



Hard Red Spring Wheat

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Spring wheat varieties are compared in trial plots at Waseca, Lamberton, Morris, Crookston, Stephen, Roseau and St. Paul. Wheat varieties are grown in replicated plots at each location. These plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all varieties at each location as possible. These hard red spring wheat trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should only be used to compare varieties within a table. Tested hard red spring wheat varieties are listed in the order of their flowering date in the tables.

Variety Selection Criteria

While grain yield is an important economic trait, return per acre also is affected by grain quality. Because *Fusarium* Head Blight (FHB), or scab, can reduce grain quality and yield dramatically, it is an important consideration. The foliar disease rating, which represents the total complex of leaf diseases, other than leaf and stripe rust, includes the Septoria complex, tan spot, powdery mildew and bacterial blight.

Although varieties may differ for their response to each of those diseases, the rating does not differentiate among them. Consequently, the rating should be used as a general indication and only for varietal selection in areas where these diseases have been a problem or if the previous crop was wheat or barley. Control of leaf diseases with fungicides may be warranted, even for varieties with an above-average rat-

ing. Disease ratings are now on a 1-9 scale where 1 = most resistant and 9 = most susceptible. Rating differences of 2 or more should be considered significant.

Variety selection for 2007 continues to be a balance between yield potential, disease responses and grain quality. Leading varieties in Minnesota, based on acres planted, include Knudson, Oklee, Freyr, Granite, Briggs, Oxen and Alsen.

Table 1. Origin and agronomic characteristics of hard red spring wheat varieties in Minnesota.

| Variety | Origin ¹ | PVP Status | Days to Heading ² | Height cm ² | Straw strength ³ |
|-------------|---------------------|------------|------------------------------|------------------------|-----------------------------|
| Briggs | 2002 SDSU | PVP (94) | 53 | 32 | Medium |
| Trooper | 2004 Westbred | PVP (94) | 53 | 29 | V. Strong |
| Kelby | 2006 AgriPro | PVP (pend) | 54 | 27 | — |
| Oklee | 2003 MN | PVP (94) | 54 | 30 | Medium |
| Ulen | 2005 MN | PVP (94) | 54 | 32 | Medium |
| Rush | 2007 Westbred | PVP (pend) | 54 | 30 | — |
| Glenn | 2005 NDSU | PVP (94) | 54 | 34 | Strong |
| Traverse | 2006 SDSU | PVP (pend) | 54 | 34 | — |
| Oxen | 1996 SDSU | PVP (94) | 54 | 31 | M. Strong |
| Walworth | 2001 SDSU | PVP (94) | 55 | 32 | Medium |
| Banton | 2004 Trigen | PVP (94) | 55 | 31 | Strong |
| Freyr | 2004 AgriPro | PVP (94) | 55 | 32 | Medium |
| Howard | 2006 NDSU | PVP (pend) | 55 | 33 | — |
| Steele-ND | 2004 NDSU | PVP (94) | 55 | 33 | Medium |
| FBC-Dylan | 2006 NPSAS/FBC | none | 56 | 30 | — |
| Granger | 2004 SDSU | PVP (94) | 56 | 35 | Medium |
| Alsen | 2000 NDSU | PVP (94) | 56 | 32 | Strong |
| Ada | 2006 MN | PVP (pend) | 56 | 30 | M. Strong |
| Knudson | 2001 AgriPro | PVP (94) | 56 | 30 | M. Strong |
| Bigg Red | 2004 Westbred | PVP (pend) | 57 | 33 | — |
| Hat Trick | 2007 Trigen | PVP (pend) | 57 | 30 | — |
| Reeder | 1999 NDSU | PVP (94) | 57 | 32 | Strong |
| Fireball | 2006 N. Star G. | PVP (pend) | 58 | 29 | — |
| Granite | 2002 Westbred | PVP (94) | 58 | 30 | V. Strong |
| Marshall | 1982 MN | none | 59 | 30 | Strong |
| Bakker Gold | 2006 N. Star G. | PVP (pend) | 59 | 33 | — |
| Polaris | 2003 N. Star G. | PVP (94) | 60 | 34 | V. Strong |
| Mean | | | 55.7 | 31.0 | |

¹ Abbreviations: MN = Minnesota Agricultural Expt. Stn.; NPSAS/FBC = Northern Plains Sustainable Agriculture Society/Farmer Breeder Club; N. Star G. = North Star Genetics; NDSU = North Dakota State University Research Foundation; SDSU = South Dakota Agricultural Expt. Stn.; Trigen = Trigen Seed Services LLC.

