Cooperators: Gerald and Carol Olsonawski, Jim and Marilyn Kukowski, Ray and Barbara Swenson, Brian and Theresa Hest, Bruce and Kim Brenden

Nearest Towns: Hallock, Strathcona, Oklee, Perley, and Rothsay

Previous Crop: Barley near Rothsay, soybean at other locations

Varieties: Alsen, Knudson, Oxen, Reeder and Walworth

Row Width: 6 inches

Herbicide: Puma and Bronate Advanced at 4-5 leaf growth stage for wheat

Experimental Design: Randomized complete block

Purpose of Study:
To determine whether diseases of wheat (leaf spots and Fusarium head blight) can be managed by tailoring disease management strategies to complement the levels of resistances in varieties by using the following fungicide treatments.

- Tilt (2 fl oz/acre) applied at the 4-5 leaf growth stage
- Headline (6 fl oz/acre) applied at full flag leaf emergence
- Tilt (2 fl oz/acre) applied at the 4-5 leaf stage and Headline (6 fl oz/acre) applied at full flag leaf emergence
- Folicur (4 fl oz/acre) applied at early flowering
- Tilt (2 oz/acre) applied at the 4-5 leaf stage and Folicur (4 fl oz/acre) applied at early flowering
- No fungicide applied

Results:
Fungicide treatment gains, or losses, were calculated at $3.70/bushel wheat grain and with $4.50/acre application costs for all treatments except Tilt at the 4-5 leaf stage. Increases or reductions in grain quality are hard to quantify, so discounts and grain marketing issues must be considered in addition to the information presented in this report. Both grain yield AND quality must be taken into account when developing comprehensive disease management strategies.
Rothsay

Plots of susceptible varieties not treated with fungicide had the most severe flag leaf tissue damage (as high as 90+% of flag leaf tissues killed per plot) (Figure 1). Vomitoxin (DON) averages varied across varieties, ranging from 0.9 ppm (Alsen, Tilt and Folicur) to 5.1 ppm (Reeder, no fungicide) (Figure 2). Grain yield averages ranged from 70 bushels/acre (Reeder, no fungicide) to 92 bushels/acre (Knudson, Tilt and Folicur); test weight averages ranged from 61 lbs./bu (Reeder, Headline) to 64 lbs./bu (Oxen, Tilt and Folicur); thousand-kernel weight averages ranged from 30.6 grams (Walworth, no fungicide) to 37.4 grams (Knudson, Folicur), and protein averages ranged from 13.2% (Knudson, Tilt and Folicur) to 14.6% (Walworth, Folicur).

Based only on grain yield results, the overall economic trend was toward loss if fungicide was applied on Alsen (from -$2.75/acre for Tilt to -$25.75/acre for Tilt and Folicur) and toward gains by applying fungicide on Walworth (from +$2.80/acre for Tilt to +$32.34/acre for Tilt and Folicur). Fungicide treatments of other varieties resulted in various outcomes. Only one fungicide treatment on Knudson was profitable (from +$4.59/acre for Tilt and Folicur to -$25.05/acre for Headline), and only one treatment on Reeder triggered loss (from -$11.52/acre for Tilt and Headline to +$15.11/acre for Folicur). Oxen, on the other hand, was evenly split with two fungicide treatments costing money and three treatments resulting in gains (from -$0.53/acre for Tilt to +12.73/acre for Tilt and Folicur).
Perley

Leaf disease injury was more moderate at this site compared with Rothsay (as high as 60+% of flag leaf tissues killed per plot) (Figure 3). Vomitoxin (DON) averages varied across varieties and treatments ranging from 0.2 ppm (Alsen, no fungicide) to 1.3 ppm (Reeder, Folicur) (Figure 4). Grain yield averages ranged from 92 bushels/acre (Alsen, no fungicide) to 107 bushels/acre (Walworth, Tilt and Folicur); test weight averages ranged from 63.9 lbs./bu (Knudson, Tilt) to 65.5 lbs./bu (Alsen, Tilt and Folicur); thousand-kernel weight averages ranged from 33.5 grams (Walworth, no fungicide) to 36.6 grams (Alsen, Folicur), and protein averages ranged from 12.1% (Knudson, Tilt and Folicur) to 13.3% (Alsen, Headline).

