

The Insecticidal Effects of Nogos and Sumicidin Against Eggs and Larvae of The Mosquito *Culex pipiens* L. (Diptera: Culicidae)

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Abstract

The two insecticides Nogos and Sumicidin were tested for their activity against larvae and eggs of *Culex pipiens* under laboratory condition.

Third instar larvae were exposed for 24, 48 and 72. hrs to five concentrations each insecticide test: 0.0005, 0.005, 0.05, 0.5 and 1.0 ppm. The same concentrations were used to test the eggs hatching.

The results showed that Nogos was more effective than Sumicidin. This insecticide (Nogos) demonstrated larval mortalities (94%) after 24 hrs and (98%) after 72 hrs at 1.0 ppm while with Sumicidin, the larval mortalities were (53%) and (78%) after 24 hrs and 72 hrs respectively at the same concentration. The exposure of deposited eggs of *C. pipiens* to 0.0005- 1.0 ppm of both insecticides revealed no noticeable ovicidal effects with Sumicidin, but with Nogos the (% hatching) was 65.66 at 1.0 ppm.

Introduction

The Culicine mosquito is widely distributed anthropophilic species in Iraq. Although *C. pipiens* creates a vector or pest problem (1), no specific measures have been planned in Iraq to combat it. The use of insecticides to control mosquito larvae dates back to the late forties (2,3), until the late sixties DDT was used widely for killing Culicine mosquitoes. Apprehension that resistance might develop. Infrequently treated territories (4) and especially toxicological reasons led to the

rapid introduction of new insecticides. Recently, Chlorinated hydrocarbons were replaced in mosquito control program by pesticides of other chemical group, especially by certain Organophosphorous (O-P) insecticides. The O-P compounds selected are safer to humans and to the environment and can effectively replace the chlorinated hydrocarbon (5). The larvicides based on O-P chemicals have been used also for control of Aedes larvae (6,7). The Pyrethroids groups were used as mosquito larvicides (8,9,10).

Mosquito control in Iraq has concentrated mainly on residual sprays with chlorinated hydrocarbons, O-P and Carbamates against adults. Due to the development of resistance to DDT and malathion in Anopheline and Culicine mosquitoes in Iraq, several researches were done to select new chemicals for their control (11).

This study presents data on the larvicidal activity of Nogos (Dimethyl 2,2-dichlorovinyl phosphate) from Organophosphorous group and Sumicidin (20% EC)- the new safe Pyrethroids- on the larvae and eggs of *Culex pipiens* under laboratory conditions.

Materials and Methods

The mosquito Larvae used in this study were collected from small pond in the AL-Qadisiya University campus in Al-Diwaniya city. They Were reared until pupal stage , then placed in cubic 25 cm wire net cages to keep the emerged adults and collect the eggs . the rearing was conducted under controlled insectary environment (23±1cand40-50% R.H.).Emerged adults were first provided with cotton soaked with sugar solution, all emerged females then fed on pigeon blood by placing a pigeon on the top of the cage.bowls containing 300 ml of tapwater was placed in each cage for egg collection.

concentration of insecticides:

Stock suspension of 1%nogos and Sumicidin was prepared in distilled water prior to each experiment. Serial dilutions were prepared from this stock solution to obtain concentration of (0.0005, 0.005 , 0.05, 0.5 and 1.0 ppm)of both insecticides

Egg treatment:

The deposited egg rafts were placed (each raft) in disposable dishes (11 cm diameter and 3.5 cm deep containing different concentrations (above)of nogos and sumicidin in 200 ml of tapwater,each treatment was replicated 3 times. Each replicate contained one control which

received only distilled water. After 48 hrs, the number of eggs per raft and hatch percent were recorded.

Larval treatment:

For bioassay studies, 20 third instar larvae *Culex pipiens* laboratory colony were placed in 300 ml disposable containers containing 200 ml of tapwater. One percent of stock suspension was prepared 20 lmin. prior to each bioassay . aliquots (0.1-1.0 ml)of the required strength suspension were added to the treatment containers as needed. Each treatment was replicated 5 times , with one control in each replication , control dishes received only distilled water, larvae were exposed to nogos and sumicidin at 0.0005,0.005,0.05,0.5 and 1.0 ppm for 24 hrs.48 hrs the 72hrs. larvae were provided with rabbit chow as food source. The bioassay dishes were placed in glass-door cooled incubater throughout the experimental period at 28 ± 1 c,40-50%r.h. and 12:12 hrs day:night regime.

