

FINAL REPORT

**2006 AMERICAN BIOPHYSICS CORPORATION
MOSQUITO TRAP EVALUATION STUDY**

Sponsored in part by:

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PURPOSE¹

The aim of this study was to compare the mosquito-trapping prowess of the American Biophysics Corporation Mosquito Magnet Liberty Plus with several configurations of the Mosquito Magnet X and other popular mosquito traps used for surveillance. This study was designed to compare the numbers and species caught and not to assess mosquito control efficacy.

MATERIALS AND METHODS

Study Site:

The project was performed on a 10-acre peninsula surrounded by salt marsh on the campus of the Public Health Entomology Research & Education Center (PHEREC) of Florida A&M University located on the St. Andrews Bay in Panama City, Florida.

Study Design:

The following trap configurations were randomly assigned one trap/location to eight sites spaced 120-300 ft apart. Traps located closer to one another were separated by buildings and vegetation.

1. Mosquito Magnet Liberty Plus + propane combusted CO₂ + octenol (hereafter referred to as MM Liberty+)
2. Mosquito Magnet X trap (hereafter referred to as MM-X) - CO₂ + octenol + live oak leaf infusion
3. MMX + CO₂ + octenol + live oak leaf infusion
4. MMX + CO₂ + octenol + bird seed infusion
5. MMX + CO₂ + octenol – infusion
6. ABC Light Trap + CO₂
7. Hock 1012 Light Trap + CO₂
8. CDC 512 Light Trap + CO₂

Traps were operated approximately 24 hrs from 7-8 a.m. until the same time the following morning. The Liberty trap was operated continuously 24/7 per manufacturer's directions; however, a new collection bag was placed in the trap during the same time period as when the other traps were operated. Pressurized CO₂ gas was delivered at a rate of 200 ml / min for all traps except the MM Liberty which generated CO₂ by propane combustion. One MM-X trap was operated with no CO₂. Infusion water was supplied by filling a dishpan half full with well water containing either dried live oak leaves or a cup of wild bird seed. The dishpan was sunken into the ground directly beneath the trap up to the pan lip. The traps were rotated in a circular pattern from site to site in a Latin-square design until three good replications were obtained. A complete rotation through all trapping sites was considered a replication. Trap runs were repeated when equipment failed to operate properly or when unsuitable weather or poor/excessive trap catches occurred. Each trap operated a total of 24 times, three times at eight trap sites. Good trap runs were conducted on: June 14 & 27, July 5, August 2, 3, 10, 14, 15, 16, 28, 29 & 31, September 25 & 26 and October 3, 5, 10, 12, 19 & 31, 2006. Additional trap runs

¹ The findings in this report do not represent an endorsement or recommendation for or against the traps tested, referred to, or not mentioned in this study by Florida A&M University.

were conducted on July 9, 10, 17 & 18, 2007 to replace trap days in 2006 that had excessively low or high counts. Trap contents were collected each morning around 8 a.m., sorted, identified to species, counted and entered into an EXCEL database. Weather data were recorded for each day of the study from the Panama City International Airport located within a half mile from the study site.

Data Analysis:

Total mosquitoes collected by trap and species abundance by trap were charted using Microsoft Excel 2000 pivot tables and charting functions. Analysis of variance was conducted on log-transformed data and tested for statistical differences between traps using SAS PC.

RESULTS

Environmental Data:

Conditions during the study are presented in Table 1. Temperatures ranged from the mid to upper 70's for lows and mid-80's for highs. Outliers generally ranged in the mid-60's for lows and mid-70's for highs. This was limited to the cooler days in October. There was no observed lessening in the total mosquitoes collected on these days. Precipitation was either zero or light for most every day of testing. When rain events occurred, it was during afternoon hours when mosquitoes were not typically seeking traps. Wind speed averaged about 5 mph for most days of testing and typically prevailed from the southwest. Although not indicated in the table, humidity averaged between 70-80%. In general, conditions were ideal for the trap study.

Table 1. Climatological data for each day traps were operated during 2006 & 2007.

