

# Effects of Various Nitrogen Treatments on Late Planted Soybeans

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## Introduction

Nitrogen has become a very widely used fertilizer for numerous crops. Although soybeans are able to fix their own N through a relationship with rhizobia bacteria, it can also take up nitrogen from the soil. As yields have increased, a deficit of nitrogen may occur, creating a need for additional nitrogen to be applied to keep up with yields. To determine and evaluate its effects on growth and yield, variations of nitrogen treatments were applied to the same soybeans to measure these differences.

## Objective

The objective of this study is to find the most effective combination of nitrogen applications by measuring stand counts, SPAD readings (leaf chlorophyll concentration), and yield to understand the effect and need for nitrogen application in soybeans

## Materials and Methods

This study was planted on June 20, 2018 with Xtend low maturity soybeans (AG38X6) in no-till soil on Spindletop Farm: Lexington, KY. Each plot was planted with a Wintersteiger no-till planter with 15 inch row spacing. 8 total treatments were applied in 4 replications and are as follows:

1. Check: no in-furrow, no post emergence application
2. In-furrow UAN (32%N), No post emergence application
3. In-Furrow UAN(32%N), 100lb ai/a Urea (46% N)
4. In-furrow UAN(32%N), 21lb ai/a AMS (21% N), 79lb ai/a Urea (46% N)
5. In-furrow UAN (32%N), 21lb ai/a AMS (21% N), 79lb ai/a Urea (46% N), 100lb ai/a Urea (46% N)
6. No In-furrow, 21lb ai/a AMS (21% N), 79lb ai/a Urea (46% N)
7. No In-furrow, 100lb ai/a Urea (46% N)
8. No-In furrow, 21lb ai/a AMS (21% N), 79lb ai/a Urea (46% N), 100lb ai/a Urea (46% N)

The AMS was always applied with Urea to regulate Sulfur levels and to reach total 100lbs ai/a of Nitrogen. Urea was applied itself, solely making up 100lbs ai/a of N. Both post-emergence treatments were granular, and spread by hand immediately following emergence, while the in-furrow treatment was applied during planting. In order to test these differences in N application, several tests were done to measure the growth and overall effect of the N.

- SPAD reading at V2- to measure chlorophyll concentration
- Stand counts at V2- to give a good prediction on yields and early growth between the different N treatments.

