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EFFICACY OF THE SUTERRA BIOLURE INDIVIDUAL FEMALE FRUIT FLY ATTRACTANT PACKAGES VS. THE UNIPAK VERSION

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Female-specific, synthetic food attractants for detection of Tephritidae fruit flies of economic significance to American agriculture such as the Mediterranean fruit fly *Ceratitis capitata* (Wiedemann), the Caribbean fruit fly *Anastrepha suspensa* (Loew), and the Mexican fruit fly *Anastrepha ludens* (Loew) are becoming an alternative to the use of proteinacious baits in Cooperative State/Federal survey programs (FDACS, 2001). The standard BioLure bait dispensers (Suterra Inc., Bend, OR) for the Mediterranean fruit fly contain ammonium acetate, putrescine (1,4-diaminobutane), and trimethylamine hydrochloride, while a bait dispenser for *Anastrepha* spp. fruit flies contains ammonium acetate and putrescine. The baits are manufactured in adhesive-backed units that can be attached to the insides of a plastic, two-piece McPhail-like trap (Thomas et al. 2001; Holler et al. 2006; Jang et al. 2007) or suspended from the top of the trap by a clip provided. Prior to sticking the dispensers to the side of the trap or suspending the combined units to the trap clip, a protective cover is removed from the front of the baits to initiate volatilization through a central circular membrane of the formulations (Florida Fruit Fly Detection Manual 2004).

The objective of this study was to determine whether individual bait dispensers (BioLure) for *Anastrepha* spp. and *C. capitata* could be combined into a dispenser (Unipak) without compromising bait efficacy.

The advantage of the Unipak is the reduced time required to bait a Multilure trap with the 2 or 3 baits in separate dispensers and the security gained in lessening the risk that 1 of the 3 individual dispensers will become separated from the other(s) and either drop into the liquid preservative in the bottom of the trap or occlude the trap opening and prevent fly entry.

Field tests were conducted in urban residential areas containing fruit fly host material, such as citrus (*Citrus paradise* Macfad), mangoes (*Mangifera indica* Lindl), guava (*Psidium gua-*

java Lindl), Surinam cherry (*Eugenia uniflora* Lindl) and loquat (*Eriobotrya japonica* Lindl), on both the east (Sarasota/Bradenton) and west (Ft. Pierce) coast of Florida. In the Sarasota area traps comparing ammonium acetate, putrescine and trimethylamine in individual dispensers vs. Unipak were located in backyards over which sterile medflies were aerially released. In the Ft. Pierce area efficacy comparisons of the dispensers and the Unipak were conducted on properties where wild Caribbean fruit fly infestations occurred. Baited traps remained in the field in Sarasota for a period of 8 weeks, and in the Ft. Pierce area for 12 weeks. Traps were serviced weekly and trapped flies were separated by sex.

The trap selected for use in this study was the Multilure (Better World Manufacturing, Fresno, CA.). Fifty traps containing either the individual BioLure dispensers or the Unipak were observed for fly attractance. For this test, the individual BioLure components or the Unipak was attached to the clip on the inside top of the Multilure trap. Three-hundred mL of 10% Lowtox antifreeze (Prestone Products Corp., Danbury, CT) were placed in the bottom of the trap initially and replenished or replaced as needed. Traps were situated in pairs, 1 of each treatment type about a meter apart.

Twenty-five traps, each baited with individual dispensers or Unipaks, were initiated in the Ft. Pierce area on 17 Apr and were terminated 10 Jul 2007, whereas traps were placed in the Sarasota/Bradenton vicinity (25 of each pair), beginning on 10 Apr and removed 5 Jun 2007. If either baited trap of a pair of traps was missing or damaged, i.e., removed, vandalized, or on the ground, no data were used for the pair that week, nor was the missing treatment re-set for the remainder of the test. By design, this procedure eliminated efficacy measurements over time between treatments placed in the field initially with those placed perhaps weeks after. This eliminates the possibility of variability over time and space, which could influence performance of 1 treatment over another.

Data from Sarasota/Bradenton were analyzed by ANOVA (Proc GLM, SAS Inst.) with numbers of *A. suspensa* and *C. capitata* as the dependent variable, and attractant, trapping location (town), time (week of test), tree species in which traps were hung, and all possible interactions as independent variables. Data from Ft. Pierce were similarly analyzed with either the number of male or female *A. suspensa* captured or the sums of males and females as dependent variables with attractant, time (week of test) and the interaction of attractant and time as independent variables. In the Sarasota/Bradenton experiment there were significant differences in the numbers of *C. capitata* captured at the 2 locations in different "host" trees and in different weeks (Table 1, Fig. 1). However, there were no differences between the attractants or in the interactions between attractants and location, time, and tree. Results for *A. suspensa* were similar (Table 1, Fig. 1). The attractant used had no effect on *A. suspensa* captures, but trapping location and the species of tree in which traps were hung did have an effect. Unlike the situation with *C. capitata*, time had no significant effect on capture.

