Mapping Soybean Protein and Oil Quality in Farmer Fields

Funding: $218,000

Principal Investigator
Ignacio Ciampitti, Kansas State University

Co-Principal Investigators
Aaron Prestholt, Iowa Soybean Association

Overview of Project Objectives

The importance of soybean seed quality and composition is receiving increased attention among farmers, researchers, agronomists, and commodity traders. Soybean seed quality is influenced by genetics, biotech traits, plant growth and development, as well as soil types, climate and weather conditions, and agronomic practices in the field. Within-field knowledge of soybean quality will enable and encourage increases along the marketing value chain. This work will expand knowledge of soybean protein and oil quality in farmer fields in 10 states across the North Central region. This larger database will be incorporated into a decision support tool developed with funding requested from USB for mapping soybean quality in production fields across the U.S. This project will provide the base level of ground-truth field data for integration with remote sensing provided by multi-spectral satellite imagery to build predictive models that will provide new insights derived from soybean quality spatial variations.

Key Results

The team is making substantial progress for developing a multi-state database to allow upscaling of soybean quality predictions to regional levels. Data collection across all states was presented for the complete dataset using 2022 growing season information. The team is developing a similar outcome for 2023 and will then combine both sets of data. When yield data was divided into three sections, a third of yield data clearly reflected a greater protein concentration, while both lower and middle yield ranges presented similar protein variation. The variation in oil concentration was less sensitive to yield levels.

The effect of soil and weather variables on soybean oil and protein concentration were evaluated for all the collected data. For protein concentration, farmer fields with high yield presented greater protein levels linked to the levels of soil organic matter. The levels of oil concentration were mainly linked to weather conditions during the seed filling period and were less influences by soil type. This is a preliminary analysis based on only one year of data, but with more than 100 fields included in the evaluation. Analysis of seed quality from fields is underway for the 2023 season, and reports by state and for farmers will be produced and released to each partner. A publication will be prepared synthesizing all the data from 2022 and 2023 seasons, new field reports and extension newsletters will be released as a part of this effort.

Benefit to Farmers

This project is important and timely since it complements efforts to breed high yielding and high seed quality soybeans and will provide relevant information to growers related to segregating quality at the field level, with the ultimate outcome of improving overall profits from soybean genetics and cropping systems.

Links

Mapping Soybean Protein and Oil Quality in Farmer Fields
USB National Soybean Checkoff Research Database

Planning for the Future: Mapping Soybean Fields for Protein and Oil Quality
SRIN article