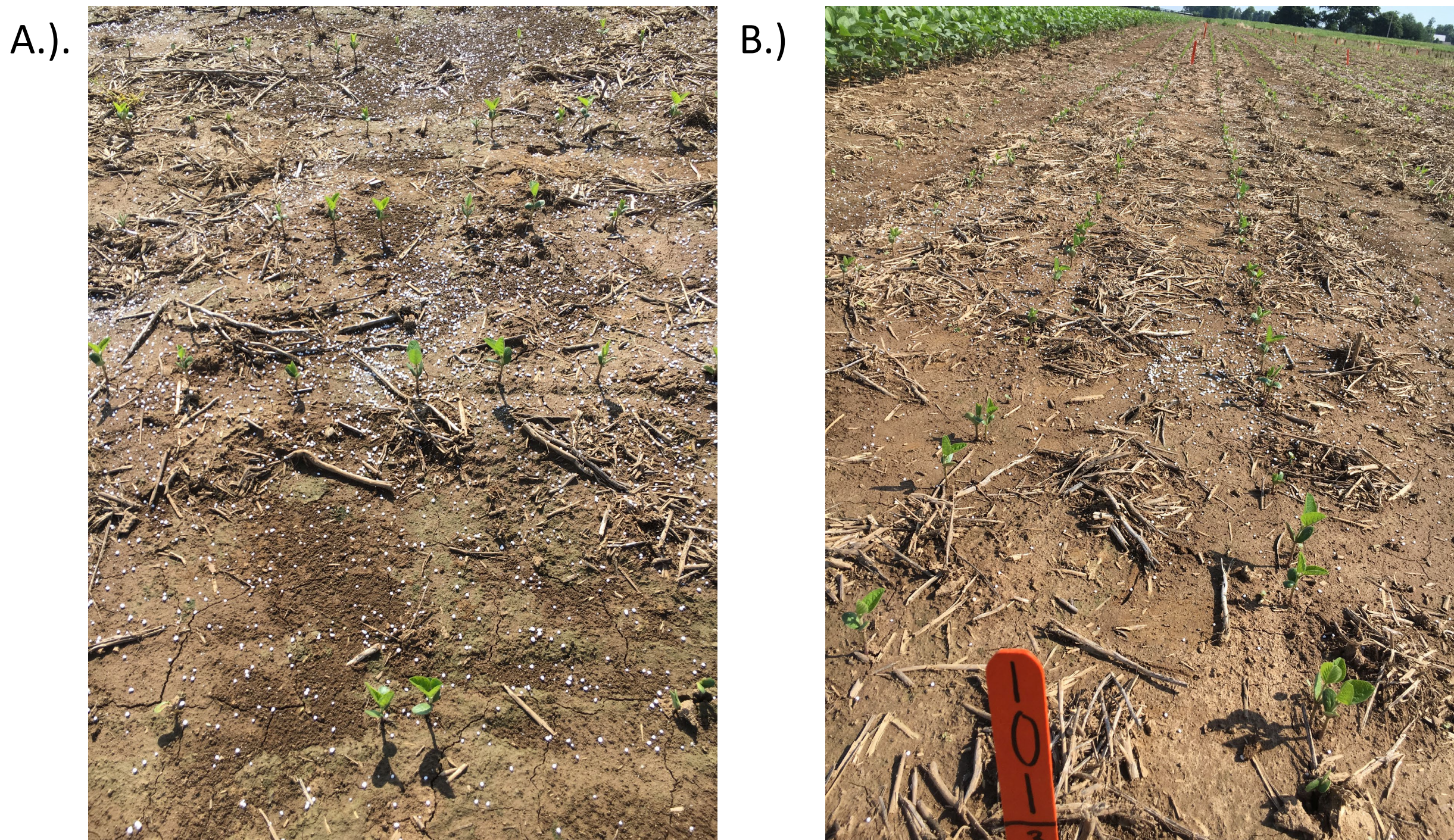


Figure 1. A.) Urea and AMS application at V1. B.) Urea application at V1.

