

Observations on the Effectiveness of a Commercially Available MCU – 900 ULTRA Mosquito Trap In Collection of Adult Mosquito (Diptera: Culicidae) Populations from Two Selected Areas in Districts of Colombo and Gampaha, SriLanka

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Abstract: There are several Trapping Devices available to collect adult mosquitoes, but only a few comparisons have been conducted to assess the effectiveness of the device. MCU – 900 ULTRA trap is differently constructed with four attractants to attract mosquitoes effectively. The aim of this study is to provide information for mosquito trapping that could be used practically in surveillance programs. Co₂, Octenol, LED light and Nectar jar were the attractants. Observations were carried out in two areas in the Colombo and Gampaha Districts, Sri Lanka where the high prevalence of Dengue cases reported. Two different spatial patterns were examined. Mann–Whitney U-test and t – test were used to identify spatial autocorrelation. Consistently high mosquito populations were captured within the uncontrolled area in comparison to the control area. High densities of Aedes species were captured in the uncontrolled area. Such observation may become useful for necessary action to control or prevent arboviral transmission and the MCU-900 Ultra Mosquito trap seems to be an efficient tool.

Keywords: mosquito trap collections, MCU-900 Ultra Mosquito trap.

1. INTRODUCTION

WHO defines “Health as not merely the absence of disease or infirmity but as a state of complete physical, mental, cultural and social well – being” (WHO,1946)

Mosquitoes have been collected for various experimental and educational requirements by various methods, such as hand collections, mouth aspiration, pyrethrum spray collections, cattle baited net trap collections and CDC light trap collections. The efficacies of these methods vary due to several factors. In the present study, the efficacy of MCU-900 ULTRA trap (Envirosafe Technologies Newzealand) was tested at Royal Colombo golf grounds, Colombo5 Sri Lanka,

during the period of 23rd October – 02nd November, 2015 and an open land surrounded by marshes at Wedikanda, Hunupitiya, Wattala, Sri Lanka, during the period of 03rd – 13th November, 2015.

2. STUDY AREA

1st study area - Royal Colombo Golf Club is approximately 2 Km² in area and surrounded by several shanties and various mosquito breeding habitats. The Colombo Municipal Council regularly applies adulticides and larvicides in this area.

2nd study area - It is approximately 4 Km² open area with a marshy land at Wedikanda, Hunupitiya, Wattala, Sri Lanka. No proper mosquito controlling is conducted in this area by the Local Government Authorities.

3. MATERIAL AND METHODS

MCU-900 ULTRA trap was placed near the pavilion of the Golf Club, facing the ground for 10 days and near the marshy land for 10 days respectively. The trap is approximately 1 ½ ft in height and consists of a cylinder filled with CO₂ gas. The bottom consists of a chamber to which is attached a lure containing an Octenol strip. The top is covered with 5" conical shade. The trap has multiple attractants as indicated in table 01 below.

