On-Farm Corn and Soybean Fungicide Demonstration Trials

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Introduction

An application of foliar fungicide to corn and soybean has become a common practice for many farmers in Iowa. The effect of fungicide on corn and soybean yield, however, can vary from year to year. Environmental conditions, such as rainfall and temperature, influence disease development, which will determine whether a fungicide affects yield. Because environmental conditions vary from one year to the next, it is difficult to predict how and when to use a fungicide. The objective of these trials was to evaluate whether the application of a foliar fungicide would result in a yield increase in corn and soybean.

Materials and Methods

In 2019, there were five trials in Iowa that evaluated the effect of fungicide on corn yield (Table 1), and 17 trials investigated the effect of fungicide on soybean yield (Table 2). Most trials were conducted on cooperators' farms. Some trials were conducted on research farms. Fungicide treatments were applied by ground equipment and were arranged in a randomized complete block design with at least three replications per treatment. Plot size varied from field-to-field depending on the field equipment. All plots were machine harvested for grain yield.

In corn Trial 1, Quilt Excel® at 10.5 oz/acre was applied at R2 and LucentoTM at 5 oz/acre was applied at VT (Table 3). In corn Trial 2, Aproach Prima® at 6 oz/acre was applied to corn at V11 in the morning and in the afternoon. In Trial 3. Miravis® Neo at 13.7 oz/acre was applied to corn at V11. In Trials 4 and 5, Tigris TM Axozyprop was applied at 10.5 oz/acre to corn at VT. In all corn trials, the strips treated with a fungicide application were compared with untreated strips.

In soybean Trial 1, Aproach Prima® at 6 oz/acre was applied to soybean at R2 in the morning and in the afternoon (Table 4). In Trial 2, Miravis® Neo at 13.7 oz/acre was applied to soybean at R2. In Trials 3 and 4, LucentoTM at 5 oz/acre was applied to soybean at R3. In Trials 5, 6, and 7, Delaro® at 11 oz/acre was applied to soybean at R3. In Trial 8, Aproach Prima® at 6 oz/acre was applied to soybean at R1. In Trial 9, Delaro® at 10 oz/acre was applied to soybean at R2. In Trials 10 and 11, RevytekTM at 8 oz/acre plus Fastac[®] insecticide at 3 oz/acre was applied to soybean at R3 and compared with RevytekTM at 8 oz/acre at R3. In Trials 12 and 13, Delaro® at 8 oz/acre plus Warrior® insecticide at 3 oz/acre was applied to soybean at R3 and compared with Delaro® at 8 oz/acre at R3. In Trial 14, Priaxor® at 4 oz/acre was applied to soybean at R3. In Trials 15 and 16, LucentoTM at 5.5 oz/acre was applied to soybean at R3. In Trial 17, Headline[®] at 12 oz/acre was applied to soybean at R5. In all soybean trials, except Trial 13, strips treated with a fungicide application were compared with untreated strips.

Results and Discussion

In corn Trial 1, the corn treated with Quilt Excel[®] yielded 8 bushels/acre more than the untreated corn, but there was no effect of the LucentoTM on corn yield. In Trial 2, there was no effect of the Aproach Prima® on corn yield with either the morning or afternoon application. In Trial 3, there was an 8 bushel/acre increase in yield with the corn treated with Miravis[®] Neo (P = 0.07). In Trial 4, there was no effect of the TigrisTM Axozyprop on corn yield, but in Trial 5 there was a 14 bushel/acre decrease in corn yield with the application of TigrisTM Axozyprop. It is possible the yield decrease was due to the surfactant in the spray solution affecting the ear development. The fields were not fully tasseled at the time of application. This problem has occurred in other fields with fungicide applications prior to tasseling.

In soybean Trial 1, there was no effect of the Aproach Prima® on soybean yield with either the morning or afternoon applications. In Trial 2, there was a 2 bushel/acre increase in soybean yield with the application of Miravis® Neo (P = 0.03). In Trials 3 and 4, there was no effect of the LucentoTM on soybean yield. In Trials 5 and 6, there was no effect of the Delaro® on soybean yield, but in Trial 7 there was a 10 bushel/acre increase in yield with the Delaro®. In Trial 8, there was no effect of the Aproach Prima® on soybean yield. In Trial 9, there was a 3 bushel/acre decrease in soybean yield with the application of Delaro[®] (P =0.01). It is not known what might account for the yield decrease. In Trial 10, there was a 3 bushel/acre increase in yield with the application of RevytekTM and an additional 2 bushels/acre with the addition of Fastac® insecticide.

In Trial 11, there was a 1 bushel/acre increase in yield with the application of RevytekTM and an additional 3 bushels/acre with the addition of Fastac® insecticide. In Trial 12, there was a 6 bushel/acre increase in yield with the application of Delaro® and an additional 5 bushels/acre with the addition of Warrior® insecticide. In Trial 13, there was no difference in yield between the soybeans that received an application of Delaro® and the soybeans that received an application of Delaro® plus Warrior®. In Trial 14, there was no effect of the Priaxor® on soybean yield. In Trials 15 and 16, there was no effect of the LucentoTM on soybean yield. In Trial 17, there was an increase of 1 bushel/acre with the application of Headline[®] (P = 0.05).

