Capstone Report

Identifying the Effect of Collard Host Variety on Green Peach Aphid Population Growth

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Introduction

Integrated pest management (IPM) strategies are useful for every farmer. They provide tools for farmers to combat pests and diseases through means other than pesticide spraying. IPM involves a combination of strategies to prevent and monitor insect pest populations from gaining a foothold on crops to then use pesticides only when there is an evident need for pesticide control on the crops (Karlsson Green, 2020). IPM strategies are sometimes much more useful for smaller farmers as they are not always able to get a hand on certain pesticides that large farmers are able to, so having IPM methods available to them can boost their ability to effectively combat pests and disease in their crops. One such strategy for IPM is the selection of pest or disease resistant varieties of crops. Host resistance is something that can be introduced in genetically modified (GMO) crops but there is currently a stigma placed around GMO crops which reduces the public's desire to utilize them. This means that identifying non-GMO varieties of crops that are naturally resistant to pest species can help fill the arsenal of IPM tools which are available to farmers no matter how they feel about GMO crops to ultimately help in reducing the utilization of pesticides. Finding varieties that are naturally resistant to big problem pests is very beneficial to growers worldwide.

Green peach aphid, *Myzus persicae,* is a generalist pest species found throughout the world which makes them a problem pest. They are commonly viewed in the US and Europe as a significant pest due to their ability to spread over 100 identified viruses between plants and their ability to proliferate rapidly with as little as one aphid present (Capinera, 2023). This research

was conducted to identify potential host varieties that show resistance to green peach aphids through hindering the growth of their population sizes. In this research, the primary question was if collard crop variety had an impact on *Myzus persicae* population growth, specifically looking at Flash var. and Top Chop var.

Materials and Methods

This research started by growing 24 Flash var. collard plants and 24 Top Chop var. collard plants in miracle-gro brand soil to then take the 8 healthiest plants of each variety and repot them. A population of *Myzus persicae* was also maintained in the lab prior to the start of the experiment. 16 18.5 cm x 30.5 cm sections of 5-mil plastic shielding were cut out, rolled into a cylinder, and then glued together via hot glue in preparation for caging the individual plants. On 11/10/2023, 5 green peach aphids were placed on each collard plant which was then caged by the plastic shielding cylinders which were then covered on the top by pulling a fine mesh bag over the top to fully seal the cage above the plant. Aphid population sizes were then counted and recorded on 11/13/2023, 11/15/2023, 11/20/2023, and 11/28/2023. These results were then evaluated using statistica.

Results

Statistica was used for the evaluation of significance of the differences of population growth between Flash and Top Chop var. collard plants. The mean number of aphids on each variety was calculated and then run through an ANOVA test which showed significance between the 2 treatments, Flash and Top Chop ($F_{1, 56} = 5.60$, $P = 0.0215$) (Figure 1 & 2).

