

Progress Report on Seed Production Research

prepared by

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## 1984 Weather at Roseau

In an attempt to explain some of the production differences, we have continued reporting rainfall data in Table "a" and the soil temperatures in Table "b". These data seem to give more explanation each year, as they do for the 1983-84 winter and the summer rainfall.

The readings on the Welin Farm showed the soil temperature under sod (3 to 4 inches) never dropped below 24°F. This is compared with the 12°F reading in December, 1982. During 1982-83 most of the perennial ryegrass died. In 1983-84, the injury depended on whether the ground was exposed or covered. The perennial ryegrass data are particularly interesting as the second replication showed general injury and killing, while replications one and three showed rather good survival.

Perennial ryegrass in a field seeding with wheat stubble showed excellent survival and seed production in 1984. Del Ray perennial ryegrass on the Roger Sandstrom farm gave good production and showed no injury in the spring. During the winter, this material was covered with snow to stubble height.

Rainfall - Fall rainfall in 1983 was adequate and with less than normal rainfall in the spring of 1984, grass seed yields were still good. June and July rainfall was adequate and new seedings sown in late May showed excellent emergence and establishment. However, the very sparse rainfall in August and September placed a great deal of stress on the new seedings. Seedings attempted in August or September were at a decided disadvantage, and whether they established and will survive is very questionable.

October rainfall was about 4.50 inches, and this should help for 1985 production, although the established grasses did not look good in the fall, even after 4.50 inches of rain in October.

### Kentucky Bluegrass Studies

The strain trials seeded in 1981, 1982 and 1983 were managed for performance data in 1984 (Tables 1-3). Generally, seed yields were lower than normal, but there is a range of the higher yielding strains to the lower ones.

We made a concerted effort to collect information on Powdery Mildew infection, but generally the infection was too low to give meaningful data. We established another strain trial (100 entries) in 1984 in hopes we can record good mildew evaluations in 1985.

A trial with six varieties, under four residue management and two fertilizer regimes was harvested and the seed yields, plus other data, are presented (Table 7). Burning with straw, or spraying with Paraquat and burning gave best general yields. Clipping four inches and removing residue reduced yield, and clipping 1-1/2 inches and removing residue gave slightly lower yields than the burning treatments. There is a striking difference in these six varieties for seed yields and lodging.

A limited study on Parade Kentucky bluegrass on peat soil indicated that Nitrogen was the major factor reducing yields in this field (Table 5). We applied nitrogen at 0, 30, 60, 90 to 102 lb/A and the seed yields are closely correlated with the amount of nitrogen applied. This is contrary to common thinking of the need of nitrogen on peat soil, but in soil that has been recently brought into cultivation, it has been observed before.

In a field of Rugby Kentucky bluegrass, mildew never developed to give the readings we desired (Table 6). The best information from this trial is that Parlay greatly reduced lodging, and increased the harvest index. We hope to repeat this study in 1985, under heavier mildew infection.

Growth retardants were applied in four trials (Tables 8, 9, 10, & 11). The major result is that they reduced lodging, increased harvest index, but did not seriously alter the seed yield. Under higher fertility the seed yield was increased and standability was satisfactory, but the study was not designed to give a good comparison of the high vs. normal fertility. Growth retardants will be studied again in 1985.

Table 1. Plant height, percent heading, lodging, harvest date, and seed yields for 50 Kentucky bluegrass strains seeded in 1981 on the Melin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strain       | MSP No. | Plant height* (cm) |       | Percent heading<br>(5-28) / (6-8) | Lodging**<br>(6-28) / (7-11) | Harvest Date | Seed yield (lb/A) |      |      |                |
|--------------|---------|--------------------|-------|-----------------------------------|------------------------------|--------------|-------------------|------|------|----------------|
|              |         | (6-19)             | (7-5) |                                   |                              |              | 1982              | 1983 | 1984 | 3-year average |
| America      | 1695    | 40                 | 53    | 0                                 | 1.0                          | 7-5          | 457               | 567  | 419  | 481            |
| Aquila       | 1915    | 48                 | 59    | 0                                 | 2.0                          | 7-4          | 327               | 538  | 202  | 356            |
| Barblue      | 1837    | 53                 | 52    | 0                                 | 1.3                          | 7-7          | 327               | 508  | 241  | 359            |
| Baron        | 1765    | 48                 | 53    | 0                                 | 1.0                          | 7-8          | 86                | 820  | 487  | 464            |
| Bartissimo   | 1675    | 50                 | 60    | 0                                 | 1.3                          | 7-11         | 324               | 350  | 223  | 299            |
| Bristol      | 1767    | 52                 | 55    | T                                 | 1.0                          | 7-12         | 330               | 591  | 327  | 416            |
| BAR Pp80-T   | 1872    | 38                 | 52    | 2                                 | 1.1                          | 7-12         | 27                | 407  | 163  | 199            |
| BAR Pp81-E   | 1871    | 53                 | 53    | 0                                 | 1.7                          | 7-6          | 395               | 555  | 294  | 415            |
| Claudia      | 1545    | 58                 | 65    | 0                                 | 1.0                          | 7-3          | 202               | 517  | 374  | 364            |
| Eclipse      | 1740    | 48                 | 63    | 0                                 | 1.0                          | 7-11         | 303               | 511  | 276  | 363            |
| Emmundi+     | 1603    | 65                 | 63    | 2                                 | 2.2                          | 7-5          | 300               | 526  | 279  | 368            |
| Enprima      | 1898    | 55                 | 60    | 3                                 | 1.3                          | 7-5          | 466               | 686  | 410  | 521            |
| Entopper     | 1570    | 53                 | 63    | 0                                 | 1.0                          | 7-13         | 457               | 781  | 407  | 548            |
| Escort       | 1571    | 67                 | 68    | 0                                 | 3.5                          | 7-9          | 303               | 493  | 267  | 354            |
| Geronimo     | 1546    | 65                 | 62    | 0                                 | 1.6                          | 7-3          | 154               | 927  | 434  | 505            |
| Harmony      | 1712    | 45                 | 47    | 0                                 | 1.0                          | 7-11         | 532               | 588  | 416  | 512            |
| Holiday      | 1752    | 52                 | 55    | 0                                 | 1.5                          | 7-7          | 386               | 285  | 140  | 270            |
| Holt         | 1808    | 50                 | 53    | 17                                | 1.0                          | 7-3          | 45                | 541  | 143  | 243            |
| ISI-128      | 1693    | 58                 | 63    | 7                                 | 1.1                          | 7-4          | 80                | 639  | 270  | 330            |
| Kimono       | 1547    | 48                 | 48    | 0                                 | 1.1                          | 7-9          | 193               | 665  | 273  | 377            |
| Merit        | 1840    | 52                 | 58    | 0                                 | 1.0                          | 7-7          | 83                | 915  | 546  | 515            |
| Mireille     | 1754    | 48                 | 55    | 0                                 | 1.4                          | 7-11         | 36                | 368  | 267  | 224            |
| MLM-18011    | 1657    | 52                 | 63    | 0                                 | 1.0                          | 7-14         | 104               | 475  | 264  | 281            |
| Monopoly     | 1586    | 65                 | 67    | 0                                 | 3.8                          | 7-12         | 606               | 520  | 359  | 495            |
| MomPp 1417   | 1543    | 50                 | 60    | 0                                 | 1.1                          | 7-13         | 609               | 680  | 365  | 551            |
| MomPp 1765   | 1544    | 53                 | 60    | 0                                 | 2.1                          | 7-5          | 324               | 745  | 463  | 511            |
| Mosa         | 1548    | 52                 | 53    | 0                                 | 1.3                          | 7-9          | 18                | 674  | 404  | 365            |
| NK-Exp K1-76 | 1742    | 68                 | 72    | 8                                 | 2.2                          | 6-30         | 639               | 621  | 362  | 541            |

Table 1. (continued)

| Strain    | MSP No. | Plant height* (cm) |       | Percent heading |       | Lodging** |        | Harvest Date | Seed yield (lb/A) |      |      |                |
|-----------|---------|--------------------|-------|-----------------|-------|-----------|--------|--------------|-------------------|------|------|----------------|
|           |         | (6-19)             | (7-5) | (5-28)          | (6-8) | (6-28)    | (7-11) |              | 1982              | 1983 | 1984 | 3-year average |
| NK-Exp    | K1-152  | 1811               | 63    | 0               | 33    | 1.4       | 2.1    | 7-4          | 187               | 591  | 377  | 385            |
|           | K3-157  | 1812               | 63    | 0               | 43    | 1.6       | 2.8    | 7-7          | 457               | 413  | 238  | 369            |
|           | K3-160  | 1813               | 62    | 0               | 28    | 2.2       | 2.9    | 7-6          | 395               | 347  | 205  | 316            |
|           | K3-162  | 1814               | 52    | 2               | 53    | 3.2       | 3.3    | 7-5          | 285               | 327  | 151  | 254            |
|           | K3-178  | 1815               | 65    | 0               | 45    | 1.1       | 2.2    | 7-2          | 178               | 665  | 472  | 438            |
|           | K3-179  | 1816               | 63    | 0               | 30    | 1.5       | 1.4    | 7-2          | 104               | 416  | 175  | 232            |
|           | K6-80   | 1817               | 75    | 3               | 50    | 2.3       | 2.6    | 7-2          | 356               | 440  | 285  | 360            |
|           | K0-140  | 1587               | 58    | 7               | 60    | 3.0       | 3.4    | 7-4          | 434               | 517  | 273  | 408            |
|           | N6-106  | 1588               | 58    | 3               | 63    | 2.9       | 3.3    | 7-4          | 440               | 356  | 134  | 310            |
| Nugget    | 1589    | 35                 | 38    | 0               | 18    | 1.1       | 1.3    | 7-11         | 163               | 291  | 134  | 196            |
| Parade    | 1916    | 67                 | 77    | 3               | 57    | 2.4       | 2.9    | 7-4          | 333               | 472  | 291  | 365            |
| Park      | 1461    | 68                 | 67    | 3               | 67    | 2.9       | 3.8    | 7-2          | 282               | 523  | 252  | 352            |
| Plush     | 1753    | 62                 | 63    | 7               | 47    | 1.3       | 1.9    | 7-7          | 270               | 472  | 324  | 355            |
| PPT6      | 1650    | 40                 | 53    | 0               | 28    | 1.0       | 1.1    | 7-13         | 27                | 404  | 270  | 234            |
| Ram I     | 1769    | 50                 | 63    | 0               | 23    | 1.0       | 1.4    | 7-10         | 282               | 463  | 223  | 323            |
| Rugby     | 1809    | 63                 | 63    | 0               | 35    | 1.3       | 1.7    | 7-4          | 125               | 606  | 389  | 373            |
| Sophia    | 1755    | 48                 | 60    | 0               | 30    | 1.0       | 1.4    | 7-12         | 431               | 674  | 374  | 493            |
| Touchdown | 934     | 57                 | 70    | 0               | 38    | 2.4       | 2.7    | 7-7          | 193               | 247  | 160  | 200            |
| Trenton   | 1810    | 62                 | 67    | 0               | 33    | 1.1       | 1.8    | 7-8          | 131               | 493  | 345  | 323            |
| Vanessa   | 1549    | 50                 | 57    | 0               | 37    | 1.1       | 1.8    | 7-13         | 18                | 603  | 279  | 300            |
| Victa     | 1768    | 52                 | 60    | 0               | 27    | 1.0       | 1.3    | 7-8          | 62                | 891  | 591  | 515            |
| Welcome   | 1713    | 50                 | 53    | 0               | 30    | 2.0       | 2.4    | 7-11         | 371               | 285  | 98   | 251            |

\* Plant height as centimeters; 2.5 cm = 1 inch.

\*\* Lodging, 1 = erect; 5 = lodged.

+ This lot did not perform as Enmundi.

LSD at 5% level

LSD at 1% level

112 140 106  
149 185 141

Table 2. Percent stand, plant height, percent heading, lodging, harvest date and seed yields for 65 Kentucky bluegrass strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data plus 1983 percent stands.

| Strain      | MSP No. | Percent Stand |          | Plant height* (cm) |       | Percent heading |       | Lodging** |        | Harvest Date | Seed Yield (lb/A) |
|-------------|---------|---------------|----------|--------------------|-------|-----------------|-------|-----------|--------|--------------|-------------------|
|             |         | (5-9-83)      | (5-9-83) | (6-19)             | (7-5) | (5-23)          | (6-5) | (6-16)    | (6-28) |              |                   |
| Adelphi     | 2063    | 25            | 7        | 60                 | 57    | 30              | 68    | 1.7       | 1.5    | 7-4          | 205               |
| America     | 1695    | 20            | 10       | 43                 | 57    | 20              | 62    | 1.0       | 1.1    | 7-3          | 413               |
| Aspen       | 2064    | 35            | 3        | 63                 | 60    | 27              | 63    | 1.7       | 1.4    | 7-6          | 270               |
| Balin       | 2137    | 67            | 13       | 68                 | 62    | 77              | 87    | 2.5       | 2.9    | 6-30         | 267               |
| Baron       | 1936    | 47            | 0        | 47                 | 55    | 15              | 58    | 1.0       | 1.0    | 7-6          | 508               |
| BAR Pp-81-E | 2044    | 50            | 0        | 55                 | 60    | 28              | 58    | 2.4       | 2.4    | 7-9          | 469               |
| Bel. 20     | 1930    | 35            | 0        | 63                 | 65    | 25              | 60    | 1.7       | 1.2    | 7-3          | 321               |
| Bel. 21     | 1931    | 13            | 3        | 62                 | 63    | 43              | 77    | 1.3       | 1.0    | 7-4          | 211               |
| Bel. 22     | 1932    | 37            | 10       | 70                 | 68    | 57              | 88    | 2.8       | 3.1    | 7-4          | 229               |
| Bristol     | 1767    | 47            | T        | 62                 | 63    | 17              | 53    | 1.4       | 1.5    | 7-6          | 434               |
| Camilla     | 2138    | 70            | 0        | 57                 | 52    | 13              | 43    | 3.0       | 2.8    | 7-9          | 98                |
| Charlotte   | 2139    | 77            | 0        | 52                 | 50    | 10              | 30    | 2.0       | 2.4    | 7-6          | 39                |
| Cynthia     | 2015    | 37            | 0        | 60                 | 60    | 27              | 62    | 2.8       | 2.5    | 7-11         | 416               |
| Eclipse     | 1740    | 13            | 0        | 48                 | 58    | 8               | 50    | 1.1       | 1.0    | 7-11         | 401               |
| Emundi      | 2051    | 57            | 0        | 58                 | 63    | 10              | 52    | 2.1       | 1.8    | 7-11         | 312               |
| Enprima     | 2052    | 48            | 0        | 57                 | 67    | 18              | 53    | 1.1       | 1.5    | 7-6          | 377               |
| Entopper    | 2053    | 23            | 0        | 58                 | 65    | 20              | 57    | 1.0       | 1.2    | 7-14         | 315               |
| Erte        | 2140    | 67            | 33       | 62                 | 60    | 73              | 88    | 1.2       | 2.1    | 7-1          | 199               |
| Escort      | 1571    | 22            | 0        | 72                 | 73    | 42              | 62    | 3.8       | 4.0    | 7-8          | 404               |
| Granada     | 2065    | 80            | 3        | 62                 | 65    | 25              | 62    | 2.0       | 3.1    | 7-8          | 217               |
| Harmony     | 1992    | 52            | 0        | 53                 | 53    | 23              | 53    | 1.0       | 1.3    | 7-13         | 454               |
| Holiday     | 1752    | 43            | 2        | 58                 | 62    | 13              | 47    | 1.0       | 1.0    | 7-8          | 181               |
| Julia       | 2054    | 40            | 0        | 73                 | 72    | 28              | 60    | 3.3       | 4.4    | 7-11         | 294               |
| Kimono      | 1280    | 43            | 0        | 53                 | 52    | 17              | 48    | 2.9       | 2.8    | 7-5          | 294               |
| Kyosti      | 2100    | 38            | 0        | 60                 | 63    | 15              | 58    | 1.0       | 1.0    | 7-4          | 187               |
| Leikra      | 2050    | 53            | 3        | 77                 | 73    | 75              | 88    | 3.3       | 3.8    | 7-1          | 241               |
| Melba       | 1934    | 40            | 0        | 48                 | 47    | 37              | 70    | 1.1       | 1.4    | 7-10         | 413               |
| Mer Pp-43   | 1948    | 57            | 2        | 65                 | 60    | 55              | 72    | 1.8       | 2.1    | 7-7          | 226               |

Table 2. (continued)

| Strain        | MSP No. | Percent Stand (5-9-83) | Plant height* (cm) |       | Percent heading |       | Lodging** |        | Harvest Date | Seed Yield (lb/A) |        |
|---------------|---------|------------------------|--------------------|-------|-----------------|-------|-----------|--------|--------------|-------------------|--------|
|               |         |                        | (6-19)             | (7-5) | (5-23)          | (6-5) | (6-16)    | (6-28) |              |                   | (7-11) |
| Monopoly      | 1711    | 48                     | 72                 | 72    | 0               | 25    | 63        | 2.4    | 3.2          | 7-9               | 386    |
| Mosa          | 1548    | 18                     | 58                 | 58    | 0               | 15    | 58        | 1.1    | 1.4          | 7-9               | 270    |
| Mystic        | 1937    | 45                     | 58                 | 58    | 0               | 37    | 67        | 2.0    | 1.9          | 7-5               | 267    |
| Parade        | 2066    | 18                     | 68                 | 67    | 3               | 23    | 63        | 1.9    | 1.9          | 7-4               | 454    |
| Park          | 1461    | 28                     | 73                 | 67    | T               | 60    | 78        | 2.2    | 2.4          | 7-1               | 380    |
| Plush         | 1753    | 35                     | 70                 | 68    | 0               | 37    | 67        | 2.1    | 2.1          | 7-5               | 249    |
| Prato         | 2067    | 43                     | 73                 | 73    | 3               | 68    | 87        | 3.1    | 3.1          | 7-4               | 264    |
| P.O. 3132     | 1978    | 50                     | 58                 | 58    | 0               | 15    | 48        | 2.1    | 2.1          | 7-7               | 247    |
| P.O. 3232     | 1979    | 50                     | 58                 | 63    | 0               | 17    | 48        | 1.9    | 2.8          | 7-7               | 249    |
| P.O. 3332     | 1980    | 43                     | 58                 | 63    | 0               | 15    | 52        | 1.9    | 2.4          | 7-7               | 276    |
| P.O. 3432     | 1981    | 58                     | 58                 | 62    | 0               | 18    | 62        | 1.8    | 2.3          | 7-11              | 457    |
| P.O. 30232    | 1977    | 60                     | 55                 | 58    | 0               | 25    | 63        | 2.9    | 2.9          | 7-14              | 345    |
| Ram I         | 1938    | 63                     | 47                 | 55    | 0               | 15    | 47        | 1.8    | 1.9          | 7-11              | 211    |
| Rugby         | 2068    | 43                     | 72                 | 70    | 0               | 15    | 58        | 2.1    | 2.4          | 7-5               | 463    |
| Sophia        | 2141    | 79                     | 61                 | 63    | 0               | 27    | 63        | 1.1    | 1.1          | 7-9               | 394    |
| Trampas       | 1935    | 32                     | 57                 | 55    | 5               | 30    | 65        | 1.9    | 2.3          | 7-8               | 576    |
| Trenton       | 2069    | 50                     | 73                 | 72    | 0               | 17    | 55        | 1.3    | 1.3          | 7-5               | 446    |
| Welcome       | 1993    | 73                     | 53                 | 53    | 0               | 12    | 40        | 1.8    | 2.5          | 7-8               | 172    |
| 243           | 1939    | 22                     | 63                 | 62    | 0               | 33    | 57        | 1.0    | 1.1          | 7-9               | 410    |
| NK-Exp K1-138 | 2070    | 3                      | 52                 | 55    | 0               | 35    | 70        | 2.8    | 2.2          | 7-12              | 561    |
| K1-152-7      | 2071    | 47                     | 65                 | 67    | 0               | 15    | 53        | 1.0    | 1.3          | 7-6               | 345    |
| K1-160-5      | 2072    | 60                     | 73                 | 72    | 0               | 63    | 83        | 1.1    | 1.2          | 7-2               | 273    |
| K3-157-5      | 2073    | 27                     | 67                 | 72    | 0               | 23    | 58        | 1.3    | 1.1          | 7-6               | 270    |
| K3-160-6      | 2074    | 27                     | 65                 | 65    | 0               | 35    | 62        | 1.1    | 1.1          | 7-4               | 226    |
| K3-162-5      | 2075    | 87                     | 57                 | 55    | 10              | 40    | 73        | 3.0    | 3.0          | 7-4               | 98     |
| K3-166        | 2076    | 50                     | 70                 | 65    | 0               | 15    | 57        | 1.1    | 1.0          | 7-4               | 377    |
| K3-174-3      | 2077    | 57                     | 75                 | 72    | 0               | 47    | 82        | 2.1    | 2.2          | 6-30              | 291    |
| K3-178        | 2078    | 37                     | 75                 | 72    | 3               | 28    | 70        | 1.1    | 1.7          | 7-1               | 315    |

Table 2. (continued)

| Strain   | MSP No. | Percent Stand (5-9-83) | Plant height* (cm) |       | Percent heading |       | Lodging** |        | Harvest Date | Seed Yield (lb/A) |     |
|----------|---------|------------------------|--------------------|-------|-----------------|-------|-----------|--------|--------------|-------------------|-----|
|          |         |                        | (6-19)             | (7-5) | (5-23)          | (6-5) | (6-28)    | (7-11) |              |                   |     |
| NK-Exp.  |         |                        |                    |       |                 |       |           |        |              |                   |     |
| K3-179-5 | 2079    | 60                     | 72                 | 65    | 0               | 25    | 77        | 2.2    | 2.4          | 7-3               | 169 |
| K3-180-1 | 2080    | 3                      | 58                 | 57    | T               | 30    | 70        | 1.4    | 1.2          | 7-1               | 282 |
| K3-187-2 | 2081    | 7                      | 63                 | 67    | 0               | 27    | 63        | 2.4    | 1.7          | 7-3               | 327 |
| K3-222-2 | 2082    | 23                     | 58                 | 62    | 2               | 33    | 55        | 1.0    | 1.0          | 7-3               | 205 |
| K6-32-2  | 2083    | 43                     | 68                 | 65    | 0               | 15    | 57        | 1.9    | 1.8          | 7-4               | 413 |
| K6-80-1  | 2084    | 47                     | 78                 | 73    | 17              | 58    | 83        | 1.0    | 1.2          | 7-2               | 184 |
| K6-87-1  | 2085    | 23                     | 67                 | 68    | 5               | 70    | 92        | 2.3    | 2.4          | 7-2               | 330 |
| N6-106   | 1588    | 30                     | 63                 | 63    | 23              | 62    | 82        | 1.7    | 2.5          | 7-1               | 288 |
| K0-140   | 1587    | 45                     | 67                 | 63    | 60              | 70    | 88        | 2.1    | 2.3          | 6-30              | 454 |

\* Plant height as centimeters; 2.5 cm = 1 inch.