² 2006 data. Days to heading is approximate because not all locations are included

³ 2004-2006 data.

Table 2. Grain quality of hard red spring wheat varieties in Minnesota.

| Variety | Test Weight (Lb/Bu) | | Protein (%) ¹ | | Baking Quality ² | Falling Number ³ | Pre-Harvest Sprouting |
|-------------|---------------------|---------|--------------------------|---------|-----------------------------|-----------------------------|-----------------------|
| | 2006 | 2005-06 | 2006 | 2005-06 | | | |
| Briggs | 61.5 | 60.5 | 14.3 | – | Med. | 5,1,1,0 | R |
| Trooper | 61.7 | 60.8 | 13.9 | 14.2 | Med.-high | – | R |
| Kelby | 60.9 | – | 14.8 | – | – | – | – |
| Oklee | 61.3 | 60.5 | 14.7 | 14.9 | Low-med. | 6,0,0,1 | R |
| Ulen | 61.1 | 59.8 | 14.7 | 15.0 | Med. | 6,1,0,0 | MR-MS |
| Rush | 61.4 | – | 14.8 | – | – | – | – |
| Glenn | 63.7 | 62.6 | 14.8 | 15.4 | High | – | R |
| Traverse | 59.1 | 57.8 | 13.3 | 13.6 | – | – | MR-MS |
| Oxen | 60.4 | 58.0 | 14.3 | 14.4 | High-med. | 5,2,0,0 | R |
| Walworth | 60.2 | 59.1 | 14.6 | 14.7 | Med.-high | 6,1,0,0 | R |
| Banton | 62.4 | 61.6 | 14.5 | 14.6 | High-med. | 6,0,0,1 | MR-MS ⁴ |
| Freyr | 61.0 | 59.7 | 14.2 | 14.5 | Med. | – | R |
| Howard | 61.9 | 60.9 | 14.5 | 14.9 | – | – | R |
| Steele-ND | 61.9 | 60.8 | 14.6 | 15.0 | High | 7,0,0,0 | R |
| FBC-Dylan | 61.2 | – | 14.1 | – | – | – | – |
| Granger | 61.3 | 60.2 | 14.4 | 14.6 | Med. | 4,3,0,0 | MR |
| Alsen | 61.6 | 60.7 | 14.6 | 15.0 | High | 7,0,0,0 | R |
| Ada | 62.0 | 61.0 | 14.3 | 14.6 | Med.-high | 7,0,0,0 | R |
| Knudson | 61.1 | 60.1 | 13.9 | 14.2 | Med.-high | 5,2,0,0 | R |
| Bigg Red | 62.2 | – | 13.3 | 14.1 | – | – | – |
| Hat Trick | 61.9 | – | 14.2 | – | – | – | – |
| Reeder | 61.1 | 58.9 | 13.8 | 13.9 | Med.-high | 7,0,0,0 | R |
| Fireball | 59.3 | – | 15.3 | – | – | – | – |
| Granite | 62.1 | 61.3 | 15.2 | 15.3 | Med.-low | 3,3,1,0 | MR |
| Marshall | 60.0 | 57.4 | 13.4 | 13.8 | Low | 5,2,0,0 | R |
| Bakker Gold | 59.8 | – | 13.4 | – | – | – | – |
| Polaris | 59.7 | 58.4 | 13.4 | 13.6 | Med. | – | R |
| Mean | 61.3 | 60.0 | 14.3 | 14.3 | | | |

¹ 12% moisture basis.

² 2001-2004 crop years.

³ Falling Number is the number of trials in which the variety had falling numbers greater than 400, 350-400, 300-350, and less than 250. Based on 7 environments in 2003 and 2004. A variety that had falling numbers of greater than 400 in all 7 environments (i.e. 7,0,0,0) is best.

⁴ Banton showed a variable response, being resistant at Morris and St. Paul locations, but MS at Crookston.

