# Evaluation of Foliar Fungicides and Insecticides on Soybeans in South Central Iowa

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## Introduction

Researchers at Iowa State University assessed fungicide and insecticide applications to soybeans at seven locations across Iowa including the Northwest Farm (Sutherland), Northern Farm (Kanawha), Northeast Farm (Nashua), Agronomy Farm (Boone), Armstrong Farm (Lewis), McNay Farm (Chariton), and Southeast Farm (Crawfordsville) (Figure 1).

## Materials and Methods

The experimental design at each location was a randomized complete block with four replications. Details on cultivar, planting date, population, pesticide applications, and harvest dates are listed in Table 1. Fungicides and insecticides were applied with a self-propelled research sprayer (Figure 2) at growth stage R3 (beginning pod) at all seven locations, unless otherwise noted. Disease was assessed when soybeans were at the R6 (full seed) growth stage. Diseases found included Septoria brown spot in the lower canopy and small amounts of Cercospora leaf blight and frogeye leaf spot in the upper canopy. Only diseases that had more than one percent severity were analyzed and included in this report. Soybean aphid populations were observed between R3 and R6 and the integrated pest management (IPM) spray was timed according to soybean aphid count. One of the seven locations (Sutherland) reached soybean aphid threshold, but then the aphid population crashed before the IPM treatment could be applied. Green stem disorder notes were taken once soybeans were at growth stage R8. The number of green stems were counted in 10 feet of row and then converted to a percentage based on plant population of the field. Total seed weight/plot and moisture were measured with a 2009 Almaco SPC20 research plot combine. Seed weight was adjusted to 13 percent moisture and yield was calculated.

## Results and Discussion

The 2014 growing season had timely rains throughout the summer, including August, a crucial time for disease development on soybeans.

There were two fungal diseases observed in the plots with at least one percent severity. These were Septoria brown spot and Cercospora leaf blight. Soybean vein necrosis virus and frogeye leaf spot were identified at low levels at several locations. Soybean green stem notes also were taken at all the locations. Green stem notes did not show any patterns between product applications. Levels were very low and inconsistent.

Yields averaged between 42.2–79.2 bushels/acre, depending on location. Yield responses to fungicide, insecticides, and fungicides + insecticides were minimal at all locations. There were both negative and positive responses to various treatments at some locations, but nothing consistent was observed over the seven locations (Figure 3). The average yield response for all fungicides across all locations was -0.4 bushels/acre. No insecticide alone averaged statistically greater than the untreated control across all locations. Additional insecticides were paired with fungicides (Table 2). There was no additive effect for fungicide + insecticide treatments as they averaged only 0.3 bushels/acre more than

the untreated control across all seven locations. See Table 3 for details on yield responses.

For the most part, fungicides and insecticides had minimal or no effect on seed moisture or green stem disorder. This information is from a single year (2014) and is not meant to be representative of pesticide performance every year. Additional research is required on the effect of these pesticides on soybean in Iowa.

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**Table 1. Research location, planting date, cultivar, planted population, pesticide application date, disease assessment date, and harvest date for seven fungicide and insecticide trials in Iowa in 2014.**

| Research location | Planting date | Cultivar | Planted population | Spray date | Disease assessment date | Harvest date |
|---|---|---|---|---|---|---|
| Ames (C) | Jun 6 | Pioneer 92Y75 | 164,000 | Aug 8 | Sep 15 | Oct 20 |
| Lewis (SW) | May 16 | Asgrow 2933 RR | 150,000 | Jul 16 | Sep 5 | Oct 25 |
| Crawfordsville (SE) | May 28 | Asgrow AG2931 | 165,680 | Jul 29 | Sep 9 | Oct 22 |
| Kanawha (NC) | May 20 | Stine 20RD20 | 158,000 | Jul 24 | Sep 8 | Oct 9, 10* |
| Chariton (SC) | May 6 | Pioneer 93Y60 | 160,000 | Jul 23 | Sep 4 | Oct 25 |
| Nashua (NE) | May 25 | Kruger K2-2402 | 175,000 | Jul 28 | Sep 8 | Oct 10 |
| Sutherland (NW) | May 21 | Kruger 1901 | 160,000 | Jul 22 | Sep 4 | Oct 15 |

*Kanawha-harvested half the plot each day due to wet soil conditions.

