

Soybean Response to Fungicide After Simulated Hail Damage

Lindy Berg¹, Lesley Lubenow², Greg Endres³ and Kelly Bjerke⁴
North Dakota State University

¹EXTENSION AGENT, NDSU EXTENSION/TOWNER COUNTY, LINDY.L.BERG@NDSU.EDU, ²EXTENSION SPECIALIST, NDSU EXTENSION/LANGDON RES. EXT. CENTER, LESLEY.LUBENOW@NDSU.EDU, ³EXTENSION SPECIALIST, NDSU EXTENSION/CARRINGTON RES. EXT. CENTER, GREGORY.ENDRES@NDSU.EDU, ⁴RESEARCH TECHNICIAN, CARRINGTON RES. EXT. CENTER, KELLY.BJERKE@NDSU.EDU

1. Introduction

We use **local research** to influence farmer decisions. After hailstorms, farmer questions flood the extension office on what action to do next. NDSU Extension recommends to let the crop recover without any rescue treatments. Towner County soybean farmers are pressured by industry to use fungicides after a hail event for plant health and yield recovery.

Hypotheses

This greenhouse research project supports why NDSU Extension does not recommend soybean fungicide use after a hail event with the following hypotheses:

1. No changes in soybean seed yield or maturity with Priaxor® (fluxapyroxad + pyraclostrobin) vs. no fungicide application at R2 (full flower) and R5 (beginning seed) crop stages.
2. Crop greenness will be increased by Priaxor® application.
3. Type of hail injury and its severity will not impact fungicide performance on seed yield. We expect reduced seed yield from hail injury at R5 vs. R2.

2. Materials & Methods

Planting

- Cultivar AG009X8 (Asgrow®, 00.9 maturity) was inoculated with peat-based rhizobia bacteria and sowed in 10-inch pots with Miracle-Gro potting soil on January 14, 2019.

Experimental Design

- The study design was a randomized complete block design with split-split plot arrangement with three reps. Fungicide (+/-) was the main plot, crop stage (R2 or R5) was the split plot factor, and simulated hail injury type was the split-split plot factor (Figs. 1-5).

Simulated Hail Injury

- Four types of hail injury were simulated. **33% leaf removal**: 33% of leaves were removed (Fig. 2). **66% leaf removal**: 66% of leaves were removed (Fig. 3). **Stem cut-off**: Half of the main stem nodes and all remaining leaves were removed by scissors (Fig. 4). **Bent Stem**: The main stem was broken over at 135 degree angle and all leaves were removed below the break (Fig. 5).

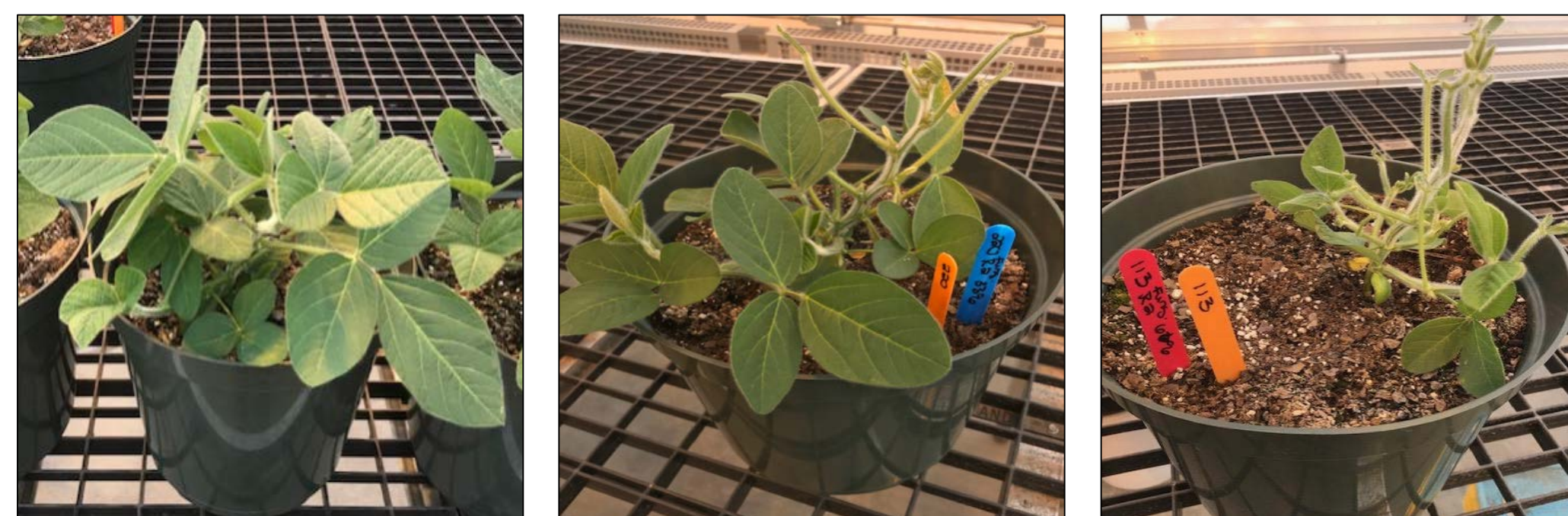


Figure 1. Untreated check
Figure 2. 33% leaf removal
Figure 3. 66% leaf removal



Figure 4. Main stem cut off
Figure 5. Main stem bent over

Fungicide Application & Agronomic Observations

- Priaxor® was foliar-applied three days post simulated hail injury at a rate of 4 oz/a using a backpack sprayer with a handheld boom.
- Plant greenness (signifying chlorophyll content) was measured at three intervals post-fungicide treatment using a Minolta SPAD-502 chlorophyll meter (Konica-Minolta, Ramsey, NJ).
- Maturity date was observed at full maturity (R8 stage). Seed was hand harvested and seed was weighed for yield.

