larvicides against *Ps. columbiae* in late season (second crop) rice fields depends upon the observation of control (untreated) populations (sites) for comparison with observations of the treated populations. In our experience, one of the following two methods has been used by researchers: 1) choosing control pans in the same field as the treated pans; or 2) selecting control fields separate from treated fields. Choosing control pans in the same field is often impractical because water movement during irrigation carries materials downfield. The results in this paper point to the greater variability between mean larval counts between fields than between the ratios of counts of two instars within the fields. Control fields can thus be chosen, but the mean number of larvae may vary so greatly between fields that the effect of the larvicide may be obscured by the high variability in the data.

On the other hand, the results herein show that there is less variability between fields when the parameter of instar ratio is used for comparison of untreated populations. Therefore, this parameter may be used for statistical evaluation of test results by comparing the observed to the expected ratios between the control and the treated fields.

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DESCRIPTION OF A BAITED TRAP FOR SAMPLING MOSQUITOES

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Adult haematophagous mosquitoes are often sampled using animal or human baited nets, or using light traps with or without suitable attractants such as carbon dioxide (Service 1976). A baited trap which we have found suitable for the capture of mosquitoes of medical importance under field conditions is described here to augment available sampling techniques.

The framework of the trap consists of hollow tubular steel about 2 mm thick in three basic sub-units which through interlocking joints are linked up to form the trap support frame (Fig. 1). The trap covering can be made of normal mosquito netting or canvas, but as will be mentioned below, the latter is preferred in some situations. The canvas that we have used is khakhi colored and light. The canvas is tailored to conform to the framework shape as in Fig. 1, and its bottom seams terminate about 25 cm above ground level.

For stability, especially in windy conditions, the trap can be tethered to the ground with pegs at the corners as with a camping tent. One shorter end of the net has a slit from the apex to the bottom. The two flaps so formed allow for entry and the slit can be secured with thin tent rope. Figure 2 depicts our own version of this trap, set up in the field.

This type of frame and net can be constructed very easily and cheaply in a workshop with basic welding and metal cutting equipment. The only major material items required are suitable metal tubing plus the canvas top. The whole trap is fairly light and it can be rapidly set up in less than 15 min in the field.

Under some hot humid tropical conditions, without the possibility of rain, the mosquito net cover is preferred to the canvas. But the advantage with the canvas is that it provides cover from the occasional showers at night causing little or no disruption of the night's capture activities. We have also compared the effect of the two types of cover on mosquito captures. On each occasion that we used an ox-bait in either trap, there were no significant

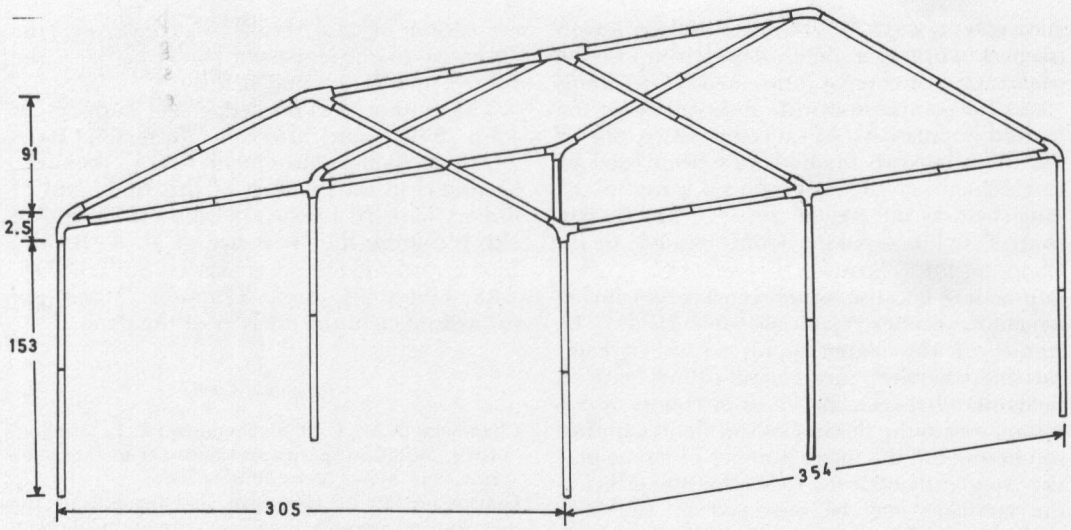

Fig. 1. Framework of baited trap (measurements are in cm).

differences in total nightly captures of *Anopheles quadriannulatus* Theobald. The only advantage was that the ox used as bait, appeared to be less confined with a mosquito net cover than the canvas, but this problem was eventually overcome as the animal became used to the trap.

