

TRAPPING CARIBBEAN FRUIT FLIES WITH PLANT ESSENTIAL OIL AND FRUIT ODORS; SEMI-QUANTITATIVE COMPARISSON

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Introduction

The Caribbean Fruit Fly (*Anastrepha suspensa*) has been a pest in South Florida since the early 1930's. The fly is considered to be a pest because the female fruit fly lays her eggs within the fruit, once the eggs hatch the larvae then devour the fruit. The host fruits for the female flies are: guava (*Psidium guajava*), carambola (*Averrhoa carambola*), several citrus trees, and among other hundred known host. Due to the antibiotic, the fruit become no longer eatable or marketable. Therefore, the local growers here in South Florida, are tremendously economically impacted. Ammonium Acetate & Putrescine Patch has been the standard technique of capturing. The flaw of this method the patch is not environmentally friendly. The entomology department in the USDA of South Florida is trying to improve the conventional methods of capturing the fruit fly. For this purpose, the experiment is a beginning stage of a new approach in handling wild fruit flies. We proposed the use of plant essential oils; ginger root (*Zingiber officinale*), Valencia orange (*Citrus sinensis*), and tea tree (*Melaleuca alternifolia*) and fruit based odors; hogplum (*Spondias mombin*), and carambola (*Averrhoa carambola*), that are biodegradable, as a possible alternative treatments for capture.

Methods and Materials

The gather of attractants such as fruits, were handpicked during the fruiting season. Carambola fruit was on site of the USDA-ARS station in south Florida. Hogplum was brought by Dr. Nancy Epsyk whom found the fruit sold at a fruit market (Homestead, FL). Fruits were placed in the blender, seeds removed, with an added 100 mL of water and were then blended. Plant essential oil ginger and tea tree, are bought from an extract company SAT Group in India. The Valencia orange oil was given by Florida Flavors in Lakeland, Florida. 75 mL of fruit puree is used in the traps and 125 mL of environmentally safe 10% antifreeze was used for a total of 200 mL solution. 200 mL of the antifreeze were used in the positive and negative control, and the remaining oils. The oils were individually pipette 1mL and disperse on to a 1 inch dry cotton wick.

In the field, on site, individual trees are chosen and tagged to contain the McPhail trap, A Better World Industries product. Blocks are considered of location used for the experiment, they are host fruit trees, a location that female Caribbean Fruit Fly will be. 2 blocks host fruit are at the Guava orchard and the other 2 are at the Carambola orchard. Test 1 was held at the blocks at the Guava orchard, the treatments were; Blank, Carambola, Ginger Root oil, Hogplum, Orange oil, Tea Tree oil. Test 2 was held at blocks at the Carambola orchard, the treatments were; Ammonium Acetate & Putrescine Patch, Carambola with the patch, Ginger Root oil with patch, Hogplum with patch, Orange oil with patch, Tea Tree oil with patch. Collection of flies is preserved in 70% Ethanol, and were counted and scored in Microsoft Excel 2007.

Data analysis done using SAS (SAS Institute, Cary, NC); this program function is to do statistical analysis of any sets of data. This aids the observer for this type of experiment to determine probability of error and significance.



Results

Test 1: The use of natural attractants for capturing Caribbean Fruit Fly

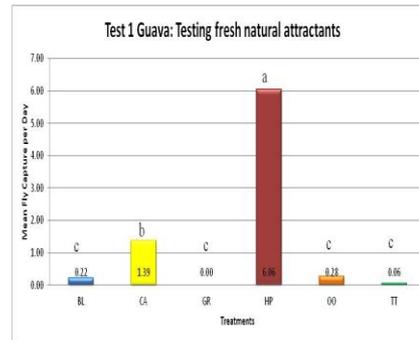


Figure 1: Average female/trap/day. Columns headed by the same letter are not significantly different. (LSD test on log [x + 1] transformed data, P = 0.05, non-transformed data presented)

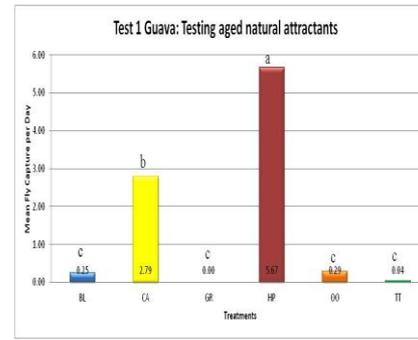


Figure 2: Average female/trap/day. Columns headed by the same letter are not significantly different. (LSD test on log [x + 1] transformed data, P = 0.05, non-transformed data presented)

Test 2: The use of the Standard treatments with the natural attractants

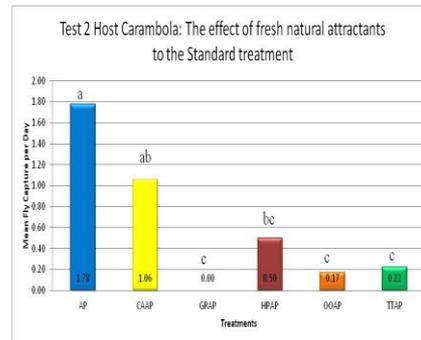


Figure 3: Average female/trap/day. Columns headed by the same letter are not significantly different. (LSD test on log [x + 1] transformed data, P = 0.05, non-transformed data presented)

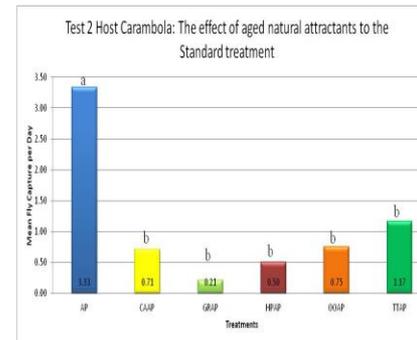


Figure 4: Average female/trap/day. Columns headed by the same letter are not significantly different. (LSD test on log [x + 1] transformed data, P = 0.05, non-transformed data presented)



Conclusion

Throughout the study, Caribbean Fruit flies did respond to the treatments that were deployed. The fly population was found to be more populated in the Guava cultivar than to the Carambola cultivar. Test 1 results show the attractant efficiency to the female Caribbean Fruit fly that fruit orders out preformed the essential oils. In Test 2, the fruit odors and essential oils diminish the efficiency of the standard Ammonium Acetate & Putrescine instead of providing higher potential of capture.

Discussion

As viewing the results, this study can provide future experiments in benefiting the control of Caribbean Fruit Fly population. In the Guava cultivar, the treatment ginger root oil did little to no capture and possibly can be a repellent to the fruit flies. With the efficiency of the Ammonium Acetate and Putrescine patch, the odors of the other attractants did alter the capture rate and needs to be further looked at.

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