\*\* Lodging, 1 = No lodging; 5 = Severe lodging.



Table 3. Vigor ratings, percent stand, mildew infection, height, percent heading, and estimated seed yields for 100 Kentucky bluegrass strains seeded on the Welin Farm, Roseau, MN in 1983. 1984 data.

| Strain      | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant Height† (6-19) | Percent heading |       |        | Est. Seed Yield (lb/A) (6-29) |     |
|-------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|-------|--------|-------------------------------|-----|
|             |         |              |                     |                 |                      | (5-25)          | (6-5) | (6-16) |                               |     |
| Adelphi     | 2238    | 2.7          | 77                  | 2.3             | 58                   | T               | 28    | 72     | 100                           | 167 |
| Admiral     | 2239    | 3.8          | 37                  | 0.3             | 65                   | T               | 27    | 57     | 93                            | 50  |
| America     | 2240    | 4.0          | 15                  | 0               | 35                   | 2               | 10    | 40     | 83                            | 175 |
| Ampellia    | 2143    | 3.5          | 77                  | 0               | 50                   | 0               | 23    | 57     | 93                            | 92  |
| Apert       | 2241    | 3.4          | 67                  | T               | 45                   | 0               | 10    | 32     | 100                           | 33  |
| Apori       | 2217    | 3.5          | 63                  | 0               | 40                   | 3               | 8     | 25     | 97                            | 27  |
| Aquila      | 1915    | 2.7          | 70                  | 0               | 52                   | T               | 40    | 73     | 93                            | 175 |
| Argyle      | 2242    | 1.7          | 83                  | 0.7             | 65                   | 60              | 83    | 93     | 100                           | 292 |
| Aspen       | 2243    | 4.1          | 43                  | 0               | 58                   | 0               | 15    | 50     | 83                            | 108 |
| A-20        | 2244    | 3.1          | 43                  | 0               | 53                   | 0               | 8     | 27     | 73                            | 42  |
| A-20-6      | 2245    | 3.8          | 40                  | 0               | 48                   | 2               | 5     | 18     | 75                            | 33  |
| A-20-6A     | 2246    | 3.1          | 57                  | T               | 60                   | 0               | 18    | 52     | 90                            | 217 |
| A-34        | 2247    | 3.0          | 57                  | 0.3             | 57                   | 5               | 43    | 63     | 87                            | 158 |
| BH61-91     | 2248    | 3.8          | 53                  | 1.0             | 47                   | 0               | 17    | 50     | 67                            | 133 |
| Banff       | 2249    | 2.9          | 53                  | 0.7             | 55                   | 0               | 30    | 60     | 80                            | 167 |
| Baron       | 2250    | 3.3          | 50                  | 0.3             | 48                   | 0               | 20    | 57     | 87                            | 150 |
| Bartissimo  | 1675    | 2.9          | 63                  | 0               | 48                   | 0               | 10    | 52     | 90                            | 42  |
| Bayside     | 2251    | 1.7          | 77                  | 0               | 58                   | 2               | 37    | 78     | 93                            | 100 |
| Birka       | 2252    | 3.4          | 50                  | 0               | 40                   | 0               | 10    | 27     | 87                            | 25  |
| Bonnie blue | 2253    | 3.8          | 33                  | T               | 42                   | T               | 8     | 23     | 63                            | 33  |
| Bono        | 2254    | 3.0          | 43                  | 0               | 47                   | 0               | 13    | 35     | 77                            | 20  |
| Bristol     | 2255    | 3.5          | 40                  | 0               | 43                   | 2               | 22    | 47     | 67                            | 58  |
| Cello       | 2256    | 3.0          | 60                  | 0               | 52                   | 0               | 12    | 50     | 90                            | 50  |
| Charlotte   | 2257    | 3.2          | 80                  | 0.3             | 45                   | 0               | 5     | 15     | 100                           | 17  |
| Cheri       | 2258    | 3.1          | 45                  | 0.3             | 50                   | T               | 20    | 52     | 80                            | 183 |
| CEB VB 3965 | 2259    | 3.9          | 43                  | 0               | 45                   | 0               | 7     | 30     | 80                            | 18  |
| Claudia     | 1545    | 4.1          | 42                  | 0.3             | 43                   | 0               | 15    | 45     | 67                            | 37  |
| Columbia    | 2260    | 3.0          | 47                  | T               | 57                   | 0               | 30    | 73     | 77                            | 237 |

Table 3. (continued)

| Strain     | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant Height+ (6-19) | Percent heading |       |        | Est. Seed Yield (lb/A) (6-29) |     |
|------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|-------|--------|-------------------------------|-----|
|            |         |              |                     |                 |                      | (5-25)          | (6-5) | (6-16) |                               |     |
| Dormie     | 2261    | 3.7          | 40                  | 0               | 50                   | 4               | 33    | 63     | 87                            | 125 |
| Eclipse    | 2262    | 4.0          | 27                  | 0               | 30                   | 0               | 7     | 18     | 63                            | 25  |
| Emundi     | 2263    | 3.5          | 70                  | 0               | 30                   | 0               | 7     | 22     | 90                            | 25  |
| Enoble     | 2264    | 3.5          | 43                  | 0               | 37                   | 5               | 23    | 43     | 77                            | 28  |
| Escort     | 2265    | 3.7          | 40                  | T               | 50                   | T               | 13    | 38     | 63                            | 37  |
| Fylking    | 2266    | 3.7          | 70                  | T               | 42                   | 0               | 5     | 18     | 87                            | 18  |
| Geronimo   | 2267    | 2.8          | 83                  | 0.4             | 53                   | T               | 53    | 87     | 97                            | 125 |
| Glade      | 2268    | 4.1          | 33                  | T               | 35                   | 0               | 5     | 32     | 80                            | 37  |
| H-7        | 2318    | 4.0          | 30                  | 0               | 43                   | 0               | 7     | 28     | 62                            | 28  |
| Harmony    | 2269    | 3.5          | 57                  | 0               | 43                   | T               | 40    | 72     | 83                            | 187 |
| Holiday    | 2270    | 3.4          | 40                  | T               | 50                   | 0               | 13    | 57     | 73                            | 153 |
| ISI-128    | 1693    | 3.8          | 37                  | T               | 45                   | 0               | 15    | 43     | 77                            | 70  |
| I-13       | 2271    | 3.7          | 28                  | T               | 37                   | 0               | 5     | 28     | 63                            | 37  |
| Kenblue    | 2272    | 3.1          | 37                  | 0               | 52                   | 42              | 53    | 72     | 67                            | 83  |
| Kimono     | 2273    | 4.7          | 10                  | 0               | 40                   | 0               | 10    | 35     | 67                            | 35  |
| K0-140     | 1587    | 2.3          | 67                  | 0               | 55                   | 57              | 73    | 87     | 93                            | 58  |
| K1-152     | 2274    | 3.0          | 57                  | 0.3             | 57                   | 4               | 37    | 65     | 93                            | 200 |
| K3-157     | 1812    | 3.0          | 40                  | 0               | 60                   | 7               | 50    | 70     | 77                            | 125 |
| K3-160     | 1813    | 2.8          | 77                  | 0               | 58                   | T               | 43    | 77     | 93                            | 175 |
| K3-162     | 2275    | 1.0          | 87                  | T               | 50                   | 45              | 77    | 93     | 100                           | 58  |
| K3-178     | 2276    | 2.3          | 70                  | 1.0             | 60                   | 5               | 47    | 73     | 93                            | 167 |
| K3-179     | 2277    | 2.3          | 57                  | 2.1             | 62                   | 2               | 40    | 75     | 80                            | 108 |
| K6-80      | 1817    | 1.7          | 77                  | 0               | 60                   | 28              | 73    | 88     | 97                            | 183 |
| Lovegreen  | 2319    | 3.4          | 57                  | T               | 40                   | T               | 33    | 55     | 80                            | 92  |
| Majestic   | 2278    | 3.0          | 60                  | T               | 43                   | 5               | 25    | 63     | 100                           | 133 |
| Mer Pp-43  | 2279    | 3.0          | 63                  | 0.7             | 48                   | 4               | 20    | 50     | 93                            | 25  |
| Mer Pp-300 | 2280    | 3.5          | 63                  | 0               | 42                   | 0               | 12    | 55     | 77                            | 83  |
| Merion     | 2281    | 3.8          | 30                  | 0.7             | 45                   | 15              | 27    | 60     | 77                            | 133 |

Table 3. (continued)

| Strain             | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant Height+ (6-19) | Percent heading |        | Est. Seed Yield (lb/A) (6-29) |     |
|--------------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|--------|-------------------------------|-----|
|                    |         |              |                     |                 |                      | (5-25)          | (6-16) |                               |     |
| Merit              | 2282    | 3.1          | 70                  | 0.7             | 52                   | 0               | 53     | 90                            | 167 |
| Mireille           | 1754    | 3.1          | 57                  | 0.8             | 52                   | 0               | 57     | 87                            | 125 |
| MLM-18011          | 2283    | 3.4          | 47                  | T               | 52                   | 0               | 53     | 87                            | 117 |
| Mom Pp 1417        | 1543    | 3.8          | 63                  | 0.3             | 43                   | 0               | 53     | 93                            | 75  |
| Mom Pp 1765        | 1544    | 4.1          | 57                  | T               | 45                   | 0               | 67     | 77                            | 58  |
| Mona               | 2284    | 2.4          | 77                  | 1.3             | 63                   | 0               | 68     | 93                            | 217 |
| Monopoly           | 2285    | 2.7          | 47                  | 0               | 57                   | T               | 72     | 90                            | 167 |
| Mosa               | 2286    | 3.2          | 70                  | 1.7             | 52                   | 2               | 63     | 97                            | 158 |
| Mystic             | 2287    | 3.2          | 67                  | 0               | 47                   | 7               | 77     | 77                            | 50  |
| Newport            | 2331    | 3.3          | 83                  | 0.3             | 48                   | 2               | 45     | 87                            | 42  |
| Nugget             | 2288    | 4.1          | 37                  | 0               | 27                   | T               | 35     | 80                            | 33  |
| N6-106             | 1588    | 2.0          | 67                  | T               | 60                   | 67              | 93     | 97                            | 225 |
| N-535 (challenger) | 2289    | 3.2          | 43                  | T               | 42                   | 0               | 37     | 70                            | 83  |
| NJ-735             | 2290    | 3.7          | 37                  | T               | 50                   | 2               | 50     | 83                            | 50  |
| Parade             | 2291    | 3.2          | 47                  | 1.0             | 57                   | 10              | 67     | 83                            | 158 |
| Park               | 1461    | 3.8          | 43                  | 1.4             | 47                   | 2               | 77     | 73                            | 50  |
| Piedmont           | 2292    | 4.0          | 15                  | 0               | 48                   | 23              | 65     | 50                            | 25  |
| Plush              | 2293    | 2.1          | 55                  | T               | 48                   | T               | 43     | 87                            | 35  |
| PSU-150            | 2294    | 2.3          | 63                  | 0               | 50                   | 2               | 35     | 80                            | 35  |
| PSU-173            | 2295    | 3.2          | 48                  | 0               | 55                   | T               | 55     | 73                            | 27  |
| PSU-190            | 2296    | 3.3          | 37                  | 0               | 48                   | 2               | 55     | 83                            | 27  |
| Ram I              | 2297    | 3.8          | 52                  | 0               | 42                   | 0               | 35     | 80                            | 52  |
| Rugby              | 2298    | 3.3          | 47                  | 0.7             | 62                   | T               | 55     | 80                            | 275 |
| S.D. Common        | 2299    | 2.8          | 53                  | 0.7             | 62                   | 17              | 67     | 73                            | 77  |
| S-21               | 2300    | 2.3          | 45                  | 1.7             | 58                   | 7               | 68     | 77                            | 45  |
| Saskia             | 2184    | 3.1          | 70                  | T               | 42                   | T               | 53     | 97                            | 50  |
| Shasta             | 2301    | 3.1          | 43                  | T               | 52                   | 2               | 47     | 83                            | 57  |
| Sophia             | 2141    | 3.9          | 70                  | T               | 42                   | 0               | 45     | 100                           | 117 |

Table 3. (continued)

| Strain          | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant Height† (6-19) | Percent heading |       |        | Est. Seed Yield (lb/A) (6-29) |     |
|-----------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|-------|--------|-------------------------------|-----|
|                 |         |              |                     |                 |                      | (5-25)          | (6-5) | (6-16) |                               |     |
| SV-01617        | 2302    | 2.7          | 60                  | T               | 42                   | T               | 7     | 22     | 97                            | 17  |
| Sydsport        | 2303    | 3.2          | 80                  | 0               | 48                   | T               | 23    | 67     | 90                            | 142 |
| Touchdown       | 2304    | 2.7          | 70                  | 0               | 60                   | 27              | 55    | 78     | 100                           | 58  |
| Trenton         | 2305    | 3.2          | 63                  | 0.4             | 58                   | 2               | 28    | 65     | 97                            | 167 |
| Vanessa         | 2306    | 3.1          | 37                  | 1.7             | 52                   | 0               | 27    | 62     | 73                            | 117 |
| Vantage         | 2307    | 1.9          | 73                  | 0.7             | 60                   | 23              | 70    | 85     | 90                            | 133 |
| Victa           | 2308    | 3.0          | 67                  | 1.0             | 52                   | 0               | 17    | 58     | 97                            | 225 |
| Wabash          | 2309    | 2.0          | 57                  | 0.7             | 62                   | 7               | 28    | 67     | 87                            | 108 |
| Welcome         | 2310    | 2.4          | 87                  | 1.0             | 48                   | 0               | 17    | 60     | 100                           | 58  |
| WWAG 463        | 2311    | 2.3          | 87                  | T               | 63                   | 0               | 43    | 70     | 100                           | 233 |
| WWAG 478        | 2312    | 3.5          | 47                  | 1.1             | 23                   | 0               | 23    | 63     | 87                            | 75  |
| WWAG 480        | 2313    | 2.8          | 70                  | T               | 47                   | 0               | 20    | 67     | 90                            | 183 |
| 225             | 2314    | 2.8          | 63                  | 0.4             | 57                   | T               | 28    | 63     | 90                            | 163 |
| 239             | 2315    | 3.1          | 40                  | T               | 52                   | 0               | 20    | 53     | 77                            | 75  |
| 243 (nassau)    | 2316    | 3.4          | 73                  | 0.4             | 43                   | T               | 30    | 58     | 87                            | 127 |
| 1528t(Midnight) | 2317    | 4.1          | 47                  | 1.1             | 43                   | 0               | 5     | 50     | 73                            | 105 |

\* Vigor - 1 = best vigor; 5 = least vigor.

\*\* Mildew infection, 0 = no symptoms; T = trace; 5 = severe infection.

† Plant height as centimeters; 2.5 cm - 1 inch.

