

Project Title: Stripe rust response to winter wheat varieties and fungicides

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Objectives: To evaluate fungicide efficacy when applied to winter wheat varieties differing in susceptibility to stripe rust.

Materials and Methods:

The factorial treatment arrangement consisted of three fungicide treatments and seven winter wheat varieties that varied in susceptibility to stripe rust (*Puccinia striiformis tritici*). The fungicide treatments included Priaxor, Prosaro, Twinline plus a non-treated control. The winter wheat varieties consisted on Decade, Eddy, Jagalene, Paladin, Tucson, Whetstone, and Yellowstone. Individual plots consisted of seven, 6-inch rows, 15 feet in length, with each variety-fungicide combination replicated 3 times in a split plot design. Fungicide treatments were the whole plot effect and the varieties were the sub-plot factor.

The study site was a conventionally tilled field that had been fallowed during the previous year. The soil was a Creston silt loam (25-50-25/ S-Si-C) with an organic matter content of 4%, a C.E.C of 20, and a pH of 7.5. A preplant application of 10-35-90-8.5 lb/A of N-P-K-S was applied on September 15, 2011, and the wheat varieties were planted 1.5 inches deep on September 24, 2011 at a rate of 80 lb/A. A topdress application of nitrogen and sulfur (100-0-0) was applied on April 17, 2012.

Priaxor, Prosaro and Twinline were applied at 4.0, 6.5, and 9.0 oz/A, respectively on June 1 when the plants were in the flag leaf stage and ranged from 23 to 27 inches in height. The infection level was light and ranged from 0 to 20 percent of the leaf tissue. Treatments were applied with a non-ionic surfactant at 0.125% v/v in 20 GPA of water using a backpack sprayer equipped with Tee Jet 11002 nozzles. The study was harvested on August 14. Yield and quality variables were then determined.

Results:

Wheat varieties varied greatly in susceptibility to the disease. On July 1, the most resistant variety was Yellowstone, which had overall infection levels of 40 percent (Table 2). In contrast, Decade (99%) was the most susceptible variety. However, by the July 30 rating, all non-treated varieties had been completely overtaken by stripe rust. The effect of the disease was so severe that infection level impacted plant height. Averaged over varieties, plant height was reduced by 2 to 3 inches (Table 1).

All three fungicides reduced the incidence of stripe rust, regardless of the level of resistance expressed by the individual cultivar. However, Priaxor was the least efficacious. While fungicide reduced the incidence of stripe rust, it did not change the relative ranking of the wheat cultivars. These results demonstrate that stripe rust management requires the use of resistant varieties as well as fungicide applications.

Table 1. Winter wheat response to the main effects of fungicide and variety for strip rust control, 2012.

| | % SR June 7 | % SR July 1 | % SR July 12 | % SR July 30 | heading Julian | Height inch | lodging % | Yield bu/a | Protein 12 % | TWT 13% | TKW 13% | FN sec | moist % |
|------------------|----------------|----------------|-----------------|-----------------|-------------------|----------------|--------------|---------------|-----------------|------------|------------|-----------|------------|
| Fungicide | | | | | | | | | | | | | |
| Control | 6 | 77 | 88 | 99 | 167 | 41 | 0 | 57 | 14.10 | 53 | 26 | 408 | 11 |
| Priaxor | 5 | 25 | 32 | 58 | 165 | 43 | 0 | 100 | 13.63 | 57 | 33 | 358 | 12 |
| Prosaro | 4 | 17 | 19 | 79 | 166 | 43 | 0 | 107 | 13.92 | 58 | 34 | 369 | 12 |
| Twinline | 7 | 16 | 16 | 54 | 166 | 44 | 0 | 111 | 13.93 | 58 | 35 | 361 | 12 |
| LSD | NS | 7.25 | 10.07 | 13.09 | 0.65 | 1.00 | NS | 2.00 | 0.15 | 0.72 | 1.11 | 15.85 | 0.33 |
| Variety | | | | | | | | | | | | | |
| Decade | 5 | 45 | 48 | 83 | 165 | 42 | 0 | 54 | 16.05 | 46 | 22 | 429 | 10 |
| Eddy | 2 | 33 | 35 | 55 | 166 | 42 | 0 | 81 | 13.97 | 58 | 35 | 338 | 12 |
| Jagalene | 6 | 36 | 40 | 68 | 165 | 44 | 0 | 98 | 13.41 | 58 | 35 | 369 | 11 |
| Paladin | 3 | 36 | 40 | 66 | 167 | 41 | 0 | 88 | 13.59 | 58 | 32 | 379 | 13 |
| Tucson | 18 | 41 | 44 | 75 | 166 | 44 | 0 | 103 | 13.07 | 59 | 37 | 379 | 11 |
| Whetstone | 2 | 25 | 34 | 81 | 163 | 41 | 0 | 109 | 14.42 | 58 | 30 | 404 | 10 |
| Yellowstone | 2 | 22 | 30 | 78 | 170 | 46 | 1 | 122 | 12.74 | 59 | 34 | 321 | 14 |
| LSD | 2.91 | 5.24 | 5.82 | 8.04 | 0.93 | 1.00 | 0.58 | 4.00 | 0.19 | 0.61 | 1.07 | 11.94 | 0.28 |

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number, Moist: grain moisture.