Hard red spring wheat planting rate and date.

Calculating and seeding the appropriate amount of seed is an important first step towards maximizing yield. The seeding rate is a function of the number of kernels per pound of seed, the percent germination of the lot, the expected stand loss as a function of the quality of the seedbed, and the desired stand. In Minnesota, an average optimum stand for hard red spring wheat when planted early is between 28 to 30 plants per square foot or approximately 1.25 million plants per acre. This number should increase by 1 to 2 plants per square foot for every week planting is delayed past the early, optimum, seeding date. Expected stand loss even under good seedbed conditions is between 10% to 20% and will increase with a poor seedbed or improper seed placement due to poor depth control.

The general formula for calculating a seeding rate is:

$$\text{Seeding Rate (Pounds/Acre)} = \frac{\text{Desired Stand (Plants/Acre)} \times (1 - \text{Expected Stand Loss})}{(\text{Seeds/Pound}) \times \text{Percentage Germination}}$$

Calculate the seeding rate for every single seed lot and calibrate the drill accordingly.

Example: Early variety.

| Desired Stand, (Plants/Acre) | Expected Stand Loss | Seeds per Pound | Percentage Germination | Seeding Rate, (Lb/Acre) |
|------------------------------|---------------------|-----------------|------------------------|-------------------------|
| 1.25 million | 0.20 | 14,000 | 0.95 | 113 |

New releases for 2006 are Ada (MN), Bakker Gold and Fireball (North Star Genetics), FBC-Dylan (Northern Plains Sustainable Agriculture Society/Farmer Breeder Club), Howard (NDSU), Kelby (AgriPro), and Traverse (SDSU).

Rust diseases were minimal in 2006, but both leaf rust and stripe rust have caused significant losses on some varieties in recent years.

Varieties with ratings of 5 or higher should be closely monitored during the season for rust development.

Varieties with ratings of 4 or better should not experience economic levels of damage to these fungi in most years. Stripe rust was a serious problem on susceptible varieties in some locations in 2004. This disease is not as widespread and does not occur as regularly as leaf rust, but can be very damaging when temperatures remain unseasonably cool into early July. Most varieties are resistant or moderately resistant. Trooper and Walworth are more susceptible, and sustained economic levels of damage in 2004. Stem rust ratings have been added in the disease tables again because there are differences in variety reaction. However, the levels of this disease have been very low in production fields in recent years, even on susceptible varieties.

Falling number data, an important end-use quality trait that can be determined at most local elevators, has been added to the grain-quality table. Falling number is measured in seconds, and values of 300 or higher are required for milling quality wheat. Falling number is related to preharvest sprouting, in that sprouted grain will always have low falling numbers. In the absence of visual sprouting, falling numbers are generally greater than 400, except in certain varieties.

Due to the increased use of fungicides in wheat in Minnesota, we have implemented an additional variety trial in which fungicides are applied at the time of herbicide application (Feekes 5), flag leaf emergence (Feekes 9), and at the

onset of flowering (Feekes 10.51). The practice of three fungicide applications during the growing season is not recommended. This fungicide regime was implemented to measure the performance of varieties when fungal diseases were controlled to the maximum extent possible. A grower's decisions regarding fungicide applications should be based on the available decision support systems, and only if and when disease levels are forecasted to reach economic damaging levels.

The additional performance evaluations were carried out adjacent to the conventional (no fungicides applied) trials, so results can be

compared directly. The trials were conducted in Lamberton, Morris, Crookston and Roseau in 2006 and in Morris, Crookston and Roseau in 2004 and 2005. In 2006, the fungicide regime as applied in these trials increased grain yield across varieties 2 to 4 bu/acre. Except for the 2-year analysis across the northern locations, the 2- and 3-year comparisons showed an increase in grain yield of 6 to 12 bu/acre. Rather than the average increases in grain yield, the responses of individual varieties provide the most useful information; varieties rated susceptible to leaf rust, stripe rust and powdery mildew benefited most from fungicide applications.