## Results

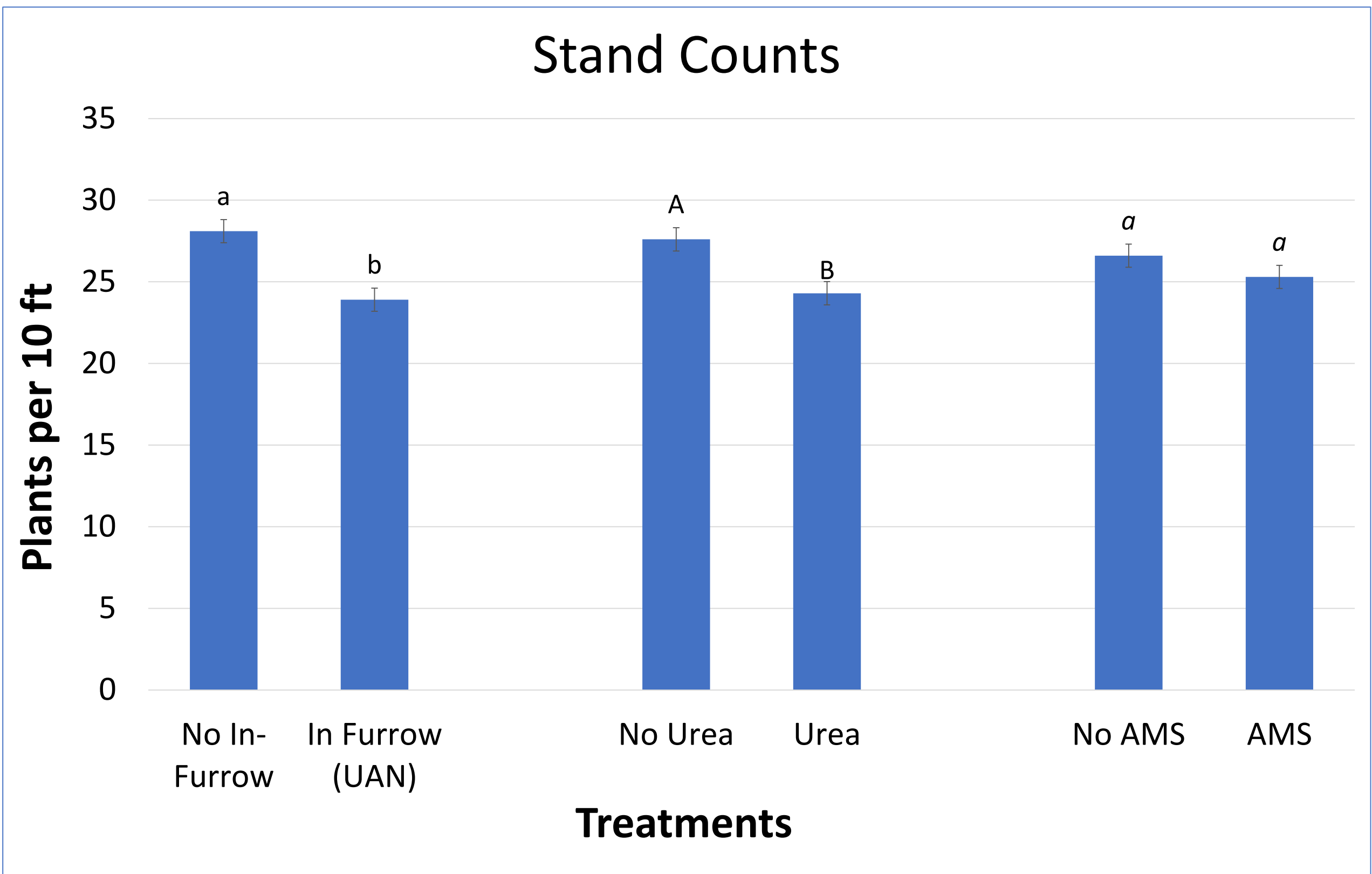


Figure 2. In-furrow (UAN), urea and AMS effects on soybean stand counts. Means overtopped by different letters are significantly different (LSD = 0.05).

