A comparative Study of Three Commercially Available Mosquito Traps for Monitoring Mosquito Populations

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Since it was first founded in 1965 the Cayman Islands Mosquito Research and Control Unit has used New Jersey light traps to monitor the mosquito population on Grand Cayman. There is a network of 30 light traps across the island, which are collected daily, and the mosquitoes counted and identified to species. Mosquito control operations are carried out based on the number and species of mosquitoes collected. There are a number of problems associated with the use of light traps for collecting mosquitoes. They catch a whole range of phototropic insects such as beetles and moths, which means that sorting through the trap catch can become a long and laborious procedure. Additionally they are known to be highly biased in the mosquito species that they collect. For example Anopheles albimanus, (a potential malaria vector which is a common man biting species on Grand Cayman) is collected in low numbers in light traps due to the fact that it is not strongly attracted to light.

The purpose of this study was to evaluate three commercially available mosquito traps for monitoring mosquito populations. Two of the traps tested used carbon dioxide and 1-octen-3-ol as the attractants. These where the "Liberty" trap manufactured by American Biophysics and the "Mosquito Deleto" manufactured by the Coleman company. The third trap, the "SonicWeb" was manufactured by Applica and used 1-octen-3-ol and the simulated the sound of a heartbeat as attractants.

Two areas were selected for the study. The first of these was less than 200 meters from a mangrove swamp area and was chosen to determine how the traps compared in an area of high mosquito density. The second area was an urban location and was selected to compare the traps in an area of relatively low mosquito abundance. The traps were placed a distance of 30 meters apart in a triangular formation and collections made over a period of 24 hours (07:00- 07:00). The trap locations were rotated each morning to reduce any differences in trap catch due to location.

Table 1 shows the results of trap collections made over a nine-day period in the area of high mosquito abundance. A total of 7161 mosquitoes were collected in the "Liberty" trap, 37 in the "Mosquito Deleto" and 5 in the "SonicWeb". Due to the low numbers of mosquitoes collected in the "SonicWeb" trap it was not included in any further tests and no statistical analysis was made to compare it to the other two traps. A paired comparison t test of the log+1 transformed mosquito catch data showed that the "Liberty" trap collected significantly more mosquitoes than the "Mosquito Deleto" ($t=18.4$, $d.f.=8$, $p<0.005$). The "Liberty" trap also collected a much larger range of species than the Mosquito Deleto" Figure 1.

Day	Mosquito Deleto			Mosquito Magnet Liberty									SonicWeb	
	Aedes taeniorhynchus	Culex nigripalpus	Culex quinquefasciatus	Aedes scapularis	Aedes taeniorhynchus	Anopheles albimanus	Anopheles grabhami	Culex iolambdis	Culex nigripalpus	Culex quinquefasciatus	Deinocerites cancer	Psorophora confinis	Aedes taeniorhynchus	Culex nigripalpus
1					234		14		24	118			0	
2	7			1	558	2	120		13	491		2	1	
3	5		1	1	425		37	2	48	402		1	1	
4	3		1		275		15	1	65	140			0	
5	1				78	1	6		4	235	1		0	
6	2				749	4	36		532	67			0	
7	1	3	1		98		19	9	211	4				1
8		4			114	21	108	6	1449			9		2
9	1	7			14		24		373				0	

Table 1: Mosquito trap counts from the three mosquito traps over a nine-day period in an area of high mosquito density