Table 4. Vigor ratings, percent stand, mildew infection, plant height, percent heading, and estimated seed yields for 40 Kentucky bluegrass strains seeded in 1983 on the Welin Farm, Roseau, MN, 1984 data.

| Strain      | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant height† (6-19) | Percent heading |        | Est. Seed Yield (lb/A) (6-29) |     |
|-------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|--------|-------------------------------|-----|
|             |         |              |                     |                 |                      | (5-25)          | (6-16) |                               |     |
| America     | 2229    | 3.8          | 52                  | 0               | 37                   | 0               | 10     | 80                            | 233 |
| Ampellia    | 2143    | 3.8          | 57                  | T               | 43                   | 0               | 12     | 40                            | 83  |
| Aporl       | 2217    | 4.0          | 67                  | 0               | 35                   | 0               | 4      | 12                            | 83  |
| Baron       | 2178    | 3.5          | 73                  | T               | 45                   | 0               | 13     | 45                            | 175 |
| Bel. 20     | 1930    | 3.3          | 50                  | T               | 50                   | T               | 28     | 58                            | 192 |
| Bel. 21     | 1931    | 4.0          | 10                  | 0               | 45                   | 2               | 15     | 30                            | 25  |
| Banff       | 2230    | 3.0          | 57                  | 0.3             | 53                   | 2               | 27     | 60                            | 100 |
| Balin       | 2137    | 3.0          | 67                  | 0               | 60                   | 18              | 53     | 83                            | 58  |
| Camilla     | 2138    | 3.4          | 80                  | T               | 47                   | 0               | 18     | 55                            | 42  |
| Charlotte   | 2139    | 3.5          | 57                  | 0               | 45                   | 0               | 5      | 15                            | 25  |
| Enmundi     | 2218    | 4.7          | 5                   | 0               | 43                   | 0               | 3      | 10                            | 92  |
| Entopper    | 2219    | 3.8          | 43                  | 0               | 43                   | 0               | 15     | 42                            | 42  |
| Erte        | 2140    | 2.3          | 70                  | 0               | 57                   | 17              | 50     | 70                            | 108 |
| Escort      | 2163    | 3.2          | 60                  | T               | 52                   | 0               | 10     | 32                            | 50  |
| EVB-8268    | 2220    | 3.2          | 70                  | 0               | 48                   | T               | 27     | 67                            | 75  |
| Georgetown  | 2179    | 3.1          | 73                  | T               | 58                   | 0               | 23     | 60                            | 158 |
| Geronimo    | 2267    | 3.0          | 73                  | 0.4             | 53                   | 0               | 33     | 73                            | 108 |
| Holiday     | 1752    | 3.1          | 70                  | 0               | 50                   | 0               | 12     | 42                            | 100 |
| Kimono      | 1280    | 3.8          | 73                  | 0.4             | 42                   | 0               | 18     | 52                            | 67  |
| Leikra      | 2050    | 2.3          | 73                  | 0               | 60                   | 4               | 50     | 72                            | 67  |
| Mom Pp-43   | 1948    | 3.2          | 77                  | 0.3             | 45                   | T               | 10     | 22                            | 25  |
| Mom Pp-2672 | 2182    | 3.4          | 57                  | 0               | 45                   | 0               | 20     | 52                            | 100 |
| Mom Pp-3123 | 2183    | 3.7          | 47                  | 0               | 48                   | 0               | 17     | 48                            | 67  |
| Monopoly    | 1711    | 3.1          | 47                  | 0               | 50                   | 0               | 30     | 40                            | 108 |
| Mosa        | 2286    | 3.3          | 77                  | 1.0             | 52                   | 0               | 10     | 55                            | 125 |
| Nassau      | 2180    | 3.4          | 57                  | T               | 47                   | T               | 23     | 50                            | 125 |
| Pp-133      | 2144    | 3.2          | 87                  | 0.4             | 47                   | 0               | 17     | 60                            | 183 |
| Parade      | 1916    | 2.9          | 70                  | T               | 57                   | 2               | 32     | 63                            | 142 |

Table 4. (continued)

| Strain     | MSP No. | Vigor* (5-4) | Percent Stand (5-4) | Mildew** (6-11) | Plant height† (6-19) | Percent heading |       |        | Est. Seed Yield (lb/A) (6-29) |     |
|------------|---------|--------------|---------------------|-----------------|----------------------|-----------------|-------|--------|-------------------------------|-----|
|            |         |              |                     |                 |                      | (5-25)          | (6-5) | (6-16) |                               |     |
| Park       | 1461    | 3.4          | 67                  | 0.3             | 52                   | 4               | 48    | 72     | 90                            | 83  |
| Plush      | 1753    | 2.9          | 70                  | 0               | 48                   | T               | 20    | 53     | 87                            | 50  |
| Ram I      | 2181    | 3.2          | 63                  | T               | 42                   | 0               | 10    | 43     | 93                            | 42  |
| Rugby      | 2298    | 2.7          | 70                  | 0.4             | 58                   | 0               | 30    | 67     | 93                            | 217 |
| Saskia     | 2184    | 3.3          | 77                  | 0.4             | 38                   | 0               | 8     | 32     | 93                            | 50  |
| Touchdown  | 2231    | 3.2          | 53                  | 0               | 50                   | 5               | 30    | 50     | 97                            | 42  |
| Vanessa    | 1549    | 3.3          | 63                  | 0.7             | 53                   | 0               | 20    | 53     | 87                            | 75  |
| ZW. 42-94  | 2158    | 2.7          | 87                  | 0               | 60                   | T               | 27    | 63     | 100                           | 133 |
| ZW. 42-96  | 2159    | 4.1          | 67                  | T               | 40                   | 0               | 5     | 8      | 80                            | 25  |
| ZW. 42-102 | 2160    | 2.7          | 67                  | 0               | 62                   | 0               | 17    | 58     | 90                            | 67  |
| ZW. 42-103 | 2161    | 3.0          | 60                  | 0               | 48                   | 0               | 8     | 20     | 67                            | 25  |
| ZW. 42-108 | 2162    | 3.1          | 47                  | 0               | 43                   | T               | 18    | 43     | 87                            | 42  |

\* Vigor - 1 = best vigor; 5 = least vigor.

\*\* Mildew - 0 = no symptoms; T = trace; 5 = severe infection.

† Plant height in centimeters; 2.5 cm = 1 inch.

Table 5. Plant height, lodging, and seed yields for Parade Kentucky bluegrass on peat soil (Scott-Kveen farm) treated with 10 fertilizer treatments. Roseau, MN. 1984 data.

| Fertilizer*<br>treatments | Plant height**<br>(7-6) | Lodging***<br>(7-12) | Seed yields<br>(lb/A) |
|---------------------------|-------------------------|----------------------|-----------------------|
| No treatment              | 50                      | 1.0                  | 39                    |
| 30+15+15                  | 58                      | 1.0                  | 74                    |
| 60+30+30                  | 58                      | 1.1                  | 116                   |
| 90+45+45                  | 63                      | 1.5                  | 232                   |
| 30+0+0+34                 | 60                      | 1.0                  | 71                    |
| 60+0+0+68                 | 63                      | 1.1                  | 134                   |
| 90+0+0+102                | 68                      | 1.7                  | 247                   |
| 32+40+120                 | 58                      | 1.1                  | 107                   |
| 64+80+240                 | 60                      | 1.0                  | 95                    |
| 96+40+120                 | 68                      | 2.0                  | 244                   |
| 100+125+372†              | 67                      | 1.8                  | 163                   |

Least significant difference at 5% level 88  
1% level 120

\* Fertilizer treatments N+P+K and in second group, N+P+K+Sulfur.

\*\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\*\* Lodging, 1 = erect; 5 = lodged.

† split application, one-half in fall and one-half in spring.  
All plots harvested July 13.

Table 6. Plant height, lodging, seed yields and harvest index for three chemicals applied at two rates and on two dates on Rugby Kentucky bluegrass on Steve Dahl Farm, Roseau, MN. 1984 data.

| Chemical     | Application date | Rate* | Plant height** | Lodging† |     | Seed yield (lb/A) | Harvest index§ |
|--------------|------------------|-------|----------------|----------|-----|-------------------|----------------|
|              |                  |       |                | 6-27     | 7-7 |                   |                |
| No treatment |                  |       | 70             | 6.0      | 7.3 | 894               | 18.3           |
| Bayleton     | May 28           | Low   | 70             | 5.5      | 6.5 | 852               | 18.8           |
| Bayleton     |                  | High  | 70             | 5.5      | 6.5 | 767               | 18.5           |
| Parlay       |                  | Low   | 58             | 1.1      | 1.0 | 754               | 24.5           |
| Parlay       |                  | High  | 55             | 1.0      | 1.0 | 812               | 25.4           |
| Tilt         |                  | Low   | 70             | 5.1      | 6.5 | 816               | 16.8           |
| Tilt         |                  | High  | 70             | 3.8      | 5.5 | 673               | 15.3           |
| Bayleton     | June 11          | Low   | 70             | 6.3      | 7.5 | 767               | 18.9           |
| Bayleton     |                  | High  | 70             | 3.6      | 4.5 | 718               | 17.1           |
| Parlay       |                  | Low   | 60             | 1.5      | 3.5 | 740               | 25.3           |
| Parlay       |                  | High  | 60             | 1.1      | 1.0 | 647               | 21.0           |
| Tilt         |                  | Low   | 70             | 5.7      | 6.5 | 691               | 18.1           |
| Tilt         |                  | High  | 70             | 5.3      | 6.0 | 874               | 20.8           |

\* Rate Bayleton: Low = 77 grams (50 WP) per 3,300 sq. ft.

High = 154 grams (50 WP) per 3,300 sq. ft.

Parlay: Low = 17 grams (50 WP) per 3,300 sq. ft.

High = 34 grams (50 WP) per 3,300 sq. ft.

Tilt: Low = 18 cc per 3,300 sq. ft.

High = 36 cc per 3,300 sq. ft.

\*\* Plant height as centimeters; 2.5 cm = 1 inch.

† Lodging - 1 = erect, 9 = lodged.

§ Harvest Index = percent of total sample as clean seed.

Note: Mildew was controlled by all three chemicals, but infection never reached serious levels any place in the field. Therefore, data for mildew infection are non-conclusive.



Table 8. Lodging, plant height, seed yields and harvest index for two growth retardants applied on three dates and at three rates on Park Kentucky bluegrass on Helmstetter Farm, mineral soil. 1984 data.

| Chemical | Date | Rate <sup>1/</sup> | Lodging*      |        |              |        |               |        | Plant height** |        |                |        |  |  |
|----------|------|--------------------|---------------|--------|--------------|--------|---------------|--------|----------------|--------|----------------|--------|--|--|
|          |      |                    | June 27, 1984 |        | July 4, 1984 |        | June 20, 1984 |        | Seed yields†   |        | Harvest index‡ |        |  |  |
|          |      |                    | High          | Normal | High         | Normal | High          | Normal | High           | Normal | High           | Normal |  |  |
| None     |      |                    | 7.6           | 2.8    | 7.5          | 2.7    | 79            | 74     | 89             | 73     | 16             | 21     |  |  |
| Parlay   | 5/5  | 0.125              | 2.0           | 1.0    | 2.3          | 1.0    | 73            | 63     | 78             | 60     | 22             | 23     |  |  |
|          |      | 0.250              | 1.7           | 1.3    | 2.0          | 1.0    | 67            | 58     | 85             | 63     | 24             | 24     |  |  |
|          |      | 0.500              | 1.0           | 1.0    | 1.0          | 1.0    | 55            | 52     | 73             | 56     | 23             | 24     |  |  |
|          | 5/15 | 0.125              | 4.7           | 1.7    | 4.3          | 1.3    | 73            | 65     | 81             | 62     | 20             | 24     |  |  |
|          |      | 0.250              | 4.3           | 1.7    | 4.7          | 1.3    | 73            | 65     | 88             | 71     | 20             | 24     |  |  |
|          |      | 0.500              | 1.0           | 1.0    | 1.3          | 1.0    | 58            | 55     | 69             | 62     | 23             | 25     |  |  |
| EL-500   | 5/24 | 0.125              | 3.3           | 1.3    | 3.3          | 1.3    | 77            | 68     | 91             | 64     | 22             | 23     |  |  |
|          |      | 0.250              | 2.7           | 1.0    | 2.3          | 1.0    | 78            | 70     | 90             | 73     | 21             | 25     |  |  |
|          |      | 0.500              | 1.3           | 1.0    | 1.0          | 1.0    | 68            | 63     | 78             | 66     | 24             | 26     |  |  |
|          | 5/5  | 0.250              | 3.7           | 1.0    | 3.7          | 1.0    | 73            | 67     | 104            | 67     | 23             | 25     |  |  |
|          |      | 0.500              | 2.0           | 1.3    | 2.7          | 1.0    | 70            | 63     | 98             | 67     | 25             | 26     |  |  |
|          |      | 1.00               | 1.0           | 1.0    | 1.0          | 1.0    | 50            | 48     | 70             | 57     | 22             | 25     |  |  |
|          | 5/15 | 0.250              | 5.3           | 2.0    | 5.0          | 2.0    | 77            | 70     | 93             | 65     | 20             | 22     |  |  |
|          |      | 0.500              | 4.0           | 2.0    | 3.3          | 2.3    | 75            | 72     | 98             | 74     | 23             | 24     |  |  |
|          |      | 1.00               | 1.7           | 1.3    | 1.7          | 1.0    | 68            | 62     | 83             | 66     | 21             | 24     |  |  |
|          | 5/24 | 0.250              | 7.0           | 1.0    | 5.7          | 1.3    | 77            | 70     | 95             | 71     | 19             | 25     |  |  |
|          |      | 0.500              | 5.3           | 2.0    | 4.0          | 2.0    | 78            | 72     | 96             | 71     | 20             | 23     |  |  |
|          |      | 1.00               | 2.3           | 1.0    | 2.0          | 1.0    | 68            | 63     | 86             | 60     | 21             | 23     |  |  |

\* Lodging - 1 = erect; 9 = lodged.  
 \*\* Plant height in centimeters; 2.5 cm = 1 inch.  
 † Seed yields as grams per square meter.  
 ‡ Harvest index = weight of seed over weight of total sample.  
 § Fertility - high is additional 50+25+25 over grower application.  
 1/ lb/A a.i.

Table 7. Plant height, percent heading, lodging, harvest dates and seed yields for six Kentucky bluegrass strains under four residue management regimes and two fertilizer levels. Seeded in 1981 on the Welin Farm, Roseau, MN, 1984 data, plus base seed yields from 1983.

|         | Residue treatment | 80+40+40       |       |                 |       |            |       |              |      |                    |       | 120+60+60      |       |                 |       |            |      |              |  |                    |  |
|---------|-------------------|----------------|-------|-----------------|-------|------------|-------|--------------|------|--------------------|-------|----------------|-------|-----------------|-------|------------|------|--------------|--|--------------------|--|
|         |                   | Plant height * |       | Percent heading |       | Lodging ** |       | Harvest date |      | Seed yields (lb/A) |       | Plant height * |       | Percent heading |       | Lodging ** |      | Harvest date |  | Seed yields (lb/A) |  |
|         |                   | (7-5)          | (6-5) | (6-16)          | (7-5) | (7-5)      | (7-5) | 1983         | 1984 | (7-5)              | (6-5) | (6-16)         | (7-5) | (7-5)           | (7-5) | 1983       | 1984 |              |  |                    |  |
| America | Clip 1-1/2"       | 43             | T     | 70              | 1.0   | 7-13       | 592   | 333          | 58   | 0                  | 90    | 1.0            | 7-13  | 592             | 431   |            |      |              |  |                    |  |
| Baron   | Rake              | 35             | 3     | 53              | 1.0   | 7-9        | 831   | 353          | 60   | 2                  | 75    | 1.0            | 7-12  | 831             | 454   |            |      |              |  |                    |  |
| Emmundi | Off               | 38             | 0     | 17              | 1.0   | 7-12       | 593   | 226          | 52   | 0                  | 13    | 1.0            | 7-12  | 593             | 330   |            |      |              |  |                    |  |
| Park    | Straw             | 77             | 33    | 80              | 1.6   | 7-2        | 768   | 466          | 73   | 32                 | 100   | 5.0            | 7-8   | 768             | 725   |            |      |              |  |                    |  |
| Ram I   |                   | 37             | 2     | 15              | 1.0   | 7-9        | 449   | 134          | 57   | 4                  | 15    | 1.0            | 7-10  | 449             | 247   |            |      |              |  |                    |  |
| Rugby   |                   | 63             | 8     | 53              | 1.0   | 7-5        | 575   | 380          | 78   | 9                  | 70    | 1.9            | 7-5   | 575             | 594   |            |      |              |  |                    |  |
| America | Clip 4"           | 52             | 0     | 70              | 1.0   | 7-13       | 592   | 273          | 57   | 0                  | 90    | 1.0            | 7-13  | 592             | 407   |            |      |              |  |                    |  |
| Baron   | Rake              | 45             | 4     | 57              | 1.0   | 7-8        | 831   | 353          | 50   | T                  | 83    | 1.0            | 7-11  | 831             | 472   |            |      |              |  |                    |  |
| Emmundi | Off               | 42             | 0     | 7               | 1.0   | 7-12       | 593   | 107          | 55   | 0                  | 7     | 1.1            | 7-12  | 543             | 184   |            |      |              |  |                    |  |
| Park    | Straw             | 75             | 33    | 90              | 2.4   | 7-2        | 768   | 345          | 75   | 30                 | 100   | 4.7            | 7-4   | 768             | 514   |            |      |              |  |                    |  |
| Ram I   |                   | 43             | T     | 7               | 1.0   | 7-11       | 449   | 65           | 50   | T                  | 12    | 1.1            | 7-12  | 449             | 131   |            |      |              |  |                    |  |
| Rugby   |                   | 57             | 7     | 43              | 1.0   | 7-4        | 575   | 247          | 68   | 4                  | 67    | 1.8            | 7-9   | 575             | 431   |            |      |              |  |                    |  |
| America | Burn              | 53             | T     | 85              | 1.0   | 7-13       | 592   | 472          | 57   | 0                  | 93    | 1.0            | 7-13  | 592             | 677   |            |      |              |  |                    |  |
| Baron   | With              | 42             | 5     | 55              | 1.0   | 7-9        | 831   | 347          | 55   | 2                  | 73    | 1.0            | 7-11  | 831             | 546   |            |      |              |  |                    |  |
| Emmundi | Paraquat          | 38             | 0     | 8               | 1.0   | 7-11       | 593   | 190          | 48   | 0                  | 9     | 1.0            | 7-12  | 593             | 169   |            |      |              |  |                    |  |
| Park    |                   | 70             | 38    | 100             | 2.7   | 7-2        | 768   | 538          | 78   | 37                 | 100   | 4.8            | 7-4   | 768             | 644   |            |      |              |  |                    |  |
| Ram I   |                   | 48             | 2     | 5               | 1.0   | 7-8        | 449   | 125          | 52   | 2                  | 15    | 1.3            | 7-8   | 449             | 151   |            |      |              |  |                    |  |
| Rugby   |                   | 67             | 5     | 80              | 1.5   | 7-7        | 575   | 457          | 77   | 5                  | 63    | 2.0            | 7-6   | 575             | 508   |            |      |              |  |                    |  |
| America | Burn              | 48             | T     | 73              | 1.0   | 7-12       | 592   | 475          | 65   | 0                  | 90    | 1.1            | 7-14  | 592             | 541   |            |      |              |  |                    |  |
| Baron   | With              | 42             | 4     | 57              | 1.0   | 7-9        | 831   | 386          | 55   | 2                  | 53    | 1.0            | 7-12  | 831             | 404   |            |      |              |  |                    |  |
| Emmundi | Straw             | 38             | 0     | 5               | 1.0   | 7-12       | 593   | 157          | 57   | 0                  | 7     | 1.0            | 7-12  | 593             | 116   |            |      |              |  |                    |  |
| Park    | Only              | 80             | 42    | 83              | 3.0   | 7-2        | 768   | 689          | 75   | 37                 | 100   | 4.8            | 7-5   | 768             | 656   |            |      |              |  |                    |  |
| Ram I   |                   | 45             | 5     | 8               | 1.0   | 7-7        | 449   | 175          | 57   | 7                  | 20    | 1.3            | 7-11  | 449             | 205   |            |      |              |  |                    |  |
| Rugby   |                   | 65             | 8     | 47              | 1.0   | 7-5        | 575   | 416          | 78   | 5                  | 57    | 2.4            | 7-8   | 575             | 653   |            |      |              |  |                    |  |

\* Plant height in centimeters; 2.5 cm - 1 inch.

\*\* Lodging - 1 = erect; 5 = severely lodged.

† 1983 yields are base yields, residue and fertilizer treatments not established.