There is no evidence that there is any difference between the Unipak and BioLure dispensers in terms of capture of either *C. capitata* or *A. suspensa*. Field tests conducted in Spain in 2006 support the Florida findings in terms of *Ceratitis* attracted to either the individual dispenser or the Unipak (Navarro-Llopis et al. 2008). Medfly catches in monitoring traps in mass trapping plots with Unipak were comparable to those found in mass trapping plots with the standard 3-component dispenser. Tests were conducted in both high and low medfly populations. Field tests reported by Thomas et al. (2001), Holler et al. (2006), and Jang et al. (2007) were designed to measure the efficacy of the Unipak for either *C. capitata* or *Anastrepha* spp. by procedures standard to State/Federal Detection/Delimiting/Eradication and Fly-Free Export Programs. Those authors reinforce our initial goal of providing a user-friendly, time-saving, bait/trap preparation, bait security, and perhaps cost savings presentation (Unipak) as an alternative to individual dispensers.

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TABLE 1. EFFECTS OF INDEPENDENT VARIABLES ON THE CAPTURE OF *C. CAPITATA* AND *A. SUSPENS*A IN THE SARASOTA/BRADENTON AND FT. PIERCE TRAPPING SITES.

Species	Variable	df	F	P
<i>Ceratit</i> is <i>capitata</i> Sarasota/Bradenton	Attractant	1	0.2	0.68
	Site	1	503.4	<0.0001
	Week	1	3.8	0.05
	Tree	13	3.2	0.0001
	Attractant*site	1	1.4	0.25
	Attractant*week	1	0.0	0.94
	Attractant*tree	4	0.6	0.69
<i>Anastrepha suspensa</i> Sarasota/Bradenton	Attractant	1	0.0	0.97
	Site	1	7.7	0.006
	Week	1	0.02	0.87
	Tree	13	2.7	0.0009
	Attractant*site	1	0.8	0.58
	Attractant*week	1	0.0	1.0
	Attractant*tree	4	0.3	0.87
<i>Anastrepha suspensa</i> Male Ft. Pierce	Attractant	1	0.1	0.80
	Week	1	43.6	<0.0001
	Attractant*week	1	0.02	0.89
<i>Anastrepha suspensa</i> Female Ft. Pierce	Attractant	1	0.3	0.61
	Week	1	48.2	<0.0001
	Attractant*week	1	0.0	0.96
<i>Anastrepha suspensa</i> Male + Female Ft. Pierce	Attractant	1	0.7	0.80
	Week	1	48.9	<0.0001
	Attractant*week	1	0.0	0.97

** refers to interaction between variables.

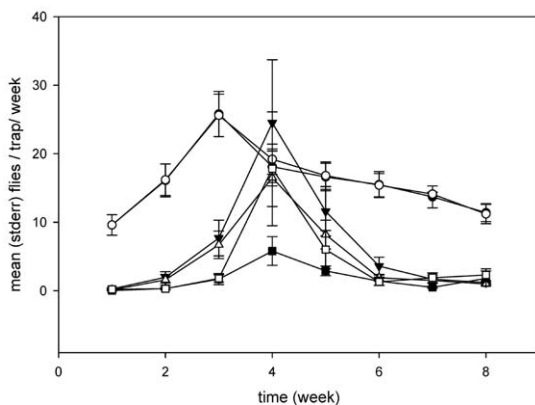


Fig. 1. The mean numbers (\pm std. error) of *Ceratitis capitata* (circles) and *Anastrepha suspensa* (triangles= Sarasota/Bradenton, 3-component lures; squares= Ft. Pierce, 2-component lures) captured with either the Unipak component conformation (black) or the Biolure conformation (white).

SUMMARY

The combination of putrescine with ammonium acetate into 1 unit had no significant effect on the attractance of Caribbean fruit fly to trap(s) when compared with the individual BioLure dispensers. Additionally, there were no significant differences in attractancy to the Mediterranean fruit fly when the trimethylamine was combined

with ammonium acetate/putrescine unit when compared to the 3 individual BioLure dispensers.

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