

Comparison of the CDC miniature light trap with a newly engineered hanging trap for mosquitoes



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Abstract

The CDC light trap was developed in the early 1960's and is one of the most widely used traps for the surveillance of many mosquito species. The trap is used hanging from a support and has a battery-driven ventilator that draws air from the space below a black lid into a catch bag. While an incandescent light under the lid was the original attractant, it was later often supplemented or even replaced by carbon dioxide, provided either from dry ice, or from bottles.

Here, we present a newly engineered hanging trap that can be used similar to the CDC trap. The goals in its development were to reduce the consumption of electricity and thus increase battery life, to use an optional light source optimized to attract mosquitoes, and to increase catch rate by an improved ventilator that also damages less of the catch. In addition to a technical description of the trap, we present field data from Europe and the United States, comparing catch rates and species spectra obtained with CDC miniature light traps and the novel trap.


Materials & Methods



CDC light trap



BG light trap

	CDC light trap	BG light trap
Fan / Ventilator	4 blades	3 blades
Voltage	6 V	
Electric current, fan & light	0.255 A	0.150 A
Air intake in cm ³ /min	2100	2470
Diameter of suction funnel	8.5 cm	10.5 cm
Height of suction funnel	8.5 cm	11.5 cm
Rain cover	yes	
Light	Incandescent lamp type CM47, 6.3 V, 0.150 A/h, luminous intensity 0.51 cd, colour temperature ca. 2 000 K	
Trap entrance at	1.50 m	
Attractant	CO ₂ , 200 ml/min, from gas cylinder, released on top of rain cover 	

Results A: Regensburg, Bavaria, Germany, June 2017

Trap	CDC light trap	BG light trap
Unidentifiable Culicidae	2	1
♀ <i>Cq. richiardii</i>	6	10
♀ <i>An. maculipennis</i> Complex	1	0
♀ <i>Cx. pipiens/torr.</i>	30	178
♀ <i>Ae./Oc. sp.</i>	9	0
♀ <i>Ae. vexans</i>	47	52
♀ <i>Oc. sticticus</i>	8	8
♀ <i>Oc. annulipes</i>	9	21
♀ <i>Ae. cinereus</i>	3	1
♀ <i>Cs. annulata/subochrea</i>	2	4
Total of mosquito ♀♀	117	275
Total of mosquito ♂♂	58	44
Simuliidae	1	117
Number of non-blood-sucking Insects	1080	1226
Average of damaged mosquitoes (n=4)	37.5 %	5.6 %
Latin square	2x2 with 8 catch days	

Results B: Lake Charles, Louisiana, USA, August 2017

Trap	CDC light trap	BG light trap
♀ <i>Ae. albopictus</i>	0	2
♀ <i>Ae. atlanticus</i>	4	3
♀ <i>Ae. sollicitans</i>	15	55
♀ <i>Ae. taeniorhynchus</i>	0	32
♀ <i>Ae. vexans</i>	0	4
♂ <i>An. crucians</i>	4	2
♀ <i>An. crucians</i>	13	18
♀ <i>Coq. perturbans</i>	33	80
♀ <i>Cx. erraticus</i>	34	33
♂ <i>Cx. nigripalpus</i>	1	0
♀ <i>Cx. nigripalpus</i>	5	34
♂ <i>Cx. salinarius</i>	14	26
♀ <i>Cx. salinarius</i>	69	284
♀ <i>Ma. titillans</i>	1	7
♀ <i>Ps. columbiae</i>	5	2
♀ <i>Ps. ferox</i>	2	5
Total of mosquito ♀♀	181	559
Total of mosquito ♂♂	19	31
Latin square	2x2 with 10 catch days	

Results C: Suffolk, Virginia, USA, July 2017

Trap	CDC light trap	BG light trap
♀ <i>Ae. albopictus</i>	47	22
♀ <i>Ae. atlanticus</i>	23	22
♀ <i>Ae. cantador</i>	1	2
♀ <i>Ae. infirmatus</i>	0	3
♀ <i>Ae. japonicus</i>	0	1
♂ <i>Ae. triseriatus</i>	8	1
♀ <i>Ae. vexans</i>	14	9
♀ <i>An. punctipennis</i>	5	5
♀ <i>An. quadrimaculatus</i>	2	4
♂ <i>Cq. perturbans</i>	3	0
♀ <i>Cs. melanura</i>	3330	4023
♂ <i>Cx. erraticus</i>	16	32
♀ <i>Cx. pipiens</i>	0	0
♀ <i>Cx. restuans</i>	0	1
♀ <i>Cx. salinarius</i>	38	32
♀ <i>Cx. territans</i>	18	18
♀ <i>Ps. ciliata</i>	2	4
♀ <i>Ps. columbiae</i>	4	5
♀ <i>Ps. ferox</i>	18	14
♀ <i>Ps. howardii</i>	8	13
♀ <i>Ur. sapphirina</i>	3	1
Total of mosquito ♀♀	3540	4211
Total of mosquito ♂♂	146	151
Latin square	3x3 with 9 catch days	

Conclusions:

- Using the same attractants (incandescent light & carbon dioxide), the BG light trap prototypes collected more mosquitoes than the CDC light trap.
- The catch was in better condition, with fewer specimens harmed by the ventilator.
- Energy consumption is 40 % lower in the BG light trap.
- The air intake is more than 15% higher in the BG light trap.