Table 3. Disease reactions of hard red spring wheat varieties in Minnesota. ¹

| Variety | Leaf Rust | Stripe Rust | Stem Rust | Other Leaf Diseases ² | Scab |
|-------------|----------------|-------------|-----------|----------------------------------|------|
| Briggs | 1 | 1 | 2 | 4 | 5 |
| Trooper | 4 | 7 | 1 | 8 ⁴ | 6 |
| Kelby | 2 | — | 1 | — | — |
| Oklee | 4 | 1 | 1 | 4 | 5 |
| Ulen | 3 | 1 | 1 | 5 | 6 |
| Rush | 4 ³ | — | 4 | — | — |
| Glenn | 1 | 1 | 1 | 4 | 3 |
| Traverse | 4 | — | 2 | — | — |
| Oxen | 7 | 1 | 3 | 7 | 8 |
| Walworth | 6 | 6 | 1 | 8 ⁴ | 5 |
| Banton | 2 | 1 | 1 | 5 | 5 |
| Freyr | 4 | 1 | 4 | — | 4 |
| Howard | 1 | — | 1 | — | — |
| Steele-ND | 1 | 1 | 1 | 4 | 6 |
| FBC-Dylan | 7 ³ | — | 1 | — | — |
| Granger | 3 | 1 | 1 | 4 | 5 |
| Alsen | 3 | 1 | 1 | 6 | 4 |
| Ada | 2 | 1 | 2 | 3 ⁴ | 6 |
| Knudson | 1 | 3 | 3 | 3 | 6 |
| Bigg Red | 8 | — | 2 | — | — |
| Hat Trick | 4 ³ | — | 3 | — | — |
| Reeder | 8 | 1 | 1 | 4 | 7 |
| Fireball | 4 | — | 1 | — | — |
| Granite | 6 | 3 | 3 | 5 ⁵ | 6 |
| Marshall | 8 | 1 | 1 | 7 | 7 |
| Bakker Gold | 3 ³ | — | 7 | — | — |
| Polaris | 6 | 1 | 8 | 3 | 7 |

¹ 1-9 scale where 1=most resistant, 9=most susceptible.

² Includes tan spot, septoria, bacterial leaf blight, and powdery mildew.

³ This rating is based on limited data.

⁴ These varieties are more susceptible to powdery mildew.

⁵ This variety is more susceptible to bacterial leaf blight.

Table 4. Relative grain yield of hard red spring wheat varieties in northern Minnesota locations.

| Variety | Crookston | | | Roseau | | Stephen | | | On-Farm | | |
|----------------|-----------|--------|--------|--------|---------------------|---------|--------|--------|---------|--------|--------|
| | 2006 | 2-Year | 3-Year | 2006 | 2-Year ¹ | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year |
| Briggs | 116 | 107 | 104 | 101 | 105 | 107 | 99 | 100 | 111 | 105 | 102 |
| Trooper | 107 | 101 | 102 | 77 | 78 | 84 | 93 | 99 | 99 | 98 | 101 |
| Kelby | 102 | – | – | 84 | – | 89 | – | – | 101 | – | – |
| Oklee | 96 | 102 | 100 | 89 | 96 | 95 | 97 | 99 | 103 | 102 | 99 |
| Ulen | 99 | 98 | 95 | 110 | 113 | 105 | 96 | 96 | 106 | 104 | 102 |
| Rush | 86 | – | – | 80 | – | 101 | – | – | 90 | – | – |
| Glenn | 92 | 97 | 98 | 111 | 108 | 98 | 103 | 101 | 104 | 103 | – |
| Traverse | 110 | 118 | – | 114 | – | 118 | 112 | – | 110 | – | – |
| Oxen | 107 | 103 | 97 | 104 | 105 | 109 | 108 | 103 | 95 | 93 | 96 |
| Walworth | 104 | 101 | 101 | 89 | 93 | 95 | 105 | 104 | 103 | 103 | 100 |
| Banton | 98 | 96 | 99 | 97 | 97 | 96 | 98 | 99 | 110 | 100 | – |
| Freyr | 98 | 104 | 103 | 98 | 96 | 98 | 108 | 100 | 98 | 102 | 100 |
| Howard | 110 | 109 | – | 111 | – | 104 | 102 | – | 106 | – | – |
| Steele-ND | 105 | 102 | 98 | 113 | 106 | 107 | 101 | 102 | 109 | 105 | 101 |
| FBC-Dylan | 97 | – | – | 105 | – | 100 | – | – | – | – | – |
| Granger | 94 | 105 | 97 | 105 | 102 | 103 | 109 | 107 | 108 | 105 | 106 |
| Alsen | 95 | 97 | 99 | 105 | 103 | 97 | 94 | 94 | 97 | 95 | 96 |
| Ada | 97 | 102 | 105 | 96 | 100 | 87 | 94 | 96 | 97 | 98 | – |
| Knudson | 108 | 112 | 113 | 104 | 96 | 106 | 109 | 105 | 108 | 107 | 105 |
| BiggRed | 95 | – | – | 104 | – | 92 | – | – | 96 | – | – |
| Hat Trick | 82 | – | – | 90 | – | 78 | – | – | – | – | – |
| Reeder | 105 | 93 | 91 | 102 | 103 | 97 | 92 | 95 | 97 | 93 | 95 |
| Fireball | 91 | – | – | 107 | – | 97 | – | – | 92 | – | – |
| Granite | 102 | 106 | 108 | 89 | 99 | 87 | 94 | 93 | 94 | 87 | 92 |
| Marshall | 99 | 95 | 92 | 92 | 84 | 81 | 78 | 84 | 84 | – | – |
| Bakker Gold | 87 | – | – | 109 | – | 99 | – | – | 92 | – | – |
| Polaris | 92 | 107 | 107 | 106 | 103 | 103 | 121 | 115 | 87 | 94 | 100 |
| Mean (Bu/Acre) | 77.1 | 69.7 | 75.3 | 78.3 | 83.9 | 70.9 | 77.1 | 75.2 | 64.9 | 64.8 | 74.7 |
| LSD (0.05) | 12.9 | 20.4 | 14.6 | 12.1 | 16.0 | 11.8 | 24.5 | 19.1 | 13.5 | 10.1 | 6.5 |

