

## AN ECONOMICAL LIGHTWEIGHT PORTABLE RESTING UNIT FOR SAMPLING ADULT *ANOPHELES QUADRIMACULATUS* POPULATIONS<sup>1,2</sup>

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Resting stations offer distinct advantages for capturing adult *Anopheles quadrimaculatus* Say compared to other methods that utilize light, carbon dioxide or animal baits. They require little maintenance to ensure attraction, whereas other methods require sources of electricity or CO<sub>2</sub>, or maintenance of animals. Another advantage is that resting stations provide purer samples in that catches are primarily *Anopheles* spp. Also, most other methods generally sample the aerial population, which is predominantly unfed females, thus producing catches which may be biased and not representative of the entire adult population. Resting stations provide unbiased samples of adult *An. quadrimaculatus* with regard to age and sex of the entire population (Service 1976).

The portable resting unit described herein was fashioned to follow the design of wooden box-type resting stations described by Edman et al. (1968). Box-type resting stations have been effective collectors of Arkansas *An. quadrimaculatus* in past studies (Weathersbee et al. 1986); however, those stations were rather expensive and cumbersome. This new unit alleviates disadvantages related to costs of materials and labor, overall weight, and space requirements of earlier designs. These units can be stacked and are very light, facilitating both vehicle and manual transport.

Materials needed for trap assembly are readily available. A Rubbermaid Roughneck® 113.5 liter refuse container (72.3 × 41.9 × 80.6 cm) is the basic component at a current cost of less than \$13.00. For less than \$1/unit, the remaining materials include duct tape, a 3 × 5 ft (91.4 × 152.4 cm) section of black plastic sheeting, three 1 ft (30.5 cm) sections of cord, 2 large nails, one 0.25 in (7 mm) diameter 3 ft (91.4 cm)

dowel, and one #5 medium binder clip. Thus, the total cost of the materials is less than \$14/unit. Labor costs involved in construction are negligible since unit assembly requires only 5 minutes. In contrast, the wooden box-type station costs over \$30 in materials alone, not counting the labor required for fabrication.

In the first stage of assembly the 3 × 5 ft sheet of plastic is attached to the container using duct tape to affix the 5 ft (152.4 cm) edge to the top and sides of the open end. This sheeting acts as a 3 ft (91.4 cm) extension of the container and creates shade for the interior. Three loops, formed from 1 ft sections of cord, are attached to duct tape-reinforced holes at the distal corners and midline of the plastic sheeting, and a 3 ft dowel is used for center support. A binder clip attached to the middle cord loop acts as an adjustable connector to the dowel, which holds the canopy in a tent-like fashion over the mouth of the container. Two large nails passed through the cord loops at the corners secured the canopy to the ground. The final product can be seen in Fig. 1.

The unit was first used in Stuttgart, AR where 21 resting sites were selected for the collection of *An. quadrimaculatus*. Sampling was conducted on 6 dates during July and August of



Fig. 1. Portable resting unit erected in Stuttgart, AR during July and August 1986 for the collection of *Anopheles quadrimaculatus*.

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1986. Mosquitoes were collected from the resting station with an aspirator similar to that described by Meek et al. (1985). The mosquitoes were aspirated first from the underside of the canopy. Then the binder clip and corner cord loops were released and the canopy was folded back over the container, providing easy access to mosquitoes resting at the rear of the container.

Collection data were subjected to ANOVA for testing the hypothesis that catches among different dates and sites were equal. Mean separation was accomplished using DMRT (SAS 1985). The overall means ( $\pm$  SE) for male and female *An. quadrimaculatus* for all sites and all dates were  $202.7 \pm 21.1$  and  $156.8 \pm 13.0$ , respectively. Other mosquitoes collected from the units were limited to a few *Culex erraticus* (Dyar and Knab) at sites shared as roosts by birds.

Results of ANOVA indicated significant differences among collection sites ( $P < 0.05$ ), suggesting that the collections might be suitable as indices of density and localized distribution. Variability in catches among sites was rather high as would be expected due to varying conditions at each site. However, variability among collections from different dates at any particular site was fairly low, as evidenced by the respective standard errors. It is likely that variability in catches from different dates was due to the increasing *Anopheles* population as the season progressed.

The collections of male and female *An. quadrimaculatus* obtained per resting unit are shown for 6 sampling dates in Table 1. The data substantiate a trend towards a seasonal increase in the populations of both male and female

mosquitoes as would be expected in rice-producing areas during the months of July and August. Numbers of males collected always exceeded that of females. These data indicate that use of this resting unit can provide an excellent measure of *Anopheles* population trends over time.

The numbers of *An. quadrimaculatus* obtained by this sampling method appear comparable with previous reports. Snow (1949) obtained mean catches/day of 316–423 *An. quadrimaculatus* from privy-type shelters, whereas Weathersbee et al. (1986) reported mean collections/day ranging from 163 to 1,007 in wooden box-type shelters at locations in and near a riceland community.

Our experiences with wooden box-type shelters during 1985 and portable resting units during 1986 led to the realization that this new resting unit design should be made available. Collections have yielded data which indicate the new unit is an efficient sampling device for resting *An. quadrimaculatus* and appears to provide the same degree of effectiveness as previous shelters designed for resting mosquitoes. The benefits derived are the monetary savings in materials and labor, the light weight construction, and the minimization of space requirements for transport and storage.

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Table 1. Mean collections (n = 21) of *Anopheles quadrimaculatus* adults per resting unit on 6 dates during July and August, 1986 near Stuttgart, AR.

Date	Male	Female
July 15	118.3 $\pm$ 22.8c*	107.8 $\pm$ 27.1b
July 16	177.5 $\pm$ 38.7bc	149.0 $\pm$ 25.2b
July 24	177.5 $\pm$ 34.5bc	155.8 $\pm$ 34.1b
July 25	241.2 $\pm$ 48.2ab	164.0 $\pm$ 28.4b
July 26	154.5 $\pm$ 26.9bc	136.9 $\pm$ 21.0b
August 12	347.3 $\pm$ 93.4a	227.5 $\pm$ 46.1a

\* Means in the same column followed by the same lower case letter are not significantly different ( $P \geq 0.05$ ) by DMRT.