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| Please use this form to clearly and concisely report on project progress. The information included should reflect quantifiable results that can be used to evaluate and measure project success. Comments should be limited to the designated boxes. Technical reports, no longer than 4 pages, may be attached to this summary report. |
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| Project Title:  | Development of climate-smart high-yield practices associated with high-end biological treatments and soybean-related microbiome resiliency |
| Organization:  | University of Texas-Arlington |
| Principal Investigator Name: | Woo-Suk Chang |
| Report Period: | 12/16/2024 – 3/15/2025 |
| Project Status:  |
| Since December 15th, we have analyzed all yield data from conventionally tilled and no-till fields in Port Lavaca (TX), Winnsboro (LA), Portageville (MO), Colt (AR), and Leland (MS). **Table 1** summarizes the 2024 field work. Additionally, we used three inoculant conditions: i) TXVA strain (drought-tolerant inoculant), ii) TagTeam (TAG, a commercial inoculant), and iii) no inoculant (control) for all conventionally tilled and no till research fields.**Table 1**. Summary of the 2024 field work.

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| Location | Collaborators | Planting Date | Mid-Harvest Sample | Pre-Harvest Sample | Harvest Date | Cultivar Used | Maturity Group |
| Port Lavaca, TX | Dr. James Grichar | 3/28 | 5/21 | 8/19 | 8/26 | Lynda-GT, Pamela-GT | INDT, IDNT |
| Winnsboro, LA | Dr. Trey Price | 5/16 | 7/11 | 8/8 | 10/9 | Ellis | 4L |
| Portageville, MO | Dr. Feng Lin | 5/30 | 7/12 | 8/9 | 11/15 | Ellis | 4L |
| Colt, AR | Dr. Shawn Clark | 6/13 | 8/1 | 8/9 | 11/18 | Ellis, S11-2024C | 4L, 5 |
| Leland, MS | Dr. Tessie Wilkerson | 6/14 | 8/2 | 8/9 | 11/19 | P49Z02E | 4.9 |

\* drought-tolerant cultivar.The results of the yield data are presented in **Figures 1, 2, 3, 4, and 5** for the fields in Port Lavaca (TX), Winnsboro (LA), Portageville (MO), Colt (AR), and Leland (MS), respectively. Unfortunately, due to unsuccessful no-till cultivation, we were unable to compare soybean yields among the three treatments (TXVA, TAG, and control) in the no-till fields at Colt (AR) and Leland (MS). Yield data from the 2024 field trials indicate that the TXVA inoculant did not result in a statistically significant increase; however, there is a trend suggesting that TXVA may enhance yields in no-till fields in Texas (**Fig. 1**). **Figure 1.** Yield comparisons between conventionally tilled and no-till soybean fields in **Port Lavaca (TX)**. Two cultivars, Lynda-GT and Pamela-GT, were planted with three treatments: TXVA (a drought-tolerant inoculant), TAG (a commercial inoculant), and a Control (no inoculant).**Figure 2.** Yield comparisons between conventionally tilled and no-till soybean fields in **Winnsboro (LA)**. Culivar Ellis was planted with three treatments: TXVA (a drought-tolerant inoculant), TAG (a commercial inoculant), and a Control (no inoculant).**Figure 3.** Yield comparisons between conventionally tilled and no-till soybean fields in **Portageville (MO)**. Culivar Ellis was planted with three treatments: TXVA (a drought-tolerant inoculant), TAG (a commercial inoculant), and a Control (no inoculant).**No comparison!****Figure 4.** Yield comparisons in conventionally tilled soybean fields in **Colt (AR)**. Two cultivars, Ellis and S11-2024C, were planted planted with three treatments: TXVA (a drought-tolerant inoculant), TAG (a commercial inoculant), and a Control (no inoculant). Note that yield data from no-till fields can not be compared due to unsuccessful cultivation.**No comparison!****Figure 5.** Yield comparisons in conventionally tilled soybean fields in **Leland (MS)**. Cultivar P49Z02E was planted planted with three treatments: TXVA (a drought-tolerant inoculant), TAG (a commercial inoculant), and a Control (no inoculant). Note that yield data from no-till fields can not be compared due to unsuccessful cultivation.Additionally, we collected rhizosphere and bulk soil samples (with at least three biological replicates) from high-yield (>100 bushels/acre) and low-yield (~35 bushels/acre) soybean fields in Arkansas. The analysis of the physicochemical properties of these soils was completed and reported previously. We have since extracted DNA from the samples and sequenced the 16S rRNA genes to compare microbial communities between high- and low-yield fields. Data analysis is currently underway to identify key microorganisms associated with high soybean yields in the Mid-South. We also aim to assess alpha and beta diversity, as well as construct co-occurrence networks linked to high-yielding soybeans. We hope to report all microbiome data in the next quarterly report. |