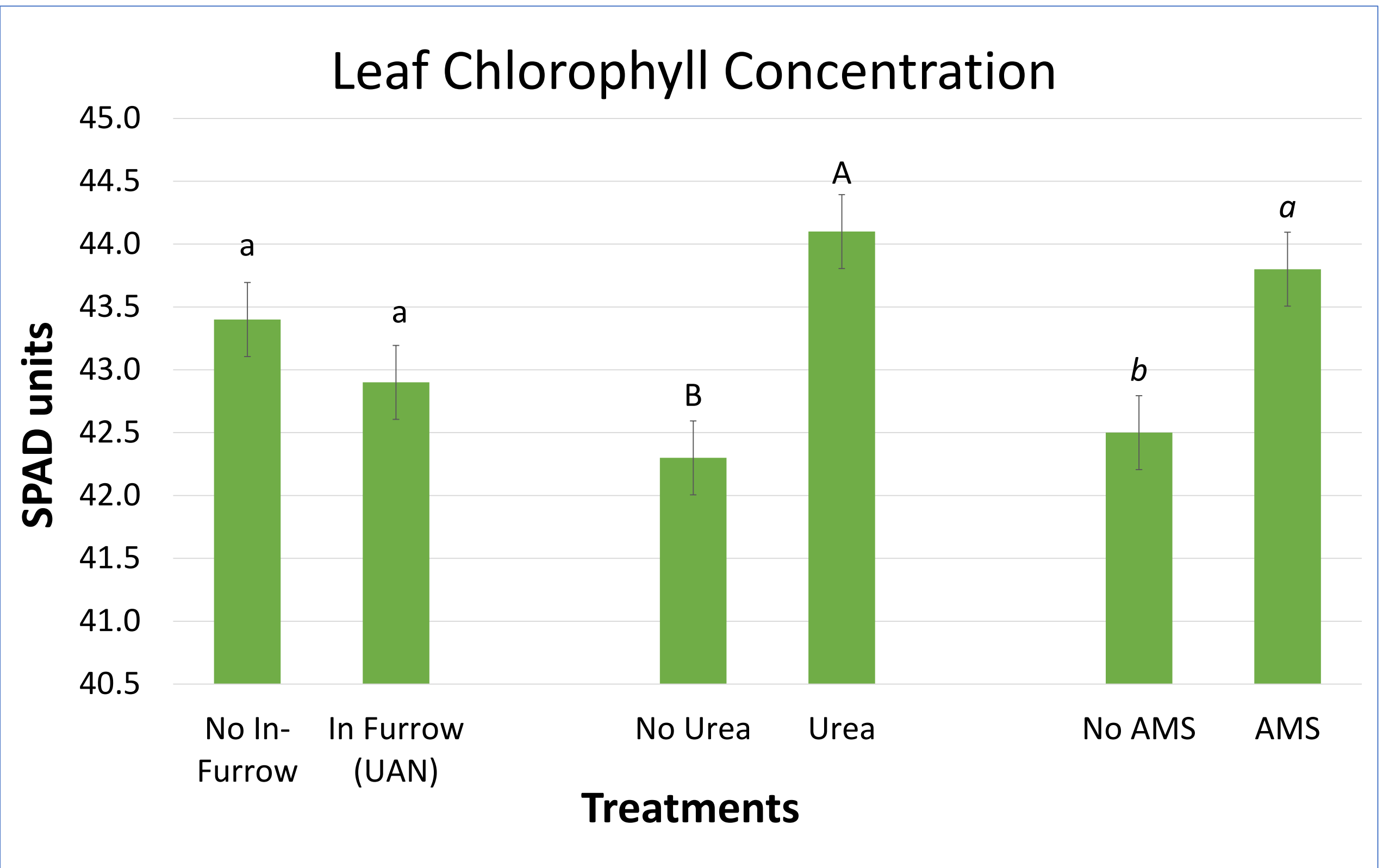


Figure 3. In-furrow (UAN), urea and AMS effects on leaf chlorophyll concentration. Means overtopped by different letters are significantly different (LSD = 0.05).

### Stand Counts

Stand counts were recorded at V2 in the 3<sup>rd</sup> row. These are taken shortly after emergence to determine and predict what yields will be based on the soybeans that have emerged. In this study it was measured to determine if both the in-furrow and the granular fertilizer had an effect on how many soybeans were in a ten foot section of every plots 3<sup>rd</sup> row.

- The In-furrow treatment was significant in decreasing the plants per 10 feet
- Urea application significantly decreased the stand count.
- AMS didn't have a significant effect the stand counts

### Leaf Chlorophyll Concentration

Using a SPAD meter which measures the chlorophyll concentration, or how green the leaves on the beans are. It is used to evaluate how much nitrogen is inside the plant. These readings were done to assess if the in-furrow and the fertilizer had an impact on the nitrogen of the beans at V2.

- In-Furrow did not have a significant effect on the leaf chlorophyll concentration
- Urea significantly increased the leaf chlorophyll concentration
- AMS had a significant effect on the concentration of leaf chlorophyll

