Studies on Insecticidal Activity of Some Hydroxytriazene Derivatives

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Abstract: Nine hydroxytriazenes have been synthesized and screened for their insecticidal activity against one day old *Drosophila melanogaster* Meig (Fruit fly). Out of all the nine compounds screened, 3-hydroxy-3-*n*-propyl-1-*m*-chlorophenyltriazene is the most active having LC₅₀ values 0.9847 ppm. The least active compound is 3-hydroxy -3-*n*-propyl-1-*p*-methylphenyltriazene, whose values are 16.52 ppm. In general, the LC₅₀ values range from 3.92 to 5.52 ppm.

Keywords: Hydroxytriazenes, Insecticidal activity, *Drosophila melanogaster* Meig.

Introduction

Hdroxytriazenes have been extensively used as analytical reagents¹⁻². Recently, they have also been screened for their biological activity including insecticidal activity in our laboratories³⁻⁸. In the present investigation, nine hydroxytriazenes have been synthesized and screened for their insecticidal activity against one day old males of fruit fly (*Drosophila melanogaster* Meig).

Experimental

Synthesis of hydroxytriazenes

All the nine hydroxytriazenes have been synthesized by the method as reported in the literature⁹⁻¹⁴. The method involves preparation of aryl or alkyl hydroxylamine, aryldiazonium salts and coupling them at the temperature between 0-5°C. The compounds so prepared were crystallized and their compositions were verified by elemental analysis, melting point determinations and I.R. studies.

Details of culture

In wide mouth bottles at a temperature of 27±1 °C *Drosophila melanogaster* Meig were reared on the agar medium described by Lewis¹⁵. For preparing the medium, maize flour

(150 g), jaggery (130 g), agar-agar (20 g), yeast (22 g), distilled water (1500 mL) and propionic acid (1 mL) were mixed and heated for 10 to 15 min. The flasks were allowed to cool. In each flask about 10-20 insects of *D. melanogaster* were released and it was covered immediately by muslin cloth. The newly emerged one day old male flies were used for investigation.

Toxicity studies

Micro bioassay was done using one day old male *Drosophila melanogaster* Meig by residue film method¹⁶.

Preparation of stock solution

A stock solution of 1000 ppm of each hydroxytriazenes was prepared in ethanol and acetone. Solutions of lower concentration were prepared by proper dilution of stock solution with the solvent.

Procedure

Residue film of one mL of the solution of each hydroxytriazene was prepared on Petri dish (10 cm diameter) by spreading 0.5 mL of the solution on each of the two parts of the Petri dish. The solution in both the parts of Petri dish was swirled gently in order to coat the entire surface. Thereafter, 20 one day old male insects were released in Petri dish and exposed for 24 h. The insects were anaesthetized by keeping them in deep freeze for about three minutes in order to make them inactive for about one minute. Each such treatment was replicated thrice. To record the natural mortality a control in three replication was also run by side. The mortality was taken after 24 h moribund insects were also counted as dead.

Results and Discussion

For the estimation of LC₅₀ values a method of probit analysis has been applied which involves changing of observed percent mortality to corrected percent mortality. For sake of brevity all the table and data of regression equation have not been incorporated. The concentration range used for test compound was 100 ppm and 500 ppm depending up on the response in individual concentration. Table 1 show LC₅₀ values and relative toxicity of hydroxytriazenes against one day old male *D. melanogaster* Meig

Table 1. LC₅₀ values and relative toxicity of hydroxytriazenes against *D. melanogaster* Meig.

S.No.	Name	LC ₅₀ for HT* ppm
1	3-Hydroxy-3- <i>m</i> -sulphonato(sodium salt)phenyl-1- <i>o</i> -nitrophenyltriazene	5.52
2	3-Hydroxy-3-phenyl-1- <i>o</i> -chlorophenyltriazene	14.09
3	3-Hydroxy-3- <i>p</i> -tolyl-1- <i>p</i> -sulphonato(sodium salt)phenyltriazene	3.92
4	3-Hydroxy-3- <i>n</i> -propyl-1- <i>m</i> -chlorophenyltriazene	0.98
5	3-Hydroxy-3- <i>n</i> -propyl-1- <i>p</i> -methylphenyltriazene	16.52
6	3- Hydroxy-3- <i>m</i> -sulphonato(sodium salt)-1- <i>o</i> -chlorophenyltriazene	13.46
7	3- Hydroxy-3-ethyl-1-(4- sulphonamidophenyl)triazene	15.77
8	3- Hydroxy-3-methyl-1- <i>m</i> -nitrophenyltriazene	4.13
9	3- Hydroxy-3- <i>p</i> -tolyl-1- <i>p</i> -nitrophenyltriazene	15.70

*Hydroxytriazenes

Perusal of Table 1 reveals that out of the nine compound screened, compound number 4 is the most active compound and its LC₅₀ value is 0.98 ppm whereas compound number 5 is

the least active having value 16.52 ppm. Most of the other compounds have LC₅₀ values in the range of 3.92 to 15.77 ppm, which is fairly good and indicates possibility of studying these compounds further.

In the residual film method the probable mechanism of action of hydroxytriazenes might be as contact poison. Slight activity may be due to vaporization of the compounds in the closed Petri dish.

The contact poison either directly penetrates through body integument or may cause oxidation suffocating the insects. Thus it is certain that hydroxytriazene can be useful as insecticidal compounds if explored further.

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