

Aqueous Grape Juice Bait for *Anastrepha suspensa* (Loew), (Diptera: Tephritidae) and *Zaprionus indianus* Gupta (Diptera: Drosophilidae)

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Introduction

The African fig fly (AFF), *Zaprionus indianus* Gupta (Drosophilidae), is an invasive nuisance pest that has spread rapidly through much of the eastern United States after first being detected in Florida in 2005. Aqueous grape juice bait was found to be a low cost attractant for the tephritid *Anastrepha ludens* (Loew) (Mangan & Thomas 2014) but was not effective for caribfly (CFF), *Anastrepha suspensa* (Loew), in field tests conducted in Miami, FL (Epsky et al. 2015). Microbial activity in aged baits decreased capture of CFF but increased capture of AFF. Effect of bait aging was tested with electroantennography (EAG) for CFF and field tests for AFF.

EAG Test of *Anastrepha suspensa*

EAG was used to test the olfactory response of 6-10 d old female flies to aqueous grape juice bait (90%) with or without PPG (10%) using methods reported previously (Kendra et al. 2005). Baits were aged in the laboratory, and antennal response measured after 5, 7, 10 and 14 d. EAG responses were initially measured in millivolts (peak height of depolarization) and converted to normalized responses.



Field Tests of *Zaprionus indianus*

Field tests were conducted in jackfruit trees and mango trees located at USDA/ARS, SHRS, Miami, FL. All trees were in fruit and there was fallen fruit decaying under the trees. Multitrap were placed ~ 1.5 m above ground in branches of trees with ripe fruit. Blocks consisted of single large trees with all treatments in traps placed around the periphery of the tree. There was at least 2 m between traps within a single tree block and at least 5 m between blocks. A randomized block design was used for all tests with 5 blocks per test period and 4 test periods per experiment.



Zaprionus indianus (Photograph by G. J. Steck)



Z. Indianus (AFF) & *A. suspensa* (CFF) on guava

Aqueous grape juice baits (90% grape juice v/v) were deployed immediately (0 d) or were held in buckets (3 L) covered with cheesecloth and were laboratory aged at room temperature until time of deployment (2 – 9 d). New batches of bait were used for all blocks within a test period, with new bait solutions used for subsequent sampling periods for most tests. Numbers of male and female AFF, and total non-target drosophilids per trap were recorded. Data were analyzed by oneway ANOVA with Tukey's test on log transformed ($x + 1$) data.



Field Test 1. Comparison of 0, 3, 6, and 9 d old grape juice bait; 3 d sampling period, baits discarded after sampling.

Field Test 2. Comparison of 0, 2, 4, and 6 d old grape juice bait, daily sampling periods for 1-4 d, bait recycled and reused after the 1-3 d and discarded after 4 d.

Knudsen & Sons, Inc., Chica, CA



Laboratory aged aqueous grape juice bait



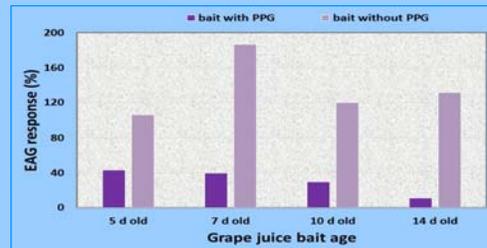
Multitrap (BetterWorld Manu. Inc., Fresno, CA)



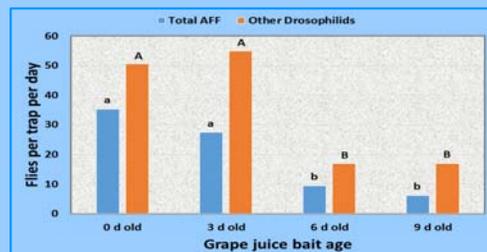
Jackfruit (*Artocarpus heterophyllus*; Moraceae) tree in fruit

Results

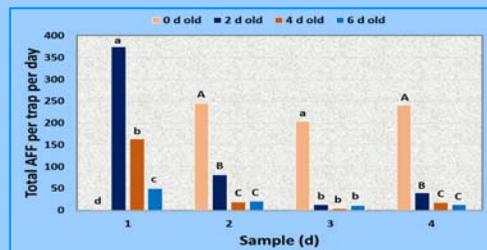
EAG Test. Antennal response of CFF to laboratory aged aqueous grape juice bait with PPG was always less than response to the same bait without PPG. This indicates that reduced capture of CFF in previous field tests may be due to production of repellent chemicals in bait without the preservative PPG.



Field Test 1. Treatment affected AFF capture and traps baited with either 0 or 3 d baits captured more AFF than traps baited with 6 or 9 d baits. This supports results from previous trials in which bait ages were tested sequentially. Response of non-target drosophilids was the same as that of AFF.



Field Test 2. When the traps were sampled daily and the bait recycled, 2 d bait was the most attractive the 1st day with no flies captured by 0 d bait. The 0 d bait was the most attractive for all subsequent sample periods.



Summary

Attraction of AFF to fermentation products was observed in previous tests of actively fermenting bait, although attraction increased with age in field fermented baits but decreased with age in laboratory fermented baits. The time period needed to produce attractant chemicals was further defined in this study, which was 2 d for laboratory aged and 1-4 d for field aged. Lack of capture in non-fermented grape juice bait indicates that grape juice itself is not attractive. However, products from active initial fermentation are highly attractive. Additional studies are needed to determine volatile chemicals responsible for attraction to these baits, and identification of the time period when the attractant chemicals are produced will aid in this research.

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References Cited

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