

### **Evaluation of foliar fungicides for control of potato early blight in Wisconsin, 2022.**

A field trial was conducted at the University of Wisconsin Agricultural Research Station in Hancock, WI to evaluate 32 season-long fungicide programs for control of early blight on potato. Seed pieces, approximately 2 oz in size, were mechanically cut from US#1 'Russet Burbank' seed tubers on 30 Apr. Seed pieces were allowed to heal prior to planting on 4 May by maintaining cut seed at 55°F under 98% relative humidity. No seed treatments were applied unless noted. A randomized complete block design with four replications was used for the trial, and treatment plots consisted of four 20-ft-long rows spaced 36 in. apart with 12 in. spacing in the row. To minimize soil compaction and damage to plants in the treatment rows, drive rows for pesticide application equipment were placed adjacent to the plots. Fertility, insect, and weed management were accomplished using standard industry practices for the region. Seed treatments were applied to tubers after cutting using a 1.06 qt Solo Hand Pump Sprayer at a rate equivalent to 3.70 L water/ton seed. In-furrow treatments were applied over the top of seed pieces in open furrows in a 12-in. band using a plot sprayer consisting of a tractor mounted boom, pressurized with an air compressor, using TeeJet Twin Jet Flat Spray Tip nozzles TJ-60 11003VS. In-furrow applied fungicides were applied at a rate equivalent to 9.5 L water/1,000 row feet at 30 psi.

Fungicide treatments were initiated on 6 Jul after the P-day value (generated from a crop physiological model used for early blight prediction and fungicide initiation) reached 300. Subsequent applications were applied on a weekly basis to all four rows of each plot on the following dates: 13 Jul, 20 Jul, 27 Jul, 3 Aug, 10 Aug, 17 Aug, 24 Aug, 31 Aug, 7 Sep, for a total of ten fungicide applications. Treatments were applied with a plot sprayer consisting of a tractor-mounted boom pressurized with an air compressor using TeeJet Hollow Disc Cone D3-23 nozzles (16 nozzles at 8-in. spacing). Fungicides were applied at a rate equivalent to 35 gal water/A at 40 psi. Plots were not artificially inoculated but relied on natural inocula from soil and plant residues from the surrounding concentrated potato production region for disease establishment. Early blight severity across 20 ft of the two center rows was visually determined on 28 Jun, 12 Jul, 25 Jul, 2 Aug, 17 Aug, 25 Aug, and 4 Sep using the Horsfall-Barratt rating scale (0 to 11 rating with 0=no disease, 11=100% disease severity). The Area Under the Disease Progress Curve (AUDPC) was determined by trapezoidal integration and then converted into Relative AUDPC (RAUDPC), i.e. percentage of the maximum possible AUDPC for the whole period of the experiment. Vines were killed on 21 Sep with an application of the desiccant Diquat E 1.5 pt/acre. Tubers from the center two rows of each 4-row plot were harvested and graded on 5 Oct. Total precipitation in Hancock during the potato production season was 20.08 in. Supplemental irrigation was applied 36 times during the potato production season for an additional 13.7 in. All data were analyzed using ANOVA ( $\alpha=0.05$ ) and Fisher's LSD at  $\alpha=0.05$  (SAS Version 9.2).

Early Blight onset was delayed, likely due to a drier, windier June/July than normal, but heavy disease pressure was present by the end of the season. There were no significant differences across programs for cull weight (data not shown). The best performing treatment, #11 Regev at 8 fl oz, had significantly greater marketable yield and disease control, based on RAUDPC, than most other programs. Treatments 6, and 12-15 had significant increases in B size tubers compared to the non-treated control. Treatments 13-15 had significant increases in C size tubers compared to the non-treated control. Treatments 2-4 and 9-11 had significantly less disease based on RAUDPC than the non-treated control. No phytotoxicity was noted with any treatments of this trial.

