Project Final Report for: Development and Expansion of Disease Management Decision-Making Tools Across Multiple Soybean Regions, Year 2 (January 31, 2025)

Uniform soybean foliar fungicide field trials were conducted in nineteen different states (data from two projects were combined, where 11 states participating as collaborators in this project, and 8 states participating through a different regional project), in which eleven treatments and a nontreated check were evaluated. Primary disease pressure came from frogeye leaf spot (FLS; caused by *Cercospora sojina*) and Septoria brown spot (SBS; caused by *Septoria glycines*). Averaged across all locations, all fungicide treatments significantly reduced frogeye leaf spot severity compared to the nontreated control, where Revytek fungicide provided the greatest FLS reduction, but was not different than all other fungicide treatments except Trivapro and Quadris (Fig. 1). For SBS management, only Miravis Neo and the three-way mixture of Echo + Folicur + Topsin were significantly different than the nontreated control. Averaged across all locations, only plots treated with Veltyma fungicide resulted in a significantly greater yield than the nontreated control (Fig. 2).

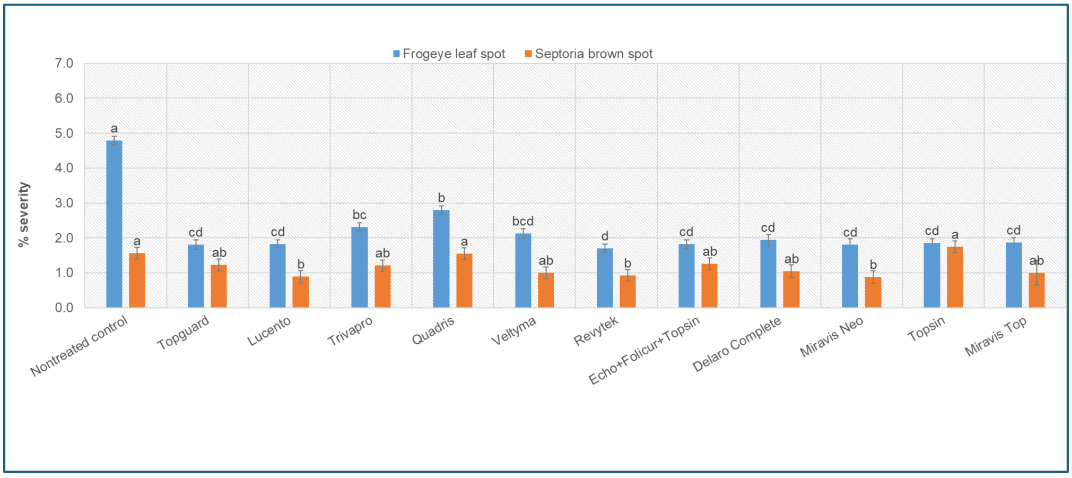

Fig. 1. Effect of foliar fungicide treatments on frogeye leaf spot and Septoria brown spot severity across soybean field trials conducted in 19 states in 2024.

