Hydrogel That Aids In Soil Water Retention

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EXECUTIVE SUMMARY

The objective of this study was to see if the hydrogel had any effect on yield and crop growth of fresh market tomatoes. I assisted with the application of fertilizer, UAN-32, that was applied to plots at rates of 200 and 150 lbs of nitrogen per acre. Subplots were marked with different color flags to make sure the correct amount of fertilizer was applied to each bed. Plants were also tagged at random and the plant height was measured weekly for the duration of the growing season. After 90 days, the plants were harvested and the crops were graded based on size and color. As described in the project outcomes, some categories of tomatoes showed an increase in total weight when treated with the hydrogel but other categories did not show a statistically significant effect. Additional data would be needed to more clearly understand the relationship between water, fertilizer application, and the use of the hydrogel before any substantial conclusion can be made. While the work was challenging, I found it rewarding and was grateful to learn more about agronomic practices and the work that goes into crop growth.
PROJECT OBJECTIVES

While I have an interest in medicine and human health, my curiosity about nutrition and food supply pushed me to consider this internship with the USDA. I thought work with agricultural researchers would be a good opportunity to learn about food production and the science that goes into studying it. Because of this, I began work on this project that involved testing polymers (hydrogel) and their ability to increase water retention in the soil. My goals were to be involved in the crop management practices and data collection from sampling and sensors. However, because of my schedule, I was only able to assist with the fertilizer application and plant height measurements, which were very important for observing any influence of the hydrogel on crop growth.

PROJECT APPROACH

Tomato plants are fertilized weekly for about 90 days. During the first couple of weeks, tomato plants were tagged with an orange ribbon. Orange ribbons plants were collected in mid-August to compile the data and begin the needed analysis. Tomato plant’s height and width were measure and collected weekly. The purpose of collecting the measurement is to determine if the hydrogel had any effect on the growth rate of the plants. The plant height results for each treatment are shown in the figures below.
PROJECT OUTCOMES

The harvested tomatoes were graded into red, breaker, diseased, and non-marketable varieties. A paired t-test was utilized to determine if the differences in the parameters of interest were statistically significant. The findings are as follows:

1. When the raw biomass of all tomatoes was totaled, the treated plots showed a greater weight for green, breakers, diseased and non-marketable fruits.

2. For both treated and control plots, non-marketable tomatoes were produced in the largest numbers. Despite this, average of extrapolated yields for all treatments was above the average in California for Fresh Market Tomatoes of 12.5 tons/acre in 1999 (source: [http://anrcatalog.ucdavis.edu/pdf/8017.pdf](http://anrcatalog.ucdavis.edu/pdf/8017.pdf)).

3. Figures 1 through 8 indicate that in most treatment configurations, there was an increase in plant growth when the product was applied. Exceptions to this were observed in the cases shown in figures 4, 5, and 6.
CONCLUSION

After three months, tomato plants with an orange ribbon were collected. We were able to summarize the study of the hydrogel use on the tomato plants. Applying hydrogel to the tomato yielded a higher mass of green and breaker tomatoes, a large percentage of the tomatoes were diseased and not marketable. In the majority of treatment configurations, the hydrogel may also have resulted in an increase in plant growth over time. Another year of data would be helpful in determining if the hydrogel did have a significant effect on tomato growth. The work experience that I gained through this internship taught me a lot about the importance of clear documentation and data collection. While it can be difficult, the attention to detail required made the work more rewarding and would make me consider work with the USDA in Forestry or Information Technology, where data collection and data management are a critical component of the required responsibilities.
APPENDIX

Figure 1: Average of measured plant height in plots at 100% ET, 200 lbs/acre N.

Figure 2: Average of measured plant width in plots at 100% ET, 200 lbs/acre N.
**Figure 3:** Average of measured plant height in plots at 100% ET, 150 lbs/acre N.

**Figure 4:** Average of measured plant width in plots at 100% ET, 150 lbs/acre N.
Figure 5: Average of measured plant height in plots at 75% ET, 200 lbs/acre N.

Figure 6: Average of measured plant width in plots at 75% ET, 200 lbs/acre N.
**Figure 7**: Average of measured plant height in plots at 75% ET, 150 lbs/acre N.

**Figure 8**: Average of measured plant width in plots at 75% ET, 150 lbs/acre N.