Although plant disease evaluations were not made in these trials, it is likely there was not much disease present in the corn and soybean trials where there was not an economic response to the fungicide. This indicates the importance of evaluating plant disease incidence and the likelihood of disease problems with current weather conditions and varieties selected to make decisions on the use of foliar fungicides in protecting corn and soybean yield.

NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.

Table 1. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2019 fungicide trials on corn.

| | | | | Row | | Planting | | |
|--------|-------|--------|-------------|---------|----------|------------|----------|------------|
| Exp. | | | | spacing | Planting | population | Previous | |
| no. | Trial | County | Variety | (in.) | date | (seeds/ac) | crop | Tillage |
| | | | Pioneer | | | | | |
| 190105 | 1 | Lyon | PO306AM | 30 | 5/7/19 | 36,000 | Soybean | Strip till |
| | | | Pioneer | | | | | |
| 190108 | 2 | Sioux | PO306AM | 30 | 6/14/19 | 34,000 | Oats | Disk |
| | | | Pioneer | | | | | |
| 190110 | 3 | Sioux | P0075AM | 30 | 6/3/19 | 34,000 | Soybean | Disk |
| 190313 | 4 | Monona | LG5525 VT2 | 30 | 5/20/19 | 32,500 | Soybean | Disk |
| 190314 | 5 | Monona | LG5548 STX7 | 30 | 5/20/19 | 32,500 | Soybean | Disk |

Table 2. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2019 fungicide trials on soybean.

| 2019 Tuliş | giciue ti | ials on soybear | <u>l.</u> | Row | | Planting | | |
|------------|-----------|-----------------|--------------------------|---------|----------|------------|----------|----------------------------|
| Exp. | | | | spacing | Planting | population | Previous | |
| no. | Trial | County | Variety | (in.) | date | (seeds/ac) | crop | Tillage |
| | | · · | Pioneer | | | , | | 0 |
| 190107 | 1 | Sioux | P19A14X | 30 | 6/6/19 | 140,000 | Corn | Disk |
| | | | Pioneer | | | | | |
| 190109 | 2 | Sioux | P16A49X | 30 | 6/3/19 | 140,000 | Corn | No-till |
| 40004. | _ | | Rob See Co | • • | - 10 110 | | ~ | |
| 190315 | 3 | Monona | RSC2615LL | 30 | 6/2/19 | 135,000 | Corn | No-till |
| 190316 | 4 | Monona | Rob See Co RSC2615 LL | 30 | 6/2/19 | 135,000 | Corn | No-till |
| 190310 | 4 | Monona | RSC2615 LL Rob See Co | 30 | 0/2/19 | 133,000 | Com | NO-IIII |
| 190317 | 5 | Monroe | RSC2386 LL | 30 | 6/2/19 | 135,000 | Corn | No-till |
| 170317 | | 1110III 0C | Rob See Co | 50 | 0,2,19 | 155,000 | Com | Tto till |
| 190318 | 6 | Monona | RSC2386 LL | 30 | 6/2/19 | 135,000 | Corn | No-till |
| | | | Rob See Co | | | | | |
| 190320 | 7 | Monona | RSC2615 LL | 30 | 6/14/19 | 135,000 | Alfalfa | Disk |
| | _ | | Nutech | | | | | |
| 190412 | 8 | Wright | 20N23E | 30 | 6/3/19 | 155,000 | Corn | Conventional |
| | | | Miller | | | | | Fall disk rip spring field |
| 190506 | 9 | Boone | 2653 LL | 30 | 6/12/19 | 140,000 | Corn | cultivate |
| 170300 | | Doone | Credenz | 30 | 0/12/17 | 140,000 | Com | cuttvate |
| 190616 | 10 | Cass | CZ2889GT LL | 15 | 5/4/19 | 135,000 | Corn | No-till |
| | | | Credenz | | | , | | |
| 190617 | 11 | Cass | 3309GT LL | 15 | 5/4/19 | 135,000 | Corn | No-till |
| | | | Credenz | | | | | |
| 190618 | 12 | Adair | CZ2601 LL | 30 | 4/22/19 | 140,000 | Corn | No-till |
| 190621 | 13 | Cass | Asgrow 28X9 | 30 | 5/16/19 | 150,000 | Corn | Vertical till |
| 190705 | 14 | Washington | Cornelius CB2908RXN | 15 | 6/4/19 | 148,000 | Corn | No-till |
| 190/03 | 14 | Washington | Pioneer | 13 | 0/4/19 | 148,000 | Com | INO-IIII |
| 190711 | 15 | Louisa | P31A22X | 30 | 6/10/19 | 150,000 | Corn | No-till |
| 170/11 | 10 | Louisa | 1 3 11 12 2 11 | 50 | 0/10/17 | 120,000 | Com | Fall chisel |
| | | | Pioneer | | | | | spring soil |
| 190712 | 16 | Washington | P29A85L | 30 | 6/12/19 | 150,000 | Corn | finisher |
| | | | | | | | | |
| | | | Pioneer | | | | | |
| 190713 | 17 | Washington | Pioneer P37A56L | 30 | 6/13/19 | 160,000 | Corn | Soil finisher |
| 170/13 | 1 / | vv asinington | 1 J/MJUL | 50 | 0/13/17 | 100,000 | COIII | 2011 HIIIZHEI |