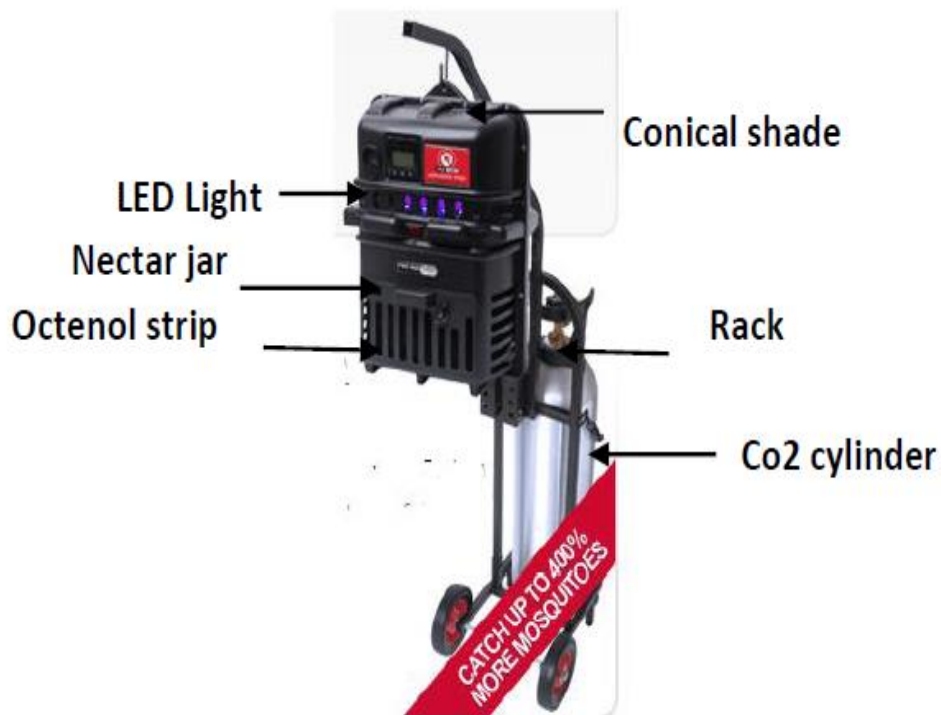


Fig01:MCU-900 Ultra Trap

Table 01: Trap model, type of attractants and power requirement

Trap type	Type of Attractants	Power Requirement
Mega – Catch™ MCU 900 Ultra	CO ₂ , Octenol, LED Light, Nectar Juice	12 Volt

4. RESULTS

Table 2 : Dates and the total adult mosquitoes collected in the mosquito controlled and non-controlled areas

Adulticides and Larvicides Applied Area		Non Controlled Area	
Date	No's Collected	Date	No's Collected
24th Oct.	60	3rd Nov.	211
25th Oct.	130	4th Nov.	240
26th Oct.	72	5th Nov.	180
27th Oct.	73	6th Nov.	280
28th Oct.	21	7th Nov.	179
29th Oct.	40	8th Nov.	338
30th Oct.	30	9th Nov.	210
31st Oct.	24	10th Nov.	121
1st Nov.	52	11th Nov.	183
2nd Nov.	64	12th Nov.	166
Total Number Collected During 24th October to 2nd November		Total Number Collected During 3rd November to 12th November 2015	
566		2108	

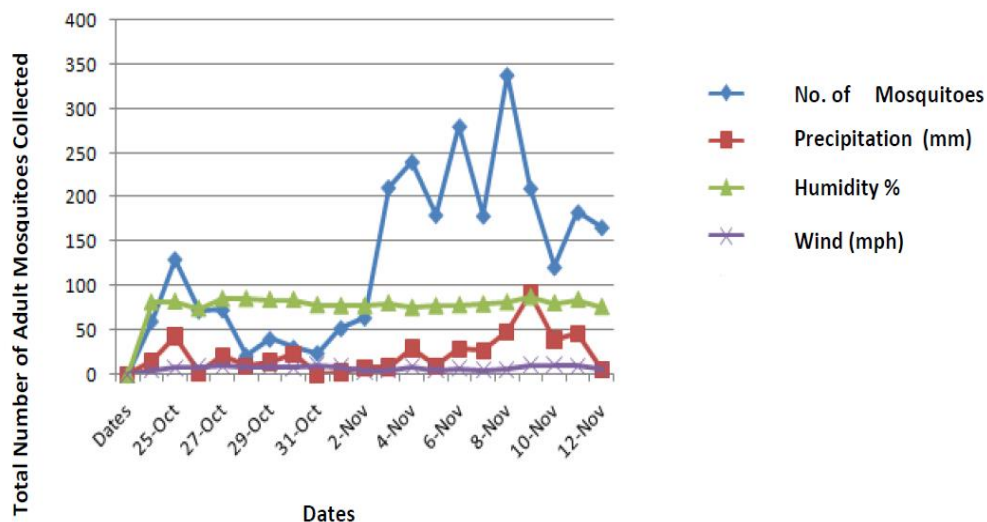


Fig 2 : Graphs Showing the Total Adult Mosquitoes Collected and the Weather that prevailed the respective Days during the period of 24th October to 12th November 2015

5. STATISTICAL ANALYSIS

Comparing two areas which the trap was placed and evaluate the effectiveness of Mosquito Trap. However, to determine the differences seen, we have employed both Parametric (t – test) and nonparametric (Mann – Whitney U test) statistical tests. Both statistical tests indicate the deference in the two areas and it is real.