Table 9. Lodging, plant height, seed yields and harvest index for two growth retardants applied on three dates and three water rates on Park Kentucky bluegrass on Helmstetter farm, mineral soil. 1984 data.

| Chemical | Date | Gallage | Rate <sup>1/</sup> | Lodging*    |        |      |        |      |        | Plant height** |              |      | Harvest index <sup>§</sup> |        |
|----------|------|---------|--------------------|-------------|--------|------|--------|------|--------|----------------|--------------|------|----------------------------|--------|
|          |      |         |                    | High        | Normal | High | Normal | High | Normal | June 20, 1984  |              | High |                            | Normal |
|          |      |         |                    |             |        |      |        |      |        | June 14, 1984  | July 4, 1984 |      |                            |        |
| None     |      |         |                    | 7.0         | 3.5    | 7.0  | 3.0    | 77   | 75     | 92             | 18           |      |                            |        |
| Parlay   | 5/5  | 10      | 0.50               | 1.0         | 1.0    | 1.0  | 1.0    | 55   | 53     | 81             | 26           |      |                            |        |
|          |      | 20      |                    | 1.0         | 1.0    | 1.0  | 1.0    | 58   | 53     | 79             | 26           |      |                            |        |
|          |      | 40      |                    | 1.0         | 1.0    | 1.0  | 1.0    | 48   | 48     | 71             | 25           |      |                            |        |
| EL-500   |      | 10      | 1.00               | 2.0         | 1.0    | 1.5  | 1.0    | 55   | 53     | 78             | 23           |      |                            |        |
|          |      | 20      |                    | 1.5         | 1.0    | 1.5  | 1.0    | 65   | 58     | 91             | 26           |      |                            |        |
|          |      | 40      |                    | 1.0         | 1.0    | 1.0  | 1.0    | 48   | 48     | 88             | 26           |      |                            |        |
| Parlay   | 5/15 | 10      | 0.50               | 2.5         | 1.5    | 2.0  | 1.5    | 68   | 65     | 104            | 24           |      |                            |        |
|          |      | 20      |                    | 2.0         | 1.5    | 2.0  | 1.0    | 65   | 65     | 91             | 24           |      |                            |        |
|          |      | 40      |                    | 1.5         | 1.5    | 1.0  | 1.0    | 60   | 58     | 94             | 24           |      |                            |        |
| EL-500   |      | 10      | 1.00               | Not applied |        |      |        |      |        |                |              |      |                            |        |
|          |      | 20      |                    | 2.0         | 1.0    | 1.5  | 1.0    | 58   | 55     | 72             | 21           |      |                            |        |
|          |      | 40      |                    | 1.5         | 1.0    | 1.5  | 1.0    | 58   | 58     | 94             | 21           |      |                            |        |
| Parlay   | 5/24 | 10      | 0.50               | 6.5         | 4.0    | 7.0  | 4.5    | 78   | 78     | 91             | 17           |      |                            |        |
|          |      | 20      |                    | 7.0         | 4.0    | 7.5  | 2.5    | 78   | 75     | 68             | 13           |      |                            |        |
|          |      | 40      |                    | 7.0         | 4.0    | 6.0  | 2.5    | 75   | 75     | 87             | 16           |      |                            |        |
| EL-500   |      | 10      | 1.00               | 7.0         | 3.0    | 6.5  | 2.0    | 78   | 78     | 90             | 18           |      |                            |        |
|          |      | 20      |                    | 6.5         | 4.0    | 6.5  | 2.5    | 75   | 78     | 79             | 16           |      |                            |        |
|          |      | 40      |                    | 6.5         | 3.5    | 6.5  | 2.5    | 78   | 75     | 87             | 15           |      |                            |        |

\* Lodging - 1 = erect; 9 = lodged.  
 \*\* Plant height in centimeters; 2.5 cm = 1 inch.  
 † Seed yields as grams per square meter.  
 ‡ Harvest index = weight of seed over weight of total sample.  
 § Fertility - high is additional 50+25+25 over grower application.  
 1/ 1b/A 50% wettable powder.

Table 10. Lodging, seed yields, and harvest index for two growth retardants applied on three dates at three rates on Park Kentucky bluegrass, Johnson Farm, peat soil, Roseau, MN. 1984 data.

| Chemical     | Date | Rate $\frac{1}{\text{lb}}$ | Lodging*     |        |              |        |              |        | Fertility $\S$ |        |      | Seed yields** |      |        | Harvest index $\dagger$ |        |      |        |
|--------------|------|----------------------------|--------------|--------|--------------|--------|--------------|--------|----------------|--------|------|---------------|------|--------|-------------------------|--------|------|--------|
|              |      |                            | July 6, 1984 |        | July 9, 1984 |        | July 9, 1984 |        | High           | Normal | High | Normal        | High | Normal | High                    | Normal | High | Normal |
|              |      |                            | High         | Normal | High         | Normal | High         | Normal | 8.4            | 6.4    | 9.0  | 8.8           | 31   | 21     | 9                       | 8      | 21   | 15     |
| No treatment |      |                            | 8.4          | 6.4    | 9.0          | 8.8    | 31           | 21     | 9              | 8      |      |               |      |        |                         |        |      |        |
| Parlay       | 5/2  | 0.125                      | 7.3          | 4.7    | 9.0          | 8.0    | 50           | 28     | 15             | 13     |      |               |      |        |                         |        |      |        |
|              |      | 0.250                      | 6.0          | 3.3    | 9.0          | 7.0    | 36           | 29     | 14             | 14     |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 6.0          | 2.0    | 8.3          | 5.7    | 54           | 22     | 18             | 12     |      |               |      |        |                         |        |      |        |
|              | 5/15 | 0.125                      | 8.0          | 5.3    | 9.0          | 8.0    | 35           | 23     | 12             | 9      |      |               |      |        |                         |        |      |        |
|              |      | 0.250                      | 5.7          | 4.7    | 8.7          | 8.3    | 30           | 27     | 12             | 12     |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 5.0          | 3.0    | 8.7          | 6.0    | 40           | 23     | 16             | 14     |      |               |      |        |                         |        |      |        |
|              | 5/23 | 0.125                      | 6.7          | 6.0    | 8.7          | 8.3    | 21           | 21     | 7              | 8      |      |               |      |        |                         |        |      |        |
|              |      | 0.250                      | 6.3          | 5.3    | 8.0          | 7.3    | 22           | 15     | 9              | 8      |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 6.0          | 2.3    | 8.3          | 6.7    | 24           | 23     | 11             | 11     |      |               |      |        |                         |        |      |        |
| EL-500       | 5/2  | 0.250                      | 6.0          | 2.3    | 9.0          | 6.7    | 39           | 20     | 12             | 12     |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 6.3          | 4.0    | 8.3          | 7.3    | 35           | 32     | 14             | 16     |      |               |      |        |                         |        |      |        |
|              |      | 1.000                      | 4.0          | 2.7    | 8.3          | 6.0    | 33           | 22     | 16             | 14     |      |               |      |        |                         |        |      |        |
|              | 5/15 | 0.250                      | 7.7          | 6.0    | 9.0          | 8.7    | 25           | 21     | 9              | 9      |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 7.3          | 4.7    | 9.0          | 7.7    | 26           | 15     | 10             | 6      |      |               |      |        |                         |        |      |        |
|              |      | 1.000                      | 5.3          | 1.7    | 8.0          | 4.7    | 35           | 13     | 12             | 11     |      |               |      |        |                         |        |      |        |
|              | 5/23 | 0.250                      | 7.7          | 5.0    | 9.0          | 8.0    | 26           | 20     | 8              | 9      |      |               |      |        |                         |        |      |        |
|              |      | 0.500                      | 7.0          | 4.7    | 9.0          | 8.3    | 30           | 15     | 11             | 8      |      |               |      |        |                         |        |      |        |
|              |      | 1.000                      | 5.7          | 3.7    | 8.3          | 7.7    | 19           | 19     | 8              | 10     |      |               |      |        |                         |        |      |        |

\* Lodging - 1 = erect; 9 = lodged.

\*\* Seed yields reported as grams per square meter.

† Harvest index is weight of seed over weight of entire sample.

§ Fertility - high is additional 30+15+15 over grower application.  $\frac{1}{\text{lb/A}}$  a.i.

Table 11. Lodging, seed yields and harvest index for two growth retardants applied on three dates and three gallonages on Park Kentucky bluegrass, Johnson farm, peat soil - 1984 data.

| Chemical | Date | Gallonage | Rate <sup>1/</sup> | Lodging* |        |     | Seed yields** |        |     | Harvest index <sup>†</sup> |
|----------|------|-----------|--------------------|----------|--------|-----|---------------|--------|-----|----------------------------|
|          |      |           |                    | High     | Normal | Low | High          | Normal | Low |                            |
| None     |      |           |                    | 7.8      | 8.2    | 9.0 | 48            | 9.0    | 13  |                            |
| Parlay   | 5/2  | 10        | 0.50               | 3.5      | 3.5    | 8.0 | 57            | 7.5    | 19  |                            |
|          |      | 20        |                    | 3.5      | 4.5    | 8.0 | 58            | 7.0    | 22  |                            |
|          |      | 40        |                    | 3.0      | 3.5    | 8.0 | 78            | 7.0    | 23  |                            |
| EL-500   | 5/2  | 10        | 1.00               | 6.0      | 4.0    | 8.5 | 37            | 8.0    | 17  |                            |
|          |      | 20        |                    | 3.0      | 4.0    | 8.5 | 54            | 8.0    | 20  |                            |
|          |      | 40        |                    | 5.5      | 4.5    | 9.0 | 49            | 8.5    | 17  |                            |
| Parlay   | 5/15 | 10        | 0.50               | 6.0      | 4.5    | 8.0 | 47            | 8.0    | 17  |                            |
|          |      | 20        |                    | 4.5      | 4.0    | 8.0 | 43            | 7.5    | 18  |                            |
|          |      | 40        |                    | 4.5      | 1.0    | 8.5 | 48            | 6.0    | 14  |                            |
| EL 500   | 5/15 | 20        | 1.00               | 5.5      | 4.0    | 8.5 | 51            | 8.0    | 19  |                            |
| Parlay   | 5/23 | 10        | 0.50               | 6.0      | 5.0    | 8.5 | 42            | 8.5    | 15  |                            |
|          |      | 20        |                    | 5.5      | 4.5    | 8.5 | 52            | 7.0    | 15  |                            |
|          |      | 40        |                    | 6.0      | 2.0    | 8.0 | 39            | 6.5    | 15  |                            |
| EL-500   | 5/23 | 10        | 1.00               | 7.5      | 5.0    | 9.0 | 34            | 9.0    | 13  |                            |
|          |      | 20        |                    | 5.5      | 2.5    | 8.5 | 31            | 8.0    | 13  |                            |
|          |      | 40        |                    | 7.0      | 6.5    | 9.0 | 31            | 9.0    | 12  |                            |

\* Lodging - 1 = erect; 9 = lodged.

\*\* Seed yields reported as grams per square meter (50 grams equal to 400 lb/a).

† Harvest index is weight of seed over weight of entire sample.

§ Fertility - high is additional 30+15+15 over grower application.

<sup>1/</sup> lb/A 50% wettable powder.

### Timothy Data

Data were collected from strain trials seeded in 1981, 1982 and 1983 (Tables 12, 13 and 14). Seed yields and other data appear comparable to past years. Numerous strains do well and could be produced if a market was available. Some strains should be evaluated very carefully before being considered for production. Several Swedish strains appear promising. A late maturing Japanese strain, Hokushu, has produced more seed than Heidemij, which is usually 3 to 7 days later than the Japanese variety.

Several strains from the Netherlands matured very early in 1984. These were the first data for these strains, and while the seed yields were quite low, they may be the result of poor establishment in 1983. These strains produced about the same yields as Climax in this seeding. The Swedish strains mentioned above show good performance in this trial.

Table 15 reports 3 years of data from six timothy varieties, under four residue management and two fertilizer regimes. The data from this study must be considered with care as they do not seem to fit a general pattern observed previously, e.g., several of the varieties appear to produce higher seed yields under the lower fertility level. Earlier data indicate that Heidemij will do much better with higher fertility. In these data this variety seems to do about as well under low as under high fertility.

Table 12. Plant height, percent heading, lodging, harvest date, and seed yields for 50 Timothy strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strains                         | MSP no. | Plant height*<br>6/19 | Percent headed |      | Lodging**<br>7/11 | Harvest date | Seed yield (lb/A) |      | 3-year average |      |      |
|---------------------------------|---------|-----------------------|----------------|------|-------------------|--------------|-------------------|------|----------------|------|------|
|                                 |         |                       | 6/16           | 6/27 |                   |              | 7/13              | 1982 |                | 1983 | 1984 |
| <b>Early maturing varieties</b> |         |                       |                |      |                   |              |                   |      |                |      |      |
| Alphage                         | 1532    | 72                    | 5              | 63   | 100               | 2.3          | 8-3               | 258  | 499            | 505  | 421  |
| Barmidi                         | 1670    | 67                    | 0              | 23   | 100               | 2.3          | 8-6               | 279  | 416            | 303  | 333  |
| Bartimi                         | 1866    | 70                    | 2              | 35   | 100               | 2.4          | 8-6               | 330  | 529            | 315  | 391  |
| Basho                           | 1501    | 75                    | 15             | 78   | 100               | 1.4          | 7-29              | 333  | 463            | 282  | 359  |
| Canada 009                      | 1528    | 83                    | 28             | 67   | 100               | 1.5          | 7-27              | 181  | 312            | 309  | 267  |
| Clair                           | 1863    | 83                    | 22             | 88   | 100               | 1.3          | 7-25              | 339  | 487            | 368  | 398  |
| Climax                          | 1743    | 78                    | 0              | 40   | 100               | 1.3          | 8-3               | 337  | 496            | 493  | 442  |
| Eskimo                          | 1072    | 77                    | 7              | 60   | 100               | 2.5          | 8-3               | 440  | 564            | 428  | 477  |
| Goliath                         | 1679    | 73                    | T              | 40   | 100               | 3.4          | 8-8               | 291  | 546            | 347  | 395  |
| Hokuo                           | 1698    | 78                    | 14             | 70   | 100               | 2.8          | 7-31              | 419  | 511            | 419  | 450  |
| Itasca                          | 1144    | 68                    | T              | 45   | 95                | 1.5          | 8-5               | 347  | 362            | 270  | 326  |
| Kampe II                        | 1699    | 78                    | 12             | 67   | 100               | 2.9          | 7-31              | 350  | 508            | 404  | 421  |
| Landsberger                     | 1700    | 78                    | 10             | 73   | 100               | 2.0          | 7-30              | 425  | 493            | 407  | 442  |
| Maris Polka                     | 1159    | 77                    | 3              | 60   | 100               | 2.3          | 8-3               | 356  | 324            | 356  | 345  |
| Marpessa                        | 1806    | 70                    | 8              | 37   | 100               | 3.2          | 8-7               | 555  | 469            | 431  | 485  |
| Mohawk                          | 1701    | 80                    | 4              | 57   | 100               | 1.7          | 8-2               | 440  | 460            | 362  | 421  |
| NAPB 447605                     | 1850    | 77                    | 5              | 53   | 100               | 1.8          | 8-4               | 410  | 448            | 309  | 389  |
| Mom Phl-126                     | 1756    | 83                    | 45             | 90   | 100               | 1.0          | 7-26              | 199  | 422            | 350  | 324  |
| NFG-#1                          | 1714    | 87                    | 27             | 67   | 100               | 1.2          | 7-25              | 327  | 472            | 377  | 392  |
| SC-10                           | 1155    | 70                    | 0              | 40   | 100               | 2.1          | 8-2               | 312  | 365            | 321  | 333  |
| Senpoku                         | 1703    | 80                    | 5              | 73   | 100               | 1.8          | 7-29              | 523  | 499            | 434  | 485  |
| SV-0906                         | 1892    | 80                    | 13             | 60   | 100               | 2.0          | 8-1               | 383  | 555            | 493  | 477  |
| SV-0907                         | 1893    | 77                    | 4              | 47   | 100               | 2.3          | 8-3               | 490  | 609            | 478  | 526  |
| SV-0909                         | 1894    | 77                    | 7              | 60   | 100               | 2.7          | 8-4               | 383  | 591            | 514  | 496  |

Table 12. (continued)

| Strains                                | MSP no. | Plant height*<br>6/19 | Percent headed |      | Lodging**<br>7/11 | Harvest date | Seed yield (lb/A) |      |      | 3-year average |      |
|--|---------|-----------------------|----------------|------|-------------------|--------------|-------------------|------|------|----------------|------|
|  |         |                       | 6/16           | 6/27 |                   |              | 7/13              | 1982 | 1983 |                | 1984 |
| SV-0910                                | 1895    | 75                    | 13             | 43   | 100               | 1.8          | 8-6               | 392  | 532  | 241            | 388  |
| Tiiti                                  | 1529    | 75                    | 2              | 50   | 100               | 3.1          | 8-7               | 529  | 490  | 558            | 526  |
| Timfor                                 | 992     | 78                    | 2              | 63   | 100               | 1.4          | 8-2               | 347  | 600  | 392            | 446  |
| Toro                                   | 1143    | 80                    | 7              | 73   | 100               | 1.3          | 7-27              | 475  | 505  | 392            | 457  |
| Toro x Clair                           | 1864    | 88                    | 27             | 93   | 100               | 1.5          | 7-27              | 425  | 517  | 404            | 449  |
| WWT-94                                 | 1534    | 78                    | 5              | 68   | 100               | 1.9          | 8-2               | 205  | 594  | 481            | 427  |
| ZW-42-79                               | 1533    | 73                    | 4              | 57   | 100               | 3.3          | 8-6               | 472  | 517  | 502            | 497  |
| <u>Intermediate maturing varieties</u> |         |                       |                |      |                   |              |                   |      |      |                |      |
| Camilla                                | 1804    | 65                    | 3              | 30   | 100               | 2.8          | 8-4               | 285  | 389  | 119            | 264  |
| Champlain                              | 1745    | 75                    | 0              | 13   | 100               | 1.7          | 8-11              | 380  | 487  | 321            | 396  |
| Kusa                                   | 1398    | 67                    | T              | 25   | 100               | 1.9          | 8-10              | 353  | 502  | 330            | 395  |
| Ludor                                  | 1535    | 65                    | 3              | 33   | 100               | 2.0          | 8-9               | 131  | 368  | 208            | 236  |
| Marcia                                 | 993     | 72                    | 3              | 33   | 100               | 2.3          | 8-8               | 312  | 362  | 199            | 291  |
| Melora                                 | 1715    | 67                    | 0              | 13   | 97                | 2.3          | 8-18              | 261  | 306  | 169            | 245  |
| Motim                                  | 1319    | 67                    | 0              | 12   | 97                | 2.5          | 8-10              | 244  | 532  | 309            | 362  |
| Teith                                  | 1050    | 73                    | 0              | 50   | 100               | 2.4          | 8-3               | 312  | 564  | 440            | 439  |
| <u>Late maturing varieties</u>         |         |                       |                |      |                   |              |                   |      |      |                |      |
| Barvonti                               | 1867    | 45                    | 0              | 0    | 70                | 1.4          | 8-27              | 288  | 282  | 202            | 257  |
| BAR Phil-81-3                          | 1868    | 50                    | 0              | 3    | 80                | 2.0          | 8-22              | 377  | -    | 187            | -    |
| Heidemi j                              | 1076    | 48                    | 0              | 2    | 73                | 1.4          | 8-22              | 529  | 451  | 282            | 421  |
| Hokushu                                | 1511    | 65                    | 0              | 3    | 90                | 2.0          | 8-8               | 365  | 440  | 273            | 359  |
| Intenso                                | 1805    | 57                    | 0              | T    | 73                | 2.2          | 8-16              | 425  | 380  | 258            | 354  |
| Liam                                   | 1537    | 72                    | 5              | 43   | 100               | 1.4          | 8-8               | 9    | -    | 199            | -    |
| Liga                                   | 1397    | 50                    | 0              | T    | 83                | 1.6          | 8-22              | 232  | 309  | 279            | 273  |
| S-48                                   | 1052    | 50                    | 0              | 2    | 77                | 1.8          | 8-27              | 368  | 324  | 220            | 304  |
| Winda                                  | 1353    | 52                    | 0              | 3    | 78                | 1.6          | 8-21              | 339  | 353  | 214            | 302  |

\* Plant height in centimeters; 2.5 cm=1 inch.

\*\* Lodging - 1=erect; 5=lodged.