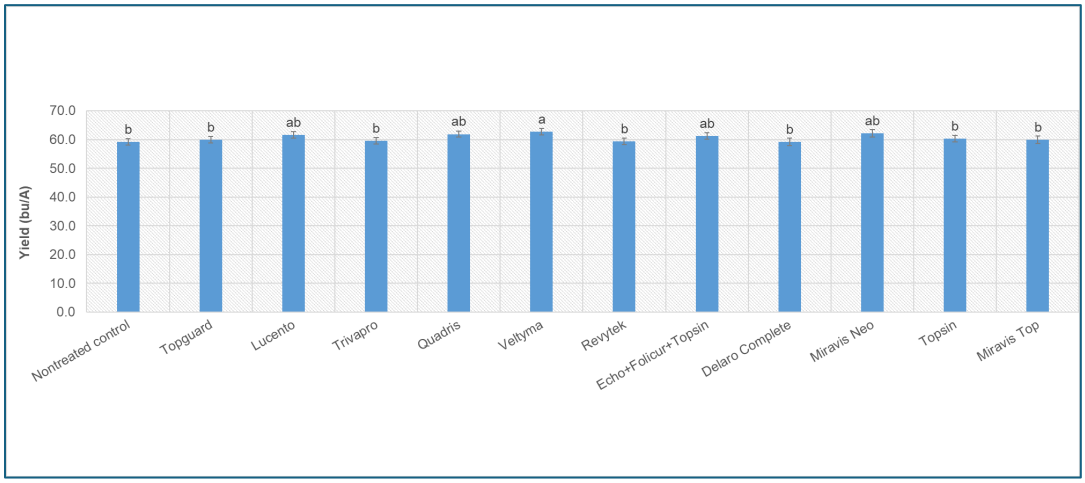

Fig. 2. Effect of foliar fungicide treatments on soybean yield across field trials conducted in 19 states in 2024.

The data from the uniform fungicide trial were used to help revise the 2025 edition of the Crop Protection Network Soybean Foliar Fungicide Efficacy Guide. In addition, the data from these trials are being used to test, adjust, and optimize disease prediction models.

Spore traps were deployed in soybean fields across eleven different states. Spore samples were collected at two different heights weekly. The samples were sent in bulk to the Smith Laboratory (University of Wisconsin), where DNA currently is being extracted from the 2024 spore samples. For the spore samples collected in 2023, all DNA have been extracted and the Smith Lab and Thomas-Sharma Lab (LSU) are enumerating spores of *Cercospora sojina* (FLS pathogen) and the species of *Cercospora* that cause Cercospora leaf blight. The Thomas-Sharma Lab also is developing a molecular assay to enumerate spores of the target spot pathogen (*Corynespora cassiicola*). Figure 3 shows an example of temporal and spatial variation of spore counts among the three species of *Cercospora* that cause Cercospora leaf blight of soybean.

