Yield and Economic Analysis of Pyraclostrobin Application to Soybean in the Presence and Absence of Foliar Diseases.

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Strobilurin fungicides increase crop yields through suppression of foliar diseases and have been demonstrated to increase yield in the absence of disease in some cases. From 2005 to 2007, trials were conducted at four locations in eastern and central Nebraska to determine the effect of pyraclostrobin application on soybean yield. Applications (6 fl oz of Headline/acre) were made at the R3 growth stage. Brown spot (Septoria glycines) was the main foliar disease present and severity was assessed two to three weeks after fungicide application. The analysis includes sites where there was no disease (severity <10%) to determine if there was a yield and/or economic response to a fungicide application. Eighteen out of 52 comparisons (35%) indicated positive economic returns from pyraclostrobin application. Economic returns were based on $8/bu soybean market price and $18/acre product and application costs. When all sites, years, and varieties were combined, trials with brown spot (>10% severity and less than 30% severity in all trials) had an average of 1.8 bu/ac (P=0.05) yield increase with the application of pyraclostrobin. Sites without brown spot had a 1.4 bu/ac (P=0.04) increase in yield. There were no variety by treatment interactions. Because of a potential yield increase associated with pyraclostrobin application, these results suggest the need to consider variety sensitivity to brown spot when deciding to apply pyraclostrobin, even under low disease pressure.

Materials and Methods

- Plots were 10 ft. X 30 ft.
- Each trial had 4-6 replications.
- A CO₂ backpack sprayer was used to apply fungicide.
  * 40 psi, 3.9 mph, Hypro twincaps (11001 tips) were used in 2005 and 2006. Teejet XR 11002 flat fan tips were used in 2007.
- All fungicide applications (6 fl oz. of Headline/A) were made at R3 (beginning pod).
- Brown spot was rated in the lower half of the canopy 2-3 weeks after fungicide application.
- The means of treated and non-treated yields were calculated with PROC MIXED in SAS.
- Economic return was calculated with $8/bu soybean price and $18/A fungicide and application cost.

Results

Soybeans with (left) and without (right) pyraclostrobin treatment

![Soybeans with pyraclostrobin treatment](image)

![Soybeans without pyraclostrobin treatment](image)

Table 1: Yield comparisons without disease. Numbers in red indicate negative economic or yield response to fungicide application.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Year</th>
<th>Mean Yield (bu/acre)</th>
<th>VE (percent)</th>
<th>Yield (bu/acre)</th>
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![Table 1](image)

Table 2: Yield comparisons with disease. Numbers in red indicate negative economic or yield response to fungicide application.

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![Table 2](image)

- Increased leaf retention was noted in most comparisons, however, this was not related with yield.
- Comparisons with no foliar disease present recorded a 1.4 bu/A (2.4%) increase in yield with application.
- Comparisons with significant levels of brown spot recorded a 1.8 bu/A (3.1%) increase in yield with application.
- There were no treatment by variety interactions that could indicate a possible genetic link with fungicide application.

Conclusions

- Comparisons yielding greater than 59 bu/A (28 comparisons) had a positive economic response 29% of the time.
- Comparisons yielding less than 59 bu/A (24 comparisons) had a positive economic response 42% of the time.

- While the average difference with treatment was greater in diseased plots, there was no increase in frequency of positive return.
- Greater economic returns may be possible in environments with more significant disease development and/or other diseases.
  * The highest brown spot severity observed in this study was 30% in the lower half of the canopy.
- This study suggests that strobilurin application may be more beneficial in soybeans with lower yield potential.