one more will be harvested in 2001. The first three went into larger increases in September 2000 so additional seed should be available in 2001.

These and three other experimentals were in seed production trials in 2000 (Table 8). All seed yields were slightly to significantly higher than NK-200 which is historically one of the highest yielding strains of perennial ryegrass in northern Minnesota.

Thirty strains of ryegrass were in the winter hardiness trials at both St. Paul and Rosemount. There was little injury at either location; the annual ryegrass check was not entirely killed in the trials.

## **Growth Regulators – Herbicides**

The growth regulator 'Palisade' has been experimented with in the western US for several years to decrease lodging and ease harvesting of grasses grown for seed. It has also increased the number of tillers and often increased seed yields. Palisade worked well on perennial ryegrass and has been labeled for use. In a trial on the Magnusson farm, Palisade worked well on perennial ryegrass and increased seed yields up to the maximum rate applied of 2 pints/ac (Table 13).

Palisade was also applied to Kentucky bluegrass at various times and rates on mineral soil (Rice farm) and organic soil (Higgins farm) in 2000 (Table 12). There was no clear trend at either location for increased seed yields although lodging was decreased. If Syngenta is interested in pursuing the label on bluegrass, we will test the material at least one more year on a field we have set up with higher fertility levels which most likely would produce more positive responses.

The use of dicamba (Banvel, Clarity) in the spring on perennial ryegrass is of some concern. To meet certification standards, it generally is necessary to control several species of weeds commonly controlled with these products. A study was initiated on the Magnusson farm in the spring of 2000 to address the issue. Two rates and two dates of application were made. Both yield and seed germination showed no significant effect from any of these treatments or in combination with 2,4-D amine (Table 14). The spring application on Kentucky bluegrass, however, again shows a yield decrease (Table 11).

## **Acknowledgements**

We would like to thank Ryan Casavan and Jerit Billberg for all the work they did on the Grass-Legume project in 2000; the farmer and seed industry cooperators for providing land, assistance, equipment and input (we don't have all the answers) when needed.

We would also like to thank Cenex for the land they provided for us to use for the last 20 years. They have also assisted us in equipment repairs and providing equipment and materials. We are no longer using the Cenex location and base operations at the Magnusson Research Farm located northwest of Roseau.

Table 1. Monthly precipitation and average 'Park' kentucky bluegrass experimental plot seed yields at Roseau, Mn. From 1967-2000