LSD at 5% level

LSD at 1% level

154

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NS

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Table 13. Plant height, percent heading, lodging, harvest date, and seed yields for 50 Timothy strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data plus 1983 seed yields.

| Strain                          | MSP no. | Plant height* |     | Percent headed |      |     | Lodging**<br>7/5 | Harvest date | Seed yield (lb/A) |      | 2-year average |      |
|---------------------------------|---------|---------------|-----|----------------|------|-----|------------------|--------------|-------------------|------|----------------|------|
|                                 |         | 7/5           | 7/5 | 6/19           | 6/29 | 7/5 |                  |              | 7/13              | 1983 |                | 1984 |
| <b>Early maturing varieties</b> |         |               |     |                |      |     |                  |              |                   |      |                |      |
| Adda                            | 1917    | 83            |     | 23             | 88   | 100 | 100              | 3.2          | 7-31              | 546  | 701            | 624  |
| Barliza                         | 2047    | 87            |     | 43             | 93   | 100 | 100              | 2.3          | 7-31              | 383  | 383            | 383  |
| Barmidi                         | 2048    | 87            |     | 4              | 50   | 87  | 100              | 2.8          | 8-5               | 353  | 374            | 364  |
| Bartimi                         | 2049    | 93            |     | 13             | 67   | 100 | 100              | 1.7          | 8-1               | 428  | 389            | 409  |
| Basho                           | 1501    | 87            |     | 63             | 100  | 100 | 100              | 2.0          | 7-27              | 350  | 333            | 342  |
| Bero                            | 1974    | 100           |     | 50             | 100  | 100 | 100              | 1.3          | 8-2               | 264  | 368            | 316  |
| Clair                           | 1863    | 108           |     | 73             | 100  | 100 | 100              | 1.0          | 7-21              | 481  | 383            | 432  |
| Climax                          | 1743    | 103           |     | 15             | 78   | 100 | 100              | 1.1          | 8-1               | 353  | 526            | 440  |
| Deploy                          | 1933    | 60            |     | 10             | 78   | 100 | 100              | 2.5          | 8-6               | 166  | 125            | 146  |
| Hokuo                           | 1698    | 102           |     | 37             | 100  | 100 | 100              | 1.7          | 7-27              | 309  | 594            | 452  |
| HJA-1168                        | 2088    | 93            |     | 32             | 93   | 100 | 100              | 2.4          | 7-29              | 493  | 630            | 562  |
| Itasca                          | 1144    | 97            |     | 5              | 50   | 90  | 100              | 1.7          | 8-5               | 434  | 561            | 498  |
| Kampe II                        | 1699    | 93            |     | 37             | 100  | 100 | 100              | 3.0          | 7-30              | 481  | 671            | 576  |
| LD-2013                         | 1976    | 97            |     | 30             | 98   | 100 | 100              | 1.7          | 8-3               | 309  | 463            | 386  |
| Marpessa                        | 1995    | 83            |     | 30             | 85   | 97  | 100              | 3.3          | 8-6               | 434  | 662            | 548  |
| Mohawk                          | 1701    | 97            |     | 15             | 85   | 100 | 100              | 1.3          | 8-1               | 422  | 508            | 465  |
| Mom Phl.-126                    | 1756    | 100           |     | 87             | 100  | 100 | 100              | 1.9          | 7-26              | 478  | 618            | 548  |
| NAPB 447605                     | 1850    | 90            |     | 32             | 90   | 100 | 100              | 2.2          | 7-30              | 496  | 627            | 562  |
| NFG-#1                          | 1741    | 108           |     | 57             | 100  | 100 | 100              | 1.1          | 7-23              | 431  | 457            | 444  |
| Nosappu                         | 1593    | 103           |     | 40             | 100  | 100 | 100              | 1.3          | 7-27              | 419  | 743            | 581  |
| Richmond                        | 1997    | 107           |     | 50             | 100  | 100 | 100              | 1.5          | 7-25              | 451  | 478            | 465  |
| Senpoku                         | 1703    | 97            |     | 38             | 92   | 100 | 100              | 2.2          | 7-27              | 365  | 639            | 502  |
| SV-0906                         | 1892    | 92            |     | 52             | 97   | 100 | 100              | 2.0          | 7-29              | 609  | 751            | 680  |
| SV-0907                         | 2089    | 88            |     | 30             | 88   | 100 | 100              | 2.2          | 7-30              | 446  | 493            | 470  |

Table 13. (continued)

| Strain                                 | MSP no. | Plant height* |     | Percent headed |      |     | Lodging**<br>7/5 | Harvest date | Seed yield (lb/A) |      | 2-year average |
|--|---------|---------------|-----|----------------|------|-----|------------------|--------------|-------------------|------|----------------|
|  |         | 7/5           | 7/5 | 6/19           | 6/29 | 7/5 |                  |              | 7/13              | 1983 |                |
| SV-0908                                | 2090    | 90            | 100 | 27             | 80   | 100 | 100              | 8-3          | 508               | 588  | 548            |
| SV-0909                                | 1894    | 98            | 100 | 47             | 100  | 100 | 100              | 7-31         | 567               | 555  | 561            |
| SV-0910                                | 2091    | 95            | 100 | 47             | 100  | 100 | 100              | 7-30         | 353               | 535  | 444            |
| SV-0914                                | 2092    | 85            | 100 | 23             | 85   | 100 | 100              | 8-2          | 529               | 612  | 571            |
| SV-0916                                | 2093    | 87            | 100 | 20             | 77   | 100 | 100              | 7-30         | 529               | 472  | 501            |
| Toro                                   | 1143    | 98            | 100 | 50             | 100  | 100 | 100              | 7-24         | 443               | 603  | 523            |
| Toro x Clair                           | 1864    | 107           | 100 | 77             | 100  | 100 | 100              | 7-21         | 425               | 419  | 422            |
| Valstad                                | 1705    | 92            | 100 | 27             | 63   | 100 | 100              | 7-29         | 481               | 440  | 461            |
| <u>Intermediate maturing varieties</u> |         |               |     |                |      |     |                  |              |                   |      |                |
| Camilla                                | 1804    | 77            | 97  | 5              | 52   | 100 | 100              | 8-8          | 312               | 416  | 364            |
| Champlain                              | 1745    | 107           | 90  | 5              | 50   | 100 | 100              | 8-3          | 342               | 321  | 332            |
| Goliath                                | 2014    | 87            | 100 | 22             | 85   | 100 | 100              | 8-3          | 431               | 440  | 436            |
| Kusa                                   | 1398    | 93            | 88  | 3              | 55   | 100 | 100              | 8-3          | 404               | 434  | 419            |
| Melora                                 | 1996    | 92            | 85  | 5              | 53   | 100 | 100              | 8-2          | 318               | 294  | 306            |
| Mirage                                 | 2055    | 83            | 88  | 5              | 53   | 100 | 100              | 8-7          | 437               | 398  | 418            |
| Motim                                  | 1702    | 85            | 83  | 5              | 53   | 100 | 100              | 8-7          | 336               | 392  | 364            |
| Teith                                  | 1906    | 97            | 100 | 13             | 57   | 100 | 100              | 8-4          | 404               | 535  | 470            |
| Tiiti                                  | 1704    | 83            | 97  | 12             | 73   | 100 | 100              | 8-7          | 609               | 585  | 597            |
| <u>Late maturing varieties</u>         |         |               |     |                |      |     |                  |              |                   |      |                |
| BAR Ph1-81-3                           | 2045    | 75            | 18  | 0              | 5    | 83  | 83               | 8-23         | 309               | 350  | 330            |
| BAR Ph1-81-4                           | 2046    | 75            | 8   | 0              | 0    | 70  | 70               | 8-23         | 232               | 255  | 244            |
| Barvonti                               | 1867    | 62            | 5   | 0              | 0    | 68  | 68               | 8-23         | 324               | 276  | 300            |
| Heidemij                               | 1744    | 73            | 23  | 0              | 7    | 77  | 77               | 8-16         | 270               | 380  | 325            |
| Hokushu                                | 1511    | 80            | 53  | 0              | 30   | 97  | 97               | 8-13         | 422               | 472  | 447            |
| Intenso                                | 1944    | 80            | 17  | 0              | T    | 73  | 73               | 8-20         | 306               | 303  | 305            |
| Nobis                                  | 1975    | 57            | 100 | 40             | 90   | 100 | 100              | 8-6          | 89                | 36   | 63             |
| Olympia                                | 2056    | 88            | 35  | 2              | 43   | 80  | 80               | 8-10         | 410               | 443  | 427            |
| S-48                                   | 1052    | 75            | 15  | 2              | 2    | 75  | 75               | 8-23         | 336               | 318  | 327            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect, 5 = lodged.

LSD at 5% level

LSD at 1% level

138

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188

249

Table 14. Percent stand, plant height, percent headed, percent pollen shedding, harvest date, and seed yields for 40 Timothy strains seeded in 1983 on the Welin Farm, Roseau, MN. 1984 data.

| Strain                          | MSP No. | Percent stand 5/4 | Plant height* 7/5 | Percent headed |      |     | Percent pollen shedding** |      | Harvest date | Seed yields (lb/A) |      |
|---------------------------------|---------|-------------------|-------------------|----------------|------|-----|---------------------------|------|--------------|--------------------|------|
|                                 |         |                   |                   | 6/16           | 6/22 | 7/2 | 7/13                      | 6/28 |              |                    | 7/12 |
| <u>Early maturing varieties</u> |         |                   |                   |                |      |     |                           |      |              |                    |      |
| Climax                          | 1743    | 63                | 90                | 15             | 73   | 97  | 100                       | T    | 8            | 7-30               | 309  |
| Extremo (Phl-126)               | 2197    | 80                | 80                | 73             | 93   | 100 | 100                       | 50   | 0            | 7-21               | 172  |
| FFR Syn. S                      | 2210    | 83                | 93                | 4              | 43   | 97  | 100                       | 0    | 10           | 8-1                | 469  |
| FFR Syn. W                      | 2211    | 77                | 95                | 47             | 87   | 100 | 100                       | 5    | T            | 7-25               | 285  |
| FFR Syn. Y                      | 2212    | 73                | 93                | 33             | 75   | 97  | 100                       | 3    | 5            | 7-30               | 309  |
| Mohawk                          | 2209    | 83                | 90                | 17             | 63   | 100 | 100                       | T    | 2            | 7-26               | 288  |
| Mom Phl-21                      | 2321    | 63                | 88                | 67             | 92   | 100 | 100                       | 37   | T            | 7-16               | 104  |
| Mom Phl-28                      | 2322    | 67                | 90                | 77             | 95   | 100 | 100                       | 63   | 0            | 7-16               | 104  |
| Mom Phl-30                      | 2323    | 50                | 85                | 73             | 93   | 100 | 100                       | 57   | 2            | 7-16               | 86   |
| Mom Phl-32                      | 2324    | 53                | 80                | 80             | 93   | 100 | 100                       | 67   | T            | 7-17               | 163  |
| Mom Phl-56                      | 2325    | 60                | 87                | 80             | 93   | 100 | 100                       | 67   | T            | 7-20               | 238  |
| Mom Phl-59                      | 2326    | 73                | 90                | 73             | 90   | 100 | 100                       | 43   | T            | 7-22               | 217  |
| Mom Phl-62                      | 2327    | 77                | 78                | 77             | 97   | 100 | 100                       | 57   | 0            | 7-16               | 160  |
| Mom Phl-63                      | 2328    | 83                | 80                | 87             | 98   | 100 | 100                       | 43   | 0            | 7-16               | 184  |
| Mom Phl-64                      | 2329    | 63                | 98                | 83             | 92   | 100 | 100                       | 40   | T            | 7-26               | 362  |
| Mom Phl-69                      | 2330    | 73                | 90                | 87             | 92   | 100 | 100                       | 42   | 0            | 7-19               | 184  |
| Nosappu                         | 1593    | 77                | 95                | 30             | 75   | 100 | 100                       | 40   | T            | 7-23               | 356  |
| Php-9                           | 2146    | 73                | 88                | 20             | 63   | 100 | 100                       | 2    | T            | 7-28               | 339  |
| Php-12                          | 2147    | 67                | 83                | 8              | 55   | 97  | 100                       | 2    | T            | 8-1                | 241  |
| Php-14                          | 2148    | 60                | 88                | 5              | 48   | 87  | 100                       | 0    | 12           | 8-1                | 416  |
| Richmond                        | 2232    | 83                | 87                | 67             | 88   | 100 | 100                       | 33   | T            | 7-19               | 110  |
| Senpoku                         | 1703    | 60                | 92                | 33             | 83   | 100 | 100                       | 13   | T            | 7-25               | 347  |
| SV-0906                         | 1892    | 60                | 92                | 53             | 82   | 100 | 100                       | 18   | 0            | 7-27               | 469  |
| SV-0907                         | 2089    | 63                | 95                | 33             | 60   | 100 | 100                       | 3    | 2            | 7-26               | 428  |

Table 14. (continued)

| Strain                                 | MSP No. | Percent stand 5/4 | Plant height* 7/5 | Percent headed |      |     | Percent pollen shedding** |      | Harvest date | Seed yields (lb/A) |      |
|--|---------|-------------------|-------------------|----------------|------|-----|---------------------------|------|--------------|--------------------|------|
|  |         |                   |                   | 6/16           | 6/22 | 7/2 | 7/13                      | 6/28 |              |                    | 7/12 |
| SV-0908                                | 2090    | 57                | 93                | 47             | 82   | 100 | 100                       | 3    | T            | 7-27               | 413  |
| SV-0909                                | 1894    | 67                | 92                | 37             | 78   | 100 | 100                       | 10   | 0            | 7-28               | 603  |
| SV-0910                                | 2091    | 73                | 90                | 67             | 83   | 100 | 100                       | 25   | 0            | 7-27               | 520  |
| SV-0914                                | 2092    | 63                | 93                | 50             | 70   | 100 | 100                       | 5    | T            | 7-28               | 416  |
| SV-0916                                | 2093    | 70                | 93                | 8              | 55   | 87  | 100                       | 0    | 5            | 7-30               | 428  |
| Tirom                                  | 2130    | 63                | 80                | 27             | 82   | 100 | 100                       | 15   | 2            | 7-28               | 232  |
| Toro x Clair                           | 1864    | 73                | 88                | 57             | 90   | 100 | 100                       | 60   | 0            | 7-17               | 131  |
| <u>Intermediate maturing varieties</u> |         |                   |                   |                |      |     |                           |      |              |                    |      |
| Goliath                                | 2198    | 53                | 87                | 40             | 60   | 90  | 100                       | T    | 20           | 8-2                | 448  |
| K4-216                                 | 2142    | 53                | 92                | 13             | 62   | 93  | 100                       | 0    | 15           | 8-5                | 267  |
| Marpessa                               | 2150    | 63                | 87                | 8              | 73   | 100 | 100                       | 5    | 12           | 8-4                | 499  |
| Melora                                 | 2151    | 60                | 87                | 0              | 13   | 70  | 100                       | 0    | 50           | 8-5                | 359  |
| <u>Late maturing varieties</u>         |         |                   |                   |                |      |     |                           |      |              |                    |      |
| Farol                                  | 2145    | 47                | 77                | T              | 3    | 42  | 93                        | 0    | 33           | 8-10               | 422  |
| Heidemij                               | 1744    | 63                | 75                | T              | T    | 33  | 90                        | 0    | 13           | 8-13               | 401  |
| Hokushu                                | 1511    | 63                | 75                | T              | 3    | 47  | 100                       | 0    | 50           | 8-10               | 466  |
| Intenso                                | 2149    | 27                | 72                | T              | T    | 15  | 77                        | 0    | 8            | 8-12               | 205  |
| SB-HK                                  | 2206    | 20                | 82                | 8              | 80   | 100 | 100                       | 0    | 10           | 8-12               | 110  |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Percent pollen shedding - apparent percent of 100% potential at a given time. Measure of maturity.

LSD at 5% level 156

LSD at 1% level 207

Table 15. Plant height, lodging, harvest date, and seed yields for six Timothy varieties under four residue management regimes and two fertility levels. Seeded in 1980 on the Wellin Farm, Roseau, MN. 1984 data, plus 1982 and 1983 seed yields.

| Entry     | Residue treatment | 80+40+40     |     |               |                      |                   |     |     |                          |              |     | 120+60+60      |                      |                   |     |     |                          |     |              |  |  |
|-----------|-------------------|--------------|-----|---------------|----------------------|-------------------|-----|-----|--------------------------|--------------|-----|----------------|----------------------|-------------------|-----|-----|--------------------------|-----|--------------|--|--|
|           |                   | Plant height |     | Lodg-<br>ing* | Har-<br>vest<br>date | Seed yield (lb/A) |     |     | Percent<br>of<br>Climax† | Plant height |     | Lodg-<br>ing** | Har-<br>vest<br>date | Seed yield (lb/A) |     |     | Percent<br>of<br>Climax† |     |              |  |  |
|           |                   | 8/7          | 8/7 |               |                      | 82                | 83  | 84  |                          | 3-yr<br>avg. | 8/7 |                |                      | 8/7               | 82  | 83  |                          | 84  | 3-yr<br>avg. |  |  |
| Bartimi   | Rake              | 103          | 103 | 1.0           | 8-6                  | 475               | 431 | 306 | 404                      | 85           | 95  | 2.9            | 8-9                  | 380               | 318 | 324 | 341                      | 71  |              |  |  |
| ChAMPLAIN | off               | 120          | 120 | 1.0           | 8-11                 | 392               | 336 | 258 | 329                      | 69           | 100 | 3.4            | 8-17                 | 365               | 288 | 353 | 335                      | 70  |              |  |  |
| Climax    | straw             | 117          | 117 | 1.0           | 8-5                  | 585               | 481 | 386 | 484                      | 101          | 103 | 2.3            | 8-7                  | 466               | 472 | 484 | 474                      | 99  |              |  |  |
| Goliath   |                   | 100          | 100 | 1.0           | 8-7                  | 428               | 600 | 496 | 508                      | 106          | 92  | 3.4            | 8-7                  | 333               | 413 | 392 | 379                      | 79  |              |  |  |
| Heidemij  |                   | 102          | 102 | 1.0           | 8-18                 | 356               | 333 | 264 | 318                      | 67           | 95  | 3.4            | 8-20                 | 374               | 339 | 383 | 365                      | 77  |              |  |  |
| Hokushu   |                   | 107          | 107 | 1.0           | 8-11                 | 380               | 398 | 404 | 394                      | 83           | 92  | 3.5            | 8-11                 | 353               | 487 | 511 | 450                      | 94  |              |  |  |
| Bartimi   | ClIP              | 100          | 100 | 1.0           | 8-8                  | 425               | 428 | 353 | 402                      | 84           | 95  | 2.1            | 8-8                  | 428               | 389 | 368 | 395                      | 83  |              |  |  |
| ChAMPLAIN | 3 inch            | 113          | 113 | 1.0           | 8-14                 | 401               | 404 | 276 | 360                      | 75           | 102 | 2.2            | 8-11                 | 413               | 306 | 315 | 345                      | 72  |              |  |  |
| Climax    | &                 | 110          | 110 | 1.0           | 8-3                  | 517               | 511 | 395 | 474                      | 99           | 103 | 1.4            | 8-7                  | 564               | 526 | 588 | 560                      | 117 |              |  |  |
| Goliath   | rake              | 100          | 100 | 1.0           | 8-7                  | 425               | 561 | 440 | 475                      | 100          | 85  | 3.8            | 8-8                  | 306               | 463 | 517 | 429                      | 90  |              |  |  |
| Heidemij  | off               | 95           | 95  | 1.0           | 8-19                 | 401               | 342 | 184 | 309                      | 65           | 90  | 2.6            | 8-18                 | 356               | 386 | 327 | 356                      | 75  |              |  |  |
| Hokushu   | straw             | 100          | 100 | 1.0           | 8-9                  | 422               | 383 | 380 | 395                      | 83           | 92  | 3.5            | 8-16                 | 437               | 419 | 431 | 429                      | 90  |              |  |  |
| Bartimi   | Spring            | 100          | 100 | 1.0           | 8-7                  | 425               | 413 | 199 | 346                      | 73           | 92  | 2.3            | 8-6                  | 457               | 398 | 359 | 405                      | 85  |              |  |  |
| ChAMPLAIN | burn              | 112          | 112 | 1.0           | 8-7                  | 345               | 392 | 300 | 346                      | 73           | 108 | 1.5            | 8-15                 | 350               | 446 | 238 | 345                      | 72  |              |  |  |
| Climax    |                   | 107          | 107 | 1.0           | 8-5                  | 582               | 520 | 270 | 457                      | 96           | 105 | 1.3            | 8-7                  | 591               | 463 | 422 | 492                      | 103 |              |  |  |
| Goliath   |                   | 97           | 97  | 1.3           | 8-7                  | 377               | 457 | 359 | 398                      | 83           | 93  | 2.8            | 8-8                  | 347               | 303 | 410 | 353                      | 74  |              |  |  |
| Heidemij  |                   | 97           | 97  | 1.0           | 8-20                 | 431               | 443 | 211 | 362                      | 76           | 88  | 2.5            | 8-19                 | 440               | 377 | 347 | 388                      | 81  |              |  |  |
| Hokushu   |                   | 102          | 102 | 1.0           | 8-10                 | 413               | 407 | 214 | 345                      | 72           | 90  | 2.7            | 8-14                 | 406               | 371 | 448 | 408                      | 86  |              |  |  |
| Bartimi   | Fall              | 107          | 107 | 1.0           | 8-6                  | 443               | 558 | 380 | 460                      | 96           | 90  | 3.8            | 8-8                  | 342               | 466 | 454 | 421                      | 88  |              |  |  |
| ChAMPLAIN | burn              | 115          | 115 | 1.0           | 8-12                 | 350               | 374 | 258 | 327                      | 69           | 97  | 3.3            | 8-14                 | 252               | 425 | 374 | 350                      | 73  |              |  |  |
| Climax    |                   | 112          | 112 | 1.0           | 8-3                  | 493               | 419 | 520 | 477                      | 100          | 98  | 2.3            | 8-7                  | 484               | 570 | 541 | 532                      | 112 |              |  |  |
| Goliath   |                   | 98           | 98  | 1.7           | 8-5                  | 454               | 630 | 511 | 532                      | 112          | 88  | 4.4            | 8-8                  | 407               | 520 | 520 | 482                      | 101 |              |  |  |
| Heidemij  |                   | 98           | 98  | 1.0           | 8-19                 | 404               | 490 | 410 | 435                      | 91           | 97  | 3.2            | 8-12                 | 371               | 321 | 451 | 381                      | 80  |              |  |  |
| Hokushu   |                   | 112          | 112 | 1.0           | 8-9                  | 347               | 472 | 362 | 394                      | 83           | 93  | 4.0            | 8-10                 | 392               | 422 | 567 | 460                      | 96  |              |  |  |

\* Plant height recorded as centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect, 5 = lodged.

