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メタデータ	言語: eng 出版者: 公開日: 2017-10-05 キーワード (Ja): キーワード (En): 作成者: メールアドレス: 所属:
URL	http://hdl.handle.net/2297/11684

[Jpn. J. Sanit. Zool. Vol. 39 No. 1 p. 77-79 1988]

Research Note

Efficiency of CO_2 baited traps for sampling Guatemalan simuliids*

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(Received: June 15, 1987)

Key words: simuliids, CO_2 traps, human bait, sampling efficiency, Guatemala, onchocerciasis.

Many techniques have been introduced for sampling adult female simuliids (Service, 1981). Human bait has widely been accepted as providing the representative samples of anthropophilic simuliids. Certain animals have been used as bait, particularly to obtain the species of veterinary importance. Various types of traps with or without attractants have been designed by many authors corresponding to the information they required. Investigators on simuliids must select most suitable technique depending on their aims and target species. In the endemic areas of onchocerciasis in Guatemala, simuliids have mainly been collected by using human bait because *Simulium ochraceum*, the most important vector, is a typical anthropophilic species (Ochoa A., 1982). However, the human bait collection is far from an ideal or the best method. It always involves risks of infection of the disease to volunteers. In addition, it requires more man power and cost than other methods. In the present study, we tested the efficiency of the triangular pyramid trap and the mosquito net trap both of which were baited with CO_2 for sampling Guatemalan simuliids. The difference of the sampling efficiency between the traps and the human bait are briefly described.

Materials and Methods

Triangular pyramid trap: This was originally devised by Hayakawa for sampling blood-sucking tabanids. It is collapsible and consisting of four main parts: a collecting cage, a collar, three supporting poles, and a skirt made of red or black Tetoron (Fig. 1). The construction and dimension of the trap are demonstrated in Hayakawa (1980). Flies are captured when they are attracted to the trap and enter into the collecting cage.

Mosquito net trap: Rectangular mosquito net made of light blue nylon mesh was used for sampling simuliids. It was set up with supporting poles and at one side the mesh was tucked up to make an opening from which simuliids could enter (Fig. 2). Most of the simuliids which were attracted flew to the upper corners in the mosquito net. When scheduled sampling time finished, flies were caught with an insect net and an aspirator.

CO_2 gas in the cylinder was released under the pyramid trap and in the mosquito net trap at a rate of 6,000 ml/min during sampling.

Human bait collection: Two persons worked together. One collected simuliids on the other person (human bait) with an aspirator and an insect net.

All the specimens collected were immediately killed and preserved in 70% ethyl alcohol for identification in the laboratory.

The date, time and locality of each sampling trial are indicated in the footnotes of Table 1.

Results and Discussion

The species and the number of individuals collected by each method at the sampling sites are shown in Table 1. Very few individuals of *S. ochraceum* were collected by the traps though many females were collected

* This study was supported by the Ministry of Public Health, Guatemala, and Japan International Cooperation Agency (JICA).

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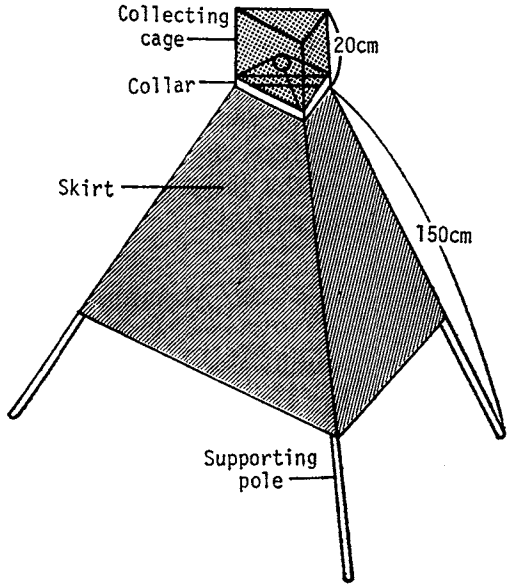


Fig. 1 Triangular pyramid trap.

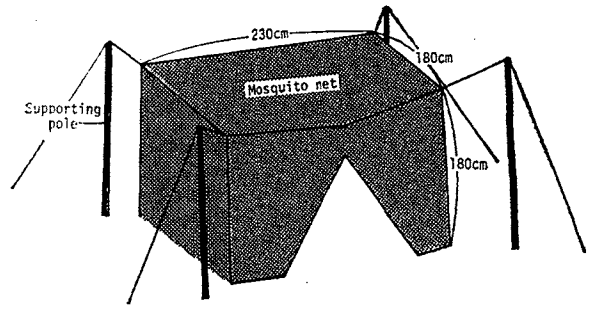


Fig. 2 Mosquito net trap.

from the human bait. On the other hand, the number of *S. metallicum* collected by the mosquito net trap was comparable to the number collected by the human bait. Females of *S. metallicum* were also attracted to the pyramid trap and flew around the skirt of the trap but they seldom entered

Table 1 Number of simuliids collected by triangular pyramid trap (PT) and mosquito net trap (MNT) baited with CO_2 in comparison with human bait collection (HB).