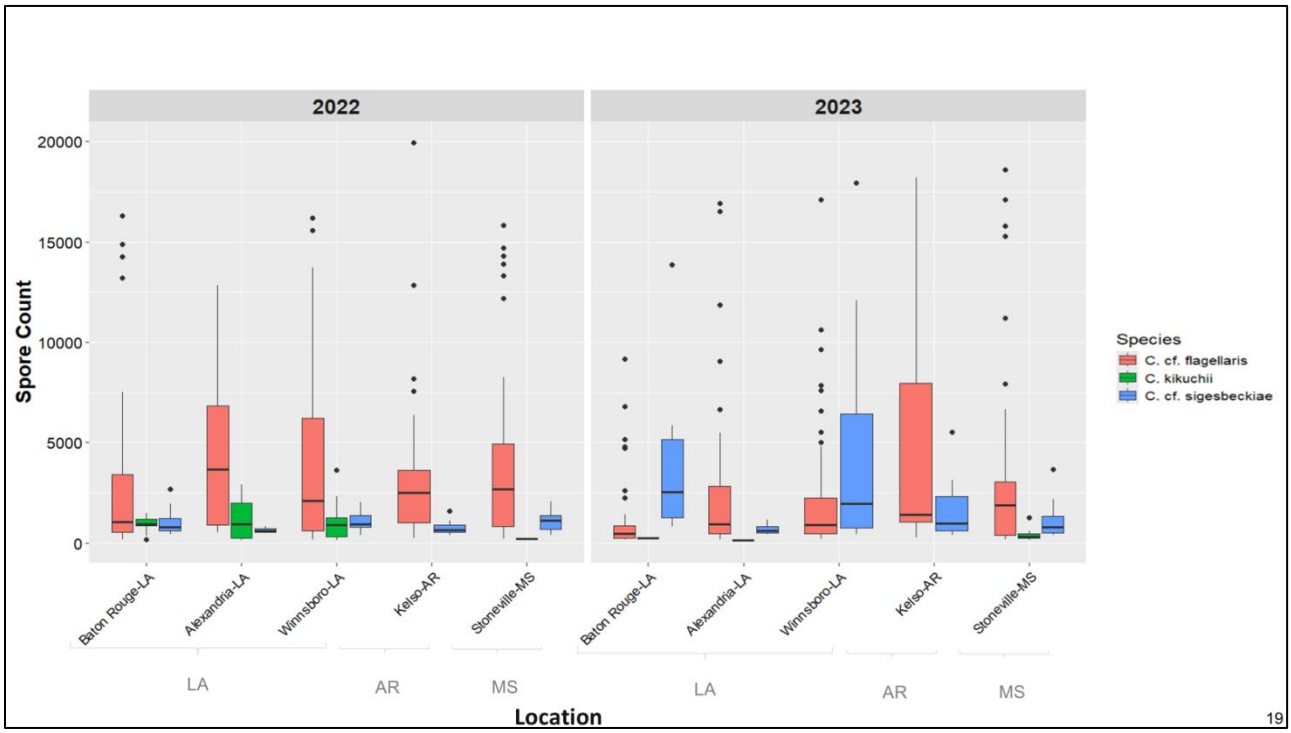

Fig. 3. Temporal and spatial variation in spore counts among the three species of *Cercospora* that cause Cercospora leaf blight of soybean (S. Thomas-Sharma Lab, LSU).

The Smith Lab continues to optimize and validate the "Frogpsotter" app that is used to forecast the risk of frogeye leaf spot (Fig. 4). A beta version of the app was made available for the 2024 growing season, and a protocol was developed to validate the risk model and evaluate spray thresholds on disease and yield. At several locations, fungicide treatments were applied at different timings based on either growth stage (R3, beginning pod) or a FLS risk threshold of 40%, 50%, and 60% if that risk occurred between R3 to R5. Results from a field trial in Princeton, KY are shown in Figure 5, where, all fungicides reduced FLS compared to the nontreated control; the resulting yield responses of the treatments also are shown.

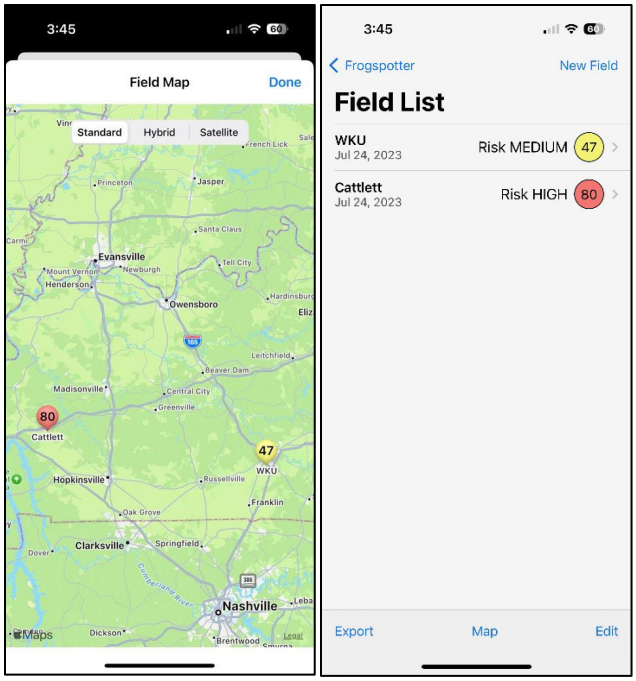

Fig. 4. A look at the beta Frogspotter app being utilized to evaluate frogeye leaf spot risk during the 2023 growing season for two University of Kentucky field research trials.

