Interaction Between Chemical And Biological Larvicidies Used In Mosqui To Control

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The present study deals with the evaluation of efficien-cy of two bacterial mosquito larvicides and a chemical one against Culex zinigag larvae when used individually or incombinations with each other under laboratory condition, 02 an integrated method of control.The obtained results indicate the following :-(A) Susceptibility tests :1. Larvicidal activity of Bacillu2 thuringiensisResults indicated that the ouscepitibility of the Culex nines! larvae to this bacterial larvi-cide was found to be correlated with the exposure time. The LC50 and LC90 of 24, 48 and 72 hr were(0.037 ; 0.15, 0.022; 0.1 and 0.013; 0.06414m) respectively.2. Larvicidal activity of Bacillus sphaericus 1593-4 :The dosage levels of this bacteria have greatinfluence in its toxicity, high concentrations evoked a rapid lethal response to the entire testedlarvae, while low dosage resulted in significant mortality rates with increasing the exposure ti10. The LC50 and LC90 of 24, 48 and 72 hr were (2.6; 8,1.10; 2.7 and 0.74; 1.6 ppm) respectively.-135 -3. Larvicidal activity of dieldrin :Susceptibility of the Culex 2121m2 larvae towerdes dieldrin was found to be correlated with the exposure time. The L050 and LC90 of 24, 48 and 72 hr were (0.013; 0.027, 0.011; 0.022 and0.0086; 0.018 ppm) repectively.(B) The combined effect of the mixed formulation of the used larvicides.On testing the lavicidal activity of conbination of the three larvicides, results were represented asfollows :1. Mixture of Bacillus thurinriensin H-14 and dieldrin:Results indicated that the larval exposure to this larvicides mixture or sequences of Bacillus thuriagiensis then dieldren or the reverse of them after 24 hr induced significantly higher larvalmortality than when either of them was used indivi-dually.2. Mixture of Bacillus sphaericus 1593-4 and dieldrin:The obtained data revealed that the larval exposure to this larvicides mixture or sequencesof Bacillus sphaericus then dieldrin or the reverse of them after 24 hr induced significantlyhigher larval mortality than when either of them was used alone.-136..3. Mixture of both bacterial larvicides :larval exposure to the Bacillus thurinfliensis and Bacillus sphaericus mixture or sequences of Bacillus thurinr-iensis then Bacillus sphaericunor the reverse of them after 24 hr induced signi-ficantly the highest larval mortality than when either of them vas used individually.(C) Comparative susceptibility of Culex 2.1212ps larvae tothe larvicides when used simultaneously or in sequences:Results indicated the following :-The Bacillus thuringiensis H-14 and Bacilluss hn.ericus 1593-4 mixture was the moot effectivemixture followed by either of their mixture with the chemical larvicide ”dieldrin”.-Comparing the effect of adding the Bacillus sphner-icusor

-dieldrin to larvae pretreated for 24 hr with Bacillus thuringiensis indicated that dield rin addition cause significant increase in larval mortality at the first 24 hr but with increasing the exposure time i.e. after 48 hr no increase in larval mortality takes -place th .n adding B. snhaericus.-Adding Bacillus thuringiensis H-.14 to larvae pre treated with B. sphaericus for 24 hr result in asignificant larval mortality than if dieldrin wasadded.- 137 -There was no significance difference in larval mortality if the Bacillus thurinf-iensis H-14 or B. sphaericuswas added to larvae pre-tre-ted with dieldrin for 24hr. There was no significance difference occur to larval mortality rates when the larvae was pre-treted for 24hrwith Bacillus thurinp:iensis or B..pphaericus and then dieldrin was added.Mortality resulted from pre-treating the larvae for 24 hr with Bacillus sphaericus and then B. thuring;.ensiswas added, was found to be significant than that result-ed from the reverse.There was no significance difference between the larval mortality occured from pre-treating Culex pipienslarvae with dieldren for 24 hr then Bacillus sphaericus was added and the reverse.No significance difference of larval mortality was found between pre-treating the larvae with dieldrin for24 hr then Bacillus thurinp:iensis was added and the reverse.-138 -(D) Histopathological studies :The pathological action of the bacterial or the chemical larvicides when used separatly or in mixtureswere evaluated by examining the sectioned materials. The results of th1 study were as follows :1. Bacillus thurin,,,iensis serotype H-14 :The histopathological examination revealed thatthis bacterial larvicide cause damage to the epithelial mid-gut cells. In the early stages of infection the cells observed with the characteristic balloon-shaped swallen, while in the late stages the epithelial cells burst as a result of cell rupture, discharging of cell contents in the gutlumen.The other affected tissues and cells were muscle bundle, fat body layers, Malpighian tubules, gastric caeca and the tracheal matrix. The discontinuation of the peritrophic membrane was observed only atlate stages of infection.2. Bacillus snhaericus 1593-4 :Examining the sectioned larvae treated with this bacteria showed that the mid-gut was the site of action of this pathogen. The epithelial cells of the gut swallen, deteriorated, and finally burst.At late stage of infection the epithelial cell nucl-eus was heavily affected and was seen vacuolated-139 -Muscles and fat body layers were also affected. 3. Dieldrin :The histopathological examination indicate that this chemical larvicide caused damage to the epithelial gut cells, muscles, fat body layers, Malpighian tubules, gastric caeca and the tracheal tubes. The nerve cord was also affected, the cotical layer and the neuropilemass became very loosely packed.4. Bacillus thurinp;iensis H-14 and dieldrin mixture :The histopathological examination revealed simila-rity between the pathological symptoms of both Bacillus thuringiensis H-14 and its mixture with dieldrin whichindicate that the larvicidal action of the Bacillus thurinLiensis is not affected by dieldrin. 5.Bacillus slhaericun 1593-4 and dieldrin mixture :Combination of Bacillus sphaericus 1593-4 and diel-drin induced a destruction of the gut epithelial cell. The posterior part of the mid-gut was extensivly destro-yed. Fat bodies, muscles, tracheal tubes and Malpigh-inn tubules were also expressed the cellular hypertop-hy.6.Bacillus thurinfiensis H-14 and -Bacillus apillericuE1593-4 mixtureMixtures of both bacterial larvicides showed patho logical activity similar to that seen when either •— 140 — Bacillus thuringiensis H-14 or Bacillus sphaericus was used.Based on the experimental results of

bioassaying each of the three tested larvicides individually or in combina-tions, as well as on studying, their pathological action, itmay be assumed that, it is preferable to use these biological lflrviciden in integration with the chemical one in mosquitocontrol programmes particularly in larval control, instead of using each of them alone.