Data Analysis

- Plant greenness, maturity date and seed yield was compared by analysis of variance by using SAS software (SAS Institute Inc., Cary, NC) ANOVA procedure with F-protected means separation at P≤0.10.
- All factors were considered fixed effects.

3. Results

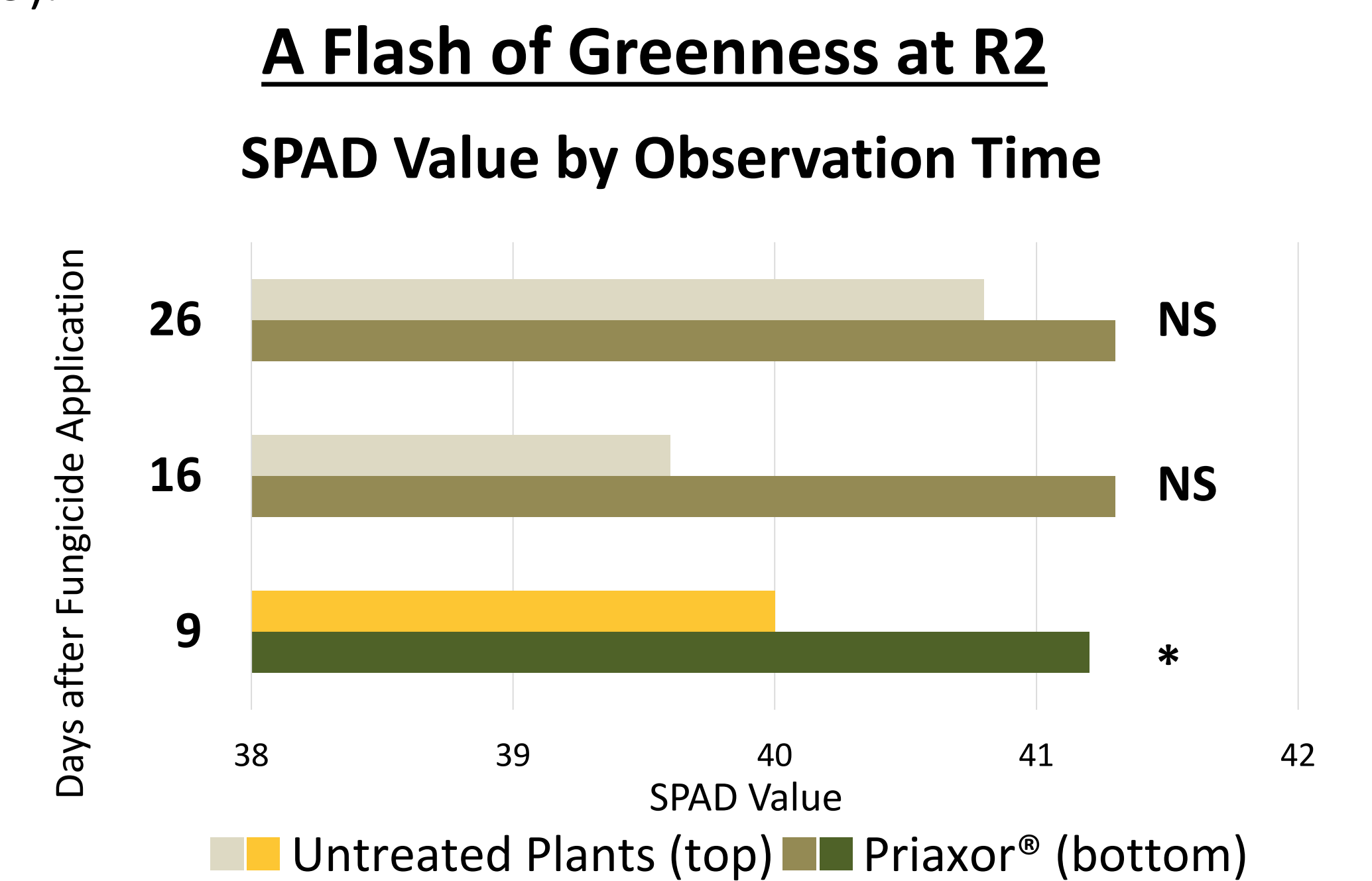
Limited Impact with Priaxor®



Seed yield, measured as weight, was similar between fungicide and untreated plants regardless of hail injury (P=0.249).

140 days

Maturity date was similar for fungicide and untreated plants (P=0.787).



At R2, plants were greener 9 days post fungicide application (P=0.064, LSD= 0.09). Differences in SPAD values were not significant at later observation times (P≥0.10). At R5, all dates were NS.

Hail Injury and Crop Stage Impacted Yield and Maturity

Simulated Hail Injury	Seed Yield	Maturity
	grams	days after planting
Untreated Plants	9.4ab	119.9a
33% Leaf Removal	9.6ab	124.4ab
66% Leaf Removal	7.6bc	126.5bc
Bent Stem	7.5c	125.3bc
Cut-off Stem	6.4c	130.6c
LSD (0.05)	1.9	6.2

More severe hail injury prolonged maturity and reduced seed yield (P=0.087 and P=0.011, respectively).

- R5 plants had 21% yield loss compared to R2 across all hail injury and fungicide (+/-) treatments (P=0.043).

4. Conclusions

- Priaxor® did not impact seed yield and maturity. At R2, Priaxor® plants were initially greener but no lasting effects.
- Simulated hail injury reduced seed yield and extended maturity date at 66% leaf removal, bent and cut-off stem as compared to untreated plants. R5 plants had reduced seed yield as compared to R2 across hail injury and fungicide application.

Acknowledgements



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