

## A COMPUTER PROGRAM TO CALCULATE PESTICIDE CONCENTRATIONS FOR MOSQUITO LARVAL SUSCEPTIBILITY TESTS<sup>1,2</sup>

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The introduction of new compounds for use in mosquito control operations, and the ever present possibility of pesticide resistance, creates a need for accurate monitoring of pesticide efficacy. Larval susceptibility tests (World Health Organization 1963) are often used for this purpose. The basic procedure involves exposing a series of containers holding mosquito larvae to various concentrations of a pesticide. After an appropriate interval (usually 24 hr), the number of dead and live larvae exposed to each concentration is determined. These data may be plotted on probit paper and an  $LC_{50}$  estimated, or a statistical package, such as SAS, may be employed to calculate the  $LC_{50}$ , along with slope, intercepts and fiducial limits (SAS 1985).

Although simple in concept, difficulties often arise when the pesticide is diluted to a concentration appropriate for the susceptibility test. The formula,

$$C_1V_1 = C_2V_2$$

where  $C_1V_1$  = Concentration of compound in volume 1  $\times$  Volume 1 and  $C_2V_2$  = Concentration of compound in volume 2  $\times$  Volume 2 (Smith and Pierce 1980) is often used for calculating dilutions. This formula allows the user to keep track of the concentration of pesticide present through a series of dilutions until the desired range is obtained. Although simple in concept, difficulties often arise from misplaced decimals, etc., which lead to incorrect pesticide concentrations in the final dilutions. In addition, the calculations can be rather tedious.

A computer program<sup>3</sup> has been developed at the Louisiana State University Agricultural

Center to assist in the calculations previously described. The program was written in IBM BASIC for use on an IBM PC personal computer. Later, a compiled version was produced in Borland Turbo Basic<sup>4,5</sup> having the advantage of higher execution speed and being easier to use. The program operates by asking the user for information concerning the bioassay (i.e., initial pesticide concentration, water volumes to be used, etc.) and then proceeds to calculate up to 5 dilutions based on the information given. After each dilution, the user is queried as to whether the desired range of final concentrations (in ppm) has been reached. A negative response will let the user dilute further; an affirmative response yields a screen printout of the final concentrations obtained when between 0.5 and 10.0 ml of diluted solution is added to containers holding larval mosquitoes. An optional hard copy is produced giving the same information as the screen printout plus the volumes of pesticide and water used to make the stock solutions and dilutions. This information is especially useful for future attempts at replicating results. Base 10 logarithms of the final concentrations are provided for later use in probit analyses of the results.

This program was designed primarily for use with water soluble or miscible liquid formulations of pesticides. Nonetheless, it is possible to use with hydrophobic pesticides if a known concentration by-weight acetone solution is produced.

This program should prove useful to individuals or agencies who performed numerous larval susceptibility tests. Workers interested in a gratis copy of the program for use on an IBM

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<sup>3</sup> No warranties or guarantees that this program will operate properly on all systems is implied or given.

Neither the authors nor the LSU Agricultural Center nor the American Mosquito Control Association accept any responsibility for any incorrectness of this program to any or all potential applications, nor any liability for damages which may result from the use of this program or the results provided by this program.

<sup>4</sup> Turbo BASIC version 1.0. 1987. Borland International Inc., 4585 Scotts Valley Dr., Scotts Valley, CA 95066.

<sup>5</sup> Mention of a commercial product does not constitute a recommendation for its purchase by the LSU Agricultural Center.

personal computer or compatible machine should send a blank 5.25 or 3.5 inch diskette and a stamped, self-addressed diskette mailer to the authors. A copy of the BASIC source code can also be provided for those who have a non-IBM compatible computer, however, no assistance will be offered in translating IBM BASIC or Borland Turbo BASIC features for another computer system.

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