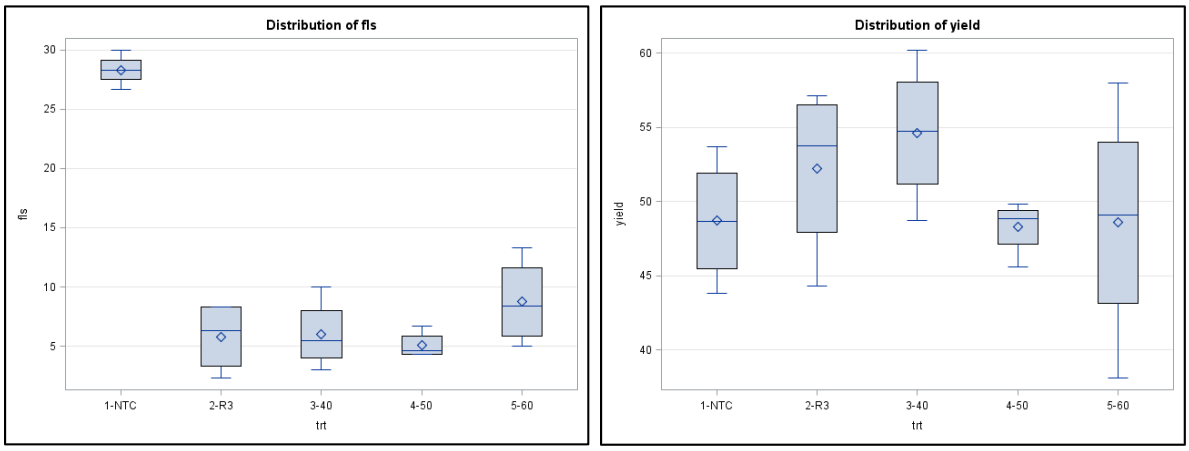

Fig. 5. Results from a soybean field trial in Princeton, KY, where validation of the Frogspotter app and evaluation of risk-based spray thresholds were being evaluated in 2024 (frogeye leaf spot severity on the left, and soybean yield on the right).

The model currently uses a 21-day average of maximum air temperature and 10-day average of total daily hours with max relative humidity > 75% (wetting variable), and daily risk indices are calculated in the tool. The disease data collected from field trials are currently being used to retrain the model, and further field validation will occur during the 2025 growing season.

Abstracts presented at scientific meetings in 2024:

Da Silva, M., and Langston, D. (2024). Curative activity of fungicides used to manage frogeye leaf spot of soybean in Virginia. P-081. Plant Health 2024, Memphis, TN, July 27-30, 2024.

Da Silva, E., J. Searight, J. Richards, T. Price, and V. Doyle. 2024. Hiding in plain sight: Disentangling the biology of *Cercospora* species associated with Cercospora leaf blight of soybean. Proc. So. Soybean Dis. Workers. Pensacola, FL. 12

Gonzalez-Acuna, J. F., Bish, M. D., Bradley, C. A., Faske, T. R., Scherer, J. M., Kelly, H. M. Y., Malvick, D. K., Mangel, D., Markell, S. G., Mueller, D. S., Price, P. P., Smith, D. L., Telenko, D. E. P., and Webster, R. W. 2024. Using environmental variables for the development of logistic regressions to predict frogeye leaf spot in soybean in the United States. Proc. South. Soybean Dis. Workers. Pensacola, FL. 14.

Irwin L. and Betts A.K. 2024. Evaluating Fungicide Cost vs. Reward Trade-off in Low Disease Environments. Plant Health 2024 Memphis, TN.

Ramos, S. K., N. Galagedara, V. P. Doyle, T. W. Allen, T. N. Spurlock, P. Price, B. Padgett, L. Coghill, and S. Thomas-Sharma. 2024. Using spore traps to decipher the epidemiology of *Cercospora* leaf blight in the mid-south. Proc. So. Soybean Dis. Workers. Pensacola, FL. 13.

Thomas-Sharma, S., Ramos, S. K., Galagedara, N., Amie, J., Doyle, V. P., Price, T., Padgett, B., Allen, T., Spurlock, T., and Connor L. 2024. Can targeting fungicide applications to spore peaks improve the efficacy and economics of Cercospora leaf blight management? Proceedings of the 51st Annual Meeting of the Southern Soybean Disease Workers. March 6-7, Pensacola Beach, FL.

Thomas-Sharma, S., Ramos, S. K., Galagedara, N., Doyle, V. P., Amie, J., Price, T., Padgett, B., Allen, T., Spurlock, T., York, M., Coghill, L., and Connor, L. 2024. One brick at a time: Building on epidemiological insights for improved management of Cercospora leaf blight on soybean in the mid-South. Proceedings of the 13th International Epidemiology Workshop. April 9-12, Foz do Iguaçu, Brazil.