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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. |
| Project Number: |  |
| Project Title:  | Identification and confirmation of natural tolerance to off-target Dicamba damage in non-Xtend soybeans |
| Organization:  | University of Arkansas |
| Principal Investigator Name: | Caio Canella Vieira |
| Other investigators: | Feng Lin/Grover Shannon |
| Report Period: | March 15 – June 15, 2024 |
| **OBJECTIVE 1:** Development of breeding populations stacking various sources of toleranceThe University of Arkansas and University of Missouri soybean breeding programs continue the development of high-yielding non-Xtend materials with tolerance to off-target dicamba. Efforts are being made to incorporate tolerance into both Enlist-E3 and conventional backgrounds. Numerous materials with tolerance have been advanced to regional trials, including the USDA Uniform Trials.**Vieira, University of Arkansas:****Development of Enlist-E3 materials with off-target dicamba tolerance:** Seven populations are being developed at the University of Arkansas consisting of a high-yielding Enlist-E3 line and a non-GMO dicamba-tolerant source. Crosses were harvested in June 2024, and leaf tissue will be used to confirm true hybrids using molecular markers. Populations will be advanced until F4 and tested under off-target dicamba exposure in summer 2025. The goal is to develop MG 4 Enlist-E3 materials that can coexist in a predominantly dicamba-based cropping system.**Population development:** Roughly 8 bi-parental populations will be developed to combine off-target dicamba tolerance with various biotic and abiotic stressors, as well as improved seed composition.**Lin, University of Missouri:****2024 Yield Trials:** Four advanced lines derived from S16-12774 (tolerant to off-target dicamba) were planted in Portageville, MO (2 local environments and 6-8 locations across different states (IL, AR, TN, MO). Approximately 598 F4:5 single plant progenies from five crosses involving dicamba-tolerant parents will be grown in single rows in the progeny testing nursery in 2024. Seeds are currently being processed and will soon be planted at Leet Farm in Portageville, MO.**Population development:** Sixteen conventional breeding populations to improve off target damage from Dicamba are being advanced from F1-F4 in winter nurseries in Costa Rica, which are expected to produce at least 1,600 new breeding lines to be evaluated in progeny rows in 2025. In addition, we aim to create 3-4 novel crosses by combining high-yielding lines with natural dicamba-tolerant lines and plant introductions (PI).**OBJECTIVE 2:** Study the underlying genetic and physiological basis of this tolerance**Dicamba QTL mapping populations:** Two RIL mapping populations derived from a tolerant PI and a susceptible breeding line will be visually phenotyped at the R3-R4 growth stages for dicamba tolerance during the summer of 2024 in Arkansas and Missouri. The genotyping of the populations will be conducted in collaboration with a seed company in summer 2024.  |