Kansas Agricultural Experiment Station Research Reports

Volume 8
Issue 4 *Kansas Field Research*

Article 7

2022

Do Late Season Soybean Management Practices Impact Seed Yields in East Kansas?

A. A. Correndo
Kansas State University, correndo@k-state.edu

L. F. A. Almeida
Kansas State University, luizfelipeaa@k-state.edu

E. Adee
Kansas State University, eadee@ksu.edu

See next page for additional authors

Recommended Citation

Correndo, A. A.; Almeida, L. F. A.; Adee, E.; and Ciampitti, I. A. (2022) "Do Late Season Soybean Management Practices Impact Seed Yields in East Kansas?," *Kansas Agricultural Experiment Station Research Reports*: Vol. 8: Iss. 4. https://doi.org/10.4148/2378-5977.8301

Do Late Season Soybean Management Practices Impact Seed Yields in East Kansas?

Authors
A. A. Correndo, L. F. A. Almeida, E. Adee, and I. A. Ciampitti

Do Late Season Soybean Management Practices Impact Seed Yields in East Kansas?

A.A. Correndo, L.F.A. Almeida, E. Adee, and I.A. Ciampitti

Introduction

In soybean (*Glycine max* [L.] Merr.), maintaining favorable growth conditions (e.g., water, solar radiation, and nutrients) during the seed filling period is crucial to avoid limitations that could reduce seed weight and ultimately constrain seed yield. The objective of this study was to explore potential effects and identify if "late-season" management practices can contribute to increasing seed weight and seed yield in soybeans.

Procedures

In the 2021 season, two soybean studies were conducted in Topeka (39.08° N, 95.77° W), and Kiro (39.09° N, 95.79° W). Soils were Eudora silt loam (Topeka) and Muir silt loam (Kiro), with 2 and 3% of soil organic matter (SOM, 0–6 in.), respectively. Right before planting, composite soil samples (6 cores) were taken from 0–6 in. depth to describe general soil fertility (Table 1).

Both Topeka and Kiro (adjacent locations) accumulated approximately 23 inches of rain each during the growing season (Figure 1). Between June and September, both locations recorded 6 days with temperatures above 95°F.

Plots were arranged in a randomized complete blocks design (RCBD) with four repetitions. Plots were 35 feet long at Topeka and 25 feet long at Kiro, and had four rows spaced at 30 in. in both locations. When needed, treatments were sprayed with a handheld backpack sprayer. Treatments were applied at full pod formation (R4 stage) and consisted of different management practices:

- Fungicide protection late-season application
- Insecticide protection late-season application
- Full-foliar protection (fungicides+insecticides late-season application)
- N fixation longevity (inoculant late-season application)
- Plant nutrition -standard- (sulfur (S) late-season application)
- Plant nutrition -complete- (micronutrients plus S late-season application)
- Nutrition -complete- + N fixation (combination of both for improving nutrition)
- Intensified inputs (all practices combined)
- Control condition (standard practices)

At physiological maturity (R7 stage) plant samples were collected from 12.5 sq ft (5 ft × 30 inch) to determine aboveground biomass at the control treatment.

At harvest maturity (R8), an area of 18.75 sq ft in the two central rows of each plot was manually harvested to determine final seed yield.

Data Analysis

The data analysis was executed by performing an analysis of variance (ANOVA) split by variable (seed yield, seed weight, and biomass) and location. For each ANOVA, a mixed model structure was considered, with treatment as the fixed factor and block as the random factor. Treatment effects were considered significant if P-value ≤ 0.05. Analyses were carried out using the lme4 and emmeans packages of R software (R Core Team, 2020).

Results

Seed Yield

Seed yield ranged between 54 and 85 bu/a at Topeka and between 63 to 88 bu/a at Kiro (Figure 2). No significant seed yield differences between treatments were observed at either of the locations (P-value > 0.05), averaging 66 bu/a for Topeka and 75 bu/a for Kiro.

Seed Weight

Seed weight ranged between 0.28 and 0.33 lb/1000 seeds at Topeka and between 0.27 to 0.37 lb/1000 seeds at Kiro (Figure 3). No significant seed weight differences between treatments were observed at either of the locations (P-value > 0.05), averaging 0.30 lb/1000 seeds for Topeka and 0.31 lb/1000 seeds for Kiro.

Plant Dry Biomass

Final dry biomass ranged between 6,346 and 12,354 lb/a at Topeka and between 5,764 to 14,997 lb/a at Kiro (Figure 4). No significant final biomass differences between treatments were observed at either of the locations (P-value > 0.05), averaging 9,102 lb/a for Topeka and 10,373 lb/a for Kiro.

Conclusions

The tested late-season treatments did not impact seed yield, seed weight, or crop biomass production. Specific soil and weather conditions may be needed to observe differences between the tested treatments. Future research could consider exploring more environments across Kansas to identify specific production conditions that are responsive to late-season management practices.

