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| Project Title | **Screening and Selecting Non-Xtend Soybeans for Dicamba Tolerance**  |
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| PI’s Title | Professor and Soybean Breeder | Institution: | University of Missouri – FDRC |
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| Additional PIsFor this project | Caio Canella Vieira (research Specialist/PhD Student); canellavieirac@mail.missouri.eduUniversity of Missouri – FDRC |
| Research Locations (and states involved) | Portageville and Clarkton, Missouri |
| **Timeline:** **Current Year - FY22** | **Multi-Year Project Information** (if applicable) |
| Year 1 | Year 2 | Year 3 |
| Start Date | Oct 1, 2021 | **Oct 1, 2019** | **Oct 1, 2020** | **Oct 1, 2021** |
| End Date | Sep 30, 2022 | **Sep 30, 2020** | **Sep 30, 2021** | **Sep 30, 2022** |
| Funds Requested | $65,500 | $65,500 | $65,500 | $65,500 |
| **Program Area (e.g., breeding, mngt.): Breeding for Yield-limiting Factors** |
| Objectives | Identify natural tolerance to off-target dicamba damage, understand the underlying genetic and physiological basis of this tolerance trait, and broadly deploy varieties with enhanced tolerance to U.S soybean farmers. |
| Justification | The claim that off-target dicamba damage is predominantly a “cosmetic” effect is increasingly shown to be false. The EPA has approved the re-registration of dicamba for over-the-top applications until 2025 and it is expected non-Xtend soybeans will continue to be exposed to and suffer losses from the off-target dicamba movement. |
| Exp Setup | In 2021, five different trials will be conducted to assess the differential response of genotypes to off-target dicamba damage, perform mapping studies to identify regions of the soybean genome regulating the tolerance, and select advanced breeding materials with enhanced tolerance. Materials include advanced breeding lines, plant introductions, and bi-parental mapping populations. |
| Summary  | Although soybeans are naturally susceptible to dicamba, genotypes may respond differently to off-target damage. A strong negative correlation between visual off-target injury and yield performance was identified, of which tolerant genotypes chronically exposed to off-target dicamba may suffer a maximum of 10% yield penalty whereas susceptible genotypes may suffer as much as 40% yield losses. We are currently in the process of using all data collected in the last two years to identify the genetics underlying this differential response. |
| Key Metrics | Field trials performance (planting, conduction of experiments, and harvesting); Quality of data (reproducibility, consistency, biological sense); Number of advanced materials in USDA regional trials with enhanced resistance; Number of publications and presentations. |
| Expected Deliverables | Elite non-Xtend soybean varieties with enhanced tolerance to off-target Dicamba damage; Genes/QTLs/markers associated with dicamba tolerance; Improved understanding of dicamba and its effects (genetic and physiological) on non-Xtend soybeans. |
| Benefit to midsouth farmers | Flexibility, freedom of choice, and a layer of yield protection to off-target dicamba damage provided by superior genetics regulating natural tolerance and ability to recovery. |
| Progress Made | Over two years of large-scale field research, we have identified many contrasting breeding lines for the off-target response. In addition, we have screened 340 exotic soybean accessions and identified differential responses to off-target dicamba exposure. Mapping populations were developed and are currently being evaluated. Many advanced breeding lines with enhanced tolerance were entered in the USDA regional trials and may be proposed for release if performance is satisfactory. We are done with majority of field-related work and are currently transitioning efforts towards identifying the genomic regions conferring tolerance and ability to recovery. |
| Signature of Principle Investigator | Date: |
|  | 8/2/2021 |