The number of dead larvae were counted and removed every day , the skim formation on the surface of rearing media were removed daily.the results were statistically analysed.

Results And Discussion

Ovicidal Activity of Insecticides:

The results of treating eggs of *C. pipiens* with 0.0005, 0.005,0.05,0.5, and 1.0 ppm of nogos show significant ovicidal effects at concentrations of 0.5 and 1.0 ppm fig. (1), egg hatch percents were 69.93 and 65.66 respectively compared with 98.44 in the control, whereas less effects were observed when same concentrations of sumicidin were used (85.93 and 80,70%egg hatch respectively). Fig. (1) shows no sever effect of sumicidin on the hatchability of eggs, and these results indicate that sumicidin may not be an effective ovicide at the concentrations tested and further studies are required in this line , while the nogos effect on egg hatchability was noticeable especially with 0.5-1.0 ppm concentrations.

Larvicidal Activity of Insecticides:

Fig. (2) shows the results of exposing 3rd instar larvae of *Culex pipiens* to 0.0005,0.005,0.05,0.5 and 1.0 ppm of nogos and sumicidin for 24 , 48,and 72 hrs. Larval mortality increased with the increased concentration , after 24 hrs of exposure to

0.0005,0.005,0.05,0.5 and 1.0 ppm of nogos and sumicidin , the highest % mortality of 3rd instar larvae was (94%)and (53%)respectively at 1.0 ppm concentration, and the lowest percent was (2%)and (5%) with 0.0005 pmm. These results indicating a concentration-dependent mortality for both used insecticides with high significance under the level of 0.01. studies revealed that o-p compounds such as Temephos ,chlorpyrifos , Bromophos and pirimiphos- methyl were toxic to 4th instar larvae of *Culex pipiens molestus* at concentrations of (0.002-0.1) ppm (7). Our study revealed that nogos possesses a high level of potency as larvicide against *C.pipiens* .sucha phenomenon was noticed in the 80% mortality of 3rd instar larvae after 48 hrs of nogos treatment with 0.5 ppm and the percentage reached 97 at concentration of 1.0 ppm,while with sumicidin (20%EC)which is one of the pyrethroid compounds gave less effect than nogos so as the mortality after 48 hrs exposure was 44% at concentration 0.5 ppm and 67% at concentration of 1.0 ppm Fig (2). Most of the synthetic pyrethroids were toxic to the larvae of *C. quinquefasciatus* Say at concentration of (0.00001-1.0)ppm (11).The Lc50-Lc90 of pyrethroids compounds against larvae of *C. quinquefasciatus* and *c.pipiens*,estimated in the laboratory were found (0.0019-1.165)ppm (8,9), this is almost similar to the toxicity reported by us Fig (2).Nelson and Surgeoner,(12) found that cypermethrin was more toxic to the 4th instar larvae of *Culex pipiens* at 14° c (Lc50 0.057 ppm) than at 27° c (lc50 0.175 ppm),this result is lower than Lc50 obtained by us at 27° c (0.05-0.5ppm) after 72 hrs treatment with nogos and sumicidin Fig (2), also the effect of nogos was higher than sumicidin effect because the pyrethroids compounds are considered safe when used in aquatic environment due to their tendencies to decompose in aqueous solutions (13):

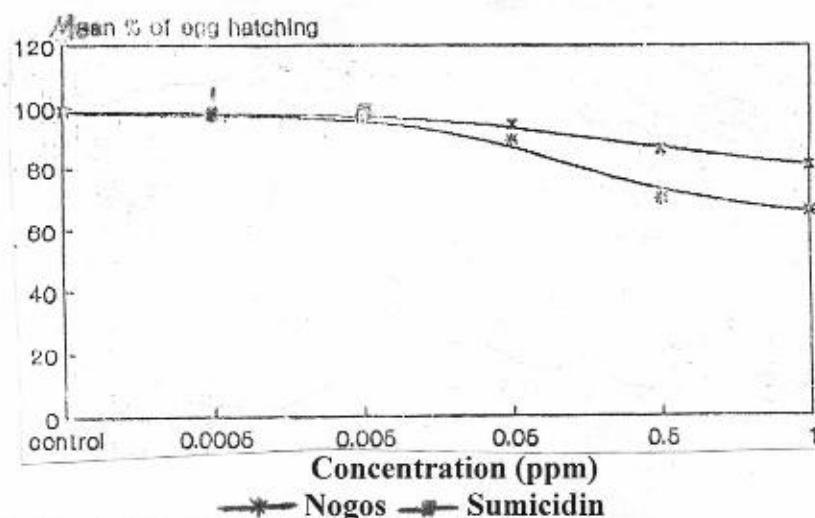
In conclusion, the results of the present study revealed that nogos showed significantly larvicidal and ovicidal activity against *C.pipiens* more than the sumicidin effects. Further laboratory studies are required to determine the mode of action and the o-p larvicides must be selected and applied with care not only for efficacy against the species of mosquito to be controlled but also in relation to non-target organisms in the aquatic environment.