| Year | Jan  | Feb  | Mar  | Apr  | May  | June | July | Aug   | Sept | Oct  | Nov  | Dec  | Yearly |             | test plot yield (#/ac.) |
|------|------|------|------|------|------|------|------|-------|------|------|------|------|--------|-------------|-------------------------|
|      |      |      |      |      |      |      |      |       |      |      |      |      | Total  | FROM NORMAL |                         |
| 1967 | 1.13 | 0.39 | 0.59 | 2.89 | 0.89 | 2.23 | 4.95 | 1.69  | 0.83 | 1.11 | 0.70 | 1.76 | 19.16  | -2.20       | 650                     |
| 1968 | 0.62 | T    | 1.25 | 0.63 | 1.46 | 6.47 | 6.13 | 8.49  | 2.35 | 1.26 | 1.06 | 0.21 | 29.93  | 8.57        | 488                     |
| 1969 | 3.07 | 0.11 | 0.05 | 1.27 | 3.31 | 2.29 | 3.70 | 4.28  | 3.29 | 1.91 | 0.30 | 0.73 | 24.31  | 2.95        | 673                     |
| 1970 | 0.71 | 0.41 | 1.38 | 2.56 | 5.93 | 4.07 | 3.55 | 0.83  | 2.77 | 1.49 | 1.21 | 0.37 | 25.28  | 3.92        | 492                     |
| 1971 | 0.54 | 0.13 | 0.26 | 1.50 | 2.24 | 2.29 | 3.58 | 0.69  | 3.33 | 2.97 | 0.29 | 0.50 | 18.32  | -3.04       | 405                     |
| 1972 | 0.68 | 0.76 | 0.50 | 0.70 | 1.66 | 5.03 | 1.92 | 1.53  | 4.22 | 1.40 | 0.38 | 0.32 | 19.10  | -2.26       | 422                     |
| 1973 | 0.09 | 0.17 | 1.18 | 0.90 | 2.46 | 2.21 | 4.04 | 2.09  | 5.67 | 1.19 | 0.67 | 0.75 | 21.42  | 0.06        | 642                     |
| 1974 | 0.88 | 0.87 | 0.16 | 2.72 | 4.12 | 1.56 | 2.56 | 10.97 | 0.42 | 0.66 | 0.15 | 1.40 | 26.47  | 5.11        | 504                     |
| 1975 | 1.10 | 0.29 | 0.64 | 1.40 | 1.52 | 4.96 | 2.26 | 1.75  | 1.79 | 1.49 | 0.20 | 0.65 | 18.05  | -3.31       | 146                     |
| 1976 | 1.13 | 0.50 | 1.05 | 0.77 | 0.54 | 5.82 | 1.52 | 3.72  | 0.34 | 0.07 | T    | 0.37 | 15.83  | -5.53       | 140                     |
| 1977 | 0.14 | 0.62 | 1.02 | 0.27 | 2.43 | 3.71 | 2.28 | 1.74  | 3.83 | 0.87 | 2.27 | 0.26 | 19.44  | -1.92       | 507                     |
| 1978 | 0.36 | 0.26 | 0.17 | 1.00 | 1.97 | 1.92 | 6.25 | 3.25  | 3.44 | 0.23 | 0.98 | 0.79 | 20.62  | -0.74       | 415                     |
| 1979 | 0.50 | 1.01 | 1.06 | 2.77 | 1.89 | 1.91 | 3.70 | 1.59  | 4.45 | 1.40 | 1.02 | 0.16 | 17.46  | -3.90       | 62                      |
| 1980 | 0.55 | 0.82 | 0.35 | 0.00 | 0.24 | 1.75 | 3.35 | 5.19  | 4.12 | 1.66 | 0.94 | 0.18 | 19.15  | -2.21       | 625                     |
| 1981 | 0.27 | 0.16 | 0.66 | 0.56 | 2.79 | 6.85 | 2.63 | 2.41  | 3.63 | 1.75 | 0.90 | 0.99 | 23.60  | 2.24        | 595                     |
| 1982 | 1.30 | 0.45 | 0.74 | 0.24 | 1.38 | 2.00 | 5.53 | 2.71  | 1.92 | 2.91 | 0.46 | 0.57 | 20.21  | -1.15       | 605                     |