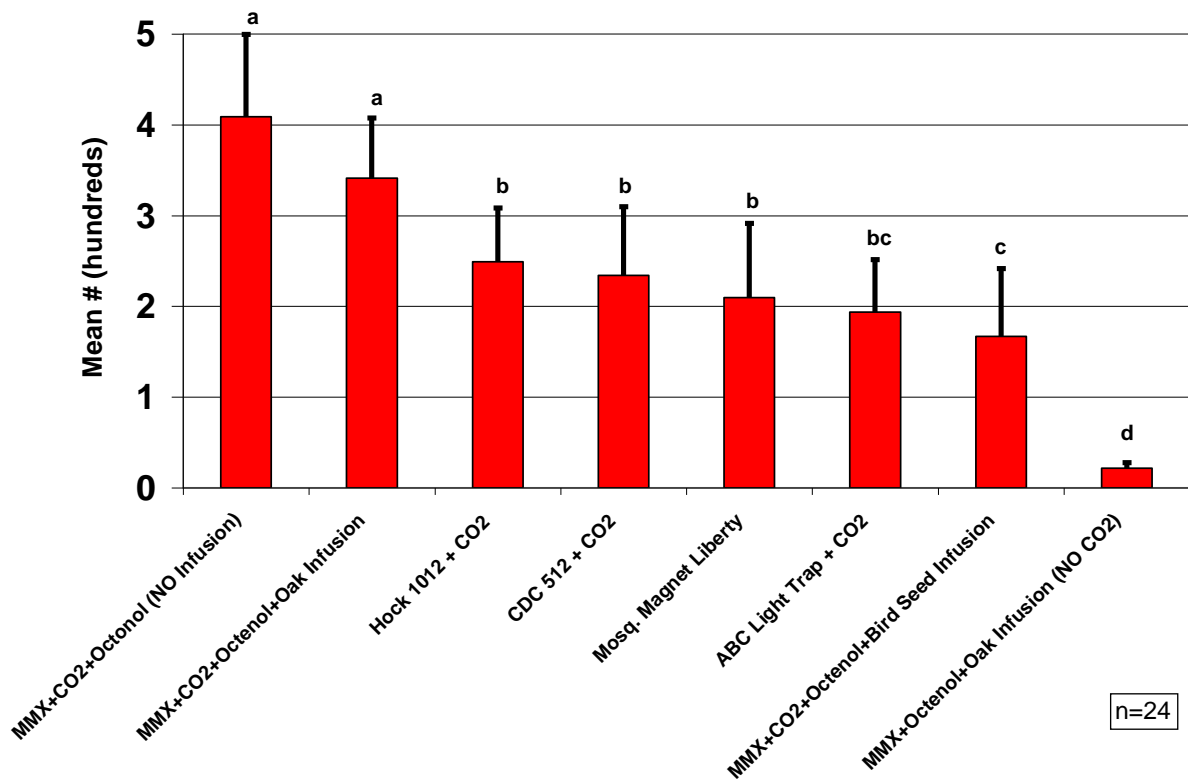
LOCAL CLIMATOLOGICAL DATA FROM PANAMA CITY AIRPORT (SOURCE: NOAA)
 STATION: PANAMA CITY AIRPORT
 LATITUDE: 30 12 N
 LONGITUDE: 85 41 W

