

FINAL REPORT

2009 KAZ Inc. MK100 Mosquito Trap Evaluation

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PURPOSE¹

The aim of this study was to compare the mosquito-trapping prowess of the Kaz Stinger MK-100, BG Sentinel, Mosquito Magnet X, and NZI traps arranged in six configurations. This study was designed to measure 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 traps were randomly assigned in a Latin-square one trap/location to six sites spaced over 300 ft apart:

1. Kaz Stinger MK-100 + Nosquito Lure
2. Mosquito Magnet X (MMX) + CO₂ gas + octenol
3. BG Sentinel + CO₂ gas + BG Lure
4. BG Sentinel + BG Lure
5. NZI + CO₂ gas + octenol
6. NZI + octenol

Traps were operated weather permitting Monday through Thursday starting at approximately 8:00 a.m. until 7:30 to 8:00 a.m. the following morning. Collections were removed and the traps were rotated clockwise to the next site and operated in a similar manner. Three complete rotations (i.e. repetitions) through all sites were conducted so each trap operated a total of 18 times, three times at six trap sites. Trap runs were repeated when equipment failed or when unsuitable weather or poor/excessive trap catches occurred. Eighteen good trap runs were conducted on: July 14-16, 21, 22, 29, August 10, 18, 20, and September 1-3, 8, 16, 22-25, 2009.

Pressurized CO₂ was provided to traps 2, 3 and 5 above via 9 kg (20 lb) cylinders equipped with 15 psi Norgren regulators, 0.3 cm (1/8") black polyethylene hoses fitted with 10 micron filters and .007 flow restrictor orifices. For the BG Sentinel, this hose system was attached directly to the manufacturer provided CO₂ needle attachment. CO₂ was delivered at 500 ml/min to the MMX as controlled by a Hock 12v trap/CO₂ photocell controller board (1.5-2.0 lbs/run). The NZI and BG Sentinel received continuous CO₂ at a rate of ca. 500 ml/min (2 lbs/run).

Attractants (Nosquito lure, BG lure and octenol) were supplied according to manufacturer directions. Trap contents were 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.

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.

Data Analysis:

Experimental variables were tested for departure from the normal distribution and x+1 log transformed where necessary. Analysis of variance (Sokal and Rohlf 1981) and Newman-Keuls post hoc tests (Winer et. al 1991) were conducted with Statistica Version 9.0 (StatSoft, Inc. 2008) to determine differences between treatment means for each monthly rotation. Results were considered significant at alpha level of 0.05.

RESULTS

Environmental Data:

Conditions during the study are presented in Table 1. Temperatures ranged from 62 – 80° for lows and 86 -93° for highs. Precipitation was zero or trace for all but three days, and on those days, rain did not appear to affect mosquito counts. Average wind speed ranged from 2.8 – 5.6 mph and prevailed from the west during July and August and from the east in September. 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 2009.

LOCAL CLIMATOLOGICAL DATA (Source: NOAA)

STATION: PANAMA CITY
 YEAR: 2009
 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
										12Z	AVG	MX	2MIN					
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
<u>July</u>																		
14	91	76	84	4	0	19	0.00	0.0	0	4.5	13	260	M	M	2	1	17	280
15	90	80	85	5	0	20	0.00	0.0	0	4.8	13	230	M	M	2		18	250
16	92	79	86	6	0	21	T	0.0	0	6.3	16	260	M	M	3		21	250
21	93	62	78	-2	0	13	0.00	0.0	0	3.1	13	260	M	M	0		16	240
22	88	67	78	-2	0	13	0.00	0.0	0	3.7	14	250	M	M	2		17	230
29	90	74	82	2	0	17	T	0.0	0	5.6	14	260	M	M	3		18	260
<u>August</u>																		
10	93	76	85	5	0	20	0.00	0.0	0	3.6	10	260	M	M	1		15	260
18	87	76	82	2	0	17	0.32	0.0	0	5.0	13	130	M	M	2	18	20	130
20	90	77	84	4	0	19	0.02	0.0	0	4.5	15	200	M	M	2	1	22	210
<u>September</u>																		
1	89	74	82	3	0	17	0.49	0.0	0	3.5	15	90	M	M	5	18	18	70
2	86	73	80	1	0	15	T	0.0	0	9.3	16	50	M	M	7		20	40
3	89	72	81	2	0	16	0.00	0.0	0	6.1	15	80	M	M	2		20	80
8	91	70	81	2	0	16	0.00	0.0	0	2.8	10	90	M	M	0	1	21	100
16	87	74	81	4	0	16	0.18	0.0	0	4.0	9	360	M	M	4	1	14	170
22	90	76	83	7	0	18	M	0.0	0	4.6	12	90	M	M	4		18	100
23	92	79	86	11	0	21	0.00	0.0	0	5.1	13	50	M	M	3		15	80
24	90	74	82	7	0	17	0.42	0.0	0	3.4	14	140	M	M	3	18	24	190
25	90	74	82	7	0	17	T	0.0	0	3.2	13	90	M	M	2	1	16	140

Trap Catch Comparison:

The mean number of mosquitoes caught by trap is presented in Figure 1. The BG Sentinel with CO₂ and BG Lure, and the MMX with CO₂ and octenol caught significantly more mosquitoes on average (4.0 and 5.5X, respectively) than the other trap configurations. There was no significant difference in numbers captured between these two traps. The BG Sentinel with BG Lure and no CO₂ managed to collect significantly more mosquitoes than the three remaining trap configurations, even the NZI with CO₂ and octenol. There was no significant difference between the NZI with CO₂ and octenol and the Stinger MK-100 with Nosquito Lure. The NZI with octenol and no CO₂ caught significantly fewer mosquitoes than any of the other traps.

