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| Project Title | | Leveraging Photosynthetic Efficiency traits for improving soybean productivity in the Mid-South | | | | | |
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| PI’s Title | | Assistant Professor | | Institution: | | University of Missouri | |
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| Additional PIs  For this project | | Co-PI: Francia Ravelombola, University of Missouri-Fisher Delta Research Extension and Education Center | | | | | |
| Locations | | Lee Farm Portageville, MO | | | | | |
| **Timeline:**  **Current Year - FY23** | | | **Multi-Year Project Information** (if applicable) | | | | |
| Year 1 | | Year 2 | | Year 3 |
| Start Date | 4/1/25 | | **April 1, 2025** | |  | |  |
| End Date | 3/31/26 | | **March 31, 2026** | |  | |  |
| Funds Requested | $30,000 | | **$30,000** | | $ | | $ |
| **Program Area:** | | | | | | | |
| Related funding: | |  | | | | | |
| Objectives: | | 1. Identification of photosynthesis related traits strongly correlating with seed yield  2. Identification of candidate genes for photosynthetic efficiency traits correlated with high seed yield  3. Develop a predictive breeding pipeline in soybean using photosynthetic efficiency towards the release of soybean varieties with high seed yield potential | | | | | |
| Justification: | | Enhancing soybean yield is crucial to meet the rising demand from a growing population and to boost profitability for U.S. Mid-South farmers. This project aims to leverage recent findings on photosynthetic efficiency to improve soybean yield through targeted breeding programs. | | | | | |
| Exp Setup: | | **Identification of photosynthesis related traits**: We have elite breeding lines and diverse germplasm from our program, which will be grown in multiple environments (weather, soil types) representing Mid-South conditions. Then, we will collect the photosynthetic data using MultispeQ and drones to achieve aforementioned objectives.  **Identification of candidate genes**:  **Develop a predictive breeding pipeline**: | | | | | |
| Summary: | | This project aims to enhance soybean yield potential by leveraging photosynthetic efficiency, a critical yet underexplored avenue in soybean breeding. By quantifying photosynthetic traits such as chlorophyll content and photosystem efficiency in diverse soybean germplasm, we will identify traits strongly correlated with higher seed yield. Utilizing advanced phenotyping technologies like MultispeQ and drones, we will collect high-throughput photosynthetic data across multiple environments. A genome-wide association study (GWAS) will identify genetic markers linked to superior photosynthetic efficiency, facilitating precise and efficient breeding strategies. Predictive models developed using this data will streamline selection of high-yielding lines, accelerating our breeding pipeline. | | | | | |
| Benefit to midsouth farmers: | | Increase farm profitability, seed yield resilience, and meeting growing market demand. Boost regional productivity and profitability, while predictive models and genetic insights will enhance breeding program efficiency. | | | | | |
| Progress Made: | | We have already designed an experiment to collected preliminary field data using our phenotyping device, so will be collecting the soybean photosynthetic in coming weeks at multiple locations. | | | | | |
| Signature of Principle Investigator | | | | | | Date: | |
|  | | | | | | 8-1-24 | |