TEMPERATURE IN F:				:PCPN:	SNOW:	WIND	:SUNSHINE:	SKY	:PK WND										
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18	
										AVG MX 2MIN									
DAY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR	
<u>June, 2006</u>																			
14	89	72	81	3	0	16	0.01	0.0	0	5.2	15	220	M	M	2	18	18	200	
27	93	75	84	5	0	19	0.65	0.0	0	6.3	22	90	M	M	2	138	25	90	
<u>July, 2006</u>																			
5	93	77	85	5	0	20	0.00	0.0	0	5.7	14	250	M	M	2		18	230	
<u>August, 2006</u>																			
2	91	78	85	5	0	20	0.13	0.0	0	4.1	15	20	M	M	1	8	20	320	
3	92	77	85	5	0	20	0.00	0.0	0	5.3	16	310	M	M	2		20	300	
10	92	77	85	5	0	20	0.00	0.0	0	6.4	15	250	M	M	2	1	20	270	
14	92	77	85	5	0	20	T	0.0	0	4.2	16	50	M	M	4	3	20	50	
15	96	78	87	7	0	22	T	0.0	0	4.8	14	200	M	M	4	3	18	220	
16	93	77	85	5	0	20	0.17	0.0	0	5.2	15	190	M	M	2	3		190	
28	96	79	88	9	0	23	0.02	0.0	0	4.8	13	180	M	M	1	3	17	180	
29	92	81	87	8	0	22	0.00	0.0	0	3.8	12	260	M	M	0		13	240	
31	91	75	83	4	0	18	0.00	0.0	0	5.4	13	270	M	M	2		16	270	
<u>September, 2006</u>																			
25	87	72	80	5	0	15	1.32	0.0	0	7.7	18	240	M	M	3	13	22	240	
26	83	65	74	0	0	9	0.00	0.0	0	6.9	13	40	M	M	0		15	10	
<u>October, 2006</u>																			
3	89	74	82	10	0	17	0.00	0.0	0	4.4	10	220	M	M	3	1	13	210	
5	90	66	78	7	0	13	0.00	0.0	0	2.7	9	20	M	M	0		M	M	
10	83	62	73	4	0	8	0.00	0.0	0	2.4	13	260	M	M	1		15	270	
12	85	66	76	8	0	11	T	0.0	0	5.7	12	250	M	M	0		16	10	
19	87	74	81	15	0	16	0.20	0.0	0	6.9	16	290	M	M	5	1	23	300	
31	82	52	67	4	0	2	0.00	0.0	0	3.3	9	260	M	M	1		10	260	
<u>July, 2007</u>																			
9	91	78	85	5	0	20	0.14	0.0	0	5.9	17	330	M	M	1	1	25	320	
10	90	78	84	4	0	19	0.00	0.0	0	5.0	12	230	M	M	2		17	210	
17	91	75	83	3	0	18	0.01	0.0	0	4.3	13	250	M	M	2	8	16	260	
18	93	76	85	5	0	20	0.00	0.0	0	4.2	14	250	M	M	0		17	230	

Trap Catch Comparison:

The total number of mosquitoes caught by trap configuration is presented in Figure 1. The MMX + CO₂ with or without oak leaf infusion collected significantly more mosquitoes than any of the other six trap configurations. There was no significant difference between MMX + CO₂ traps with or without oak leaf infusion; however, significantly fewer mosquitoes were collected when the infusion water was made from bird seed. The least productive trap configuration was the MMX + oak leaf infusion without CO₂. This system caught significantly fewer mosquitoes than the other seven trap configurations emphasizing the importance of CO₂. There was no significant difference among the MM Liberty+, Hock 1012, CDC 512 and ABC Light traps (all supplied with CO₂); however, the first three listed did catch significantly more mosquitoes than the MMX + CO₂ with bird seed infusion and the MMX – CO₂ with oak leaf infusion.

Fig. 1. Total number of mosquitoes caught and 95% confidence limits by trap configuration (different letters represent statistically significant differences at p<0.05).



Species composition for the eight trap configurations are presented in Figures 2-9. The MMX Liberty collected 14 species with *Ochlerotatus taeniorhynchus* and *Anopheles crucians* being the predominant species as they were in all of the traps (Figure 2). The MMX + CO₂ + Octenol with no infusion collected 17 species, the greatest number of all traps (Figure 3). A similar trap supplied with oak leaf infusion collected 16 species and a similar complex of the more prominent species (Figure 4). A similar trap supplied with bird seed infusion resulted in fewer species (12)

(Figure 5). Interestingly, this was the only trap configuration without light that did not capture *Culex nigripalpus*. The number of species dropped to 9 when CO₂ was removed from the MMX trap (Figure 6).

The three light traps collected similar species, 13 for the ABC (Figure 7), 14 for the Hock (Figure 8), and 15 for the CDC trap (Figure 9). The additional voltage in the Hock trap (12 volts as opposed to 6 volts for the other traps) did not make much of a difference in both mosquito numbers and species collected. The Hock trap, however, was the only light trap that collected *Cx. nigripalpus*.

Fig. 2. Mosquito species composition and number caught by the MM Liberty.