| Program number, treatment, and rate/A |  | Application<br>Timing <sup>z</sup> | Marketable<br>Yield (cwt/A) <sup>y</sup> | Bs Weight<br>(cwt/A) <sup>x</sup> | Cs Weight<br>(cwt/A) <sup>w</sup> | RAUDPC <sup>v</sup> |     |
|---------------------------------------|--|------------------------------------|--|-----------------------------------|-----------------------------------|---------------------|-----|
| 1                                     | Untreated Control                                | NA                                 | 498.7 ab <sup>u</sup>                    | 36.1 ab                           | 4.6 a-e                           | 0.287               | o   |
| 2                                     | Bravo WS 720SC 1.5 pt                            | 1,2,4,8                            |  |                                   |                                   |                     |     |
|                                       | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,6                                |  |                                   |                                   |                     |     |
|                                       | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7                                |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 581.8 h-k                                | 31.5 a                            | 2.9 a                             | 0.168               | a-e |
| 3                                     | Maxim MZ 0.5D 0.5 lb/cwt                         | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt                            | 1,2,4,8                            |  |                                   |                                   |                     |     |
|                                       | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,6                                |  |                                   |                                   |                     |     |
|                                       | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7                                |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 591.9 i-k                                | 38.6 a-e                          | 4.8 a-g                           | 0.159               | ab  |
| 4                                     | Maxim MZ 0.5D 0.5 lb/cwt                         | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt                            | 1,2,4,8                            |  |                                   |                                   |                     |     |
|                                       | Lucento 4.17SC 5.5 fl oz + Bravo WS 720SC 1.5 pt | 3,6                                |  |                                   |                                   |                     |     |
|                                       | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7                                |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 595.4 jk                                 | 39.7 a-e                          | 4.3 ab                            | 0.147               | a   |
| 5                                     | Maxim MZ   | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt 720SC                      | 1,2,4,8                            |  |                                   |                                   |                     |     |
|                                       | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,6                                |  |                                   |                                   |                     |     |
|                                       | Lucento 4.17SC 5.5 fl oz + Bravo WS 720SC 1.5 pt | 5,7                                |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 567.8 e-k                                | 38.3 abc                          | 6.1 b-h                           | 0.163               | a-c |
| 6                                     | Maxim MZ 0.5D 0.5 lb/cwt                         | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Topguard 1.04SC 28 fl oz                         | Hilling                            |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt 720SC                      | 4,8                                |  |                                   |                                   |                     |     |
|                                       | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 6                                  |  |                                   |                                   |                     |     |
|                                       | Endura 70WG 3.5 oz+ Bravo WS 720SC 1.5 pt        | 5,7                                |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 565.8 d-k                                | 41.7 a-f                          | 5.3 a-i                           | 0.157               | ab  |
| 7                                     | Maxim MZ 0.5D 0.5 lb/cwt                         | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Topguard 1.04SC 28 fl oz                         | Hilling                            |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt 720SC                      | 8                                  |  |                                   |                                   |                     |     |
|                                       | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 6                                  |  |                                   |                                   |                     |     |
|                                       | Endura 70WG 3.5 oz+ Bravo WS 720SC 1.5 pt        | 7                                  |  |                                   |                                   |                     |     |
|                                       | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10                               | 531.2 a-g                                | 38.4 a-d                          | 5.1 a-h                           | 0.165               | a-d |
| 8                                     | Cruiser Maxx Vibrance Potato 0.5 fl oz           | Seed Trt                           |  |                                   |                                   |                     |     |
|                                       | Bravo WS 720SC 1.5 pt                            | 1,2,4,6,8-10                       |  |                                   |                                   |                     |     |
|                                       | Luna T 4.16SC 11.2 fl oz+ NIS 0.1% v/v           | 3,5,7                              | 563.3 c-k                                | 43.3 a-h                          | 6.4 b-h                           | 0.172               | a-g |