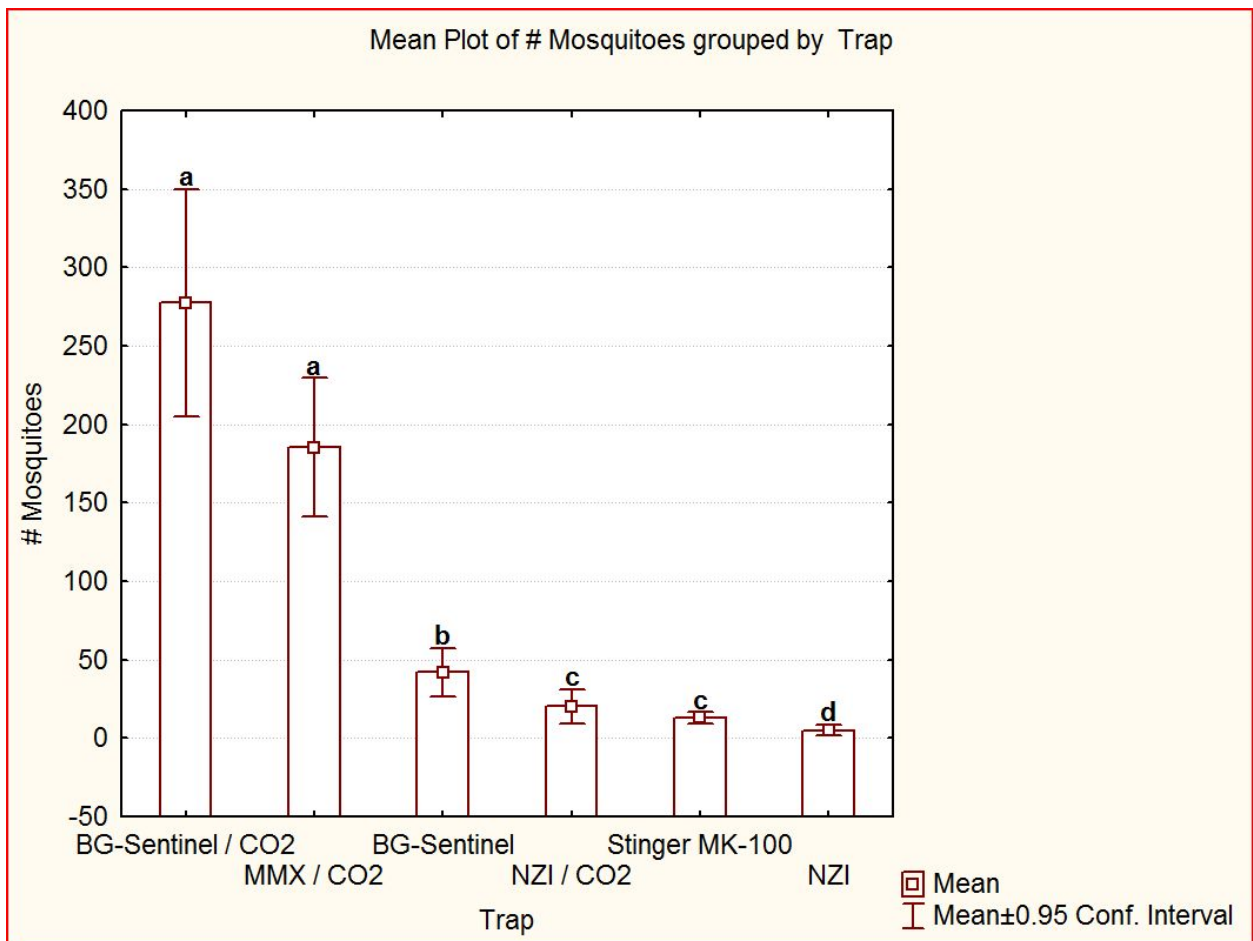


Fig. 1. Mean number of mosquitoes caught and 95% confidence limits by trap configuration (different letters represent statistically significant differences).

Species composition for the six trap configurations is presented in Figure 2. *Aedes taeniorhynchus*, the salt marsh mosquito, was the most abundant species collected in all traps. The MMX and BG Sentinel captured the most species with 14 for the MMX with CO₂ and octenol and 12 for the BG Sentinel with CO₂ and BG Lure. Most of the predominant species (i.e., *Ae. taeniorhynchus*, *Anopheles crucians*, *Anopheles atropos*, *Aedes sollicitans* and *Culex quinquefasciatus*) were common to all traps tested. In the non-CO₂ traps, except for the BG Sentinel with BG Lure, *Cx. quinquefasciatus* was less abundant in the Stinger MK-100 with Nosquito and not trapped at all in the NZI with octenol. The “by catch only” indicated in the NZI chart represents two trap tests where only non-mosquito species were collected.