Trial number[a]	Collecting method	*Simulium*					
		ochraceum	*metallicum*	*callidum*	*mexicanum*	*pulverulentum*	Other species[b]
1)	PT	0	1	4	2	1,116	0
1)	PT[c]	0	41	6	1	287	5
2)	PT	0	0	0	0	0	0
3)	PT	0	0	0	0	0	0
4)	PT	0	0	0	0	0	0
3)	MNT	0	169	3	3	5	9
3)	MNT[d]	7	41	0	0	1	0
4)	MNT	1	44	0	1	5	1
5)	MNT	1	93	134	28	0	5
6)	MNT	3	4	0	0	0	2
2)	HB	74	8	6	0	0	0
3)	HB	17	0	0	0	0	0
4)	HB	150	89	2	0	0	2
4)	HB	103	46	3	0	0	1
6)	HB[e]	100	4	14	0	0	1

[a] Trial number: 1) Finca Peña Blanca, San Vicente Pacaya, Department of Esquintla, Jan. 6, 1977 (sampling time 9:00-11:00); 2) Finca Mónica Ivoné, Department of Sololá, Nov. 12, 1977 (12:00-14:00); 3) Finca Buena Vista, Acatenango, Department of Chimaltenango, Feb. 26, 1980 (12:10-12:40 or 12:40-17:00); 4) Same locality as Trial No. 3, Feb. 27, 1980 (9:00-12:00); 5) Finca Peña Blanca, San Vicente Pacaya, Department of Esquintla, Jul. 4, 1980 (6:15-12:00); 6) Finca Monte Quina, Department of Sololá, Jul. 9, 1980 (10:00-10:45).

[b] *Simulium downsi, S. horacioi, S. rubicundulum* and *S. gonzalezi.*

[c] Simuliids attracted and flew around the pyramid trap were collected with an insect net.

[d] Collectors frequently entered into the mosquito net during sampling time.

[e] Simuliids were collected on the human bait in the mosquito net.

into the collecting cage (*cf.* Trial No. 1 in Table 1). Considerable numbers of *S. callidum* and *S. mexicanum* were collected by mosquito net trap in one occasion (Trial No. 5 in Table 1). This suggested that the mosquito net trap might be effective to collect these two species when they were abundant. Their responses to the pyramid trap and the human bait could not be ascertained because of the lack of the comparative results between the methods. *S. pulverulentum* was the only species collected in a large number by the pyramid trap. Its response to the mosquito net trap and the human bait could not be ascertained. Other species, *S. downsi, S. horacioi, S. gonzalezi* and *S. rubicundulum* were rarely collected by the methods employed in this study.

In the collection of adult female simuliids, the efficiency of CO_2 traps and the human bait varied greatly from species to species. The pyramid trap proved to be highly effective for the collection of *S. pulverulentum*, whereas the mosquito net trap was effective for *S. metallicum, S. callidum* and *S. mexicanum*. Neither pyramid trap nor mosquito net trap could sufficiently attract *S. ochraceum*. Nakamura (1982) evaluated efficiency of a mini-CO_2-trap for sampling adult female blackflies in Guatemala. It was a small (15 cm in diameter and 20 cm in height) stainless steel cylinder baited with dry ice. He mentioned that the species composition obtained by his trap was similar to that by human bait. However, the number of *S. ochraceum* collected per an hour by a single mini-CO_2-trap was only 2–9% of that by human bait. The traps baited with CO_2 alone were not effective for the collection of *S. ochraceum*. To employ human bait seems to be unavoidable in order to obtain sufficient number of this species.

ACKNOWLEDGEMENTS

We wish to express our gratitude to Dr. H. Takahasi and Dr. T. Suzuki, ex-Leaders of JICA in Guatemala. We are also grateful to Dr. K. Kamimura, Department of Pathology, Toyama Medical and Pharmaceutical University and to Guatemalan stuff members of SNEM for their cooperation in the study. We appreciate Mr. Marc Weedon-Newstead, Asahikawa Medical College, who helped improve English of the manuscript.

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摘　要

グァテマラ産ブユに対する炭酸ガストラップの採集効率

グァテマラのオンコセルカ症流行地において，炭酸ガスを用いた2種類のトラップで，ブユ成虫を捕獲し，各トラップの採集効率を人囮の場合と比較した．
蚊帳トラップでは，*Simulium metallicum, S. callidum, S. mexicanum* が，比較的多く採集されたのに対し，三角錐型トラップでは，*S. pulverulentum* のみが多数採集された．これらの種のうち，*S. metallicum* は人おとりでも蚊帳トラップとほぼ同様に採集された．*S. ochraceum* は，人おとりにのみ多数誘引され，トラップでは，ごく少数が得られたにすぎない．この種に対しては，炭酸ガスだけを誘引物とする方法では，採集効率がきわめて低く，多数の個体を得るためには人囮を利用せざるを得ないと思われた．