|    |   |              |       |     |      |     |     |     |       |     |
|----|---|--------------|-------|-----|------|-----|-----|-----|-------|-----|
| 9  | Cruiser Maxx Vibrance Potato 0.5 fl oz                    | Seed Trt     |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,3,5,7-10 |       |     |      |     |     |     |       |     |
|    | Luna T 4.16SC 11.2 fl oz+ NIS 0.1% v/v                    | 4,6          | 546.1 | b-k | 42.7 | a-g | 4.4 | a-c | 0.171 | a-f |
| 10 | Cruiser Maxx Vibrance Potato 0.5 fl oz                    | Seed Trt     |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,4,6,8-10 |       |     |      |     |     |     |       |     |
|    | Miravis Prime 3.33SC 11.0 fl oz + NIS 0.1% v/v            | 3,5,7        | 536.0 | a-g | 38.4 | a-d | 5.1 | a-h | 0.152 | a   |
| 11 | Cruiser Maxx Vibrance Potato 0.5 fl oz                    | Seed Trt     |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,3,5,7-10 |       |     |      |     |     |     |       |     |
|    | Miravis Prime 3.33SC 11.0 fl oz + NIS 0.1% v/v            | 4,6          | 542.8 | a-j | 44.5 | b-i | 4.6 | a-d | 0.150 | a   |
| 12 | Bravo WS 720SC 1.5 pt                                     | 2,4,6-10     |       |     |      |     |     |     |       |     |
|    | Regev 5.0EC 8.0 fl oz                                     | 1,3,5        | 536.7 | a-g | 64.7 | m   | 7.2 | e-h | 0.229 | n   |
| 13 | Bravo WS 720SC 1.5 pt                                     | 1,3,5,7-10   |       |     |      |     |     |     |       |     |
|    | Regev 5.0EC 8.0 fl oz                                     | 2,4,6        | 509.6 | a-c | 42.7 | a-g | 4.3 | ab  | 0.184 | b-h |
| 14 | Bravo WS 720SC 1.5 pt                                     | 1,2,4,6,8-10 |       |     |      |     |     |     |       |     |
|    | Regev 5.0EC 8.0 fl oz                                     | 3,5,7        | 571.7 | f-k | 54.3 | g-m | 5.8 | b-h | 0.205 | h-n |
| 15 | Bravo WS 720SC 1.5 pt                                     | 1,2,4,8-10   |       |     |      |     |     |     |       |     |
|    | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt          | 5,7          |       |     |      |     |     |     |       |     |
|    | Regev 5.0EC 8.0 fl oz                                     | 3,6          | 572.2 | f-k | 57.2 | j-m | 6.6 | b-h | 0.206 | h-n |
| 16 | Bravo WS 720SC 1.5 pt                                     | 1,2,4,8-10   |       |     |      |     |     |     |       |     |
|    | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt          | 3,6          |       |     |      |     |     |     |       |     |
|    | Regev 5.0EC 8.0 fl oz                                     | 5,7          | 558.8 | c-k | 50.3 | d-k | 6.1 | b-h | 0.210 | h-n |
| 17 | Zing! 4.9SC 24 fl oz                                      | 4,6,8        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt + Reason 500SC 5.5 fl oz            | 3,5,7        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,9,10     | 557.2 | c-k | 52.6 | f-l | 7.1 | d-h | 0.189 | c-j |
| 18 | Zing! 4.9SC 24 fl oz                                      | 4,6,8        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt + Revus SC 8.0 fl oz + NIS 0.1% v/v | 3,5,7        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,9,10     | 529.0 | a-g | 59.4 | k-m | 7.8 | h   | 0.220 | l-n |
| 19 | Zing! 4.9SC 24 fl oz                                      | 4,6,8        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt + Badge SC 28.8 fl oz               | 3,5,7        |       |     |      |     |     |     |       |     |
|    | Bravo WS 720SC 1.5 pt                                     | 1,2,9,10     | 557.7 | c-k | 53.2 | f-m | 7.5 | gh  | 0.199 | g-m |
| 20 | Zing! 4.9SC 34 fl oz                                      | 1-10         | 545.8 | b-k | 48.6 | c-k | 5.5 | b-h | 0.216 | j-n |
| 21 | Previcur Flex 6F 1 pt + Bravo WS 720SC 1.5 pt             | 1-10         | 551.9 | b-k | 52.5 | f-l | 6.1 | b-h | 0.223 | mn  |
| 22 | Reason 500SC 2.47 fl oz + Zing! 4.9SC 24 fl oz            | 1-10         | 573.2 | g-k | 50.5 | e-k | 7.1 | d-h | 0.192 | d-l |
| 23 | Reason 500SC 2.75 fl oz + Zing! 4.9SC 32 fl oz            | 1-10         | 596.9 | k   | 55.3 | i-m | 6.8 | b-h | 0.193 | e-l |
| 24 | Reason 500SC 2.75 fl oz + Gavel 75DF 1.0 lb               | 1-10         | 599.5 | k   | 55.0 | h-m | 7.4 | gh  | 0.187 | c-i |
| 25 | Reason 500SC 2.75 fl oz + Gavel 75DF 1.5 lb               | 1-10         | 542.9 | a-j | 53.1 | f-m | 7.3 | f-h | 0.197 | f-m |