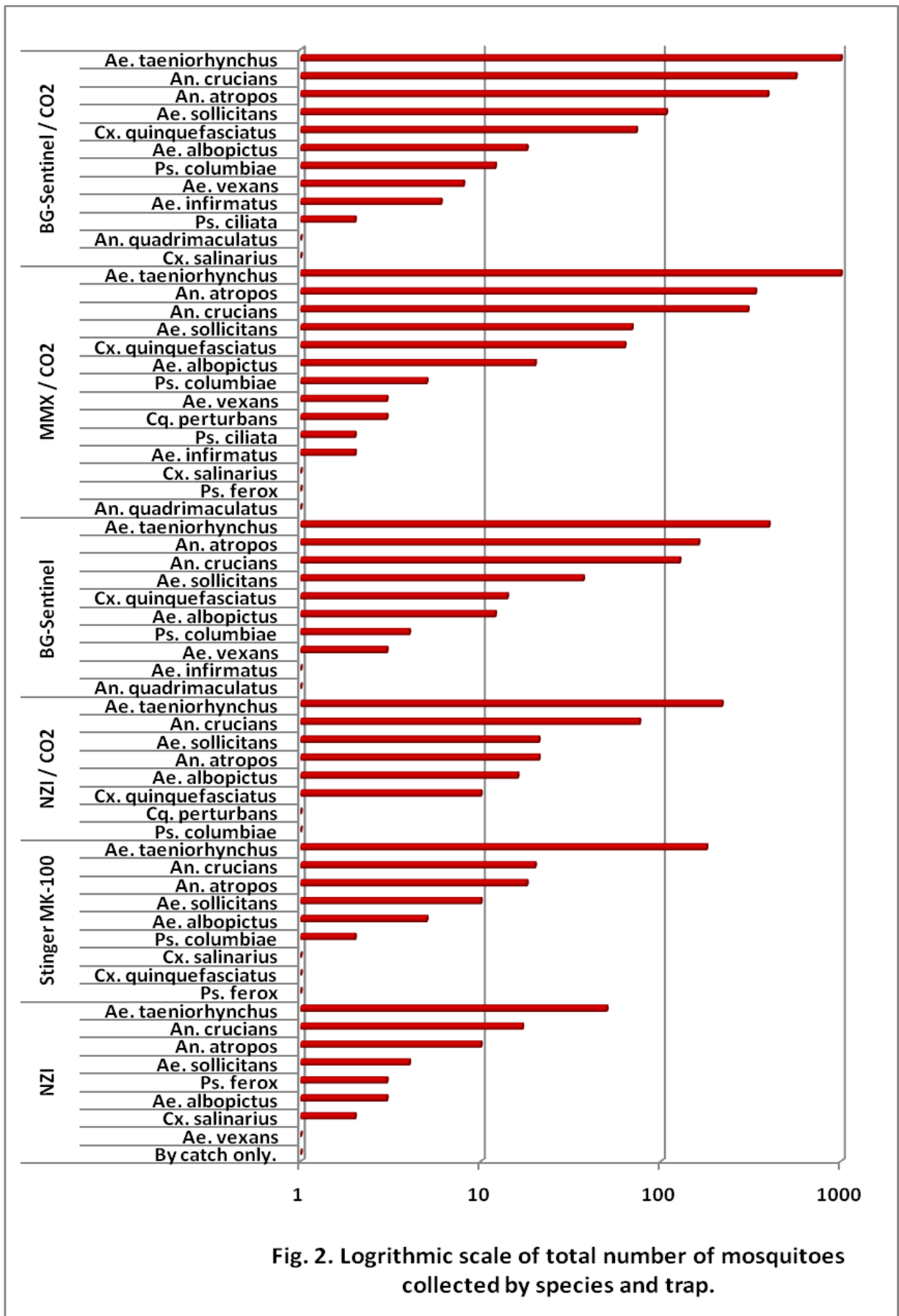


Fig. 2. Logarithmic scale of total number of mosquitoes collected by species and trap.

Discussion and Recommendations

The primary purpose of this study was to evaluate the Stinger MK-100 in comparison with other commercial and experimental traps. The MMX was utilized as a “golden standard” for comparison, since it has routinely surfaced in our studies as one of the best traps. Unfortunately, the Stinger did not perform as well as expected; however, it is very difficult to compete against traps that utilized CO₂. We have found no attractant that comes close to CO₂ in enhancing mosquito capture rates.

Suggestions for improvement of the Stinger MK-100.

1. Supplementing with CO₂ would likely improve the trap capture making it more competitive with other commercial traps.
2. The plastic spiral-shaped wind spinners required high wind velocities to turn. Wind speeds in this range were counterproductive for mosquito collection. These should be made to spin more freely or removed.

Literature Cited

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