¹ Roseau was abandoned in 2005 due to flooding. Two-year data are 2004 and 2006.

Table 5. Relative grain yield of hard red spring wheat varieties in southern Minnesota locations.

| Variety | Lamberton | | | Morris | | | St. Paul | | | Waseca | | |
|-----------|-----------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|--------|
| | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year |
| Briggs | 107 | 113 | 108 | 108 | 113 | 112 | 99 | 102 | 100 | 103 | 106 | 104 |
| Trooper | 76 | 74 | 79 | 107 | 110 | 101 | 114 | 108 | 115 | 89 | 84 | 85 |
| Kelby | 86 | – | – | 73 | – | – | 101 | – | – | 97 | – | – |
| Oklee | 93 | 105 | 102 | 97 | 98 | 101 | 94 | 94 | 97 | 99 | 112 | 109 |
| Ulen | 98 | 107 | 105 | 109 | 105 | 105 | 108 | 111 | 116 | 119 | 125 | 124 |
| Rush | 88 | – | – | 83 | – | – | 89 | – | – | 84 | – | – |
| Glenn | 88 | 89 | 89 | 79 | 83 | 90 | 84 | 103 | 103 | 86 | 102 | 98 |
| Traverse | 127 | 144 | – | 116 | 123 | – | 111 | 105 | – | 113 | 122 | – |
| Oxen | 91 | 84 | 84 | 115 | 97 | 96 | 110 | 90 | 96 | 104 | 103 | 101 |
| Walworth | 104 | 107 | 105 | 92 | 104 | 96 | 105 | 108 | 107 | 101 | 110 | 109 |
| Banton | 84 | 98 | 95 | 84 | 95 | 98 | 98 | 100 | 102 | 92 | 97 | 93 |
| Freyr | 104 | 113 | 112 | 116 | 112 | 110 | 100 | 94 | 97 | 101 | 101 | 101 |
| Howard | 108 | 112 | – | 117 | 111 | – | 103 | 109 | – | 97 | 116 | – |
| Steele-ND | 105 | 115 | 110 | 116 | 107 | 105 | 98 | 114 | 116 | 96 | 111 | 111 |
| FBC-Dylan | 92 | – | – | 116 | – | – | 95 | – | – | 96 | – | – |
| Granger | 113 | 117 | 115 | 99 | 102 | 104 | 96 | 96 | 96 | 108 | 132 | 118 |
| Alsen | 96 | 90 | 91 | 87 | 96 | 96 | 91 | 96 | 93 | 103 | 97 | 95 |
| Ada | 110 | 114 | 114 | 93 | 99 | 101 | 104 | 91 | 89 | 97 | 103 | 102 |
| Knudson | 108 | 98 | 104 | 106 | 110 | 112 | 102 | 115 | 111 | 102 | 101 | 108 |
| BiggRed | 101 | – | – | 99 | – | – | 96 | – | – | 97 | – | – |
| Hat Trick | 94 | – | – | 109 | – | – | 94 | – | – | 100 | – | – |
| Reeder | 90 | 75 | 80 | 100 | 89 | 95 | 105 | 107 | 109 | 98 | 91 | 93 |
| Fireball | 90 | – | – | 104 | – | – | 90 | – | – | 92 | – | – |
| Granite | 105 | 112 | 112 | 85 | 93 | 94 | 95 | 94 | 95 | 107 | 99 | 99 |

