A MORE ACCURATE METHOD FOR ASSESSMENT OF *PSOROPHORA COLUMBIAE* LARVICIDAL TESTS[1]

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The dark rice field mosquito, *Psorophora columbiae* (Dyar and Knab), is the most abundant mosquito in rice fields in Texas (Kuntz et al. 1982) and Louisiana (Chambers et al. 1979). Late summer populations of this pest increase geometrically (Gunstream 1964). Experimental testing of larvicides or surveillance/detection activities by control agencies often requires sampling the larval population and evaluating changes.

The purpose of this study was to determine the ratio between mean larval counts of different instars of the same population when sampled by the common dipper technique. These data could be utilized for direct comparison of pre- and posttreatment results in the same field. A method is provided for a direct quantitative comparison of changes in a population that has undergone a change in instars between sampling dates.

Fields located in Jefferson Davis Parish in southwestern Louisiana were selected for sampling as they were flooded after harvest during late summer of 1984. The sampling unit was an individual pan (that area within a field divided by earthen levees for purposes of water management). Pans were sampled 1–2 days after flooding (when larvae were in 2nd instar) and again 2 days later (when they were in the 4th instar). Usually four pans were sampled in each field. Sampling commenced on July 28 and ended September 7, 1984.

Each sample consisted of the sum of larvae in two dippers (ca. 400 ml capacity). A sample was taken by entering the pan 5 m from the bounding levee, recording the sum of two dipper samples, and moving 20 steps further along the levee for the next sample. This process was repeated until the periphery of the pan had been sampled, arriving at the place of entry to the pan. Sampling 2 days later started at the same place and proceeded in the same direction around the edge of the pan.

Counts of larval *Ps. columbiae* were made in 78 pans in 26 rice fields. The number of samples/pans ranged from 5 to 62 (2nd instar) and from 17 to 39 (4th instar). The number of pans sampled/field ranged from 1 to 7; each pan was sampled once for the 2nd instar counts and again for the 4th instar counts. The mean number of larvae/dip/pan ranged from 0.2 to 37.0 (2nd instar) and from 0.0 to 29.1 (4th instar).

Data were analyzed by the least squares estimates for difference between means. The first analysis was a test for no difference between the mean counts of larval populations of the same instar between fields for each of the two instars. The analysis of variance showed 2nd instar means had an F-value of 4.4 ($P>F=0.0001$) and 4th instar means had an F-value of 4.5 ($P>F=0.0001$). The model was for the mean counts of 2nd instars between fields as the dependent variable, with the mean counts between pans within fields serving as the independent variable (error term). Therefore, the variance in counts of the same instar between fields at the same point in time was greater than the variance between counts of the same instar in different pans within the same fields taken at different times.

The ratio of the mean count of 4th instars to the mean count of 2nd instars in the same pan was calculated. The same analysis was conducted as above to determine whether the ratios between fields were significantly different. The analysis of variance showed that the means of the ratios had an F-value of 0.53 ($P<F=0.9565$). Therefore, the ratios obtained from sampling the same pans within a field were essentially the same regardless of the field.

The analysis of variance of the ratio of the number of 4th instars to the number 2nd instars and the linear regressions showed an F-value of 339.07 ($P>F=0.001$). The r-value was 0.936. The model was set to force the intercept through the origin, and the estimate of the slope was then 0.6461 (S.E. = 0.0277). Therefore, the expected mean number of 4th instars in a pan was equal to the observed mean number of 2nd instars in the same pan times 0.6461 during this observation period. At other times (such as during the 1st crop season) the survival to the 4th instar may be different, but these observations suggest that it will be more consistent from field to field than actual density.

Field evaluations of the efficacy of various

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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