**Table 2. Products and the rates evaluated in the statewide trials in Iowa in 2014.**

| Product[a] | Active ingredient | Pesticide type | Rate (fl oz/A) |
|---|---|---|---|
| Priaxor | pyraclostrobin + Xemium | Fungicide (Fc) | 4 |
| Priaxor + Domark[b] | pyraclostrobin + Xemium + tetraconozole | Fungicide | 4 + 4 |
| Stratego YLD | trifloxystrobin + prothioconozole | Fungicide | 4 |
| Topguard | flutriafol | Fungicide | 5 |
| Equation | azoxystrobin | Fungicide | 6 |
| Aproach | picoxystrobin | Fungicide | 6 |
| Aproach Prima | picoxystrobin + cyproconazole | Fungicide | 6.8 |
| Custodia | azoxystrobin + tebuconazole | Fungicide | 8.6 |
| Fortix | fluoxastrobin + flutriafol | Fungicide | 5 |
| Quilt Xcel | azoxystrobin + propiconazole | Fungicide | 10.5 |
| Quadris Top | azoxystrobin + difenoconazole | Fungicide | 14 |
| Regalia + Quadris | extract of *Reynoutria sachalinensis* + azoxystrobin | Fungicide | 16 + 6 |
| Regalia + Fortix | extract of *Reynoutria sachalinensis* + fluoxastrobin + flutriafol | Fungicide | 16 + 5 |
| Fastac | alpha-cypermethrin | Insecticide (Ic) | 3.8 |
| Leverage 360[c] | imidacloprid + β-cyfluthrin | Insecticide | 2.8 |
| Asana XL | esfenvalerate | Insecticide | 9.6 |
| SkyRaider | bifenthrin | Insecticide | 6.4 |
| Priaxor + Fastac | pyraclostrobin + xemium + alpha-cypermethrin | Fc + Ic | 4 + 3.8 |
| Stratego YLD + Leverage 360[c] | trifloxystrobin + prothioconozole + imidacloprid + β-cyfluthrin | Fc + Ic | 4 + 2.8 |
| Aproach + Asana XL | picoxystrobin + esfenvalerate | Fc + Ic | 6 + 9.6 |
| Custodia + SkyRaider | azoxystrobin + tebuconazole + bifenthrin | Fc + Ic | 8.6 + 6.4 |

[a]All products applied with nonionic surfactant (Induce at 0.3% v/v) unless otherwise noted.
[b]Registered as Priaxor® D.
[c]Applied with COC at 0.5 percent v/v. Shaded rows include an insecticide.

**Table 3. Treatments and rates for management of foliar disease and yield response at the ISU McNay Research Farm, Chariton, IA in 2014.**

| Product | Septoria brown spot (%) | Cercospora leaf blight (%) | Green stem disorder (%) | Moisture (%) | Yield (bu/A) |
|---|---|---|---|---|---|
| Untreated Control | 2.7 | 2.8 | 0.3 | 14.2 | 67.0 |
| Priaxor | 1.3* | 2.3 | 0.5 | 13.6 | 70.4 |
| Priaxor + Domark | 1.2* | 3.4 | 0.5 | 14.1 | 74.4* |
| Stratego YLD | 1.3* | 2.3 | 0.0 | 13.7 | 69.5 |
| Topguard | 2.1 | 2.8 | 0.0 | 14.2 | 68.8 |
| Equation | 1.8* | 3.8 | 0.3 | 14.0 | 72.4 |
| Aproach | 1.7 | 3.3 | 0.0 | 14.2 | 66.6 |
| Aproach Prima | 1.5* | 3.7 | 0.3 | 14.0 | 72.0 |
| Custodia | 1.9 | 2.8 | 0.3 | 13.8 | 75.1* |
| Fortix | 1.9 | 4.1 | 0.3 | 14.1 | 67.9 |
| Quilt Xcel | 1.4* | 5.0 | 0.0 | 14.4 | 70.7 |
| Quadris Top | 2.1 | 2.2 | 0.5 | 14.2 | 72.7 |
| Regalia + Quadris | 1.7* | 3.4 | 0.0 | 14.3 | 69.5 |
| Regalia + Fortix | 2.0 | 2.3 | 0.3 | 14.1 | 68.2 |
| Fastac | 2.5 | 1.7 | 0.3 | 14.1 | 65.9 |
| Leverage 360 | 2.3 | 5.9 | 0.3 | 14.3 | 72.9 |
| Asana XL | 2.1 | 4.0 | 0.3 | 14.1 | 70.7 |
| SkyRaider | 1.3* | 2.6 | 0.5 | 13.8 | 74.8* |
| Priaxor + Fastac | 1.3* | 3.9 | 0.3 | 13.7 | 73.3 |
| Stratego YLD + Leverage 360 | 1.5* | 5.6* | 0.3 | 14.0 | 72.2 |
| Aproach + Asana XL | 2.7 | 3.1 | 0.5 | 14.1 | 69.4 |
| Custodia + SkyRaider | 1.5* | 2.5 | 0.0 | 13.6 | 71.0 |
| P value | 0.00 | 0.52 | 0.94 | 0.82 | 0.15 |
| **LSD** | **0.8** | **3.2** | **NS** | **NS** | **6.3** |
| CV% | 32.1 | 68.3 | 204.7 | 3.7 | 6.3 |