| 1983 | 1.31 | 1.26 | 1.17 | 0.53 | 2.76 | 4.03 | 1.62 | 3.34  | 2.91 | 2.26 | 0.66 | 0.10 | 21.95  | 0.59        | 613                     |
| 1984 | T    | 0.95 | T    | 0.72 | 0.72 | 4.46 | 3.78 | 0.99  | 0.37 | 4.32 | 0.10 | 1.02 | 17.43  | -3.93       | 525                     |
| 1985 | 0.12 | 0.33 | 0.06 | 1.07 | 4.35 | 4.62 | 1.08 | 8.72  | 1.60 | 1.04 | 1.68 | 0.38 | 25.05  | 3.69        | 488                     |
| 1986 | 0.30 | 0.90 | 0.26 | 2.96 | 1.40 | 2.43 | 3.59 | 2.04  | 2.52 | 0.65 | 1.97 | 0.36 | 19.38  | -1.98       | 288                     |
| 1987 | 0.47 | 0.30 | 0.10 | 0.59 | 4.37 | 2.25 | 4.80 | 2.22  | 0.82 | 0.92 | 0.73 | 0.35 | 17.92  | -3.44       | 152                     |
| 1988 | 0.60 | 0.09 | 1.75 | 0.00 | 1.74 | 1.34 | 5.53 | 1.70  | 2.24 | 0.12 | 0.77 | 1.05 | 16.93  | -4.43       | 320                     |
| 1989 | 3.27 | 0.32 | 2.86 | 0.10 | 2.82 | 5.46 | 1.60 | 2.56  | 1.24 | 0.41 | 0.62 | 0.45 | 21.71  | 0.35        | 160                     |
| 1990 | 0.55 | 0.20 | 1.12 | 1.09 | 0.46 | 3.19 | 2.48 | 0.62  | 0.91 | 0.16 | 0.18 | 0.72 | 11.68  | -9.68       | 210                     |
| 1991 | 0.56 | 0.64 | 0.58 | 2.87 | 3.19 | 5.94 | 3.40 | 1.99  | 7.42 | 1.64 | 1.36 | 0.70 | 30.29  | 8.93        | 630                     |
| 1992 | 0.61 | 0.68 | 0.45 | 2.27 | 1.99 | 2.36 | 2.72 | 4.51  | 2.76 | 0.12 | 1.27 | 0.88 | 20.62  | -0.74       | 490                     |
| 1993 | 0.68 | 0.05 | 0.27 | 1.01 | 1.63 | 5.06 | 5.87 | 4.69  | 0.72 | 0.71 | 0.45 | 0.65 | 21.79  | 0.43        | 230                     |
| 1994 | 0.21 | 0.33 | 0.47 | 0.02 | 0.16 | 2.54 | 3.03 | 3.48  | 3.94 | 1.38 | 2.72 | 0.32 | 18.60  | -2.76       | 300                     |
| 1995 | 0.57 | 0.59 | 1.23 | 0.61 | 2.50 | 2.13 | 4.59 | 3.59  | 1.81 | 1.33 | 1.54 | 1.46 | 21.95  | 0.59        | 250                     |
| 1996 | 0.94 | 0.48 | 0.22 | 1.65 | 4.62 | 1.64 | 7.34 | 1.78  | 1.77 | 1.75 | 2.73 | 1.07 | 25.99  | 4.63        | 350                     |
| 1997 | 1.06 | 0.14 | 1.02 | 0.84 | 2.02 | 3.36 | 4.02 | 1.31  | 4.01 | 2.45 | 0.19 | 0.25 | 20.67  | -0.69       | 275                     |
| 1998 | 0.69 | 1.05 | 0.21 | 0.77 | 4.55 | 5.39 | 3.01 | 2.20  | 0.31 | 4.42 | 1.39 | 0.95 | 24.94  | 3.58        | 400                     |
| 1999 | 0.15 | 0.77 | 0.23 | 1.31 | 4.09 | 6.97 | 3.46 | 1.38  | 3.16 | 0.43 | 0.38 | 0.56 | 22.89  | 1.53        | 550                     |
| 2000 | 0.45 | 0.14 | 0.79 | 0.38 | 1.83 | 7.38 | 1.63 | 6.45  | 2.14 | 2.89 | 3.41 | 0.74 | 28.23  | 6.87        |                         |