Based on grain yield results, the overall economic trend was toward loss if fungicide was applied on Knudson (from -$6.35/acre for Folicur to -$17.07/acre for Tilt and Headline), Reeder (from -$0.90/acre for Tilt to -$18.55/acre for Tilt and Headline), and Walworth (from -$2.48/acre for Headline to -$8.19/acre for Tilt and Headline). Only one fungicide treatment on Oxen was not profitable (from -$2.27/acre for Tilt and Headline to +$8.45/acre for Folicur), while all treatments on Alsen resulted in gains (from +$6.61/acre for Tilt and Headline to +$11.95/acre for Headline).
Oklee

Leaf diseases established slowly in the growing season at this site (as high as 30+% of flag leaf tissues killed per plot) (Figure 5). Vomitoxin (DON) averages varied somewhat across varieties (Figure 6), ranging from 0.03 ppm (Alsen, Tilt and Headline) to 0.8 ppm (Reeder, Headline). Grain yield averages ranged from 101 bushels/acre (Oxen, no fungicide) to 119 bushels/acre (Walworth, Folicur); test weight averages ranged from 60.5 lbs./bushel (Oxen, no fungicide) to 64.3 lbs./bushel (Alsen, Headline); thousand-kernel weight averages ranged from 34.1 grams (Walworth, Tilt) to 39.0 grams (Reeder, Folicur), and protein averages ranged from 13.5% (Knudson, Folicur) to 15.4% (Reeder, Headline).

Based on grain yield results, the fungicide treatments resulted in gains when applied to Oxen (from +$12.36/acre for Tilt and Folicur to +$32.67/acre for Headline), and losses when applied to Reeder (from -$2.81/acre for Tilt and Folicur to -$19.50/acre for Headline). One fungicide treatment on Walworth was not profitable (from -$2.75/acre for Tilt to +$15.48/acre for Folicur). Knudson had three treatments that were not profitable (from -$24.68/acre for Headline to +$7.34/acre for Folicur), while Alsen had three profitable treatments (from -$7.46/acre for Folicur to +10.51/acre for Tilt and Folicur).
Leaf diseases did not establish at this site (up to 7% of flag leaf tissues killed per plot) (Figure 7). Vomitoxin (DON) averages were low (Figure 8), ranging from 0.08 ppm (Alsen, Tilt) to 0.56 ppm (Reeder, no fungicide). Grain yield averages ranged from 76 bushels/acre (Alsen, Tilt) to 99 bushels/acre (Oxen, Tilt and Folicur); test weight averages ranged from 61.3 lbs./bushel (Reeder, no fungicide) to 62.8 lbs./bushel (Walworth, Folicur); thousand-kernel weight averages ranged from 34.3 grams (Alsen, no fungicide) to 37.9 grams (Knudson, Headline), and protein averages ranged from 13.7% (Knudson, no fungicide) to 14.8% (Reeder, Headline).

Based on grain yield results, the overall economic trend was toward loss if fungicide was applied on Reeder (from -$11.26/acre for Tilt to -$45.93/acre for Tilt and Headline), and Oxen (+$2.53/acre for Folicur to -$19.50/acre for Headline). Three treatments netted profits on Alsen (from +$4.75/acre for Folicur to -$6.88/acre for Tilt and Folicur). Two of the five fungicide treatments resulted in gains for Walworth (from -$12.64/acre for Folicur to +$10.84/acre for Headline), and Knudson (from +$10.31/acre for Tilt and Headline to -$30.40/acre for Folicur).
Red River Valley On-Farm Wheat Disease Management Trials
Kittson, Roseau, Red Lake, Norman, and Wilkin Counties (continued)

Hallock

Leaf disease pressure was relatively low at this site (up to 30% of flag leaf tissues killed per plot) (Figure 9). Vomitoxin (DON) averages varied (Figure 10), ranging from 0.4 ppm (Walworth, Folicur) to 4.8 (Reeder, Headline). Grain yield averages ranged from 83 bushels/acre (Alsen, no fungicide) to 104 bushels/acre (Oxen, Tilt and Folicur); test weight averages ranged from 54.6 lbs./bushel (Oxen, Tilt and Headline) to 59.5 lbs./bushel (Alsen, Tilt and Folicur); thousand-kernel weight averages ranged from 28.0 grams (Oxen, Tilt) to 34.6 grams (Knudson, Tilt and Folicur), and protein averages ranged from 13.5% (Knudson, Tilt and Headline) to 14.9% (Reeder, Folicur).

Based on grain yield results, the overall economic trend was toward loss if fungicide was applied on Knudson (from -$1.91/acre for Folicur to -$26.06/acre for Tilt), and toward gains by applying treatments on Reeder (from +$7.24/acre for Tilt to +$23.09/acre for Tilt and Folicur). Only one fungicide treatment was not profitable on Alsen (from -$5.34/acre for Tilt to +$17.33/acre for Folicur), as well as Walworth (from -$1.17/acre for Folicur to +$16.06/acre for Tilt and Folicur). Three fungicide treatments were profitable on Oxen (from -$15.33/acre for Tilt to +$30.49/acre for Tilt and Folicur).

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