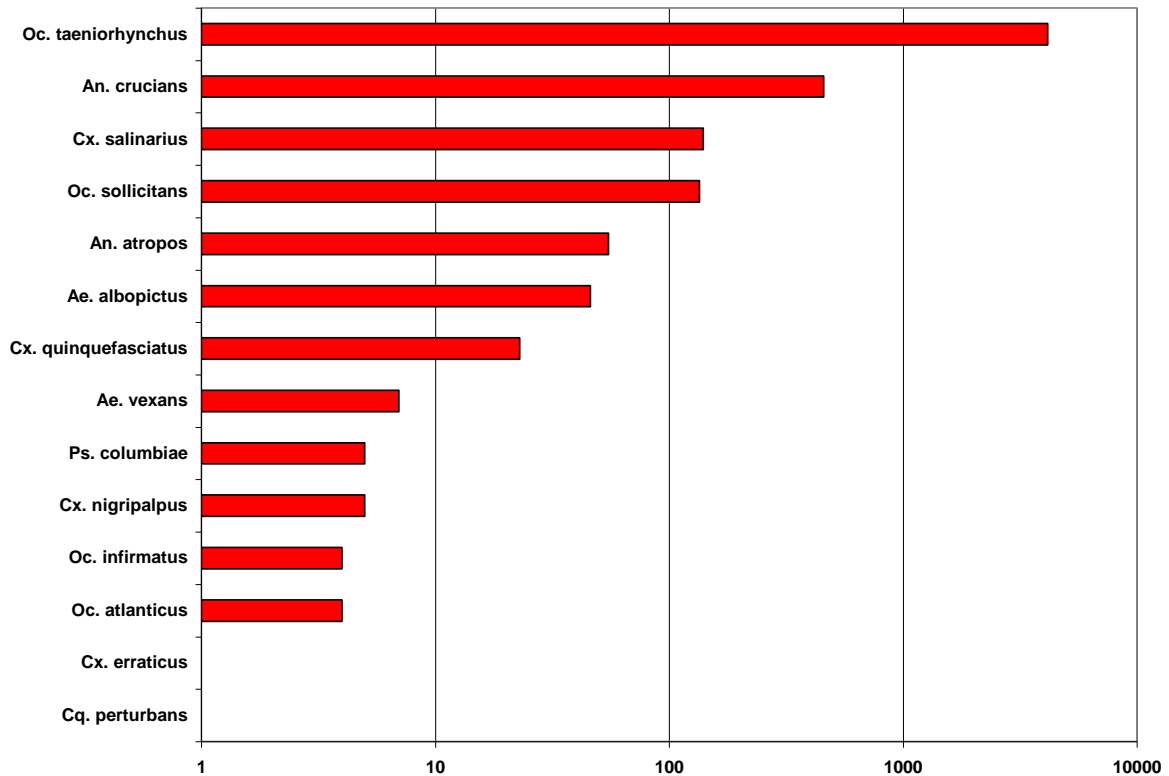


Fig. 3. Mosquito species composition and number caught by the MMX + CO2 + Octenol - Infusion.