34 year average 21.36

Table 2. Heading, height, and seed yield for 8 ky. Bluegrass varieties seeded in 1996 on the Cenex farm. Roseau, Mn. 1999-00 data

| Variety    | msp  | Heading     | Harvest              | Seed yield    |               |                  |
|------------|------|-------------|----------------------|---------------|---------------|------------------|
|            |      | %<br>6/6/00 | height (in),<br>1999 | lb/ac<br>1999 | lb/ac<br>2000 | lb/ac<br>2yr.ave |
| Abbey      | 2606 | 30          | 24                   | 607           | 301           | 454              |
| Blacksburg | 3094 | 23          | 21                   | 107           | 67            | 87               |
| Midnight   | 3020 | 8           | 24                   | 352           | 281           | 317              |
| Minnfine   | 2794 | 100         | 31                   | 399           | 508           | 454              |
| Optigreen  | 3096 | 40          | 27                   | 504           | 190           | 347              |
| Park       | 3021 | 100         | 33                   | 323           | 522           | 423              |
| Rugby      | 3038 | 48          | 31                   | 299           | 259           | 279              |
| Trenton    | 3047 | 48          | 31                   | 386           | 335           | 360              |
| LSD @5%    |      | 11          | 2                    | 161           | 154           | 132              |

Experimental design: RCB with 4 reps

Table 3. Percent heading, height, lodging, harvest date and seed yield for 12 varieties of kentucky bluegrass seeded in 1997 on the Higgins (Eastman) farm north of Roseau on organic soil. 2000 data and 1999 seed yields.

| Variety    | msp# | % heading |        |         | ht (in) | harvest |         | Yield<br>lb/ac.<br>1999 | Yield<br>lb/ac.<br>2000 | Yield<br>lb/ac.<br>2yr.ave |
|------------|------|-----------|--------|---------|---------|---------|---------|-------------------------|-------------------------|----------------------------|
|            |      | 6/6/00    | 6/9/00 | 6/16/00 |         | lodging | date    |                         |                         |                            |
| Abbey      | 2606 | 0         | 10     | 61      | 19      | 1.0     | 7/15/01 | 531                     | 132                     | 331                        |
| Trenton    | 3047 | t         | 26     | 70      | 26      | 1.0     | 7/18/01 | 243                     | 89                      | 166                        |
| Blacksburg | 3094 | 0         | 9      | 65      | 19      | 1.0     | 7/18/01 | 85                      | 80                      | 83                         |
| Midnight   | 3153 | 4         | 8      | 58      | 20      | 1.0     | 7/18/01 | 272                     | 178                     | 225                        |
| Minnfine   | 2794 | 18        | 88     | 100     | 24      | 5.5     | 7/6/01  | 156                     | 190                     | 173                        |
| Optigreen  | 3156 | 0         | 9      | 63      | 20      | 1.0     | 7/18/01 | 283                     | 118                     | 201                        |
| Park       | 3021 | 20        | 90     | 100     | 29      | 3.8     | 7/9/01  | 225                     | 211                     | 219                        |
| Lato       | 2918 | 12        | 38     | 90      | 31      | 1.0     | 7/18/01 | 301                     | 136                     | 219                        |
| CAS-JC91ii | 3164 | 0         | 15     | 73      | 23      | 1.0     | 7/18/01 | 308                     | 132                     | 220                        |
| Park       | 2552 | 9         | 88     | 98      | 29      | 4.3     | 7/6/01  | 232                     | 132                     | 182                        |
| Unique     | 2859 | 0         | 7      | 66      | 18      | 1.0     | 7/18/01 | 250                     | 105                     | 177                        |
| Barmax     | 2861 | 0         | 40     | 93      | 19      | 1.0     | 7/18/01 | 529                     | 176                     | 352                        |
| LSD@5%     |      | 7         | 10     | 18      | 6       | 1.4     | 3       | 89                      | 84                      | 65                         |

\* lodging: 1 = no lodging 9=severe lodging

Experimental design: RCB with 4 reps

Table 4. Heading, height, lodging, harvest date and seed yield for 21 kentucky bluegrass strains seeded in 1998 on the Magnusson farm. 2000 data