References

R Core Team. 2020. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Table 1. Soil fertility at the planting time of soybean at Topeka and Kiro, KS, locations during the 2021 growing season

Site	pH	SOM	Sand	Silt	Clay	P	K
	---	---	%	---	---	ppm	---
Topeka	6.8	2.0	32	56	12	17	228
Kiro	5.5	3.0	23	62	16	27	420

Table 2. General soybean crop management at Topeka and Kiro, KS, locations during the 2021 growing season

Site	Tillage	Irrigation	Planting date	Row spacing	Soybean variety	Seeding rate (seeds/a)	Harvest
Topeka	Vertical	Yes	05/12/2021	30 in.	AG40X70	141,000	10/04/2021
Kiro	Vertical	Rainfed	05/12/2021	30 in.	AG40X70	141,000	10/08/2021

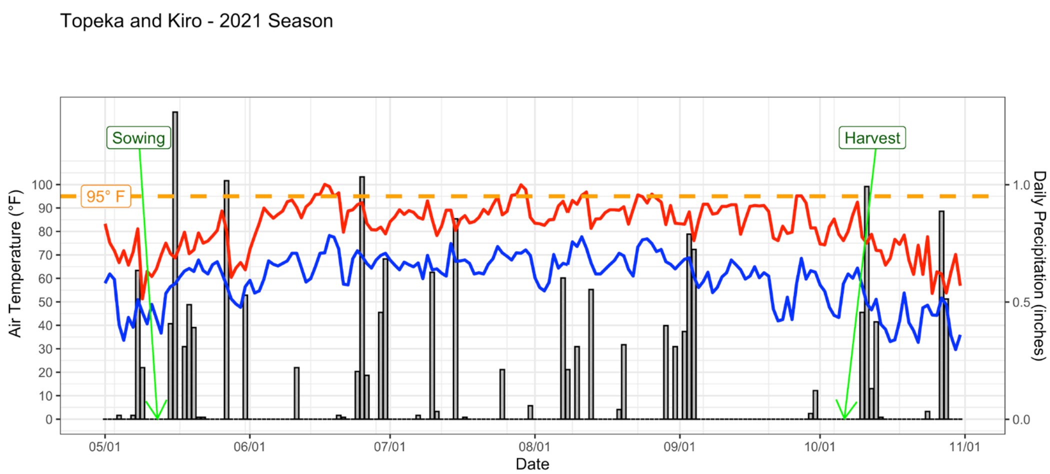

Figure 1. Daily precipitation in inches, and maximum and minimum temperatures (°F) at Topeka and Kiro, KS, locations for the 2021 growing season. Source: Kansas Mesonet (*https://mesonet.k-state.edu/*).

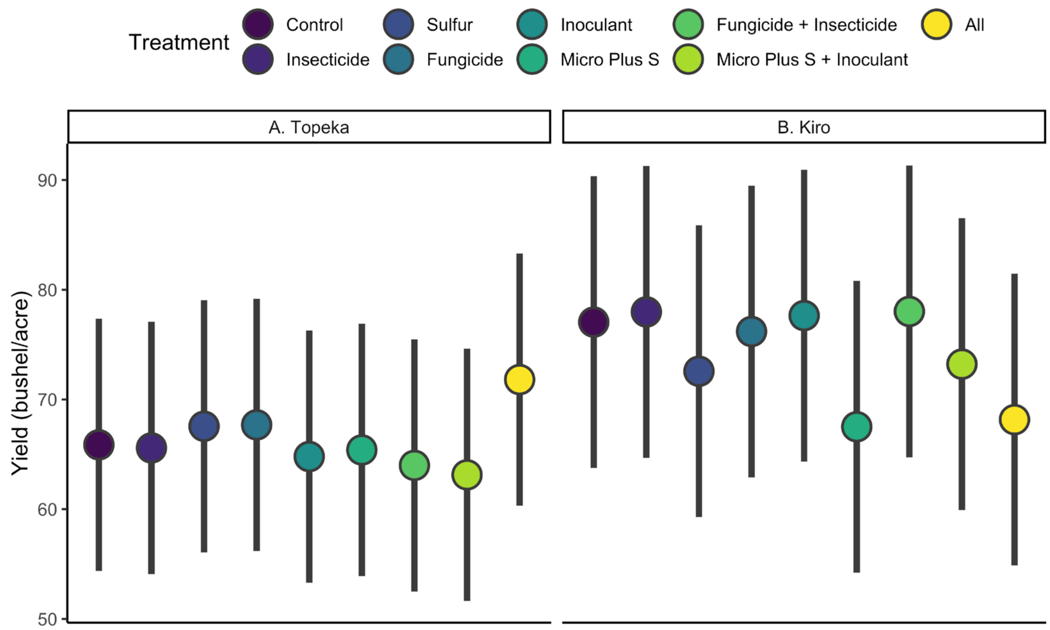

Figure 2. Seed yield (bu/a) for each treatment at Topeka and Kiro, KS, locations for the 2021 growing season. Vertical bars are the standard deviations.