Table 3: Statistical Analysis of the Effectiveness of Mosquito trap on collecting Adult Mosquitoes in the two selected areas

Statistical test	Results	Probability of Effect Seen due to Chance Alone (P)	Significant Difference Between Areas
t- test	t = 6.9803, df = 18	P = 0.0001 (0.01%)	Yes
Mann - Whitney	U = 1, N = 10	P = 0.00024 (0.024%)	Yes

6. DISCUSSION AND CONCLUSION

The efficacy of the Ultra Mosquito Trap, MCU-900 in attracting adult mosquito populations in two different areas in the Colombo and Gampaha Districts, Sri Lanka was evaluated. The adult mosquitoes gathered daily during the period of 24th October to 12th November 2015 was recorded. The number of adult mosquitoes collected daily is shown in Table 2. It is seen that a total of 2108 mosquitoes were gathered from the non controlled area while total collection from the adulticides and larvicides applied area amounted to only 566. This amounts to 21% of the total number of mosquitoes collected from both areas. This reflects a clear impact of the mosquito control measures implemented in the area by the Local Government Authorities.

Gregory L'Ambert, et.al (2012) investigated the effectiveness of five different trapping methods for surveillance of mosquito vectors of West Nile virus in Rhone Delta, France. The methods used were (a) carbon dioxide (CO₂) baited traps (b) bird-baited traps (c) resting boxes (d) gravid traps and (e) human landing catches. The CO₂ baited traps were modified from CDC Miniature Light Traps Model 512 without a light source and baited with 1Kg. dry ice. These investigators found that CO₂ and bird-baited traps were the most practical methods for collecting the West Nile virus vectors in the field.

In a study carried out in Macha, Zambia by Christen M. Formadel, et.al. (2010) for monitoring Anopheles arabiensis human biting rates (HBR) in an area with low vector density and high insecticides – treated bed nets, the investigators found that their results suggested that in regions where use of vector control interventions are high and vector densities are low. CDC light traps can be used to monitor An. arabiensis human biting rates (HBR).

In Sri Lanka the presence of 140 mosquito species belonging to 16 genera have been recorded (Chelliah & Jayasekera, (1981) ; Amerasinghe, (1983)). There are several mosquito borne diseases that have been recorded from the island. These include Malaria, Filariasis, both urban and rural ; Dengue and DHF, Japanese Encephalitis and more recently Yellow Fever (Vitharana et. al, (2001)). In the early period severe outbreaks of Malaria that had raged the country in intensity and distribution leading to 80000 deaths within a short period have been recorded (Wicramasinghe 1981). Thus a program was launched to control mosquito breeding. The early methods used were source reduction which included filling of breeding places, draining of marshy lands and introduction of larvivorous fish such as Gambusia Affinis into suitable mosquito breeding places such as wells, ponds, water storage tanks. However DDT (dichlorodiphenyltrichloroethane) was introduced in mid 1950's for indoor residual house spraying as the major vector of Malaria Anopheles Culicifacies was identified and found to be a highly anthropophilic and endophilic species. The results were dramatic and the incidents of Malaria gradually decreased to only six cases. Thus DDT spraying was withdrawn. However within a short period there were focal outbreaks of the disease which later led to epidemic proportions. Thus residual house spraying was started again and DDT was discarded due to development of vector resistance to this insecticide. Later the concept of area wise and rotational use of unrelated insecticides were introduced to delay development of resistance by the vector. At present it is reported that Malaria is no longer a major threat in Sri Lanka (Wicramasinghe 1981).

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The assessment of the impact of the control measures needed gathering both larval and adult mosquito samples, mouth aspirators, cattle baited net traps, indoor residual spraying with Pyrethrum, human bait night collections were carried out for adult mosquito sampling. Larval sampling was done mainly by dipping with the standard needle. Although these sampling methods used for adult showed a varying degree of gathering a satisfactory sample of mosquitoes depending on the prevailing weather condition. However the practical implementation of such sampling under field condition involve various difficulties. Thus the use of MCU-900 Ultra Trap for adult sampling seems to overcome these difficulty. The use of these traps in locations where the mosquito density is high may bringing a reasonable reduction of the adult population of Mosquitoes. These traps used in combination with other adult control measures in an integrated mosquito control program is most likely to cause a satisfactory reduction of the mosquito population. However the collected mosquitoes in this trap remains dry and masking external morphological features for identification of species. This seems to be a major disadvantage for identification of species in gathering mosquito samples for any research studies. This may be overcome by necessary improvement to prevent such drying of mosquitoes collecting in the chamber.

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