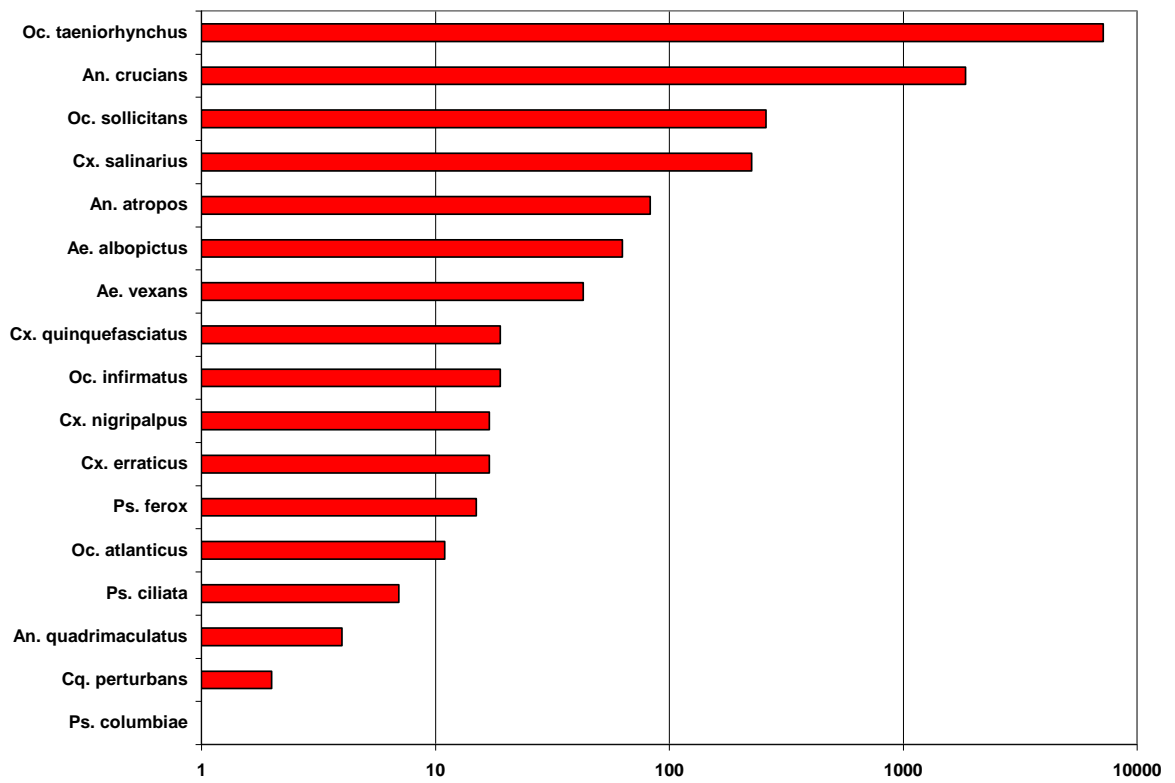


Fig. 4. Mosquito species composition and number caught by the MMX + CO2 + Octenol + Oak Infusion.

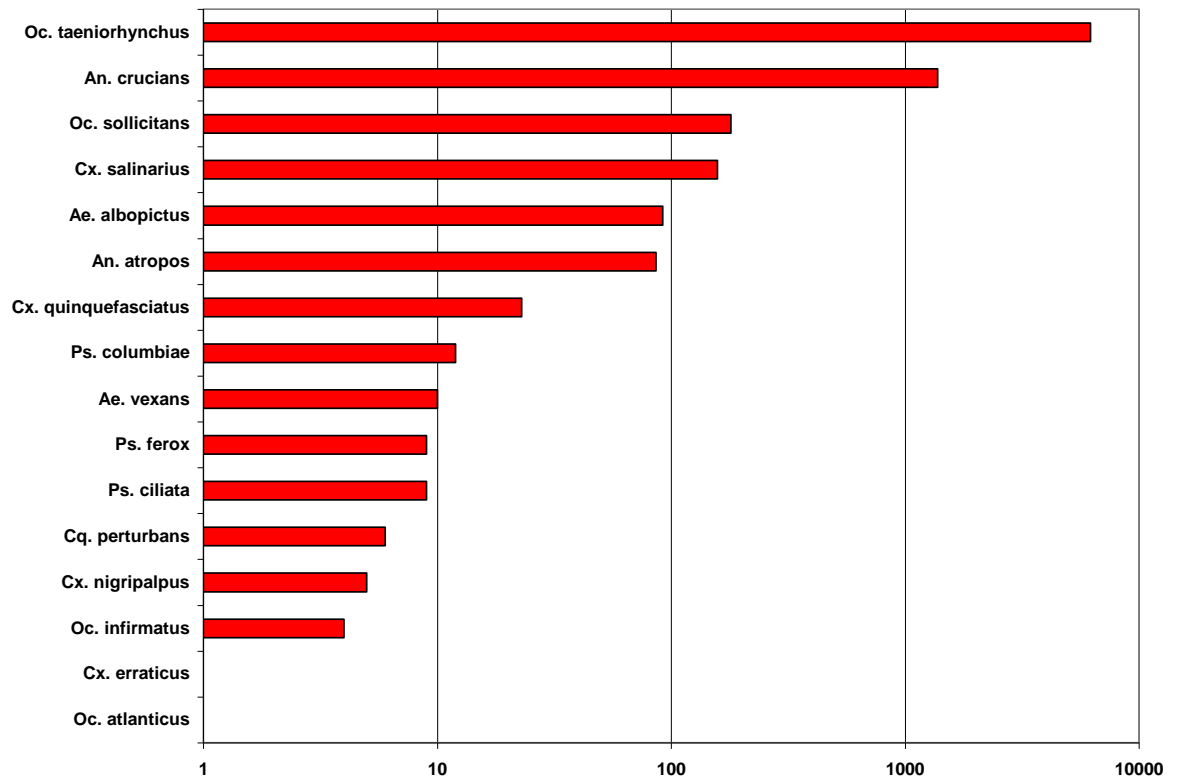


Fig. 5. Mosquito species composition and number caught by the MMX + CO2 + Octenol + Bird Seed Infusion.