† Percent of Climax - Three-year averages are expressed as percent of Climax yield for Fall Burn treatment and 80+40+40 fertilizer level.

### Fine Fescue Studies

We are reporting results from three strain trials and one residue management study with fine fescues. The strain trials are rather simple and require little interpretation. We believe that a number of these strains produce well enough that we could commercially produce seed, if and when the quackgrass problem is satisfactorily reconciled. One note -- all of these trials were with 100 pounds of nitrogen per acre.

The residue management study requires more explanation. This was on the variety 'Ruby' fine fescue, a variety from Northrup King and Co. The study was in an 8-acre production field on the Warren Hagen farm, one mile east of Roseau. Four residue management regimes, three fertility regimes and two application dates of the growth retardant, Parlay, compared with the check were imposed on this area.

The residue management study shows that the residue must be removed in some manner, the same as for Kentucky bluegrass. We believe that the most efficient and effective method is using a desiccant and burning. This is shown as Paraquat burn in the table. Failure to remove the residue caused the yields to be grossly deficient. The straw burn treatment did not produce well, although we moved extra straw to the plots and burned. The Paraquat burn plots were sprayed, left three days to dry and then burned. The clipping treatment appears effective, but would require considerable effort and cost, we think.

The Parlay treatment, either applied May 15 or May 26, caused the material to stand much better, but did not increase seed yield.

We expect to repeat this entire study in 1985.

The general production from this field was about 375 lb/A of quackgrass free seed after treatment with flusilade herbicide.

Table 16. Plant height, percent headed, lodging, harvest date, and seed yields for 38 fine fescue strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strain         | MSP No. | Plant height*<br>7/5 | Percent headed<br>5/29 | 6/16 | Lodging**<br>7/5 | Harvest date | Seed yield (lb/A) |      |      |                |
|----------------|---------|----------------------|------------------------|------|------------------|--------------|-------------------|------|------|----------------|
|                |         |                      |                        |      |                  |              | 1982              | 1983 | 1984 | 3-year Average |
| Agio           | 1900    | 73                   | T                      | 40   | 2.2              | 7-8          | 392               | 505  | 371  | 423            |
| Atlanta        | 1337    | 68                   | 0                      | 32   | 1.2              | 7-6          | 177               | 321  | 249  | 249            |
| Barfalla       | 1685    | 68                   | 0                      | 30   | 1.3              | 7-6          | 222               | 208  | 128  | 186            |
| Barcota        | 1683    | 68                   | 0                      | 43   | 2.8              | 7-6          | 236               | 454  | 244  | 311            |
| BAR Frc-79-Lau | 1684    | 65                   | 0                      | 67   | 2.4              | 7-5          | 416               | 368  | 404  | 396            |
| BAR Frc-80-WA  | 1830    | 72                   | 0                      | 42   | 1.9              | 7-6          | 277               | 419  | 297  | 331            |
| BAR Frc-80-WC  | 1831    | 65                   | 0                      | 43   | 1.9              | 7-6          | 296               | 448  | 252  | 332            |
| BAR Frc-80-WB  | 1832    | 63                   | 0                      | 30   | 2.5              | 7-9          | 360               | 425  | 175  | 320            |
| BAR Frc-Z      | 1833    | 70                   | 0                      | 62   | 2.0              | 7-5          | 166               | 594  | 318  | 359            |
| BAR Frc-GB     | 1834    | 63                   | T                      | 30   | 2.1              | 7-7          | 303               | 413  | 181  | 299            |
| BAR Frc-HI     | 1686    | 63                   | 0                      | 35   | 2.1              | 7-6          | 39                | 255  | 229  | 174            |
| BAR Frc-79-Wb  | 1880    | 67                   | 0                      | 40   | 2.6              | 7-6          | 293               | 636  | 288  | 406            |
| BAR Frc-80-sha | 1881    | 65                   | 0                      | 65   | 2.9              | 7-5          | 107               | 324  | 247  | 226            |
| BAR FO-81-225  | 1888    | 52                   | 0                      | 58   | 1.3              | 7-5          | 211               | 493  | 143  | 282            |
| BAR FOV-8      | 1887    | 40                   | 60                     | 82   | 1.0              | 7-5          | 55                | 469  | 128  | 217            |
| Checker        | 1608    | 72                   | 0                      | 57   | 3.1              | 7-5          | 232               | 505  | 261  | 333            |
| Engina         | 1901    | 63                   | 0                      | 40   | 1.9              | 7-8          | 483               | 763  | 446  | 564            |
| Ensylva        | 1840    | 65                   | 0                      | 25   | 2.5              | 7-7          | 258               | 371  | 190  | 273            |
| Reliant (FL-1) | 1655    | 62                   | 33                     | 70   | 2.0              | 7-5          | 481               | 612  | 261  | 451            |
| Highlight      | 1903    | 57                   | 0                      | 58   | 2.2              | 7-5          | 256               | 347  | 199  | 267            |

Table 16. (continued)

| Strain        | MSP No. | Plant height* 7/5 | Percent headed 5/29 | 6/16 | Lodging** 7/5 | Harvest date | Seed yield (lb/A) |      |      | 3-year Average |
|---------------|---------|-------------------|---------------------|------|---------------|--------------|-------------------|------|------|----------------|
|               |         |                   |                     |      |               |              | 1982              | 1983 | 1984 |                |
| Jamestown     | 1656    | 75                | 7                   | 55   | 3.5           | 7-6          | 152               | 707  | 380  | 413            |
| Longfellow    | 1609    | 72                | 0                   | 60   | 3.4           | 7-6          | 394               | 766  | 487  | 549            |
| Mom Frc-12    | 1284    | 67                | 0                   | 35   | 2.8           | 7-7          | 213               | 318  | 264  | 265            |
| Mom Frc-61    | 1639    | 58                | 0                   | 43   | 2.3           | 7-8          | 348               | 633  | 255  | 412            |
| Mom Frc-62    | 1285    | 73                | 0                   | 57   | 2.4           | 7-6          | 377               | 615  | 401  | 464            |
| Mom Frr-38    | 1641    | 77                | 7                   | 53   | 2.4           | 7-7          | 459               | 419  | 487  | 455            |
| Mom Frr-205   | 1642    | 72                | 0                   | 40   | 2.4           | 7-9          | 585               | 588  | 398  | 524            |
| Oase          | 1904    | 67                | 0                   | 58   | 2.7           | 7-5          | 80                | 306  | 226  | 204            |
| Pennlawn      | 1237    | 75                | 0                   | 38   | 3.1           | 7-8          | 461               | 597  | 419  | 492            |
| UofM-79 66354 | 1721    | 73                | 3                   | 45   | 2.9           | 7-9          | 207               | 642  | 499  | 449            |
| UofM-79 6673  | 1722    | 73                | 0                   | 42   | 3.8           | 7-9          | 422               | 636  | 639  | 566            |
| UofM-79 66111 | 1723    | 77                | 0                   | 45   | 2.9           | 7-9          | 394               | 558  | 514  | 489            |
| UofM-79 66136 | 1726    | 72                | 0                   | 37   | 3.2           | 7-9          | 428               | 517  | 517  | 487            |
| UofM-79 66218 | 1727    | 75                | 0                   | 38   | 2.7           | 7-9          | 532               | 680  | 478  | 563            |
| UofM-79 66223 | 1728    | 70                | 0                   | 40   | 3.2           | 7-9          | 342               | 674  | 505  | 507            |
| UofM-79 66233 | 1729    | 75                | 0                   | 43   | 3.2           | 7-9          | 367               | 564  | 544  | 492            |
| UofM-79 67123 | 1724    | 77                | 0                   | 48   | 3.3           | 7-9          | 397               | 647  | 514  | 519            |
| UofM-79 67135 | 1725    | 75                | 53                  | 78   | 2.8           | 7-6          | 129               | 597  | 546  | 424            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% level 149 141 157  
LSD at 1% level 199 188 209



Table 17. Plant height, percent headed, lodging, harvest date, and seed yields for 49 fine fescue strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data plus 1983 seed yields.

| Strain        | MSP No. | Plant height*<br>7/5 | Percent headed |      | Lodging**<br>7/5 | Harvest date | Seed yield (lb/A) |      |                |
|---------------|---------|----------------------|----------------|------|------------------|--------------|-------------------|------|----------------|
|               |         |                      | 6/8            | 6/19 |                  |              | 1983              | 1984 | 2-year Average |
| Artist        | 2007    | 68                   | 27             | 100  | 3.7              | 7-5          | 40                | 366  | 203            |
| Atlanta       | 2106    | 80                   | 18             | 77   | 2.4              | 7-7          | 442               | 317  | 380            |
| Barcota       | 1683    | 80                   | 65             | 100  | 2.0              | 7-7          | 433               | 571  | 502            |
| BAR Frc-80-sh | 2040    | 78                   | 53             | 100  | 3.9              | 7-5          | 263               | 580  | 422            |
| BAR Frt-9b    | 2042    | 73                   | 25             | 100  | 2.7              | 7-7          | 406               | 161  | 284            |
| BAR Frt-82-So | 2043    | 68                   | 17             | 97   | 1.4              | 7-6          | 571               | 219  | 395            |
| Bellamy       | 2003    | 78                   | 43             | 100  | 3.1              | 7-7          | 638               | 522  | 580            |
| Biljart       | 2105    | 75                   | 80             | 100  | 2.2              | 7-10         | 348               | 508  | 428            |
| Bingo         | 1986    | 75                   | 43             | 100  | 3.4              | 7-5          | 348               | 575  | 462            |
| Cascade       | 2107    | 85                   | 50             | 100  | 3.5              | 7-7          | 326               | 558  | 442            |
| Crystal       | 2009    | 68                   | 60             | 100  | 1.8              | 7-5          | 250               | 714  | 482            |
| Dawson        | 2108    | 78                   | 30             | 100  | 3.2              | 7-7          | 335               | 357  | 346            |
| Dorado        | 2004    | 78                   | 50             | 90   | 2.5              | 7-7          | 758               | 589  | 674            |
| Eboli         | 2124    | 83                   | 60             | 100  | 2.3              | 7-5          | 290               | 517  | 404            |
| Echo          | 1965    | 88                   | 55             | 100  | 2.9              | 7-10         | 767               | 772  | 770            |
| Engina        | 2060    | 83                   | 35             | 90   | 1.7              | 7-10         | 1057              | 914  | 986            |
| Fr-2141       | 1964    | 77                   | 10             | 77   | 2.7              | 7-9          | 540               | 299  | 420            |
| HJA-10-1      | 2094    | 78                   | 18             | 80   | 2.3              | 7-9          | 678               | 415  | 547            |
| HJA-37-13     | 2095    | 78                   | 27             | 83   | 2.0              | 7-9          | 647               | 624  | 636            |
| HJA-38-6      | 2096    | 73                   | 10             | 83   | 2.1              | 7-9          | 691               | 245  | 468            |
| Highlight     | 2062    | 75                   | 60             | 100  | 2.5              | 7-5          | 178               | 571  | 375            |
| Ivalo         | 2125    | 75                   | 65             | 100  | 3.3              | 7-5          | 379               | 549  | 464            |
| LD-3480       | 1963    | 78                   | 13             | 77   | 1.5              | 7-9          | 125               | 245  | 185            |
| LD-3484       | 1961    | 73                   | 37             | 100  | 3.3              | 7-5          | 165               | 388  | 277            |

Table 17. (continued)

| Strain         | MSP No. | Plant height*<br>7/5 | Percent headed |      | Lodging**<br>7/5 | Harvest date | Seed yield (lb/A) |      |                |
|----------------|---------|----------------------|----------------|------|------------------|--------------|-------------------|------|----------------|
|                |         |                      | 6/8            | 6/19 |                  |              | 1983              | 1984 | 2-year Average |
| Luster         | 1987    | 78                   | 70             | 100  | 3.7              | 7-5          | 397               | 549  | 473            |
| Mary           | 2005    | 80                   | 47             | 100  | 3.3              | 7-7          | 727               | 620  | 674            |
| Mom Frr-38     | 2133    | 80                   | 40             | 90   | 2.8              | 7-7          | 263               | 678  | 471            |
| Mom Frr-205    | 2134    | 78                   | 18             | 80   | 2.7              | 7-9          | 450               | 366  | 408            |
| Mom Frr-232    | 2008    | 78                   | 30             | 90   | 2.7              | 7-10         | 687               | 731  | 709            |
| Mom Frr-238    | 2135    | 80                   | 28             | 95   | 2.5              | 7-10         | 727               | 807  | 767            |
| NR-56          | 2097    | 78                   | 40             | 80   | 1.7              | 7-9          | 31                | 161  | 96             |
| NR-57          | 2098    | 75                   | 30             | 90   | 2.2              | 7-7          | 366               | 446  | 406            |
| Pennlawn       | 2109    | 83                   | 40             | 100  | 3.1              | 7-7          | 633               | 495  | 564            |
| Pernille       | 2136    | 78                   | 20             | 80   | 3.5              | 7-10         | 437               | 384  | 411            |
| Puma           | 1962    | 78                   | 53             | 100  | 2.9              | 7-6          | 397               | 584  | 491            |
| Rapid          | 1988    | 85                   | 33             | 87   | 2.4              | 7-9          | 919               | 745  | 832            |
| Reliant (FL-1) | 1655    | 72                   | 80             | 100  | 1.6              | 7-5          | 473               | 941  | 707            |
| Reptans        | 2122    | 88                   | 28             | 95   | 2.7              | 7-9          | 700               | 482  | 591            |
| Ruby           | 2110    | 75                   | 23             | 95   | 2.7              | 7-10         | 442               | 500  | 471            |
| Scarlet        | 2101    | 77                   | 40             | 90   | 4.0              | 7-8          | 335               | 558  | 447            |
| Tamara         | 2126    | 83                   | 35             | 90   | 2.7              | 7-9          | 651               | 384  | 518            |
| Tatjana        | 2127    | 85                   | 65             | 100  | 3.3              | 7-5          | 535               | 821  | 678            |
| UofM 6673      | 1722    | 80                   | 37             | 97   | 2.8              | 7-10         | 763               | 736  | 750            |
| UofM 66354     | 1116    | 78                   | 35             | 95   | 2.0              | 7-10         | 758               | 736  | 747            |
| UofM 67123     | 1724    | 90                   | 53             | 100  | 3.0              | 7-9          | 781               | 870  | 826            |
| Venus          | 2006    | 88                   | 60             | 100  | 2.7              | 7-7          | 482               | 723  | 603            |
| Waldorf        | 2102    | 77                   | 30             | 97   | 2.4              | 7-7          | 731               | 513  | 622            |
| Wintergreen    | 2111    | 73                   | 70             | 100  | 4.1              | 7-5          | 272               | 642  | 457            |
| WWSR 108       | 2123    | 73                   | 30             | 100  | 2.5              | 7-7          | 187               | 370  | 279            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% 181  
LSD at 1% NS

NS NS

Table 18. Vigor, percent stand, plant height, percent headed and estimated seed yields for 30 fine fescue strains seeded in 1983 on the welin Farm, Roseau, MN. 1984 data.

| Strain      | MSP No. | Vigor*<br>5/4 | Percent stand<br>5/4 | Plant height**<br>6/19 | Percent headed |     |      | Estimated seed yield<br>6/29<br>(lb/A) |     |
|-------------|---------|---------------|----------------------|------------------------|----------------|-----|------|--|-----|
|             |         |               |                      |                        | 5/25           | 6/5 | 6/16 |  |     |
| Atlanta     | 2106    | 3.8           | 28                   | 48                     | T              | 18  | 52   | 77                                     | 25  |
| Bellamy     | 2185    | 3.4           | 47                   | 50                     | 0              | 20  | 57   | 70                                     | 25  |
| Biljart     | 2105    | 4.0           | 53                   | 45                     | 8              | 57  | 87   | 77                                     | 33  |
| Checker     | 2170    | 3.2           | 63                   | 52                     | T              | 23  | 57   | 90                                     | 33  |
| Eboli       | 2124    | 3.0           | 73                   | 50                     | T              | 23  | 67   | 77                                     | 25  |
| Enzet       | 2171    | 2.2           | 80                   | 62                     | 2              | 43  | 72   | 100                                    | 300 |
| Highlight   | 2062    | 3.6           | 60                   | 45                     | 0              | 22  | 65   | 97                                     | 25  |
| Jamestown   | 2104    | 3.3           | 53                   | 47                     | 0              | 20  | 57   | 80                                     | 25  |
| Lifalla     | 2216    | 3.0           | 63                   | 50                     | T              | 17  | 52   | 93                                     | 25  |
| Longfellow  | 1609    | 3.0           | 63                   | 48                     | 0              | 53  | 85   | 87                                     | 67  |
| Mn 6673     | 1722    | 3.0           | 50                   | 53                     | 2              | 38  | 75   | 80                                     | 100 |
| Mn 66111    | 1723    | 3.1           | 60                   | 53                     | 2              | 33  | 72   | 100                                    | 125 |
| Mn 66136    | 1726    | 3.0           | 60                   | 52                     | T              | 22  | 58   | 93                                     | 92  |
| Mn 66218    | 1727    | 3.0           | 60                   | 55                     | T              | 33  | 73   | 80                                     | 100 |
| Mn 66223    | 1728    | 3.0           | 63                   | 53                     | T              | 25  | 75   | 87                                     | 92  |
| Mn 66233    | 1729    | 3.0           | 70                   | 57                     | 2              | 22  | 70   | 93                                     | 75  |
| Mn 66354    | 1721    | 4.0           | 50                   | 50                     | T              | 28  | 68   | 87                                     | 58  |
| Mn 67123    | 1724    | 2.7           | 67                   | 55                     | T              | 32  | 70   | 93                                     | 75  |
| Mn 67135    | 1725    | 3.5           | 47                   | 47                     | 8              | 37  | 80   | 73                                     | 33  |
| Mom Frc-12  | 1284    | 2.9           | 80                   | 50                     | T              | 28  | 73   | 83                                     | 42  |
| Mom Frc-61  | 1639    | 4.0           | 67                   | 48                     | T              | 37  | 77   | 83                                     | 67  |
| Mom Frr-38  | 2133    | 4.1           | 8                    | 53                     | 4              | 30  | 68   | 70                                     | 50  |
| Mom Frr-205 | 2186    | 2.8           | 77                   | 57                     | 0              | 25  | 70   | 97                                     | 158 |

Table 18. (continued)

| Strain         | MSP No. | Vigor*<br>5/4 | Percent stand<br>5/4 | Plant height**<br>6/19 | Percent headed |     |      | Estimated seed yield<br>6/29<br>(lb/A) |     |
|----------------|---------|---------------|----------------------|------------------------|----------------|-----|------|--|-----|
|                |         |               |                      |                        | 5/25           | 6/5 | 6/16 |  |     |
| Mom Frr-232    | 2187    | 3.1           | 77                   | 55                     | 0              | 27  | 70   | 93                                     | 208 |
| Mom Frr-238    | 2188    | 3.0           | 77                   | 60                     | T              | 32  | 70   | 100                                    | 275 |
| Pennlawn       | 2109    | 2.3           | 83                   | 63                     | 4              | 43  | 77   | 100                                    | 217 |
| Reliant (FL-1) | 1655    | 3.5           | 60                   | 52                     | 20             | 67  | 92   | 87                                     | 100 |
| Ruby           | 2110    | 3.3           | 50                   | 55                     | 2              | 30  | 65   | 93                                     | 67  |
| ZW 42-100      | 2152    | 4.0           | 57                   | 45                     | T              | 20  | 68   | 77                                     | 25  |
| ZW 42-101      | 2153    | 4.0           | 60                   | 43                     | 0              | 12  | 55   | 73                                     | 33  |

\* Vigor - 1 = most; 5 = least.