| Variety      | msp# | % Heading |      |     |     |     |      | Harvestlodging at<br>ht.(in.) harvest | date | seed<br>yield<br>#/ac. |     |
|--------------|------|-----------|------|-----|-----|-----|------|---------------------------------------|------|------------------------|-----|
|              |      | 5 25      | 5 30 | 6 2 | 6 7 | 6 9 | 6 16 |                                       |      |                        |     |
| Abbey        | 2606 | 0         | 0    | 0   | 11  | 15  | 93   | 28                                    | 3.3  | 7/11/00                | 909 |
| Barmax       | 2861 | 0         | 0    | 0   | 14  | 58  | 93   | 25                                    | 6.8  | 7/10/00                | 599 |
| Blacksburg   | 3094 | 0         | 0    | 1   | 16  | 48  | 80   | 25                                    | 4.8  | 7/17/00                | 188 |
| Blackstone   | 3225 | 0         | 2    | 9   | 24  | 63  | 75   | 28                                    | 3.3  | 7/17/00                | 130 |
| CAS-JC91L II | 3164 | 0         | 0    | 0   | 8   | 38  | 85   | 30                                    | 4.3  | 7/11/00                | 482 |
| Lato         | 2918 | 0         | 1    | 4   | 14  | 55  | 78   | 33                                    | 4.5  | 7/17/00                | 413 |
| Midnight     | 3153 | 0         | 0    | 1   | 10  | 10  | 80   | 24                                    | 3.0  | 7/17/00                | 630 |
| Minnfine     | 2794 | 43        | 45   | 60  | 83  | 100 | 100  | 31                                    | 6.8  | 7/6/00                 | 694 |
| Moonlight    | 3226 | 0         | 0    | 0   | 11  | 40  | 88   | 27                                    | 1.8  | 7/16/00                | 323 |
| Northstar    | 3227 | 0         | 0    | 1   | 18  | 45  | 85   | 19                                    | 1.5  | 7/17/00                | 413 |
| Optigreen    | 3156 | 0         | 0    | 1   | 20  | 40  | 88   | 29                                    | 4.5  | 7/17/00                | 559 |
| Park         | 3021 | 1         | 9    | 19  | 45  | 100 | 100  | 31                                    | 7.3  | 7/7/00                 | 695 |
| Park         | 2552 | 3         | 14   | 30  | 51  | 100 | 100  | 30                                    | 7.5  | 7/6/00                 | 727 |
| Rugby        | 3038 | 0         | 1    | 4   | 18  | 55  | 88   | 31                                    | 4.5  | 7/17/00                | 391 |
| Trenton      | 3047 | 0         | 1    | 3   | 16  | 43  | 95   | 30                                    | 5.3  | 7/17/00                | 401 |
| Unique       | 2859 | 0         | 0    | 1   | 13  | 20  | 80   | 29                                    | 5.3  | 7/17/00                | 595 |
| 484S exp     | 3232 | 0         | 0    | 0   | 13  | 43  | 85   | 26                                    | 2.5  | 7/11/00                | 643 |
| 1628S exp    | 3233 | 0         | 0    | 0   | 18  | 33  | 94   | 24                                    | 3.0  | 7/11/00                | 652 |
| 2073S exp    | 3234 | 0         | 0    | 0   | 13  | 43  | 100  | 26                                    | 1.5  | 7/10/00                | 676 |
| 3073S exp    | 3236 | 0         | 0    | 0   | 14  | 40  | 100  | 26                                    | 1.8  | 7/11/00                | 739 |
| Washington   | 3239 | 0         | 0    | 6   | 21  | 75  | 95   | 31                                    | 6.3  | 7/11/00                | 369 |
| LSD @5%      |      | 3         | 4    | 9   | 11  | 15  | 18   | 3                                     | 2.0  | 2                      | 142 |

lodging: 1=none ,9=flat  
experimental design: RCB with 4 reps

Table 11. 1998-00 herbicide trial on 'Park' kentucky bluegrass - Rice Farm, north of Roseau, 1999-2000.

plot size-10'x70'