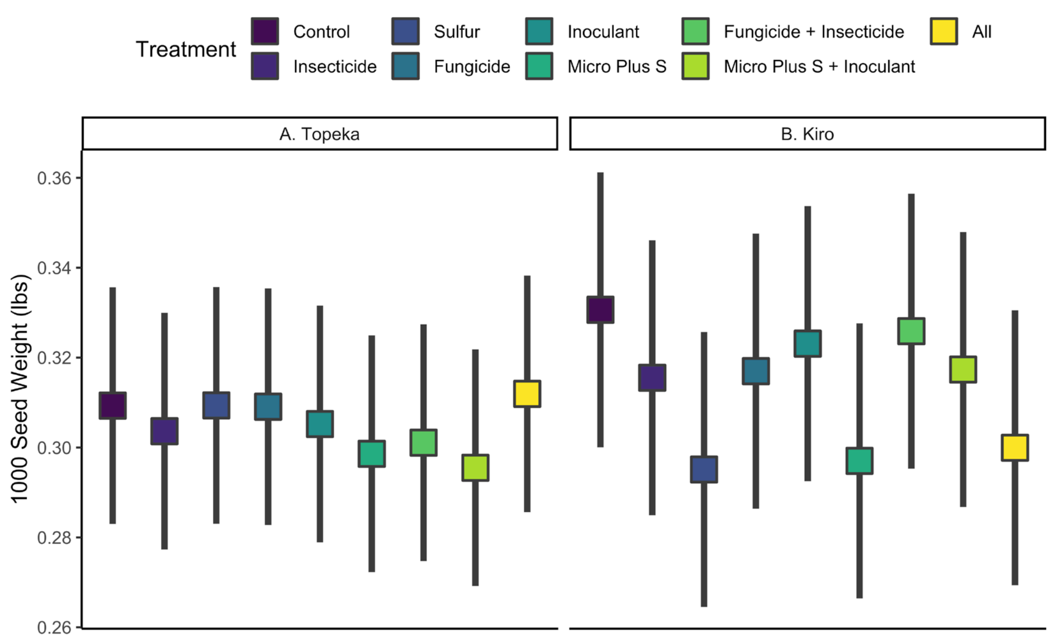

Figure 3. Final seed weight rate for each treatment at Topeka and Kiro, KS, locations for the 2021 growing season. Vertical bars are the standard deviations.

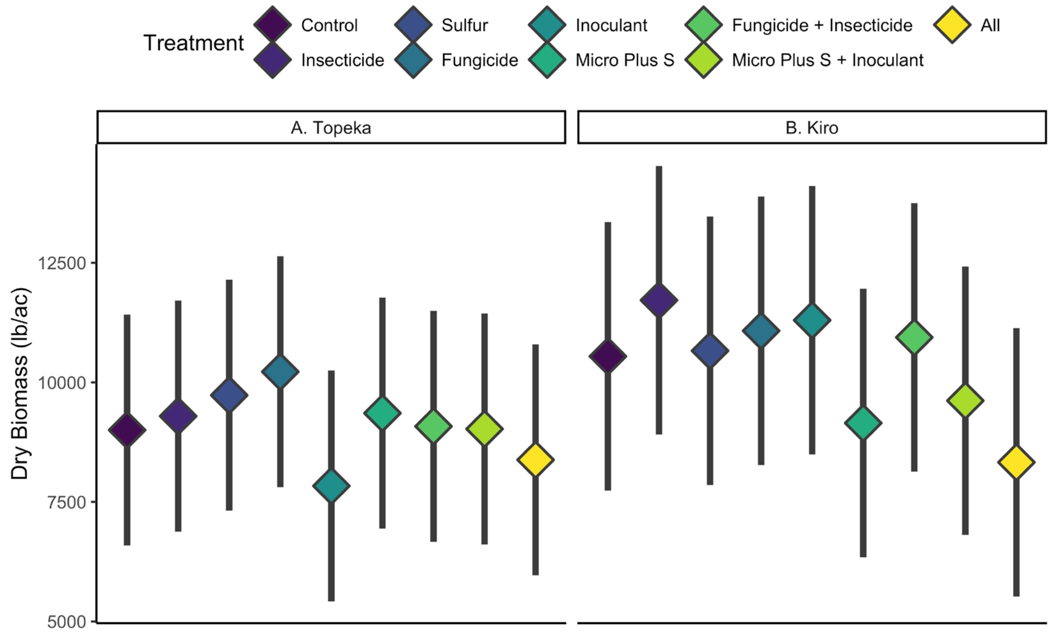

Figure 4. Final dry biomass at physiological maturity (R7) for each treatment at Topeka and Kiro, KS, locations for the 2021 growing season. Vertical bars are the standard deviations.