Nitrogen Fixation: Biological vs. Synthetic Agents

Schnabel, Addie (School: Ashley Public School)

Today's farmers must be innovative and cautiously smart with the way that the markets are continuing to trend. They must figure out how cost may be eliminated, what they can do to increase profit margins, increase crop yields, and protect the environment at the same time. Nitrogen fixation is a way that farmers can protect soil from nutrient stripping caused by nitrogenous fertilizers and increase profit margins. This process allows farmers use different biological agents to pull nitrogen from the atmosphere and put it into the soil to meet the nitrogen requirements of a leguminous plant. In my experiment, I tested to see if biological nitrogen-fixing agents can produce enhanced results when compared to a synthetic nitrogen source. I had 4 test groups that received a treatment of either rhizobia, cyanobacteria, nitrogen fertilizer, or no treatment at all. I used an inoculation technique to apply both the cyanobacteria and rhizobia, and spread the fertilizer to simulate real field situations. In conclusion, I found cyanobacteria can be extremely helpful when growing soybeans, whether it is used to fix nitrogen or increase water intake. At this point, rhizobia needs more time to develop to see how nitrogen levels will appear over time, but depleted/deficient potassium levels show that it isn't the best plant health promoter. Nitrogen is a reliable source for producing a high quantity of biomass, which could lead to higher crop yield. More exploration is needed to completely understand how, but biological nitrogen-fixing agents can work comparatively to synthetic fertilizers.