\*spring treatment-5/26/99 , 5/9/2000

\*fall treatment --9/16/98 , 9/15/2000

CO2 bicycle sprayer-8003 nozzels @27psi- 12.5gpa

| Treatment           | Product applied/ac | Timing*     | Adjuvant                    | Harvest ht.(in.) | 1999* lb/ac. | 2000 lb/ac |
|---------------------|--------------------|-------------|-----------------------------|------------------|--------------|------------|
| Beacon              | 0.4 oz.            | fall        | 0.25% non-ionic             | 29               | 440          | 821        |
| Beacon              | 0.4 oz.            | spring      | 0.25% non-ionic             | 28               | 347          | 669        |
| Beacon              | 0.2 oz.+ 0.2 oz.   | fall+spring | 0.25% non-ionic             | 28               | 263          | 746        |
| Beacon              | 0.2 oz.            | spring      | 0.25% non-ionic             | 28               |              | 669        |
| 2,4-D amine+Banvel  | 3/4 pt.+ 3/4 pt.   | fall        | none                        | 29               | 415          | 770        |
| 2,4-D amine+Banvel  | 3/4 pt.+ 3/4 pt.   | spring      | none                        | 30               | 344          | 699        |
| 2,4-D amine+Express | 3/4 pt.+ 0.25 oz.  | fall        | none                        | 29               | 395          | 725        |
| 2,4-D amine+Express | 3/4 pt.+ 0.25 oz.  | spring      | none                        | 29               | 352          | 714        |
| Distinct            | 6 oz.              | fall        | 0.25% non-ionic+0.25% -28%N | 29               |              | 735        |
| no treatment        | 0                  | 0           | none                        | 30               | 333          | 745        |
| LSD @5%             |                    |             |                             | 1                | 94           | 83         |

experimental design:RCB with 4 reps

**Treatment formulations:**

Beacon 75DF 75% DF  
 Weedar 64 (2,4-D amine) 3.8#/ gal.  
 Banvel 4#/ gal.  
 Maverick 75% DG  
 Distinct 70WDG

\* Plots in 1999 had considerable shattering

Table 12. PALISADE' GROWTH REGULATOR TRIAL ' Park' Kentucky Bluegrass 2000 Roseau Minn.

Rice location- sandy loam soil w/ 90+30+40 applied late Oct. 1999  
 Higgins location- organic(peat) soil no added fertilizer

| Treatment product/ac.<br>ai | Rice  |         | Rice               |                    | Rice               |                     | Higgins            |                     | Higgins            |                     |
|-----------------------------|-------|---------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|
|                             | #/ac  | Date ** | ht.(in.)<br>6/8/00 | ht.(in.)<br>7/5/00 | lodging*<br>7/5/00 | seed yield<br>#/ac. | ht.(in.)<br>6/9/00 | seed yield<br>#/ac. | ht.(in.)<br>7/6/00 | seed yield<br>#/ac. |
| no treat                    | 0     | 0       | 24                 | 28                 | 6.5                | 809                 | 18                 | 420                 | 26                 | 420                 |
| 0.67 pt.                    | 0.178 | Early   | 20                 | 28                 | 4.5                | 740                 | 14                 | 385                 | 21                 | 385                 |
| 1.33 pt.                    | 0.356 | Early   | 15                 | 22                 | 2.3                | 772                 | 10                 | 485                 | 17                 | 485                 |
| 2 pt.                       | 0.534 | Early   | 10                 | 21                 | 1.3                | 753                 | 8                  | 418                 | 16                 | 418                 |
| 0.67 pt.                    | 0.178 | med     | 17                 | 26                 | 4.8                | 764                 | 17                 | 438                 | 20                 | 438                 |
| 1.33 pt.                    | 0.356 | med     | 14                 | 23                 | 4.0                | 791                 | 18                 | 483                 | 22                 | 483                 |
| 2 pt.                       | 0.534 | med     | 12                 | 20                 | 2.3                | 717                 | 16                 | 408                 | 18                 | 408                 |
| 0.34 pt.                    | 0.089 | split   | 23                 | 26                 | 4.8                | 746                 | 16                 | 425                 | 20                 | 425                 |
| 0.5 pt. + 0.5 pt.           | 0.134 | split   | 23                 | 25                 | 4.8                | 798                 | 14                 | 481                 | 19                 | 481                 |
| 0.67 pt. + 0.67 pt.         | 0.178 | split   | 20                 | 24                 | 3.5                | 808                 | 12                 | 471                 | 18                 | 471                 |
| 0.67 pt.                    | 0.178 | late    | 24                 | 27                 | 5.0                | 743                 | 18                 | 445                 | 27                 | 445                 |
| 1.33 pt.                    | 0.356 | late    | 25                 | 26                 | 4.3                | 724                 | 18                 | 424                 | 24                 | 424                 |
| 2 pt.                       | 0.534 | late    | 24                 | 25                 | 2.5                | 694                 | 18                 | 450                 | 25                 | 450                 |
| LSD @ 5%                    |       | 2       | 2                  | 2                  | 0.9                | 85                  | 2                  | 72                  | 3                  | 72                  |
| cv                          |       |         |                    |                    |                    | 7.8                 |                    |                     |                    | 11                  |