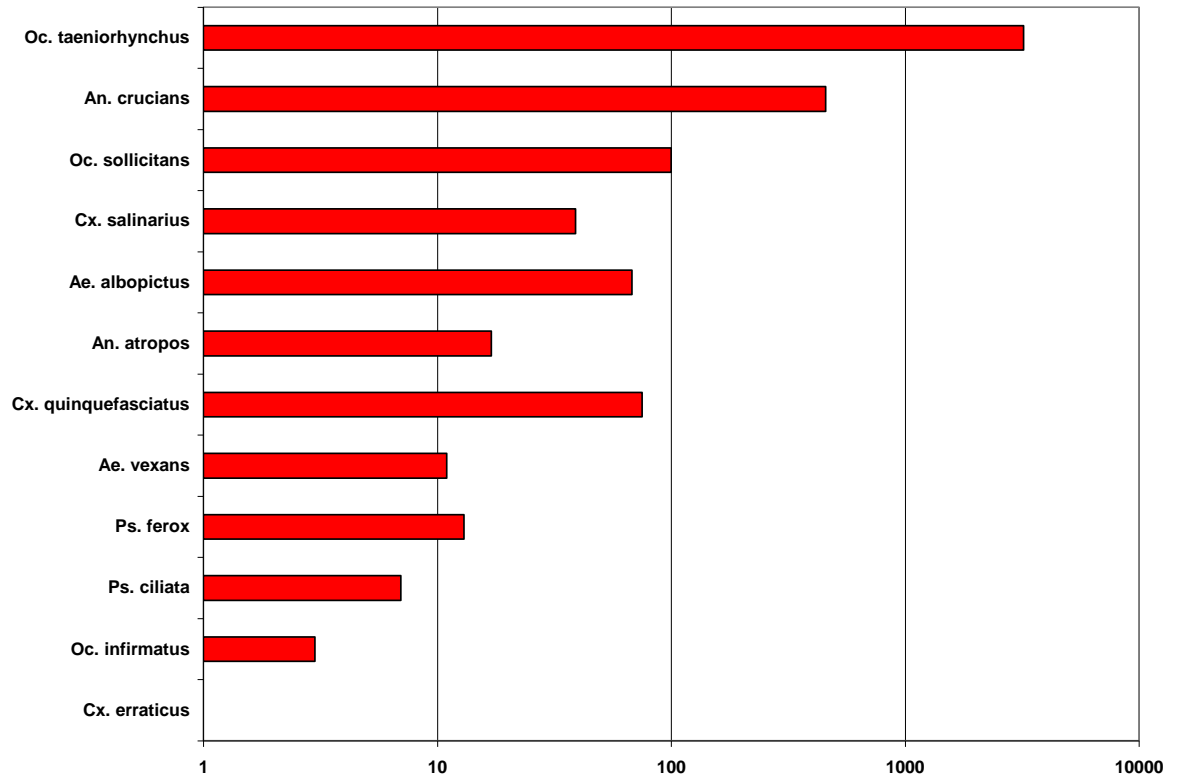


Fig. 6. Mosquito species composition and number caught by the MMX - CO₂ + Octenol + Oak Infusion.