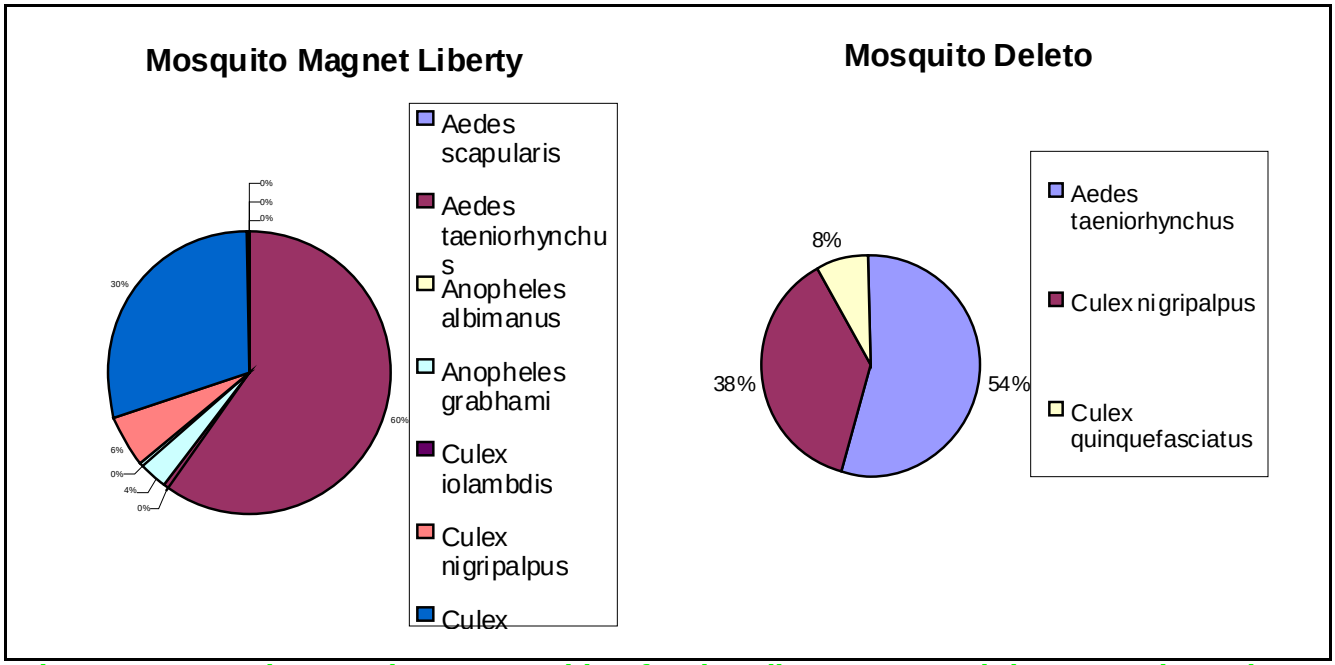

Figure 1: Mosquito species composition for the Liberty trap and the Mosquito Deleto

Table 2 shows the results of trap collections made over a 17-day period in the area of low mosquito abundance. A total of 286 mosquitoes were collected in the "Liberty" trap and 5 in the "Mosquito Deleto". A paired comparison t test of the log+1 transformed mosquito catch data showed that the "Liberty" trap collected significantly more mosquitoes than the "Mosquito Deleto" ($t=22.4$, $df=16$, $p<0.005$). As before, the "Liberty" trap also collected a larger range of species than the Mosquito Deleto".

Day	Mosquito Deleto	Mosquito Magnet				
	Culex nigripalpus	Aedes taeniorhynchus	Anopheles albimanus	Anopheles grabhami	Culex quinquefasciatus	Deinocerites cancer
1	2	1	1	1	32	1
2	0				19	
3	0				10	
4	1				20	
5	0	3		3	16	
6	0				12	
7	0		2		22	1
8	0			1	8	
9	0				7	
10	0			3	12	
11	0	1			4	
12	0	3		1	17	
13	0				11	
14	1				13	
15	0	1	3		20	2
16	0			2	16	
17	1				17	

Table 2: Mosquito trap counts from the three mosquito traps over a 17-day period in an area of low mosquito density.

In conclusion; the "SonicWeb" trap collected only 5 mosquitoes and found to be of no use for monitoring mosquito populations. Although the "Mosquito Deleto" did collect a number of mosquitoes the sticky papers used to collect the mosquitoes on the trap made it very difficult to identify the mosquitoes collected. For this reason and the fact that it collected significantly fewer mosquitoes (and fewer species) than the "Liberty" trap, the Mosquito Deleto" was dismissed as a potential alternative to New Jersey light traps for monitoring the mosquito population on Grand Cayman. Further investigations are still required to determine the potential of the "Liberty" trap as an alternative to the New Jersey light trap. The relationship between the mosquito catches from the New Jersey light trap, the "Liberty" trap and human bait collections needs to be established.