Experimental design-RCB w 4 reps

plot size- 10' x 50'

all treatments applied with co2 bicycle sprayer

8004 xr nozzels @ 27 psi and 17.5 gpa

\* lodging 1=none; 9=flat (no lodging on Higgins location)

\*\*Date: date of application

**Rice location**  
 early- 5/9/00  
 med- 5/25/00  
 late- 6/8/00  
 split -5/9+6/8

**Higgins location**  
 early- 5/25/00  
 med- 6/8/00  
 late- 6/21/00  
 split-5/25/00 + 6/8/00

15 cm. /no heading  
 45 cm. /30% heading  
 60 cm. /100%heading



Table 13. Palisade Growth Regulator Trial

Per. Ryegrass -germplasm 3275 (WHxTQ): Magnusson farm, Roseau, MN. 2000.

| Product/ac*    | ai lb/ac | Date   | lb/ac      | Harvest height (in)<br>7/24/00 | Harvest lodging |
|----------------|----------|--------|------------|--------------------------------|-----------------|
| no treatment   | 0        | 0      | 959        | 81                             | 8.3             |
| 0.34 pt.       | 0.089    | 6/9/00 | 990        | 74                             | 6.0             |
| 0.50 pt.       | 0.134    | 6/9/00 | 1177       | 74                             | 5.8             |
| 0.67 pt.       | 0.178    | 6/9/00 | 1039       | 75                             | 6.5             |
| 1.36 pt.       | 0.356    | 6/9/00 | 1204       | 71                             | 4.5             |
| 2.00 pt.       | 0.534    | 6/9/00 | 1445       | 66                             | 2.8             |
| <b>LSD@ 5%</b> |          |        | <b>214</b> | <b>6</b>                       | <b>1.8</b>      |
| cv             |          |        | 13         |                                |                 |

\*0.34 pt. & 0.5 pt. rates set up for split application but second date not applied

Growth stage 6/9/00: height - 50cm. and 5% heading

Plot size: 10' x 50'

All treatments applied with CO<sub>2</sub> bicycle sprayer

8004 xr nozzels @ 27 psi and 17.5 gpa

Experimental design-RCB w 4 reps

Fertility: 100+35+35+12 (sulfur)

Table 14. Tolerance of 'Winter Hardy Select' perennial ryegrass to spring applied Banvel(Dicamba) field M4 Magnusson farm 7/24-2000

| Treatment     | Date    | Seed yield<br>lb/ac | Germination |
|---------------|---------|---------------------|-------------|
| Banvel .33pt. | 5/25/00 | 1189                |             |
| Banvel .67pt. | 5/25/00 | 1228                |             |
| Banvel .67pt. | 5/25/00 | 1094                | 97          |
| Banvel .33pt. | 6/8/00  | 1240                |             |
| Banvel .67pt. | 6/8/00  | 1109                |             |
| Banvel .67pt. | 6/8/00  | 1255                | 96          |
| no treatment  | none    | 1195                | 96          |
| LSD @5%       |         | NS                  | NS          |
| cv            |         | 18                  |             |

Experimental design: RCB with 3 reps

5/25/00 - 12" high/early boot 4:00pm. 65 F

6/8/00 - 10% heading 11:00 am 60 F

height: 7/24 - all about 30 in.