

**Project:** "Mitigating soybean root and seedling diseases in Kansas." (C.R. Little, PI, KSU)  
*Fall 2023 Progress report:*

1. Discover resistance to *Fusarium* seedling diseases, sudden death syndrome (SDS), and charcoal rot in germplasm with abiotic stress resistance traits.
2. Evaluate management strategies for soybean seedling and root diseases.
3. Assess the impact of re-emerging root pathogens: *Phytophthora sojae* in Kansas.
4. Develop and communicate management considerations based on objectives 1, 2, and 3.

**OBJ 1.**

The primary activities associated with this objective have been on the pathogen side. We have screened multiple isolates of root and seedling-associated *Fusarium* spp. against soybeans ('AG3403') in a rolled-towel pathogenicity assay and obtained germination, root length, and seedling weight data. See [Figure 1](#) for more information.

*Abiotic stress resistance traits:*

In addition, 47 plant introductions (PIs) with heat tolerance, 151 PIs with halotolerance, and 360 PIs with chlorosis scores of '1' have been identified from the GRIN database that may have the potential for pathogen screening to integrate abiotic stress tolerance with root and seedling *Fusarium* disease resistance. Integrating these with charcoal rot resistance, to the extent that it exists, is also of interest.

**OBJ 2.**

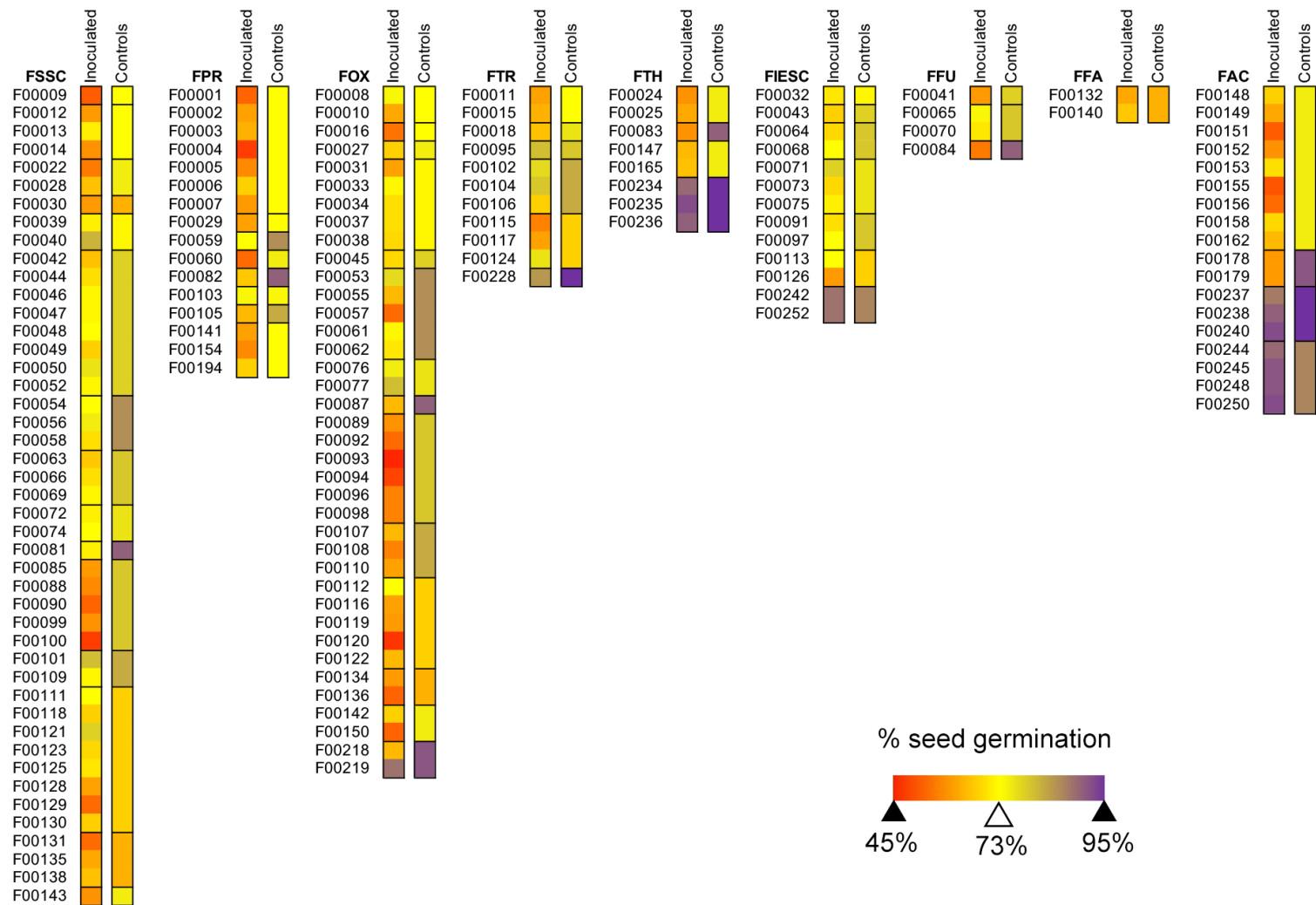
The primary activities associated with this objective have been testing *Fusarium proliferatum* isolates against strobilurin fungicides. An undergraduate, Hutch Turner, is working on this and has completed a set of 30+ *F. proliferatum* isolates and their growth on azoxystrobin. This data is still being analyzed and also EC50 calculations need to be performed. Hutch will also extract DNA and perform PCR on all isolates using species-specific primers to ensure the proper identification of these pathogens.

**OBJ 3.**

Numerous soil and plant samples have been obtained from southeast Kansas at both experiment station sites and cooperator farmers fields. These samples have been collected a pre-, mid-, and post-season time points. *Phytophthora*-specific primers are being used to amplify whole soil DNA and seedling/root DNA to detect the presence of *P. sojae*. In addition, traditional culturing approaches are being used. Also, other pathogens, such as *Diaporthe* spp. are quite common in this production area and co-exist with *Macrophomina*, *Fusarium*, and other root pathogens of interest.

**OBJ 4.**

Information and updates that come from these studies are communicated by the Row Crops Extension Pathologist, Rodrigo Onofre, at grower meetings, radio interviews, field days, and other opportunities for interaction. A potential goal would be to develop a soybean seedling and root disease extension publication for Kansas in the future.



**Figure 1.** Heat map of rolled-towel pathogenicity assay seed germination results for isolates within nine species of seedling and root-associated *Fusarium*. *Abbreviations:* FSSC = *Fusarium solani* species complex; FPR = *F. proliferatum*, FOX = *F. oxysporum*, FTR = *F. tricinctum*, FTH = *F. thapsinum*, FIESC = *Fusarium incarnatum-equiseti* species complex, FFU = *F. fujikuroi*, FFA = *F. falciforme*, and FAC = *F. acuminatum*.