Some authors have alluded to the fact that such traps as we describe here, could act as resting shelters for mosquitoes that have sought a host elsewhere (Akiyama 1973). On several trap nights, we used the canvas version to test this possibility. Two traps were set up adjacent to each other. An ox-bait was provided in one of them and the other left unbaited. Mosquitoes were recovered 2 hr after first light, after

Fig. 2. Baited trap with canvas cover.

having been given ample opportunity to escape after engorging a bloodmeal. No blood-engorged mosquitoes were recovered in the unbaited trap. So it would appear that the presence of a suitable host is the only attractant and that mosquitoes enter these traps to seek a host and not shelter.

The other advantage of the present trap apart from shelter from the rain, is that the overall design is based on observations (Snow 1979) that a large proportion of unfed female mosquitoes, including members of the *An. gambiae* Giles complex, can be caught by suction traps below a height of 1 m from the ground. For this reason, the net is slightly raised above ground level so that unfed mosquitoes are not restricted entry into the net to feed. We have found that after engorgement, mosquitoes are guided upwards by the apical shape of the net. Immediately after a blood meal, the engorged mosquitoes are sluggish and rest on the trap walls. They can then be aspirated at periodic intervals during the night. We have not determined the duration of mosquito-retention after successful engorgement but we assume some loss in the total catch. This would be more so if the gap between the bottom seams of the trap and the ground level is very wide. The location of the trap(s), especially in relation to mosquito breeding sites, should take into account that the adult mosquitoes (both parous and nulliparous) fly upwind in the absence of visual cues in search of blood (Gillett 1979).

We have been using the above trap in our routine surveys for malaria vectors, in particular those of the *An. gambiae* complex, and have found it very productive in terms of relating seasonal densities of mosquitoes to malaria incidence (Mpofu 1985). *Anopheles gambiae* s.s. Giles and *An. arabiensis* Patton, the most important vectors of malaria in most of Africa including Zimbabwe, were captured from man baited traps of the type described here. Over a 3-month period, longitudinal captures yielded a total of 147 specimens (*An. gambiae* 7.5%; *An. arabiensis* 48.9% and *An. quadriannulatus* 43.6%) and this period coincided with peak malaria transmission. The trap was most useful in the sense that no mosquito biting activity was demonstrated in nearby inhabited huts, nor were indoor resting mosquitoes recovered by aerial spray knockdowns in huts. Despite the absence of indoor biting activity, malaria cases were still being reported. This observation could indicate an exophagic malaria vector population in the study area which would account for malaria transmission through outdoor man-biting but which can only be sampled effectively by the trap described above.

In the same study, the trap showed its potential usefulness in assessing host preferences within a group of sibling species. Over a 12-month period, a sheep baited trap consistently yielded the zoophilic sibling species *An. quadriannulatus* indicating that such traps, suitably baited, could be used to sample exclusively for one species. This is already being done in a study which is attempting to colonize *An. quadriannulatus* by capturing large batches using an ox-bait. We have consistently collected over a 95% proportion of this species to the near total exclusion of its siblings which would otherwise interfere with our mass-breeding program.

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NOTES ON DEER FLIES AND HORSE FLIES (DIPTERA: TABANIDAE) FROM SOUTHERN VERMONT

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Deer flies and horse flies in the family Tabanidae are pests of man and livestock in Vermont. This paper provides a list of 29 species of Tabanidae collected with insect nets near Laurel Lake, Jacksonville, Windham County, Vermont since 1965. Most specimens were netted as they attempted to bite people, but some were collected from flowers as described in a previous paper (Pratt and Pratt 1972). This part of Windham County lies at an elevation of 500 to 600 meters in what Johnson (1925) describes as the "The Lower 'Green Mountains' area." Jacksonville is near the southern border

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