Table 5. Relative grain yield of hard red spring wheat varieties in southern Minnesota locations (continued).

| Variety | Lamberton | | | Morris | | | St. Paul | | | Waseca | | |
|----------------|-----------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|--------|
| | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year |
| Marshall | 79 | 58 | 65 | 96 | 72 | 71 | 101 | 73 | 64 | 96 | 63 | 64 |
| Bakker Gold | 107 | — | — | 98 | — | — | 95 | — | — | 105 | — | — |
| Polaris | 108 | 84 | 88 | 121 | 103 | 105 | 93 | 96 | 99 | 113 | 92 | 91 |
| Mean (Bu/Acre) | 49.1 | 42.5 | 46.6 | 65.8 | 72.0 | 75.7 | 92.3 | 71.7 | 70.1 | 66.5 | 53.2 | 57.4 |
| LSD (0.05) | 13.8 | 17.2 | 29.0 | 20.5 | 33.2 | 20.8 | 7.9 | 28.4 | 19.6 | 10.1 | 32.4 | 20.2 |

Table 6. Relative grain yield of hard red spring wheat varieties in Minnesota.

| Variety | State | | | North | | | South | | |
|---------------------|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year | 2006 | 2-Year | 3-Year |
| Briggs | 106 | 106 | 105 | 108 | 101 | 102 | 104 | 108 | 106 |
| Trooper | 93 | 94 | 95 | 89 | 94 | 95 | 97 | 94 | 95 |
| Kelby | 91 | — | — | 92 | — | — | 89 | — | — |
| Oklee | 95 | 101 | 101 | 93 | 99 | 99 | 96 | 102 | 102 |
| Ulen | 107 | 107 | 108 | 105 | 99 | 99 | 108 | 112 | 113 |
| Rush | 87 | — | — | 89 | — | — | 86 | — | — |
| Glenn | 91 | 98 | 98 | 100 | 103 | 102 | 84 | 94 | 95 |
| Traverse | 116 | 121 | — | 114 | 115 | — | 117 | 123 | — |
| Oxen | 106 | 97 | 97 | 107 | 105 | 101 | 105 | 93 | 94 |
| Walworth | 99 | 105 | 103 | 96 | 101 | 101 | 101 | 107 | 104 |
| Banton | 93 | 98 | 98 | 97 | 97 | 98 | 89 | 97 | 97 |
| Freyr | 102 | 105 | 103 | 98 | 106 | 102 | 105 | 105 | 105 |
| Howard | 107 | 110 | — | 108 | 106 | — | 106 | 112 | — |
| Steele-ND | 106 | 109 | 107 | 108 | 103 | 101 | 104 | 112 | 111 |
| FBC-Dylan | 100 | — | — | 101 | — | — | 100 | — | — |
| Granger | 102 | 110 | 106 | 101 | 108 | 104 | 104 | 112 | 108 |
| Alsen | 96 | 96 | 95 | 99 | 97 | 97 | 94 | 95 | 94 |
| Ada | 97 | 100 | 101 | 93 | 99 | 101 | 101 | 102 | 101 |
| Knudson | 105 | 107 | 108 | 106 | 110 | 107 | 104 | 106 | 109 |
| BiggRed | 98 | — | — | 97 | — | — | 98 | — | — |
| Hat Trick | 92 | — | — | 83 | — | — | 99 | — | — |
| Reeder | 99 | 91 | 94 | 101 | 93 | 94 | 98 | 90 | 94 |
| Fireball | 96 | — | — | 98 | — | — | 94 | — | — |
| Granite | 96 | 99 | 100 | 93 | 99 | 101 | 98 | 99 | 100 |
| Marshall | 92 | 73 | 73 | 91 | 87 | 87 | 93 | 67 | 66 |
| Bakker Gold | 100 | — | — | 98 | — | — | 101 | — | — |
| Polaris | 105 | 100 | 101 | 100 | 115 | 111 | 109 | 94 | 96 |
| Mean (Bu/Acre) | 71.1 | 61.7 | 65.8 | 75.5 | 74.1 | 76.9 | 68.4 | 55.5 | 59.5 |
| LSD (0.05) | 8.3 | 9.2 | 7 | 7.1 | 12.6 | 9.8 | 7.4 | 13 | 9.6 |
| No. of Environments | 7 | 14 | 20 | 3 | 6 | 8 | 4 | 8 | 12 |