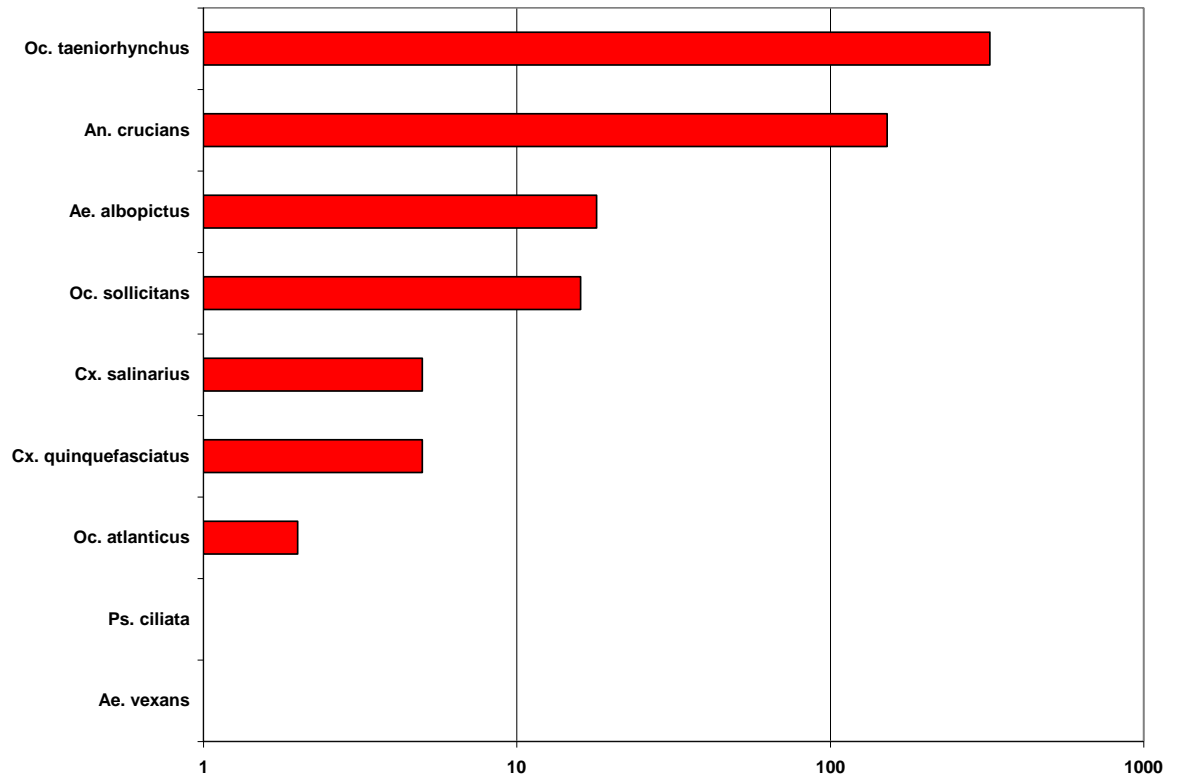


Fig. 7. Mosquito species composition and number caught by the ABC Light Trap + CO2.