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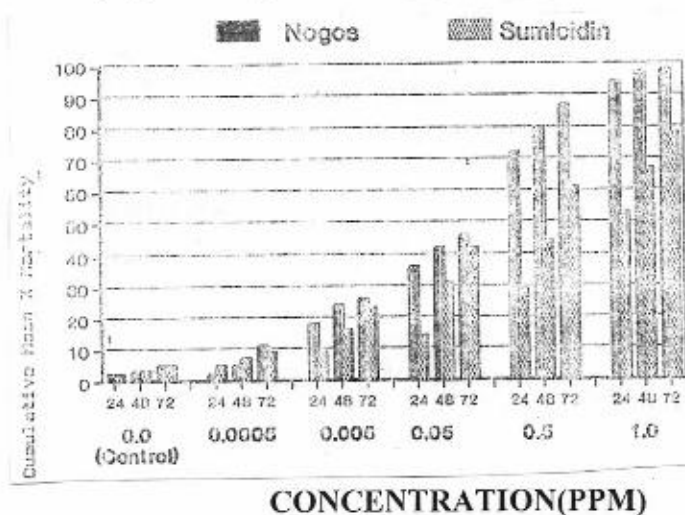
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L.S.D.(0.01)=18.56 for hatch.x con.(nogos)

L.S.D.(0.01)=4.83 for hatch.x con.(somicidin)

Fig.(1) Effects of different concentrations of nogos and somicidin on the (%)hatching of *Culex pipiens* eggs.



L.S.D, (0.01)=8.18 for conc . (nogos)

L.S.D. (0.01)=25.37 for conc (somicidin)

L.S.D.(0.01)=3.56 for time (nogos and somicidin)

Fig. (2) Cumulative effects of nogos and somicidin at various concentrations on 3rd instar larvae of *Culex pipiens* after 24,48 and 72 hrs of exposure.

التأثير الحشري السام لمبيدي النوكوز والسوميسيدين ضد بيوض ويرقات بعوضة الكيولكس بيبينس

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الخلاصة

تم اختبار نوعين من المبيدات الحشرية (النوكوز والسوميسيدين) حول فعاليتيهما ضد بيوض ويرقات بعوضة الكيولكس بيبينس تحت الظروف المختبرية، حيث عرضت يرقات العمر الثالث من البعوض الى خمسة تراكيز مختلفة (0,0005، 0,005، 0,05 و 1 جزء من المليون) من كلا المبيدين ولمدة 24، 48 و 72 ساعة. وقد استخدمت نفس التراكيز اعلاه لاختبار فقس البيوض.

اظهرت النتائج بأن تأثير النوكوز كان اعلى من تأثير السوميسيدين حيث احدث احدث مبيد النوكوز نسبة قتل لليرقات (94%) بعد مرور 24 ساعة و (98%) بعد 72 ساعة من التعريض عند تركيز 1 جزء من المليون، بينما كانت النسبة المئوية لقتل اليرقات التي احدثها مبيد السوميسيدين 53% و 78% بعد 24 ساعة و 72 ساعة على التوالي وعند نفس التركيز. اما لدى تعريض بيوض بعوضة الكيولكس بيبينس (الموضوعة حديثا) الى التراكيز من (0,0005 الى 1 جزء من المليون) من كلا المبيدين فإن السوميسيدين لم يظهر تأثيرا فعالا على النسبة المئوية للفقس في حين ان مبيد النوكوز كان له تأثير واضحا على النسبة المئوية لفقس البيوض حيث بلغت 65,66% عند تركيز 1 جزء من المليون.