**Objectives:**

1. Maintain an efficient soybean genetic transformation facility.  
Goal: Provide transformation capacity to leveraged projects funded through the National Science Foundation, United States Department of Agriculture, and the United Soybean Board.  
2. Use transformation and targeted mutagenesis (gene editing) to assess gene functions and enhance traits of interest for Minnesota soybean growers.  
Goal 1: Test functions of genes hypothesized to influence IDC tolerance using targeted mutagenesis.  
Goal 2: Generate novel architecture mutants by mutagenizing and characterizing candidate genes for CNGC20 and UGT.

**Achievements:**

This report covers progress from 5/1/2019 to 4/30/2020.  We have continued efforts to develop targeted mutations in soybean using the CRISPR/Cas9 transgenic system and/or stable transformed lines to test for gene function.  Progress has been made on each of the following genes:

1.    IDC candidate gene: In this reporting period, we have developed a transgenic construct for a gene we hypothesize is critical for IDC tolerance in certain soybean varieties. In this reporting period, we initiated experiments to test the function of the transgene in hairy roots. The preliminary data was promising, but we had to stop the experiment before completion due to the COVID19 University reduced operations from mid-March forward.  
2.    CNGC20 (Glyma.16g218000): Loss of function mutation may generate short petiole phenotype; Status: We obtained the necessary permission to grow the non-transgenic CRISPR edited line. The line was grown in the field in 2019. We did not find significant differences in petiole length between the CRISPR mutant line and the Bert wild-type parent line.   
3.    UGT (Glyma.17g166500): Loss of function mutation may generate a reduced branch angle phenotype; Status: We have not recovered heritable CRISPR edited plants for this gene.  
4.    Lps1 (Glyma16g33430): Loss of function mutation may generate short petiole phenotype; Status: Previous attempts to mutate this gene with CRISPR/Cas9 were successful, but did not exhibit the desired phenotype. We suspect that the region of the gene targeted in these experiments was not important for gene function. We have thus initiated another round of CRISPR mutagenesis, this time on a region that is more likely involved with gene function. In this reporting period, we recovered two new mutations for this gene. We expect that mutagenesis in these plants is ongoing and may provide us new mutations in the next generation. These seeds have been harvested and are ready for the next generation. However, we have not been able to initiate these experiments due to the University reduced operations. We expect to have these seeds planted in the greenhouse by mid-June.

In addition to the above projects, the transformation facility has supported transformation and/or CRISPR mutation efforts for additional targets, using funding leveraged from the National Science Foundation, United States Dept of Agriculture, and the United Soybean Board. The project has also contributed to collaborative efforts with other research teams.

**Challenges:**

COVID19. The University went to reduced operations in mid-March. We have been able to maintain and harvest materials for this project and analyze previously-generated data. But we have not been able to do new experiments with these materials during the period of reduced operations.