

Manipulating a major gene governing seed reserves as a means to maintain yield and oil while increasing protein

Funding: \$55,425

Principal Investigator

Matthew Hudson, University of Illinois at Urbana-Champaign

Overview of project objectives

The research team had previously fine-mapped the high-protein Quantitative Trait Locus (QTL) and identified a gene on the basis of this QTL. This project furthers the research to develop the higher-protein soybean. Through greenhouse-grown populations and yield trials the researchers will attempt to recreate the high-protein phenotype using CRISPR/Cas9 to further their knowledge of this locus on chromosome 15.

Key results

Field trials were completed for two growing seasons and data is being analyzed. Early indications show that one transgenic event increased protein and free amino acid levels while oil content was not affected, but this still may be statistically insignificant. The effect on protein and oil tested in the greenhouse and in field trials with the down-regulated high protein allele showed a 1-2 percent increase in protein in the best lines. Further field experiments are in progress to see the effects on maturity and seed mineral content in the transgenic field trials. A manuscript is being written describing the identification of the gene and its role in controlling oil and protein levels.

Benefit to farmers

An evaluation of soybean varieties released between the 1920s and 2010 showed that seed protein content has reduced by about 2 percent. This reduction makes it difficult for crushers to produce soybean meal with 48 percent protein, which is the industry standard. While 2 percent doesn't seem to be significant, the world soybean crop is around 370 million metric tons, thus a single percentage point in protein concentration represents 3.7 million tons. Growing soybeans with increased protein will improve the crop's value for growers.

Links

[Manipulating a major gene governing seed reserves as a means to maintain yield and oil while increasing protein](#) *USB National Soybean Checkoff Research Database*