



# Resistant and Susceptible Sorghum

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## Abstract

In the year 2015, the USA produced 597 Million bushels of sorghum and planted 7.85 million acres. Kansas produced 281.6 million bushels and planted 3.2 million acres. With Green bug aphid and the sugarcane aphid a major pest of the sorghum crop in Kansas and sorghum being the 3<sup>rd</sup> top crop commodity in Kansas if a big infestation comes in could hurt agriculture industry as a whole. In the sorghum industry they have developed varieties that are resistance to specific types of aphids but one variety maybe resistance to one type of aphid but susceptible to another type. My project was to compare two type of aphids on 2 different varieties of sorghum and see how a resistance variety and a susceptible variety are affected by aphids. The resistance varieties will have less damage done by the aphids to the plant compared to the susceptible variety. These results are important in the state of Kansas due to Kansas being ranked 7<sup>th</sup> in the nation in agriculture production. Being an Animal Science and Industries major with the production option, milo seed is a product of sorghum, similar to corn and sometimes cheaper, we can use milo seed in feed to produce the same amount in livestock industry for less money so our production can be more profitable.

## Purpose

To show how susceptible variety and resistance variety of sorghum handle aphids.

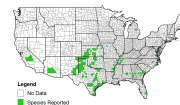
## Questions, Hypotheses, and Predictions

**Question:** How will the Resistance and the susceptible varieties compare when infested with aphids?

**Hypothesis:** Resistance will have less damage and more aphids than the susceptible

## Study System

Two types of organisms were involved in this study, including Green bug aphid (*Schizaphis graminum*) and Sugarcane aphid (*Melanaphis sacchari*). Both are significant pest in US.



## Methods and Experimental Design

Research was conducted at the Kansas State Agricultural Research center in Hays Kansas. To start, we went to the sorghum field to observe and sample sorghum plots to examine what aphids do to plants and catch and see what was present in the field. We observed many green lacewings which are predators of aphids. Our lab experimental design was as follows:

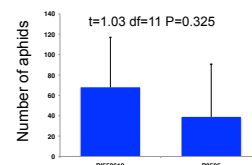
- 2 varieties of sorghum were tested , once susceptible PI550610 and resistance P8505 for green bug aphid
- Individual plants were place in clear plastic tubes
- Each plant was inoculated with 150 aphids
- They were placed in a incubator at 23.4 C on 14:10 Light cycle for 2 weeks
- Individual plants were tested for damage and number of aphids after 2 weeks
- Sugarcane Aphid was tested the same way, except the varieties were PI03707 (resistant) and PI550610 (susceptible)



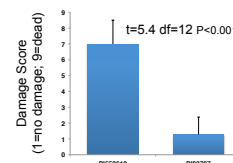
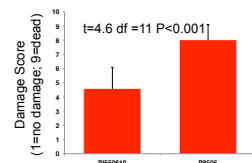
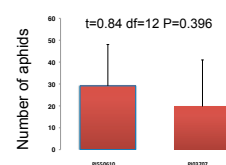
## Results

The resistance variety will have less damage to the plant compared to a susceptible variety. The green bug on PI550610 the resistance variety had higher numbers of aphids and less damage compared to P8505 variety which is a susceptible to green bug aphids. In Sugar cane Aphids PI03707 had lower amounts of damage a resistance variety compared to PI550610 a susceptible variety.

### Green Bug Aphid



### Sugarcane Aphid



## Conclusions

The resistance variety of Sorghum can handle more aphids and less damage and in the real world the plant would be able to resistance the aphids long enough that a predator would eat the aphid. For Green bug aphids the variety PI550610 is more Resistance variety of sorghum compared to the variety P8505 which is susceptible to green bug aphids. For the Sugarcane Aphid the variety PI03707 is resistance to Sugar cane aphids and the variety PI550610 is susceptible to them. If your field is know for high numbers of Green bug Aphids of these two varieties of Sorghum, variety PI550610 would be the most economical choice and result in the best yield but PI556010 would be the worst variety in the case if your had high levels of Sugarcane Aphids. Thus, you would want to plant PI03707 in that situation.

## Future Directions

The next step if I continued this project would be a field study, where I would plant a plot of each variety and then with a higher number of plants come through and count the number of aphids and give the plants a damage score and see if the controlled environment of the lab had an effect on how the plant handle the aphids compared to outside where there are predators, weather and other variables. I think that if there were for example green lacewing involved in this experiment the resistance variety would have a lot less aphids on them and the susceptible variety would not have has high of damage score due that the green lacewing. Also it would be interesting to compare the number of bushels compared the varieties PI550610 and P8505 in highly populated Green bugs aphids and with Variety PI55610 and PI03707 In highly populated Sugarcane aphid Field and see if what we did in the lab translates to the fields with the variables of the a field that were not present in the control in the lab environment

## Reference

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