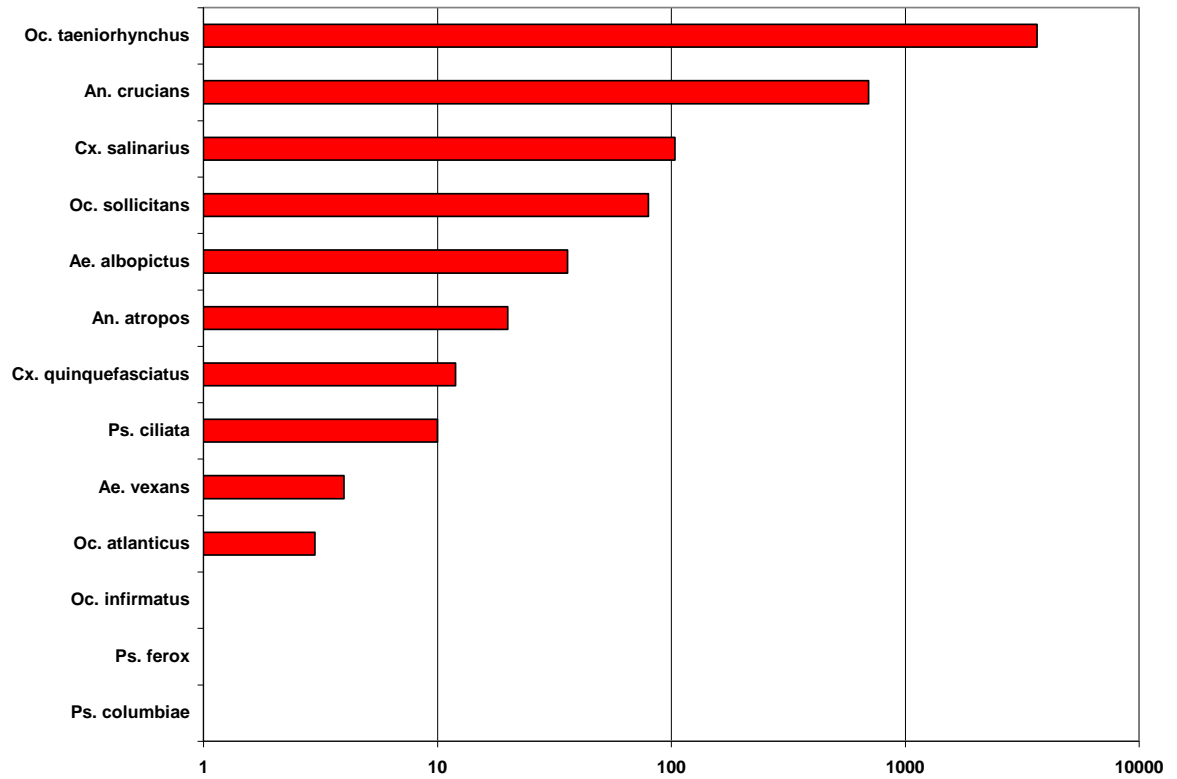


Fig. 8. Mosquito species composition and number caught by the Hock 1012 Light Trap + CO2.

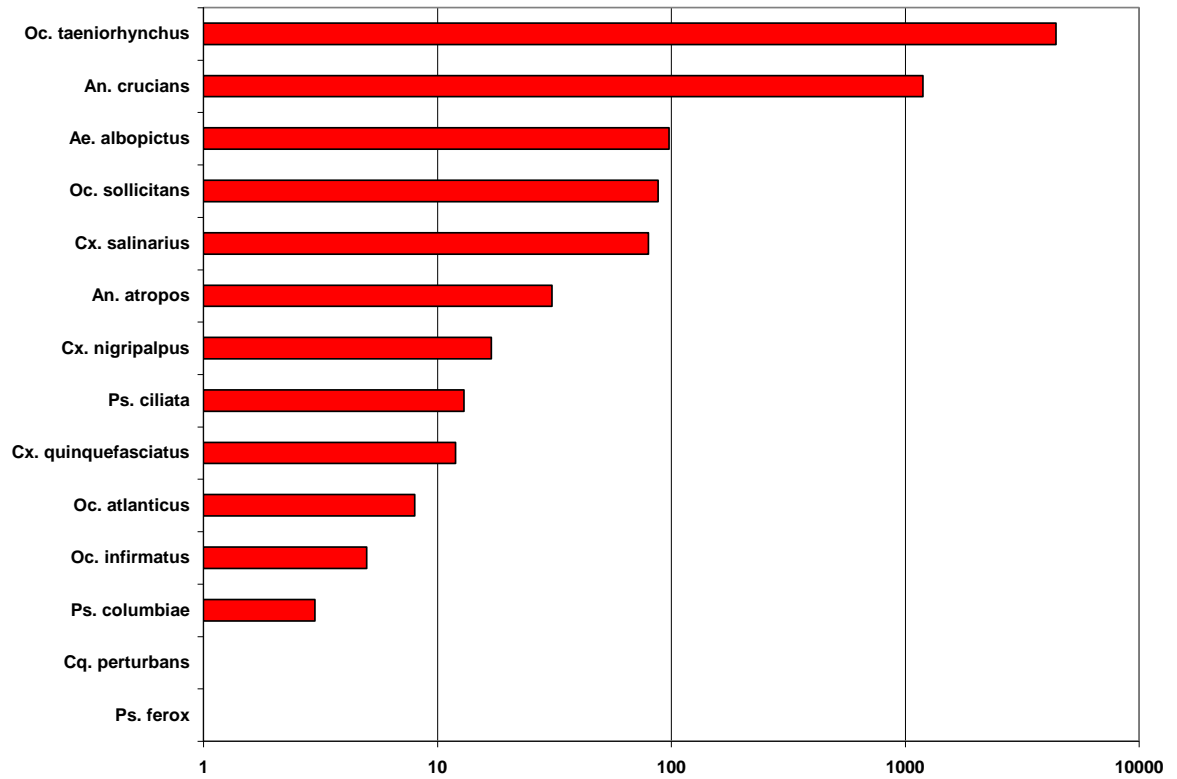


Fig. 9. Mosquito species composition and number caught by the CDC 512 Light Trap + CO2.