Shaded rows include an insecticide.
*Significantly different than the untreated control.

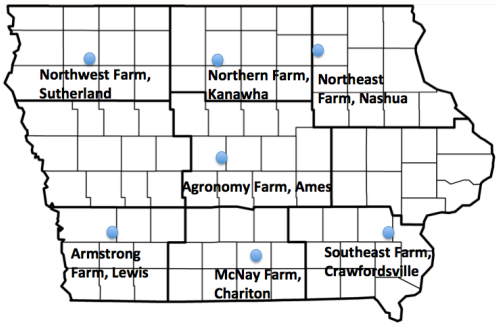


**Figure 1. Map of field locations for the 2014 fungicide and insecticide study.**

**Figure 2. Self-propelled research sprayer applying treatments in Ames, IA.**

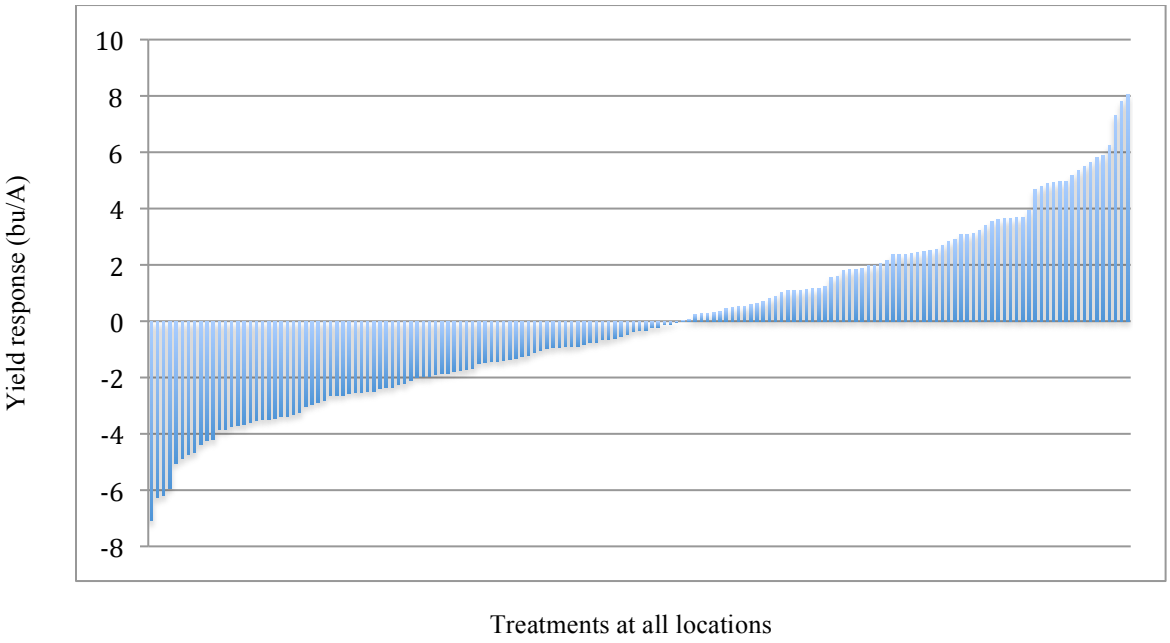


**Figure 3. Yield response (bu/A) to treatments compared with untreated control on soybean at seven locations in Iowa during the 2014 growing season. Treatments consisted of 16 fungicides, 4 insecticide, and 4 fungicide and insecticide combinations. The average response to each treatment was plotted as management response (bu/A).**