Table 3. Yields for on-farm fungicide trials in corn in 2019.

| Exp. | • | | Yield | • |
|--------|-------|---|----------------------|----------------------|
| no. | Trial | Treatment | (bu/ac) ^a | P-value ^b |
| 190105 | 1 | Quilt Xcel at 10.5 oz/ac at R2 | 225 a | 0.02 |
| | | Lucento at 5 oz/ac at VT | 221 ab | |
| | | Control | 217 b | |
| 190108 | 2 | Aproach prima at 6 oz/ac at V11 in the morning (76°F) | 192 a | 0.10 |
| | | Aproach prima at 6 oz/ac at V11 in the afternoon (86°F) | 194 a | |
| | | Control | 188 a | |
| 190110 | 3 | Miravis Neo at 13.7 oz/ac at V11 | 224 a | 0.07 |
| | | Control | 216 a | |
| 190313 | 4 | Tigris Axozyprop at 10.5 oz/ac at VT | 182 a | 0.23 |
| | | Control | 198 a | |
| 190314 | 5 | Tigris Axozyprop at 10.5 oz/ac at VT | 175 a | < 0.01 |
| | | Control | 189 b | |

^aValues denoted with the same letter within a trial are not statistically different at the significance level of 0.05. ^bP-value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.

Table 4. Yields for on-farm fungicide trials in soybean in 2019.

| Exp. | | | Yield | |
|--------|-------|--|----------------------|----------------------|
| no. | Trial | Treatment | (bu/ac) ^a | P-value ^b |
| 190107 | 1 | Aproach prima at 6 oz/ac at R2 in the morning (76°F) | 63 a | 0.60 |
| | | Aproach prima at 6 oz/ac at R2 in the afternoon (86°F) | 64 a | |
| | | Control | 63 a | |
| 190109 | 2 | Miravis Neo at 13.7 oz/ac at R2 | 69 a | 0.03 |
| | | Control | 67 b | |
| 190315 | 3 | Lucento at 5 oz/ac at R3 | 66 a | 0.36 |
| | | Control | 65 a | |
| 190316 | 4 | Lucento at 5 oz/ac at R3 | 59 a | 0.17 |
| | | Control | 55 a | |
| 190317 | 5 | Delaro at 11 oz/ac at R3 | 56 a | 0.54 |
| | | Control | 55 a | |
| 190318 | 6 | Delaro at 11 oz/ac at R3 | 44 a | 0.28 |
| | | Control | 42 a | |
| 190320 | 7 | Delaro at 11 oz/ac at R3 | 55 a | < 0.01 |
| | | Control | 45 b | |
| 190412 | 8 | Aproach prima at 6 oz/ac at R1 | 71 a | 0.43 |
| | | Control | 69 a | |
| 190506 | 9 | Delaro at 10 oz/ac at R2 | 58 a | 0.01 |
| | | Control | 61 b | |
| 190616 | 10 | Revytek at 8 oz/ac plus Fastac at 3 oz/ac at R3 | 87 a | 0.01 |
| | | Revytek at 8 oz/ac at R3 | 85 b | |
| | | Control | 82 c | |
| 190617 | 11 | Revytek at 8 oz/ac plus Fastac at 3 oz/ac at R3 | 90 a | < 0.01 |
| | | Revytek at 8 oz/ac at R3 | 87 b | |
| | | Control | 86 c | |
| 190618 | 12 | Delaro at 8 oz/ac plus Warrior at 3 oz/ac at R3 | 72 a | < 0.01 |
| | | Delaro at 8 oz/ac at R3 | 67 b | |
| | | Control | 61 c | |

Table 4 (continued). Yields for on-farm fungicide trials in soybean in 2019.

| Table 4 (c | omumu | cu). Ticlus for on-farm fungiciuc triais in soybean in 2017. | | |
|------------|-------|--|------|------|
| 190621 | 13 | Delaro at 8 oz/ac plus Warrior at 3 oz/ac at R3 | 87 a | 0.22 |
| | | Delaro at 8 oz/ac at R3 | 84 a | |
| 190705 | 14 | Priaxor at 4 oz/ac at R3 | 69 a | 0.28 |
| | | Control | 67 a | |
| 190711 | 15 | Lucento at 5.5 oz/ac at R3 | 64 a | 0.19 |
| | | Control | 62 a | |
| 190712 | 16 | Lucento at 5.5 oz/ac at R3 | 62 a | 0.47 |
| | | Control | 61 a | |
| 190713 | 17 | Headline at 12 oz/ac at R5 | 66 a | 0.05 |
| | | Control | 65 b | |

^aValues denoted with the same letter within a trial are not statistically different at the significance level of 0.05. b P-value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.