\*\* Plant height in centimeters; 2.5 cm = 1 inch.

Table 19. Seed yields and lodging in Ruby Fine Fescue, Hagen Farm, under four cultural management regimes, three fertility levels and two application dates of growth retardant treatments. Mineral soil - 1984 data.

| Cultural treatment        | Fertility | Lodging* recorded June 27 |                | Lodging* recorded July 11 |                | Seed yields** |                |
|---------------------------|-----------|---------------------------|----------------|---------------------------|----------------|---------------|----------------|
|                           |           | Check                     | Parlay<br>5/15 | Check                     | Parlay<br>5/15 | Check         | Parlay<br>5/15 |
|                           |           |                           |                |                           |                |               |                |
| Rake off straw<br>(Check) | 40+20+20  | 3.0                       | 1.0            | 3.0                       | 1.3            | 25            | 17             |
|                           | 80+40+40  | 3.2                       | 1.0            | 3.7                       | 1.0            | 11            | 25             |
|                           | 120+60+60 | 5.0                       | 1.0            | 3.7                       | 1.3            | 20            | 33             |
| Clip-rake off             | 40+20+20  | 4.3                       | 1.3            | 6.0                       | 1.3            | 57            | 51             |
|                           | 80+40+40  | 5.8                       | 1.0            | 7.0                       | 1.3            | 70            | 49             |
|                           | 120+60+60 | 6.6                       | 1.7            | 7.3                       | 2.0            | 66            | 62             |
| Straw burn                | 40+20+20  | 1.3                       | 1.0            | 2.0                       | 1.0            | 53            | 35             |
|                           | 80+40+40  | 3.0                       | 1.0            | 3.3                       | 1.0            | 75            | 69             |
|                           | 120+60+60 | 1.8                       | 1.0            | 3.3                       | 1.3            | 66            | 46             |
| Paraquat burn             | 40+20+20  | 3.0                       | 1.0            | 4.3                       | 1.3            | 65            | 51             |
|                           | 80+40+40  | 4.0                       | 1.8            | 6.7                       | 1.7            | 69            | 67             |
|                           | 120+60+60 | 6.5                       | 1.8            | 7.0                       | 1.3            | 85            | 79             |

\* Lodging - 1 = erect; 9 = lodged.

\*\* Seed yield - 75 grams/m<sup>2</sup> = 670 lb/a

Parlay applied at 0.500 lb/A a.i.

### Meadow Fescue Studies

We are presenting data from two Meadow fescue strain trials. We believe these data are self-explanatory and require little explanation. Suffice to say, some varieties are good and some not so good. All were grown under 100 lbs/A nitrogen fertility level.

### Tall Fescue Studies

We are presenting results from two tall fescue trials. One a strain trial seeded in 1981, and the other a fertilizer trial on Galway tall fescue.

The strain trial indicates a difference in strains. Several appear good enough to commercially produce seed, when the quackgrass problem is reconciled.

The fertility trial was in a 25-acre production field on the Roger Sandstrom farm southeast of Roseau. The addition of 60+30+30 fertilizer gave an increase of about 500 lbs/A, although this was not statistically significant in this trial. Also, the higher rates caused more lodging. Splitting the fertilizer application, fall and spring, did not change the yields.

The production field produced about 650 lbs/A of quackgrass-free tall fescue seed.

### Orchardgrass Study

We are presenting results from one trial of orchardgrass strains. Severe winter temperatures during winters of 1981-82, and 1982-83 caused little or no yields on many strains. A moderate winter in 1983-84 (heavy snow cover and higher soil temperatures) permitted fair seed yields in 1984. Orchardgrass is a questionable crop for northern Minnesota.

Table 20. Plant height, percent headed, lodging, harvest date and seed yields for 19 Meadow fescue strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strain         | MSP No. | Plant height* 6/19 | Percent headed 6/22 | Lodging** 7/11 | Harvest date | Seed yield lb/A) |      |      |                |
|----------------|---------|--------------------|---------------------|----------------|--------------|------------------|------|------|----------------|
|                |         |                    |                     |                |              | 1982             | 1983 | 1984 | 3-year average |
| Barverte       | 1883    | 78                 | 85                  | 3.3            | 7-10         | 478              | 273  | 493  | 415            |
| BAR Fp-79-72S  | 1884    | 82                 | 85                  | 4.2            | 7-10         | 858              | 264  | 644  | 589            |
| BAR Fp-79-74I  | 1885    | 75                 | 83                  | 2.8            | 7-10         | 318              | 149  | 309  | 259            |
| BAR Fp-81-1    | 1886    | 75                 | 65                  | 2.5            | 7-13         | 647              | 184  | 496  | 442            |
| BAR Fp-81-5    | 1682    | 72                 | 58                  | 2.0            | 7-12         | 781              | 220  | 523  | 508            |
| Beaumont       | 1553    | 78                 | 82                  | 3.4            | 7-10         | 597              | 217  | 555  | 456            |
| Belimo         | 1643    | 75                 | 82                  | 2.9            | 7-11         | 1010             | 383  | 799  | 731            |
| Bundy          | 1706    | 73                 | 80                  | 2.9            | 7-10         | 665              | 169  | 573  | 469            |
| Comtessa       | 1707    | 80                 | 83                  | 3.1            | 7-10         | 728              | 336  | 677  | 580            |
| Cykade         | Plants  | 83                 | 83                  | 2.4            | 7-9          | 1167             | 609  | 659  | 812            |
| Ensign (K2-95) | 1368    | 78                 | 80                  | 3.2            | 7-10         | 1132             | 241  | 636  | 670            |
| Fiola          | 1708    | 80                 | 87                  | 3.1            | 7-10         | 737              | 244  | 618  | 533            |
| First          | 1736    | 80                 | 83                  | 2.1            | 7-10         | 808              | 273  | 573  | 551            |
| Garanta        | 1716    | 77                 | 87                  | 3.5            | 7-10         | 719              | 181  | 487  | 462            |
| K2-28          | 1236    | 78                 | 77                  | 2.9            | 7-10         | 760              | 258  | 567  | 528            |
| Mimer          | 1923    | 82                 | 83                  | 3.1            | 7-9          | 906              | 327  | 636  | 623            |
| Sena           | 1709    | 78                 | 80                  | 2.4            | 7-10         | 832              | 267  | 484  | 528            |
| WW AS 74       | 1924    | 83                 | 85                  | 3.2            | 7-10         | 701              | 247  | 603  | 517            |
| WW AS 670      | 1925    | 80                 | 80                  | 2.9            | 7-9          | 597              | 235  | 573  | 468            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% level

LSD at 1% level

239 119 145

319 159 NS

Table 21. Plant height, percent headed, lodging, harvest date and seed yields for 21 Meadow fescue strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data and 1983 seed yields.

| Strain         | MSP No. | Plant height* 7/5 | Percent headed |      | Lodging** 7/5 | Harvest date | Seed yields (lb/A) |      |                |
|----------------|---------|-------------------|----------------|------|---------------|--------------|--------------------|------|----------------|
|                |         |                   | 6/16           | 6/22 |               |              | 1983               | 1984 | 2-year average |
| BAR Fp-79-72S  | 1884    | 90                | 62             | 93   | 2.5           | 7-7          | 757                | 460  | 609            |
| BAR Fp-79-72S  | 2020    | 92                | 58             | 97   | 3.3           | 7-8          | 618                | 606  | 612            |
| BAR Fp-79-72T  | 1885    | 55                | 90             | 90   | 3.2           | 7-10         | 585                | 523  | 554            |
| BAR Fp-79-74G  | 2022    | 83                | 65             | 95   | 3.0           | 7-6          | 342                | 368  | 355            |
| BAR Fp-79-74I  | 1885    | 78                | 70             | 100  | 2.8           | 7-6          | 190                | 398  | 294            |
| BAR Fp-81-1    | 1886    | 92                | 15             | 50   | 2.4           | 7-11         | 636                | 244  | 440            |
| BAR Fp-81-1    | 2019    | 93                | 38             | 87   | 2.5           | 7-11         | 612                | 576  | 594            |
| AS-670         | 2121    | 93                | 53             | 83   | 2.4           | 7-9          | 698                | 514  | 606            |
| Barverte       | 2023    | 87                | 48             | 85   | 2.8           | 7-11         | 297                | 618  | 458            |
| Belimo         | 1757    | 90                | 50             | 88   | 2.3           | 7-9          | 808                | 665  | 737            |
| Beaumont       | 1553    | 93                | 47             | 83   | 2.2           | 7-9          | 496                | 493  | 495            |
| Boris          | 2099    | 98                | 48             | 85   | 1.5           | 7-10         | 965                | 472  | 719            |
| Ensign (K2-95) | 1368    | 93                | 53             | 87   | 2.4           | 7-10         | 549                | 603  | 576            |
| First          | 1736    | 92                | 52             | 90   | 2.4           | 7-9          | 588                | 579  | 584            |
| Joma           | 1959    | 88                | 52             | 87   | 2.2           | 7-9          | 175                | 377  | 276            |
| K2-28          | 2112    | 93                | 47             | 90   | 2.4           | 7-12         | 582                | 618  | 600            |
| LD-3220        | 1960    | 95                | 53             | 95   | 2.9           | 7-9          | 811                | 659  | 735            |
| Mer Fp Syn 1   | 1770    | 93                | 43             | 88   | 2.8           | 7-9          | 873                | 603  | 738            |
| Mimer          | 1923    | 90                | 43             | 85   | 2.3           | 7-10         | 811                | 538  | 675            |
| WWAS-74        | 1924    | 88                | 62             | 97   | 3.4           | 7-9          | 701                | 650  | 676            |
| WWAS-670       | 1925    | 90                | 42             | 92   | 3.0           | 7-8          | 576                | 529  | 553            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% level

LSD at 1% level

250 NS

334 NS



Table 22. Plant height, percent headed, lodging, harvest date and seed yields for 15 Tall fescue strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strain        | MSP No. | Plant height* 6/19 | Percent headed 6/22 | Lodging** 7/11 | Harvest date | Seed yield lb/A |      |      | 3-year average |
|---------------|---------|--------------------|---------------------|----------------|--------------|-----------------|------|------|----------------|
|               |         |                    |                     |                |              | 1982            | 1983 | 1984 |                |
| Barcel        | 1680    | 85                 | 77                  | 2.1            | 7-18         | 505             | 163  | 725  | 464            |
| BAR Fa-75-X   | 1681    | 80                 | 77                  | 2.0            | 7-15         | 529             | 255  | 965  | 583            |
| Hokuryo       | 1506    | 103                | 85                  | 1.1            | 7-15         | 570             | 561  | 612  | 581            |
| Houndog       | 1841    | 85                 | 73                  | 1.5            | 7-17         | 858             | 481  | 843  | 727            |
| NK-Exp-K5-27  | 1823    | 87                 | 80                  | 1.5            | 7-14         | 680             | 226  | 707  | 538            |
| NK-Exp-K5-30  | 1821    | 90                 | 87                  | 1.8            | 7-14         | 944             | 241  | 734  | 640            |
| NAPB-147801   | 1617    | 85                 | 83                  | 2.4            | 7-16         | 921             | 389  | 876  | 729            |
| NAPB-147802   | 1618    | 85                 | 78                  | 1.9            | 7-14         | 1322            | 549  | 734  | 868            |
| NAPB-147801   | 1842    | 93                 | 90                  | 1.9            | 7-14         | 1191            | 535  | 924  | 883            |
| NAPB-147802   | 1843    | 87                 | 80                  | 1.2            | 7-14         | 1274            | 597  | 787  | 886            |
| NAPB-147803-A | 1844    | 83                 | 77                  | 2.3            | 7-17         | 656             | 285  | 787  | 576            |
| Rebel         | 1654    | 83                 | 78                  | 2.0            | 7-15         | 802             | 386  | 808  | 665            |
| Stanton       | 1739    | 83                 | 90                  | 3.2            | 7-11         | 650             | 347  | 398  | 465            |
| Stef          | Plants  | 93                 | 52                  | 1.0            | 7-16         | 1396            | 502  | 573  | 824            |
| Yamanami      | 1507    | 93                 | 97                  | 2.0            | 7-11         | 754             | 276  | 974  | 668            |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% level

LSD at 1% level

353 NS

223 NS

NS

NS

Table 23. Plant height, lodging and seed yields for Galway Tall fescue with 9 fertilizer treatments. Roger Sandstrom farm, Roseau, MN. 1984 data.

| Date         | Fertilizer<br>Rate | Plant height* |     | Lodging** |      | Seed yield (lb/A) |
|--------------|--------------------|---------------|-----|-----------|------|-------------------|
|              |                    | 6/28          | 90  | 6/28      | 7/16 |                   |
| No treatment |                    |               | 90  | 1.0       | 1.0  | 705               |
| Fall         | 60+30+30           |               | 102 | 1.0       | 2.5  | 1204              |
|              | 90+45+45           |               | 100 | 2.0       | 3.3  | 1412              |
|              | 120+60+60          |               | 102 | 2.0       | 3.2  | 1142              |
| Spring       | 60+30+30           |               | 102 | 1.1       | 2.8  | 1231              |
|              | 90+45+45           |               | 102 | 2.0       | 3.8  | 1136              |
|              | 120+60+60          |               | 102 | 2.8       | 4.0  | 1127              |
| Fall         | 45+22.5+22.5]      |               |     |           |      |                   |
| Spring       | 45+22.5+22.5]      |               | 102 | 1.8       | 3.8  | 1293              |
| Fall         | 60+30+30]          |               |     |           |      |                   |
| Spring       | 60+30+30]          |               | 100 | 2.4       | 3.8  | 1237              |

\* Plant height in centimeters; 2.5 cm = 1 inch

\*\* Lodging - 1 = erect; 5 = lodged.

LSD at 5% level

LSD at 1% level

NS

NS

All plots harvested July 16.

Table 24. Plant height, percent headed, harvest date and seed yields for 16 Orchardgrass strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1982 and 1983 seed yields.

| Strain         | MSP No. | Plant height*<br>6/19 | Percent headed |      | Harvest date    | Seed yield (lb/A) |      |      |
|----------------|---------|-----------------------|----------------|------|-----------------|-------------------|------|------|
|                |         |                       | 6/5            | 6/16 |                 | 1982              | 1983 | 1984 |
| Akimidori      | 1502    | 103                   | 13             | 78   | 7-10            | NH**              | NH   | 463  |
| Aonami         | 1503    | 105                   | 8              | 77   | 7-13            | NH                | NH   | 389  |
| Barata         | 1873    | 92                    | T              | 57   | 7-16            | NH                | NH   | 261  |
| Barera         | 1679    | 93                    | --             | --   | 7-16            | NH                | NH   | 342  |
| Barbridge      | 1874    | 98                    | 4              | 67   | 7-12            | NH                | 92   | 428  |
| Bartyle        | 1875    | 98                    | 4              | 72   | 7-13            | NH                | NH   | 585  |
| Crown          | 1610    | 110                   | 10             | 80   | 7-9             | NH                | NH   | 612  |
| Hawk           | 1611    | 105                   | 15             | 85   | 7-9             | 223               | NH   | 618  |
| Kitamidori     | 1504    | 105                   | 7              | 77   | 7-10            | 217               | NH   | 538  |
| NAPB 417501    | 1847    | 103                   | 5              | 75   | 7-11            | 347               | NH   | 567  |
| NAPB 417901    | 1848    | 103                   | 8              | 77   | 7-10            | NH                | NH   | 499  |
| NAPB 417902    | 1849    | 103                   | 4              | 72   | 7-14            | NH                | NH   | 659  |
| Nordstern      | 1177    | 102                   | T              | 52   | 7-18            | 466               | 282  | 365  |
| Okamidori      | 1505    | 100                   | T              | 75   | 7-12            | 377               | 214  | 594  |
| Piedmont Syn-2 | 1542    | 98                    | 7              | 70   | 7-10            | NH                | NH   | 371  |
| Mobite         | 1761    | 98                    | --             | 55   | 7-17            | NH                | NH   | 273  |
|                |         |                       |                |      | LSD at 5% level | NS                | 129  | 157  |
|                |         |                       |                |      | LSD at 1% level | NS                | NS   | 211  |

\* Plant height in centimeters; 2.5 cm = 1 inch.

\*\* Not harvested.

#### Reed Canarygrass Data

We are reporting data from two strain trials of Reed Canarygrass. Data from the 1981 seeding (Table 25) shows only average yields. Palaton, NAPB 427901, and Venture produced best yields in both 1983 and 1984.

The yields from the 1982 seeding (Table 26) show very similar data. Palaton is the highest yield strain. In both 1983 and 1984, yields were harvested on two dates. It appears there was little shattering between harvest dates in both years. We are interested in the rather good yields harvested in these plots, compared with the very poor yields produced in grower fields in Roseau county in 1984. We offer no explanation for the difference.

#### Smooth Bromegrass Data

We are presenting data for two strain trials of Smooth bromegrass in Tables 27 and 28. We believe these data need no additional explanation.

#### Birdsfoot Trefoil Data

Results from a seeding rate trial with two varieties are presented in Table 32. Note that in the first crop year, the lower seeding rates produced the most seed, but in subsequent years, the stands have leveled off and the yields are not greatly different.

Table 25. Plant height, percent headed and seed yields for 11 Reed canarygrass strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data plus 1983 seed yields.

| Strains        | MSP no. | Plant height*<br>6-19 | Percent headed<br>6-16 | Seed Yield (lb/A) |         |        |
|----------------|---------|-----------------------|------------------------|-------------------|---------|--------|
|                |         |                       |                        | 7-12-83           | 7-15-83 | 7-7-84 |
| Flare          | 1826    | 117                   | 5                      | 187**             | 160     | 232    |
| Hansvoll       | 1541    | 70                    | 2                      | NH                | NH      | NH     |
| Mn-76          | 1534    | 93                    | 3                      | 76                | 48      | 77     |
| Mn-7904        | 1540    | 65                    | 0                      | NH                | NH      | NH     |
| NAPB 427901    | 1851    | 128                   | 18                     | 312               | 226     | 356    |
| NAPB 427902    | 1852    | 108                   | 5                      | 149               | 181     | 175    |
| Palaton(PS-3)  | 1828    | 128                   | 27                     | 493               | 413     | 460    |
| Rise           | 1853    | 113                   | 5                      | 187               | 172     | 154    |
| Rovik          | 1615    | 68                    | 0                      | NH                | NH      | NH     |
| Vantage        | 1854    | 125                   | 23                     | 241               | 255     | 324    |
| Venture(PS-2A) | 1827    | 130                   | 22                     | 386               | 318     | 315    |
|                |         |                       |                        | LSD at 5% level   | 98      | 181    |
|                |         |                       |                        | LSD at 1% level   | NS      | NS     |

\* Plant height as centimeters, 2.5 cm = 1 inch.

\*\* Not harvested.