Table 7. Grain yield (bushels/acre) of hard red spring wheat varieties grown under conventional and intensive management ¹.

| | North | | | | | | South | | | | | | State | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 1-Year | | 2-Year | | 3-Year | | 1-Year | | 2-Year | | 3-Year | | 1-Year | | 2-Year | | 3-Year | |
| | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. | Conv. | Inten. |
| Briggs | 84.3 | 89.7 | 76.3 | 82.5 | 84.2 | 86.2 | 60.0 | 61.3 | 56.8 | 56.8 | 65.9 | 68.3 | 73.2 | 75.5 | 67.1 | 70.4 | 76.4 | 78.6 |
| Trooper | 71.3 | 84.6 | 67.2 | 77.2 | 72.6 | 88.4 | 50.9 | 49.8 | 50.2 | 49.3 | 55.4 | 64.0 | 62.0 | 67.2 | 59.2 | 64.0 | 65.3 | 78.1 |
| Kelby | 72.5 | 76.2 | - | - | - | - | 44.8 | 53.5 | - | - | - | - | 59.9 | 64.8 | - | - | - | - |
| Oklee | 71.8 | 72.7 | 70.4 | 69.3 | 77.6 | 77.7 | 53.1 | 58.0 | 49.4 | 55.7 | 60.0 | 67.9 | 63.3 | 65.4 | 60.5 | 62.9 | 70.2 | 73.6 |
| Ulen | 81.1 | 75.9 | 74.4 | 72.4 | - | - | 57.7 | 56.6 | 52.5 | 53.4 | - | - | 70.5 | 66.2 | 64.1 | 63.5 | - | - |
| Rush | 64.7 | 71.9 | - | - | - | - | 47.7 | 47.5 | - | - | - | - | 57.0 | 59.7 | - | - | - | - |
| Glenn | 79.1 | 73.4 | 74.0 | 70.7 | - | - | 46.8 | 49.9 | 43.4 | 47.8 | - | - | 64.4 | 61.7 | 59.6 | 60.0 | - | - |
| Traverse | 87.3 | 84.5 | - | - | - | - | 68.3 | 68.8 | - | - | - | - | 78.6 | 76.7 | - | - | - | - |
| Oxen | 82.3 | 94.9 | 75.5 | 83.1 | 83.2 | 87.5 | 57.4 | 65.2 | 48.6 | 61.9 | 56.7 | 70.6 | 71.0 | 80.1 | 62.9 | 73.1 | 72.0 | 80.3 |
| Walworth | 74.9 | 78.7 | 70.4 | 74.6 | 77.2 | 83.4 | 55.0 | 58.7 | 53.2 | 56.4 | 56.9 | 66.7 | 65.8 | 68.7 | 62.3 | 66.0 | 68.6 | 76.3 |
| Banton | 75.7 | 83.8 | 70.3 | 77.8 | 79.7 | 83.5 | 47.1 | 50.7 | 46.9 | 48.7 | 57.9 | 60.2 | 62.7 | 67.3 | 59.2 | 64.1 | 70.5 | 73.7 |
| Freyr | 76.1 | 84.1 | 73.7 | 77.1 | 78.6 | 81.0 | 61.1 | 64.8 | 56.0 | 60.7 | 64.9 | 72.0 | 69.3 | 74.5 | 65.4 | 69.4 | 72.8 | 77.2 |
| Howard | 86.0 | 81.7 | - | - | - | - | 62.4 | 65.6 | - | - | - | - | 75.3 | 73.6 | - | - | - | - |