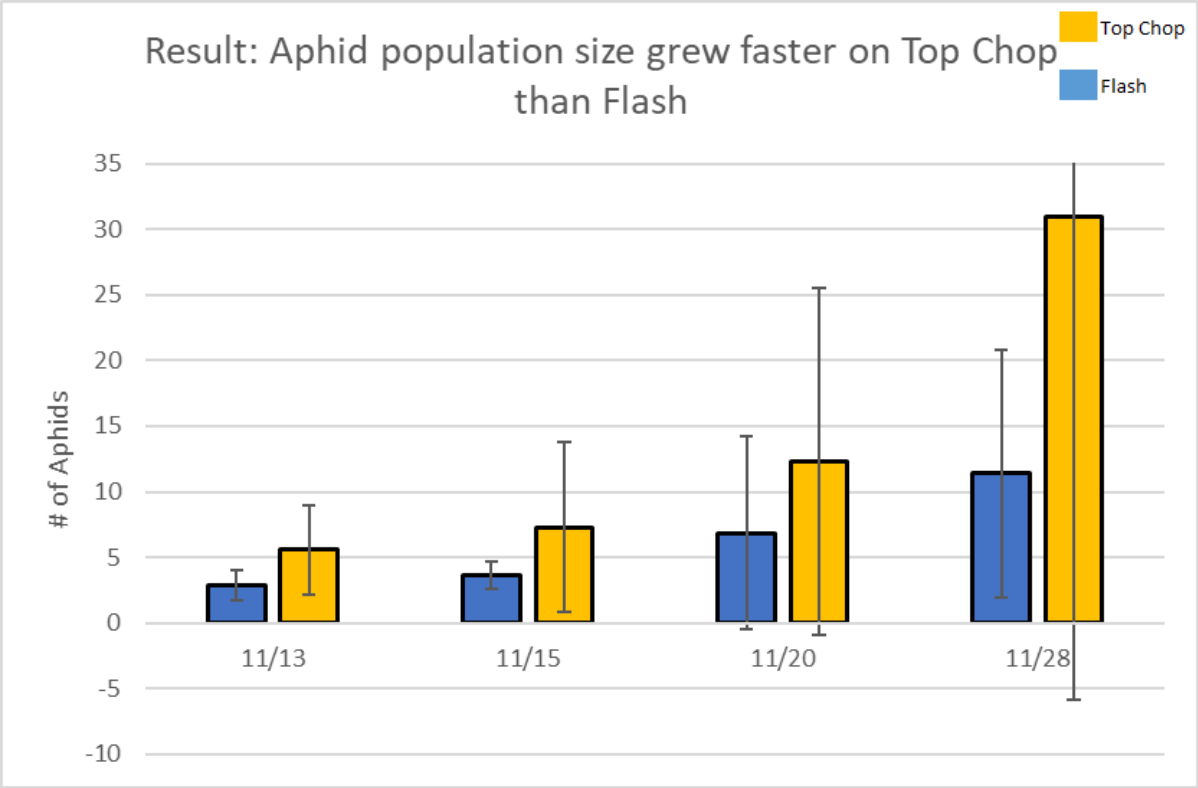

Figure 1: Bar graph showcasing the mean number of green peach aphids present on Top Chop in yellow and Flash in blue on the dates of 11/13/2023, 11/15/2023, 11/20/2023, and 11/28/2023 with standard deviation shown via standard deviation lines

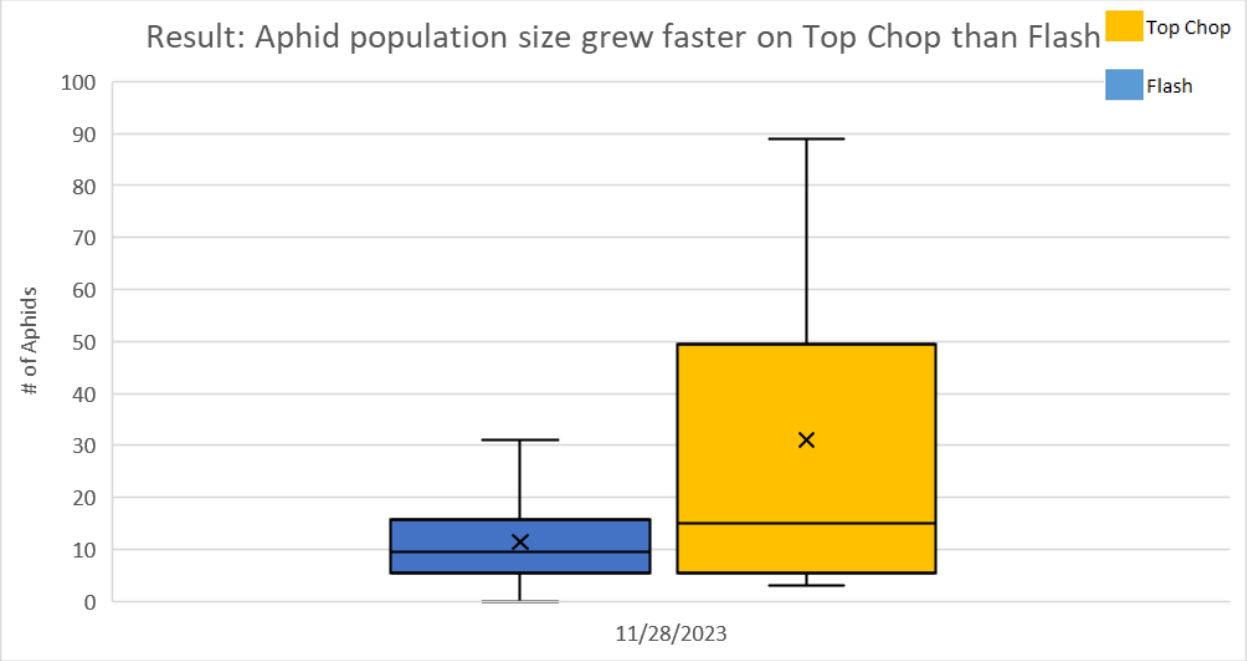

Figure 2: A box and whisker plot showcasing the mean number of green peach aphids on Top Chop in yellow and Flash in blue on 11/28/2023

Discussion

Options for pesticide control are limited for many small growers which means that IPM tools like variety selection are very important for many people and getting food to either sell or put on the table. This study has identified that Flash var. collard crops have more resistance towards *Myzus persicae* population growth than Top Chop var. collard crops. The mechanics behind the differences in population growth are unknown but this lays a potential foundation for future studies into differences between host varieties in collards. This study could use a repeat due to several issues that occurred, one being an early infestation of *Myzus persicae* which, while thought to be eradicated before the start of the experiment, it led to one Top Chop plant having an unknown amount of extra green peach aphids present towards the start of the experiment, so the plant had to be removed. Another potential problem of this experiment is the decrease of

many Flash plants in their first *Myzus persicae* population count; however, this could be caused by an underlying mechanism of pest resistance present in Flash. More research is needed to fully understand the cause of this anomaly, but this study shows that Flash var. collard crops can inhibit *Myzus persicae* population growth better than Top Chop var. collard crops.

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Sources

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