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| Project Number:  |  |
| Project Title:  | Identification and confirmation of natural tolerance to off-target Dicamba damage in non-Xtend soybeans |
| Organization:  | University of Arkansas |
| Project Lead Name: | Caio Canella Vieira |
| Reporting Period:*Please select the appropriate reporting period for this report.* |  [x]  December [ ]  March [ ]  June [ ]  September [ ]  Final |
| The information included in this detailed report should reflect quantifiable results that can be used to evaluate and measure project success.If Progress Report – What key activities were undertaken and what were the key accomplishments during this reporting period? List each key deliverable from the proposal and describe progress made (or not made) toward achieving it, including metrics were appropriate.If Final Report – What were the key accomplishments during the life of the project? List each deliverable from the proposal and describe progress made (or not made) toward achieving it, including metrics where appropriate. |
| **OBJECTIVE 1:** Development of breeding populations stacking various sources of toleranceThe University of Arkansas and the University of Missouri's 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. Advancement decisions have been completed based on multi-environment yield data, including generation advancement of Enlist-E3 materials with off-target dicamba tolerance.**Vieira, University of Arkansas:****Development of Enlist-E3 materials with off-target dicamba tolerance:** Population advancement is still ongoing in an off-season nursery in Puerto Rico, with an expected return of F4:5 progeny rows in 2026. Single plants were genotyped using a panel of 25 SNP markers to confirm true hybrids. Yield data of the recurrent Enlist-E3 parent was obtained in 2024, of which many continue to show high performance compared to commercial checks (Table 1)**Table 1.** Yield of Enlist-E3 lines included as a parent in the introgression of off-target dicamba tolerance.

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| **Name** | **Type** | **MG** | **2024 Yield** | **2024 %E3 CK** | **2023 Yield** | **2023 %E3 CK** |
| R23PR-00100 | Enlist-E3 | 4E | 63.7 | 101.4 | 61.9 | 101.5 |
| R23PR-00043 | Enlist-E3 | 4E | 73.4 | 117.6 | 68.2 | 107.0 |
| R23PR-00037 | Enlist-E3 | 4L | 62.1 | 81.9 | 69.2 | 106.6 |
| R23PR-00068 | Enlist-E3 | 4L | 62.0 | 90.1 | 65.2 | 107.0 |
| R23PR-00089 | Enlist-E3 | 4L | 61.5 | 91.4 | 67.6 | 93.2 |
| R23PR-00035 | Enlist-E3 | 5E | 61.4 | 95.5 | 68.5 | 107.5 |
| R23PR-00055 | Enlist-E3 | 5E | 70.6 | 102.6 | 70.1 | 107.9 |

**Population development**: Three new crosses for specialty markets were developed using a dicamba-tolerant parent in 2024. These are currently being advanced in an off-season nursery in Puerto Rico.**Lin, University of Missouri:****Progeny rows and population development**: 598 F4:5 single plants from five crosses involving dicamba-tolerant parents will be grown in single rows in the progeny testing in 2024. A total of 29 lines with best agronomic traits were visually selected for further evaluation in 2025.**Population development:** Sixteen conventional breeding populations to improve off-target dicamba tolerance 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 made four novel crosses by combining high-yielding lines with natural dicamba-tolerant line and plant introductions (PI) in our breeding program.**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 were 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 was conducted in collaboration with a seed company using a proprietary panel of 5,000 SNPs. The data is expected to be processed over the winter and should be available in the next quarterly report. |