|    |  |            |       |     |      |     |     |     |       |     |
|----|--|------------|-------|-----|------|-----|-----|-----|-------|-----|
| 26 | Reason 500SC 5.5 fl oz                           | 1-10       | 548.2 | b-k | 45.8 | b-j | 7.1 | d-h | 0.200 | h-m |
| 27 | Reason 500SC 8.2 fl oz                           | 1-10       | 518.3 | a-f | 63.7 | lm  | 7.0 | c-h | 0.214 | i-n |
| 28 | Zing! 4.9SC 34 fl oz                             | 1-10       | 519.6 | a-g | 49.1 | c-k | 7.3 | f-h | 0.199 | g-m |
| 29 | Gavel 75DF 2.0 lb                                | 1-10       | 514.6 | a-e | 58.1 | k-m | 6.0 | b-h | 0.217 | j-n |
| 30 | Bravo WS 720SC 1.5 pt                            | 1,2,4,8    |       |     |      |     |     |     |       |     |
|    | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,6        |       |     |      |     |     |     |       |     |
|    | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7        |       |     |      |     |     |     |       |     |
|    | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9,10       | 541.4 | a-i | 48.0 | b-k | 5.7 | b-h | 0.191 | d-k |
| 31 | Bravo WS 720SC 1.5 pt                            | 1          |       |     |      |     |     |     |       |     |
|    | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,         |       |     |      |     |     |     |       |     |
|    | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7        |       |     |      |     |     |     |       |     |
|    | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9          | 512.2 | a-d | 55.7 | i-m | 7.5 | gh  | 0.219 | k-n |
| 32 | Bravo WS 720SC 1.5 pt                            | 1          |       |     |      |     |     |     |       |     |
|    | LifeGard 4.5 oz/100 gal water                    | 2,4,6,8,10 |       |     |      |     |     |     |       |     |
|    | Priaxor 4.17SC 4.5 fl oz + Bravo WS 720SC 1.5 pt | 3,         |       |     |      |     |     |     |       |     |
|    | Endura 70WG 3.5 oz + Bravo WS 720SC 1.5 pt       | 5,7        |       |     |      |     |     |     |       |     |
|    | Dithane DF75 2 lb + Super Tin 80WP 2.5 oz        | 9          | 489.6 | a   | 50.1 | c-k | 6.9 | c-h | 0.205 | h-n |

<sup>z</sup>Seed treatments and in-furrow applications occurred at planting. Hilling applications occurred on 19 May. Fungicide application dates: 1 = 6 Jul, 2 = 13 Jul, 3 = 20 Jul, 4 = 27 Jul, 5 = 3 Aug, 6 = 10 Aug, 7 = 17 Aug, 8 = 24 Aug, 9 = 31 Aug, 10 = 7 Sep.

<sup>y</sup>Marketable yield refers to weight of Size A potato tubers of a size range  $\geq 2.5$  in diameter measured in hundredweight or 100 lb per acre or cwt/A.

<sup>x</sup>Size B potato tubers are of a size range between 1.5 and 2.25 in diameter.

<sup>w</sup>Size C potato tubers are of a size range less than 1.5 in. in diameter.

<sup>v</sup>RAUDPC= Relative Area Under the Disease Progress Curve determined by trapezoidal integration and then converted into Relative AUDPC (RAUDPC).

<sup>u</sup>Column numbers followed by the same letter are not significantly different at P=0.05 as determined by Fisher's Least Significant Difference (LSD) test.