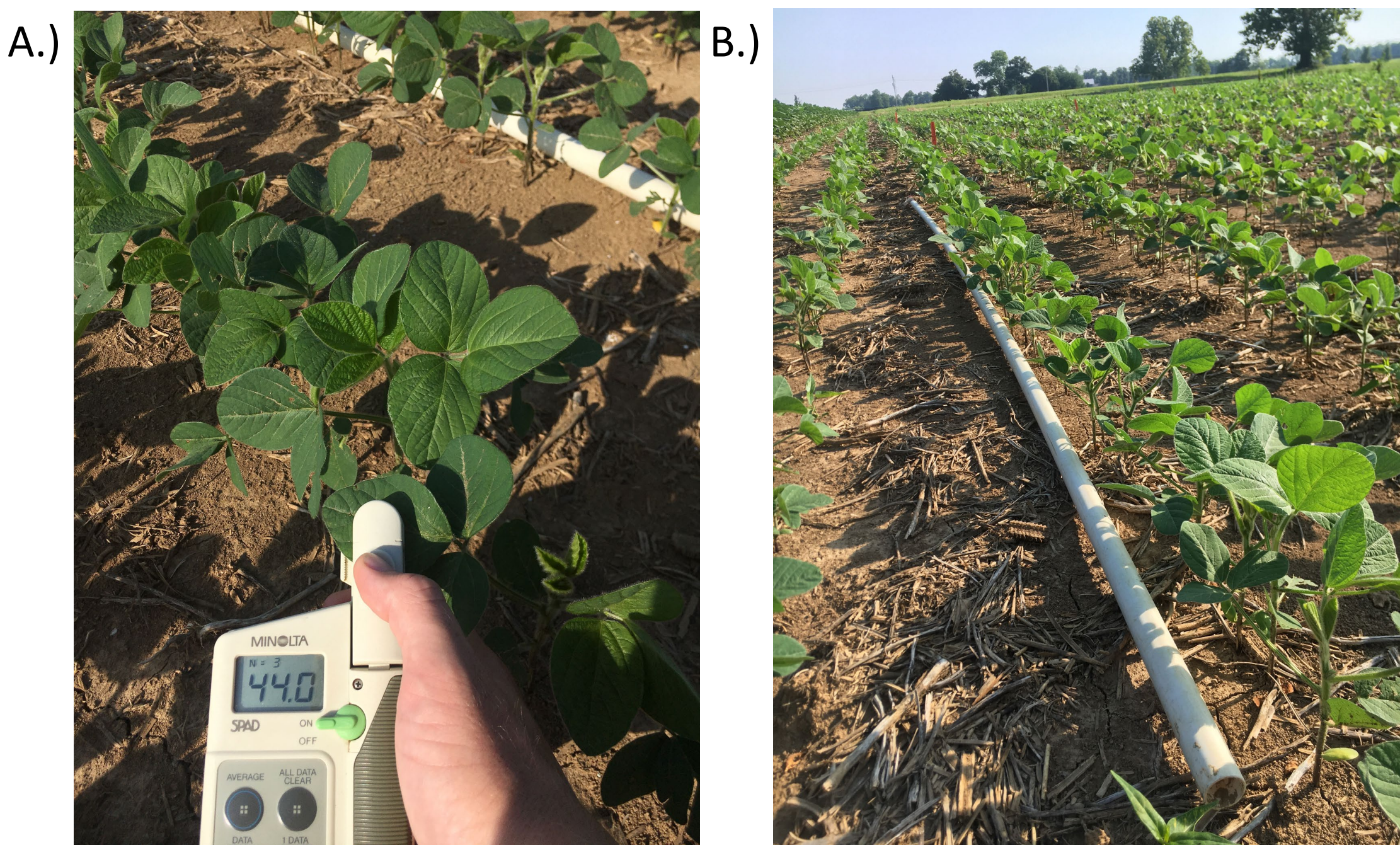


Figure 4. A.) SPAD meter testing leaf chlorophyll concentration. B.) Stand counts measuring number of plants per 10 feet.

## Future Direction

- Nodule counts will be conducted and documented to see how the soybeans are actively fixing nitrogen, and determining differences in Nitrogen fixation across the treatments.
- Yield measurements will be recorded and assessed to determine which combination of treatments or the control had the most significant effect on the yield.

## Anticipated Conclusions

- The expected results are that the combination of both the in-furrow treatment and the 100 lbs ai/a would promote the best growth giving the best results in all the tests taken and the highest yield. This is due to the fact that any nitrogen deficits that could not be made up by the soybeans themselves, would be added by the treatments and make up for the deficit.

## Acknowledgements

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