SCSB Quarterly Report

General Information
Principal Investigator(s) Name(s): C. Nathan Hancock (USCA) and Kendall Kirk (Clemson)
Organization: University of South Carolina Aiken
Date: 27 Oct, 2020
Quarter: Third

Proposal Information
Title: Strategies for identification and rescue of poorly nodulated soybeans
Amount Expended to Date: $1,500

Progress Assessment
Report the progress toward the situation described in the proposal summary. Include progress against budget, timeline and scope.

The research plot was planted on Tuesday, 16 June 2020, as described in the proposal. Twelve treatments (10 Nod- mutants and 2 controls, with three levels of nitrogen treatment) were arranged in 6 complete randomized replicates. Germination was pretty consistent, suggesting that this season will provide better data than last year.

At the R1 stage (20 July) we measured height by hand and NDVI with a handheld Greenseeker (Figure 1). These results showed that the addition of nitrogen resulted in taller and greener plants as expected. The control (Williams 82) plants benefited from the nitrogen treatment, suggesting that we may not have had good nodulation. We also collected leaf samples that were sent to the lab to be analyzed for nitrogen content. Aerial images were also captured at the R1 stage, producing a single low resolution image of the field (Figure 2) and a mosaic of images captured from lower altitudes. In the coming months, leaf color and leaf nitrogen content compared.

At R1 stage, a rescue application of fertilizer was applied to a subset of the plants with low nitrogen content (Nod-). We measured NDVI In the following weeks to see if the plant color had improved. We observed that the rescue application of nitrogen greened up the plants (Figure 3), with the lowest application rate (80 lbs/acre) giving the best result. This result together with our data from at planting application suggested that higher nitrogen application rates may be inducing stress or burning.

The plants were harvested from the field on 23 Sep 2020 and brought to the lab to dry. They will be threshed in the coming weeks to measure the yield of each treatment.

In addition to the plot described in our proposal, we were able to identify three chlorotic patches in SC growers' fields to perform nitrogen rescue tests. In each field, we produced 4 replicates of three treatments (0, 120, and 240 lbs/acre N). We measured height, collected leaf

tissue, and took aerial images as a reference for the response. Observations at two of these plots suggests that there are significant differences in plant health in those treated with nitrogen (Figure 4). These plots will be harvested in the coming weeks to determine if there was a significant effect on yield.

Key Performance Indicators

What KPI(s) are being used to measure project success? How are KPI(s) being measured? Will KPI(s) not be met? Are KPI(s) on track? Will KPI(s) be exceeded? Explain the key circumstances that are impacting achieving or not achieving KPI(s).

We are currently on track with all of the aims of the project.

Next Steps

Explain the next steps of the projects and what you hope to achieve during the next quarter.

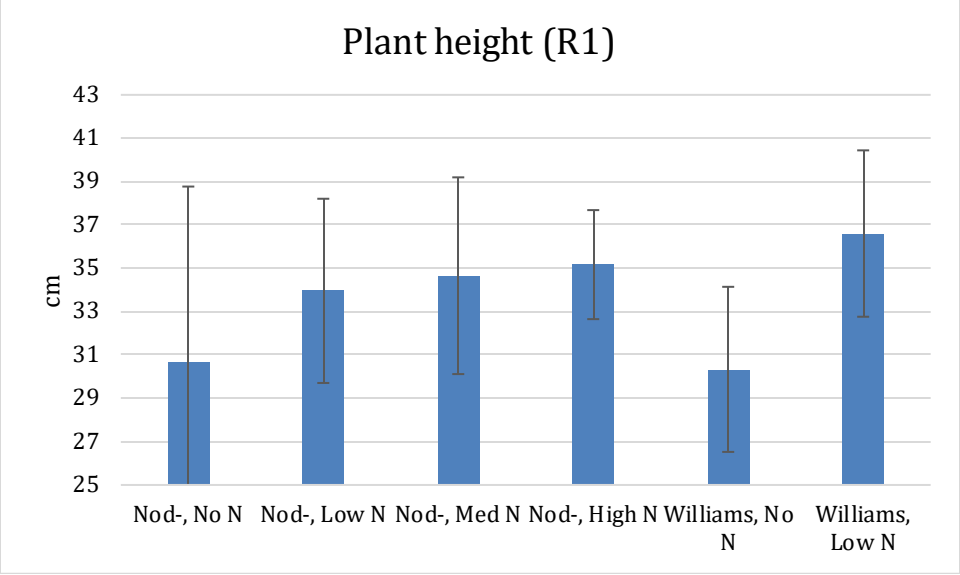
Data from the R1 stage will be analyzed and a regression model will be created describing the relationship between leaf color and nitrogen content. Yield of each treatment will be determined in comparison to the control lines. This will allow us to determine how much nitrogen is required to rescue poorly nodulated soybeans.