Table 2. Winter wheat response to the interactive effects of fungicide and variety on strip rust control, 2012.

| | % SR June 7 | % SR July 1 | % SR July 12 | % SR July 30 | heading Julian | Height inch | lodging % | Yield bu/a | Protein 12 % | TWT 13% | TKW 13% | FN sec | moist % |
|-------------|----------------|----------------|-----------------|-----------------|-------------------|----------------|--------------|---------------|-----------------|------------|------------|-----------|------------|
| Control | | | | | | | | | | | | | |
| Decade | 9 | 99 | 100 | 100 | 166 | 38 | 0 | 7 | 17.01 | 41 | 15 | 479 | 10 |
| Eddy | 2 | 87 | 99 | 99 | 166 | 42 | 0 | 41 | 14.09 | 53 | 26 | 377 | 10 |
| Jagalene | 6 | 85 | 95 | 99 | 166 | 42 | 0 | 59 | 13.52 | 52 | 26 | 389 | 10 |
| Paladin | 3 | 88 | 92 | 98 | 169 | 38 | 0 | 45 | 13.58 | 53 | 25 | 402 | 11 |
| Tucson | 18 | 78 | 79 | 99 | 166 | 43 | 0 | 74 | 13.11 | 57 | 30 | 413 | 11 |
| Whetstone | 1 | 65 | 85 | 99 | 163 | 40 | 0 | 81 | 14.63 | 55 | 26 | 433 | 10 |
| Yellowstone | 2 | 40 | 68 | 99 | 170 | 44 | 0 | 90 | 12.74 | 57 | 30 | 363 | 12 |
| Priaxor | | | | | | | | | | | | | |
| Decade | 3 | 32 | 53 | 85 | 164 | 42 | 0 | 48 | 15.72 | 44 | 20 | 415 | 10 |
| Eddy | 2 | 20 | 24 | 37 | 165 | 43 | 0 | 90 | 13.74 | 59 | 37 | 317 | 12 |
| Jagalene | 5 | 32 | 33 | 62 | 165 | 44 | 0 | 105 | 13.06 | 60 | 35 | 358 | 11 |
| Paladin | 3 | 30 | 36 | 50 | 167 | 41 | 0 | 95 | 13.37 | 59 | 33 | 367 | 14 |
| Tucson | 15 | 37 | 41 | 53 | 164 | 44 | 0 | 112 | 12.83 | 60 | 39 | 363 | 11 |
| Whetstone | 1 | 11 | 20 | 65 | 163 | 41 | 0 | 116 | 14.06 | 59 | 32 | 392 | 11 |
| Yellowstone | 2 | 13 | 16 | 52 | 170 | 46 | 1 | 132 | 12.60 | 60 | 37 | 296 | 15 |
| Prosaro | | | | | | | | | | | | | |
| Decade | 4 | 23 | 21 | 95 | 165 | 42 | 0 | 78 | 15.67 | 51 | 27 | 418 | 10 |
| Eddy | 3 | 9 | 10 | 52 | 166 | 42 | 0 | 94 | 13.92 | 59 | 37 | 322 | 12 |
| Jagalene | 4 | 16 | 23 | 69 | 165 | 45 | 2 | 112 | 13.60 | 60 | 37 | 371 | 11 |
| Paladin | 2 | 11 | 15 | 67 | 166 | 42 | 0 | 103 | 13.74 | 59 | 35 | 379 | 14 |
| Tucson | 14 | 25 | 30 | 83 | 166 | 45 | 0 | 115 | 13.14 | 59 | 39 | 382 | 11 |
| Whetstone | 2 | 15 | 15 | 94 | 163 | 41 | 0 | 116 | 14.49 | 58 | 31 | 400 | 10 |
| Yellowstone | 3 | 20 | 21 | 91 | 170 | 47 | 1 | 130 | 12.86 | 60 | 35 | 313 | 15 |
| Twinline | | | | | | | | | | | | | |
| Decade | 3 | 26 | 20 | 52 | 165 | 45 | 0 | 81 | 15.81 | 50 | 25 | 405 | 10 |
| Eddy | 3 | 14 | 7 | 32 | 165 | 43 | 0 | 99 | 14.12 | 59 | 39 | 334 | 12 |
| Jagalene | 10 | 12 | 11 | 43 | 165 | 44 | 0 | 115 | 13.46 | 61 | 39 | 358 | 11 |
| Paladin | 5 | 13 | 17 | 49 | 167 | 42 | 0 | 109 | 13.66 | 60 | 35 | 368 | 15 |
| Tucson | 24 | 25 | 24 | 65 | 166 | 45 | 0 | 113 | 13.20 | 60 | 39 | 357 | 11 |
| Whetstone | 3 | 11 | 17 | 66 | 162 | 43 | 0 | 121 | 14.49 | 59 | 33 | 391 | 11 |
| Yellowstone | 1 | 14 | 16 | 72 | 170 | 46 | 2 | 138 | 12.77 | 60 | 36 | 311 | 15 |
| LSD | NS | 10.48 | 11.63 | 16.08 | NS | 2.00 | NS | 9.00 | 0.37 | 1.21 | 2.15 | NS | 0.55 |

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number, Moist: grain moisture.