| Steele-ND | 84.6 | 87.4 | 77.1 | 77.9 | 82.7 | 81.5 | 61.7 | 58.0 | 54.6 | 53.3 | 62.3 | 62.2 | 74.2 | 72.7 | 66.5 | 66.3 | 74.0 | 73.4 |
| FBC-Dylan | 78.6 | 78.0 | - | - | - | - | 57.6 | 64.3 | - | - | - | - | 69.1 | 71.1 | - | - | - | - |
| Granger | 77.3 | 79.2 | 75.9 | 77.2 | 81.5 | 81.5 | 59.2 | 66.5 | 54.2 | 62.2 | 64.2 | 69.8 | 69.1 | 72.8 | 65.7 | 70.1 | 74.2 | 76.6 |
| Alsen | 77.7 | 78.8 | 72.2 | 74.0 | 78.9 | 80.8 | 51.3 | 55.3 | 49.1 | 51.7 | 57.7 | 61.7 | 65.7 | 67.1 | 61.4 | 63.5 | 70.5 | 72.7 |
| Ada | 72.0 | 86.0 | - | - | - | - | 56.8 | 62.3 | - | - | - | - | 65.1 | 74.1 | - | - | - | - |
| Knudson | 82.2 | 86.8 | 78.8 | 81.3 | 83.5 | 86.0 | 59.8 | 60.9 | 57.9 | 58.5 | 68.7 | 70.3 | 72.0 | 73.9 | 68.9 | 70.6 | 77.2 | 79.4 |
| BiggRed | 77.3 | 85.3 | - | - | - | - | 56.0 | 58.8 | - | - | - | - | 67.6 | 72.0 | - | - | - | - |
| Reeder | 78.0 | 90.3 | 69.0 | 78.6 | 76.7 | 86.3 | 52.9 | 57.5 | 45.9 | 54.3 | 57.2 | 66.6 | 66.6 | 73.9 | 58.1 | 67.2 | 68.4 | 78.0 |
| Granite | 73.2 | 78.1 | 71.4 | 75.0 | 78.8 | 85.7 | 53.2 | 57.8 | 52.6 | 55.5 | 60.3 | 66.5 | 64.1 | 67.9 | 62.6 | 65.8 | 71.0 | 77.6 |
| Marshall | 74.4 | 85.3 | 68.4 | 81.5 | 71.9 | 88.5 | 48.9 | 60.0 | 38.4 | 56.6 | 43.7 | 66.0 | 62.8 | 72.7 | 54.3 | 69.8 | 60.0 | 79.0 |
| Polaris | 76.9 | 86.6 | 76.7 | 85.7 | 81.9 | 90.3 | 64.0 | 64.2 | 57.0 | 60.9 | 66.1 | 69.7 | 71.0 | 75.4 | 67.4 | 74.1 | 75.2 | 81.6 |
| Mean | 77.5 | 82.2 | 73.0 | 77.4 | 79.3 | 84.6 | 55.6 | 59.0 | 50.6 | 55.5 | 59.4 | 66.8 | 67.5 | 70.6 | 62.4 | 67.1 | 70.7 | 77.1 |
| LSD | 13.7 | 11.6 | NS | NS | 8.3 | NS | 12.3 | 7.2 | 10.3 | 5.3 | 9.6 | 6.2 | 8.2 | 7.4 | 7.2 | 6.2 | 6.1 | 5.7 |
| Env. | 2 | 2 | 3 | 3 | 5 | 5 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 6 | 6 | 9 | 9 |

¹ Intensive trials received fungicide treatments at Feekes 5 (Stratego @ 5 fl.oz/acre), Feekes 9 (Tilt @ 4 fl.oz/acre), and Feekes10.51 (Folicur @ 4 fl.oz./acre). Conventional trials received no fungicide.