Table 26. Plant height and seed yields for 12 Reed Canarygrass strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data plus 1983 seed yields. Seed yields harvested on two dates each year.

| Strains        | MSP no. | Plant height* |                 | Seed Yield (lb/A) |        |         |
|----------------|---------|---------------|-----------------|-------------------|--------|---------|
|                |         | 7-5           | 7-8-83          | 7-12-83           | 7-6-84 | 7-10-84 |
| Flare          | 1983    | 158           | 252             | 151               | 443    | 339     |
| Hansvoll       | 1541    | 67            | NH              | NH                | NH     | NH      |
| Mn-76          | 1734    | 147           | 62              | 18                | 122    | 122     |
| Mn-7904        | 1540    | 102           | 9               | 12                | 24     | NH      |
| NAPB 427901    | 1851    | 155           | 279             | 199               | 535    | 404     |
| NAPB 427902    | 1852    | 155           | 270             | 160               | 606    | 564     |
| Palaton(PS-3)  | 1985    | 157           | 202             | 193               | 624    | 621     |
| PS-2           | 1302    | 153           | 255             | 187               | 431    | 437     |
| Rise           | 1853    | 157           | 149             | 89                | 466    | 460     |
| Rovik          | 1539    | 77            | NH              | NH                | NH     | NH      |
| Vantage        | 1854    | 157           | 178             | 74                | 428    | 389     |
| Venture(PS-2A) | 1984    | 155           | 151             | 140               | 514    | 490     |
| Venture(PS-2A) | 1827    | 157           | 154             | 101               | 644    | 460     |
|                |         |               | LSD at 5% level | 117               | 186    | 154     |
|                |         |               | LSD at 1% level | NS                | 254    | 211     |

\* Plant height in centimeters; 2.5 cm = 1 inch.

Table 27. Plant height, percent headed, lodging, harvest date, and seed yields for 8 smooth bromegrass strains seeded in 1981 on the Welin Farm, Roseau, MN. 1984 data, plus 1982 and 1983 seed yields.

| Strains        | MSP no. | Plant height*<br>6-19 | Percent headed<br>6-16 | Lodging**<br>7-11 | Harvest date | Seed yields (lb/A) |      |      |                |
|----------------|---------|-----------------------|------------------------|-------------------|--------------|--------------------|------|------|----------------|
|                |         |                       |                        |                   |              | 1982               | 1983 | 1984 | 3-year average |
| Barton         | 1825    | 110                   | 52                     | 2.1               | 7-19         | 858                | 392  | 380  | 543            |
| Baylor         | 1855    | 110                   | 60                     | 1.8               | 7-19         | 870                | 451  | 434  | 585            |
| Blair          | 1856    | 110                   | 52                     | 2.0               | 7-19         | 787                | 333  | 437  | 519            |
| Bromex(K1-105) | 1167    | 110                   | 53                     | 2.0               | 7-19         | 1087               | 615  | 377  | 693            |
| NAPB 407601    | 1857    | 110                   | 50                     | 2.0               | 7-19         | 995                | 365  | 318  | 559            |
| NAPB 407602    | 1606    | 110                   | 62                     | 2.8               | 7-19         | 909                | 535  | 336  | 593            |
| NAPB 407603    | 1607    | 110                   | 53                     | 2.0               | 7-19         | 1060               | 463  | 460  | 661            |
| Wisconsin B-8  | 1662    | 110                   | 62                     | 2.0               | 7-19         | 743                | 457  | 407  | 536            |

LSD at 5% level

NS

NS

NS

NS

NS

NS

\* Plant height as centimeters; 2.5 cm = 1 inch.

\*\* Lodging - 1 = erect; 5 = lodged.

Table 28. Plant height, percent headed, lodging, harvest date, and seed yields for 8 smooth bromegrass strains seeded in 1982 on the Welin Farm, Roseau, MN. 1984 data plus 1983 seed yields.

| Strains                                | MSP no. | Plant * height 7-5 | Lodging ** 7-11 | Harvest date | Seed yields (lb/A) |      |
|--|---------|--------------------|-----------------|--------------|--------------------|------|
|  |         |                    |                 |              | 1983               | 1984 |
| Barton                                 | 1982    | 130                | 3.3             | 7-19         | 446                | 561  |
| Bromex                                 | 1914    | 130                | 3.3             | 7-19         | 570                | 662  |
| Deborah<br>( <i>Bromus carinatus</i> ) | 2016    | winter killed      | -               | ---          | ---                | ---  |
| Exp. - 13011                           | 1998    | 130                | 3.3             | 7-19         | 686                | 567  |
| Jubilee                                | 1999    | 130                | 3.3             | 7-19         | 395                | 659  |
| NAPB 407601                            | 1311    | 130                | 3.3             | 7-19         | 734                | 829  |
| NAPB 407602                            | 1312    | 130                | 3.3             | 7-19         | 671                | 659  |
| NAPB 407603                            | 1313    | 130                | 3.3             | 7-19         | 633                | 650  |

LSD at 5% level 129 NS  
LSD at 1% level 180 NS

\* Plant height as centimeters; 2.5 cm = 1 inch.  
\*\* Lodging - 1 = erect; 5 = lodged.



Table 29. Winter injury, percent stand, percent headed, plant height, lodging, harvest date, and seed yields for 36 perennial ryegrass strains seeded in 1983 on the Welin Farm, Roseau, MN. 1984 data.

| Strain                 | MSP No. | Winter injury* 5/4 | Percent stand 5/4 | Percent headed |      |          | Plant height** 7/5 | Lodging† 7/5 | Harvest date | Seed yield\$ (lb/A) |
|------------------------|---------|--------------------|-------------------|----------------|------|----------|--------------------|--------------|--------------|---------------------|
|                        |         |                    |                   | 6/5            | 6/16 | 6/27 7/2 |                    |              |              |                     |
| Barry                  | 1877    | 3.1                | 53                | 0              | 8    | 58       | 88                 | 2.5          | 7-23         | 597                 |
| Bastion                | 2191    | 1.7                | 67                | 15             | 67   | 93       | 100                | 2.9          | 7-22         | 633                 |
| Bison                  | 2172    | 3.1                | 53                | T              | 63   | 88       | 100                | 1.1          | 7-22         | 933                 |
| Citadel                | 2192    | 2.2                | 47                | 0              | 47   | 80       | 100                | 2.5          | 7-24         | 713                 |
| Delray                 | 1585    | 3.0                | 43                | 30             | 90   | 100      | 100                | 1.3          | 7-14         | 561                 |
| Diplomat               | 1941    | 3.8                | 38                | 0              | 6    | 80       | 100                | 2.3          | 7-22         | 615                 |
| Gambit                 | 2221    | 2.3                | 43                | 20             | 85   | 100      | 100                | 1.3          | 7-20         | 496                 |
| Gator                  | 2173    | 1.7                | 70                | 2              | 43   | 95       | 100                | 3.0          | 7-21         | 930                 |
| HW-5 (annual ryegrass) | 1719    | 5.0                | 0                 | --             | --   | --       | --                 | --           | --           | --                  |
| LD 2504                | 2225    | 3.9                | 27                | 5              | 65   | 100      | 100                | 1.2          | 7-22         | 719                 |
| LD 2508                | 2226    | 3.6                | 27                | 5              | 65   | 95       | 100                | 1.2          | 7-20         | 930                 |
| Lp-721                 | 2131    | 2.8                | 40                | 8              | 65   | 95       | 100                | 1.8          | 7-20         | 858                 |
| Magella                | 2222    | 2.2                | 53                | 0              | 8    | 52       | 82                 | 2.5          | 7-20         | 933                 |
| Mom Lp-87              | 2193    | 2.0                | 53                | 15             | 67   | 93       | 100                | 1.8          | 7-17         | 707                 |
| Mom Lp-210             | 2013    | 2.9                | 47                | 0              | 10   | 72       | 97                 | 2.8          | 7-20         | 826                 |
| Mom Lp-736             | 2194    | 3.0                | 57                | 2              | 47   | 95       | 100                | 2.2          | 7-20         | 1019                |
| Mom Lp-792             | 2195    | 2.3                | 53                | 2              | 18   | 85       | 100                | 3.5          | 7-20         | 1042                |
| Morenne                | 2196    | 2.3                | 47                | 0              | 16   | 60       | 90                 | 3.3          | 7-20         | 939                 |
| NK-200                 | 1584    | 2.0                | 60                | 0              | 3    | 45       | 80                 | 2.8          | 7-25         | 1212                |
| NK-Exp 79307           | 1820    | 2.7                | 30                | 10             | 45   | 100      | 100                | 2.2          | 7-14         | 463                 |

Table 29. (continued)

| Strain       | MSP No. | Winter injury*<br>5/4 | Percent stand<br>5/4 | Percent headed |      |          | Plant height**<br>7/5 | Lod-<br>ging†<br>7/5 | Har-<br>vest<br>date | Seed<br>yield§<br>(lb/A) |
|--------------|---------|-----------------------|----------------------|----------------|------|----------|-----------------------|----------------------|----------------------|--------------------------|
|              |         |                       |                      | 6/5            | 6/16 | 6/27 7/2 |                       |                      |                      |                          |
| NK-Exp 79308 | 1821    | 2.8                   | 40                   | 13             | 77   | 100      | 57                    | 1.1                  | 7-16                 | 541                      |
| NK-Exp 79309 | 1822    | 2.9                   | 30                   | 10             | 75   | 100      | 58                    | 1.3                  | 7-17                 | 579                      |
| Norlea       | 1257    | 2.4                   | 17                   | 0              | 2    | 50       | 87                    | 1.5                  | 7-24                 | 1218                     |
| Palmer       | 2174    | 1.7                   | 73                   | 4              | 77   | 100      | 62                    | 3.0                  | 7-19                 | 992                      |
| Prelude      | 2175    | 1.9                   | 53                   | 8              | 77   | 100      | 67                    | 2.1                  | 7-19                 | 704                      |
| Salem        | 2155    | 2.0                   | 57                   | 0              | 5    | 45       | 78                    | 2.2                  | 7-22                 | 760                      |
| SB-F         | 2205    | 2.7                   | 40                   | 0              | 5    | 50       | 90                    | 1.5                  | 7-24                 | 841                      |
| SISU         | 2116    | 3.9                   | 73                   | T              | 13   | 63       | 93                    | 1.3                  | 7-24                 | 428                      |
| Stanza       | 2156    | 3.0                   | 53                   | 5              | 53   | 100      | 72                    | 1.5                  | 7-17                 | 621                      |
| Tove         | 2118    | 3.3                   | 24                   | 0              | 40   | 68       | 93                    | 1.4                  | 7-24                 | 784                      |
| Tonga        | 2117    | 2.7                   | 40                   | 12             | 63   | 93       | 100                   | 1.4                  | 7-19                 | 523                      |
| Tresor       | 2223    | 3.3                   | 27                   | 0              | 6    | 33       | 70                    | 2.7                  | 7-23                 | 686                      |
| Verna        | 2119    | 3.0                   | 38                   | 12             | 43   | 95       | 100                   | 1.2                  | 7-15                 | 633                      |
| WWE-19       | 2120    | 3.3                   | 27                   | 0              | 3    | 32       | 68                    | 1.7                  | 7-25                 | 1025                     |
| WWE-23       | 2132    | 2.8                   | 44                   | 0              | 13   | 58       | 85                    | 2.2                  | 7-22                 | 968                      |
| Yatsugane    | 1509    | 3.0                   | 37                   | 0              | T    | 23       | 63                    | 2.0                  | --                   | --                       |

\* Winter injury - 1 = least injury; 5 = severe injury.

\*\* Plant height in centimeters; 2.5 cm = 1 inch.

† Lodging - 1 = erect; 5 = lodged.

§ The seed yield data in this table should be considered with reservations.

Winter injury and winter kill caused the loss of some plots, but we believe the data should be recorded.

LSD at 5% level  
LSD at 1% level319  
NS

### Perennial Ryegrass Studies

We are presenting information from three trials with perennial ryegrass. First, a strain trial of 36 entries on the Welin farm; secondly, a fertility trial in the Roger Sandstrom field; and thirdly, a trial with growth retardants in the Sandstrom field.

Winter injury readings in the strain trial on the Welin farm show that snow cover is critical for the survival of this crop in northern Minnesota. The first and third replications were less injured than the second replication. This is because the second replication was on a slight ridge and during the winter had a few inches less snow cover. We suggest these data should be considered with reservation but we believe they warrant inclusion in this report.

The fertility trial indicates that the first 60+30+30 application significantly increased seed yield, but the additional increments gave little additional yield. Lodging was much more severe with all fertility applications over the no treatment plots. The severe lodging in most plots did not seem to affect seed production.

The application of growth retardants did not affect seed yields, but greatly improved standability in the treated plots. Also, in most cases the harvest index was higher in the treated plots. The 25-acre production field produced more than 800 lb/A of quackgrass-free perennial ryegrass seed. The severe lodging noted in the untreated plots did not reduce seed yields. We observed that there was adequate room within the canopy for pollen to move to effect pollination, which apparently did occur.

Table 30. Plant vigor, plant height, lodging and seed yields for Delray Perennial Ryegrass with 9 fertilizer treatments. Roger Sandstrom Farm, Roseau, MN. 1984 data.

| Fertilizer<br>Date | Rate           | Vigor*<br>5/29 | Plant height** |      | Lodging† |      | Seed yield<br>(lb/A) |
|--------------------|----------------|----------------|----------------|------|----------|------|----------------------|
|                    |                |                | 6/28           | 7/16 | 6/28     | 7/16 |                      |
| No treatment       |                | 4.0            | 62             |      | 1.0      | 1.3  | 526                  |
| Fall               | 60+30+30       | 3.0            | 65             |      | 1.5      | 4.5  | 1047                 |
|                    | 90+45+45       | 2.3            | 73             |      | 3.3      | 5.0  | 1160                 |
|                    | 120+60+60      | 2.3            | 73             |      | 3.8      | 5.0  | 1171                 |
| Spring             | 60+30+30       | 2.9            | 72             |      | 3.3      | 5.0  | 1186                 |
|                    | 90+45+45       | 2.6            | 72             |      | 3.3      | 4.7  | 1097                 |
|                    | 120+60+60      | 2.3            | 75             |      | 4.1      | 5.0  | 1050                 |
| Fall<br>Spring     | 45+22.5+22.5]§ | 1.3            | 73             |      | 3.8      | 5.0  | 1189                 |
|                    | 45+22.5+22.5]  |                |                |      |          |      |                      |
| Fall<br>Spring     | 60+30+30]§     | 1.3            | 73             |      | 3.8      | 5.0  | 1041                 |
|                    | 60+30+30]      |                |                |      |          |      |                      |

\* Vigor - 1 = best vigor; 5 = least.

\*\* Plant height in centimeters; 2.5 cm = 1 inch.

† Lodging - 1 = erect; 5 = lodged.

§ Split application, Fall and Spring.

All plots harvested July 16, except check - July 13.

LSD at 5% level 253  
LSD at 1% level NS

Table 31. Plant height, lodging, seed yields and harvest index for application of Parlay and EL-500 on Del Ray Perennial Ryegrass on three dates and three gallonages of water per acre. Sandstrom Farm, Roseau, MN. Mineral Soil - 1984 data.

| Chemical     | Date | Gallonage | Rate <sup>1/</sup> | Plant *<br>height<br>6-20 | Lodging ** |      |      | Seed<br>yields † | Harvest<br>index ‡ |
|--------------|------|-----------|--------------------|---------------------------|------------|------|------|------------------|--------------------|
|              |      |           |                    |                           | 6-20       | 6-28 | 7-13 |                  |                    |
| No treatment |      | ----      |                    | 63                        | 2.5        | 6.5  | 8.5  | 117              | 20                 |
| Parlay       | 5-2  | 10        | 0.50               | 50                        | 1.0        | 1.5  | 2.5  | 128              | 22                 |
|              |      | 20        |                    | 58                        | 1.0        | 2.0  | 4.0  | 102              | 21                 |
|              |      | 40        |                    | 53                        | 1.0        | 1.5  | 2.0  | 111              | 22                 |
| EL-500       | 5/2  | 10        | 1.00               | 55                        | 1.0        | 1.0  | 2.5  | 115              | 24                 |
|              |      | 20        |                    | 50                        | 1.0        | 1.0  | 2.0  | 117              | 21                 |
|              |      | 40        |                    | 53                        | 1.0        | 1.5  | 2.0  | 116              | 20                 |
| No treatment |      | ----      |                    | 63                        | 3.0        | 7.0  | 8.5  | 137              | 21                 |
| Parlay       | 5/15 | 10        | 0.50               | 53                        | 1.5        | 2.0  | 3.8  | 126              | 22                 |
|              |      | 20        |                    | 53                        | 1.0        | 1.0  | 2.0  | 114              | 24                 |
|              |      | 40        |                    | 48                        | 1.0        | 1.0  | 1.5  | 124              | 24                 |
| EL-500       | 5/15 | 20        | 1.00               | 50                        | 1.0        | 1.0  | 2.0  | 109              | 26                 |
| No treatment |      | ----      |                    | 60                        | 2.0        | 6.0  | 8.5  | 127              | 22                 |
| Parlay       | 5/23 | 10        | 0.50               | 50                        | 1.0        | 1.5  | 2.0  | 95               | 23                 |
|              |      | 20        |                    | 48                        | 1.0        | 1.0  | 2.0  | 118              | 22                 |
|              |      | 40        |                    | 55                        | 1.0        | 1.0  | 1.5  | 107              | 24                 |
| EL-500       | 5/23 | 10        | 1.00               | 55                        | 2.0        | 1.5  | 2.0  | 90               | 23                 |
|              |      | 20        |                    | 48                        | 1.0        | 1.0  | 1.0  | 89               | 24                 |
|              |      | 40        |                    | 50                        | 1.0        | 1.0  | 1.0  | 92               | 24                 |

\* Centimeters (2.5 cm = 1 inch).

\*\* Lodging - 1 = erect; 9 = lodged.

† Seed yields as grams per meter square; All plots harvested 7-17.

‡ Harvest index = weight of seed over weight of total sample.

<sup>1/</sup> lb/A a.i.

Table 32. Effects of seeding rate on stand and seed yields of birdsfoot trefoil.

| Data                       | Seeding rate (lb/A) |     |     |     |     |          |     |     |     |     |  |  |  |  |  |
|----------------------------|---------------------|-----|-----|-----|-----|----------|-----|-----|-----|-----|--|--|--|--|--|
|                            | 'Norcen'            |     |     |     |     | 'Viking' |     |     |     |     |  |  |  |  |  |
|                            | 0.5                 | 1.0 | 2.0 | 4.0 | 8.0 | 0.5      | 1.0 | 2.0 | 4.0 | 8.0 |  |  |  |  |  |
| Plants per square yard -   |                     |     |     |     |     |          |     |     |     |     |  |  |  |  |  |
| on June 22, 1981           | 16                  | 35  | 62  | 93  | 197 | 11       | 26  | 49  | 80  | 153 |  |  |  |  |  |
| on May 6, 1982             | 13                  | 20  | 30  | 39  | 64  | 11       | 18  | 30  | 47  | 60  |  |  |  |  |  |
| on May 5, 1983             | 13                  | 17  | 27  | 41  | 54  | 4        | 8   | 11  | 22  | 23  |  |  |  |  |  |
| on April 28, 1984          | 14                  | 18  | 22  | 27  | 32  | 17       | 16  | 17  | 22  | 25  |  |  |  |  |  |
| Seed yields harvested on - |                     |     |     |     |     |          |     |     |     |     |  |  |  |  |  |
| August 31, 1982 (lbs/A)    | 496                 | 385 | 335 | 267 | 178 | 447      | 374 | 338 | 240 | 187 |  |  |  |  |  |
| August 9, 1983 (lbs/A)     | 359                 | 402 | 342 | 336 | 323 | 208      | 239 | 182 | 287 | 318 |  |  |  |  |  |
| August 9, 1984 (lbs/A)     | 501                 | 520 | 502 | 542 | 454 | 428      | 470 | 450 | 494 | 522 |  |  |  |  |  |

Plots of 'Norcen' and 'Viking' birdsfoot trefoil were seeded with a Billion seeder at 0.5, 1.0, 2.0, 4.0 and 8.0 lbs/A at Roseau, Minnesota on May 6, 1981. On June 22, 1981 the number of plants established per square yard were counted. Each spring the number of plants that survived the winter were counted. After the first winter, stand loss was much greater in the plots seeded at the highest rates. Viking showed significant stand losses over the second winter, but little difference was noted in Norcen. By 1984, stand differences between cultivars and differences between plots seeded at different rates was small. Seed yields were taken in 1982, 1983, and 1984. In 1982, the lowest seeding rates tended to produce the highest yields. Little difference was noted in seed yields in 1983 or 1984.