In the SC grower's fields, we will measure yield to determine what effect the nitrogen application had. We will then calculate the economic feasibility of nitrogen application.

Additional Information

Provide all additional supporting information, facts or figures here.

Figure 1 – Height and NDVI Results



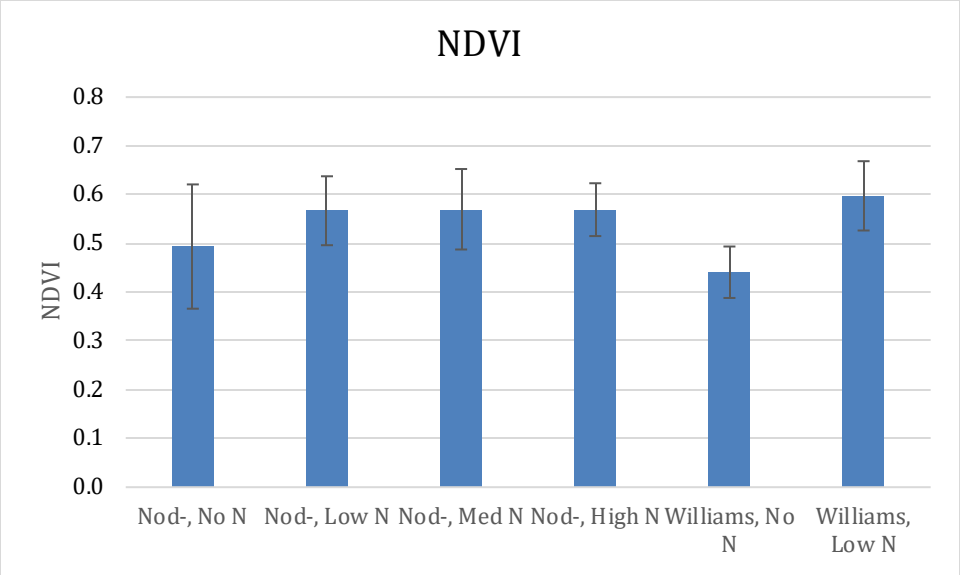


Figure 2 - Aerial Image of the 2020 experimental plot

Figure 3. NDVI after Rescue application of Nitrogen

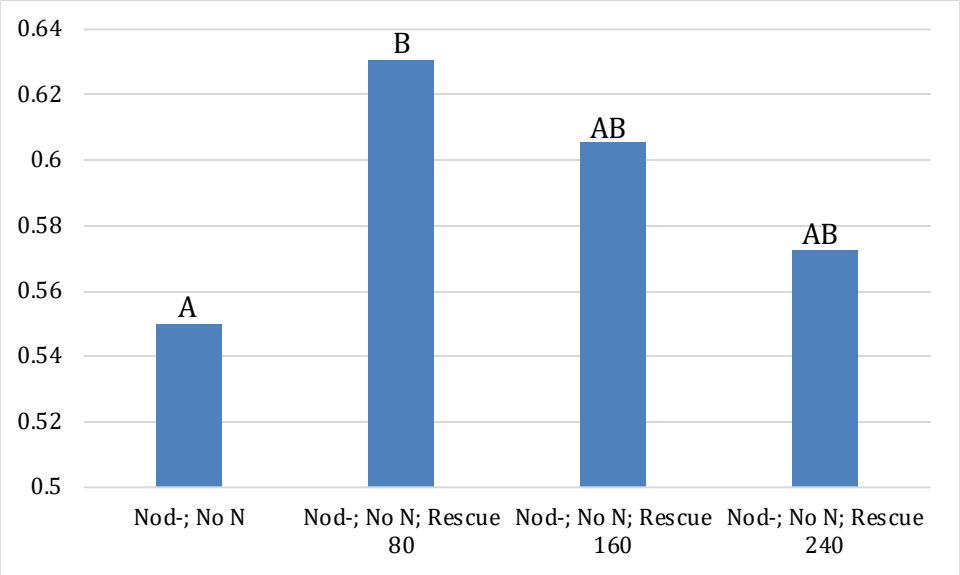


Figure 4. Image showing the effect of nitrogen application (right) to a grower's field

Prior to submission, reports should be saved as a pdf document using the following naming convention; 2018Date(yrmoday)_(PI Last Name)_(Abbreviated Proposal Title)_Qtr1.