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TOXIC CHROMOSOMAL AND GENETIC EFFECTS ON DROSOPHILA  
MELANOGASTER OF SOME PESTICIDAL FORMULATIONS  
COMMONLY USED IN SRI LANKA.

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## A B S T R A C T

### TOXIC, CHROMOSOMAL AND MUTAGENIC EFFECTS ON DROSOPHILA MELANOGASTER OF SOME PESTICIDAL FORMULATIONS COMMONLY USED IN SRI LANKA.

1. Nineteen pesticides, namely, Aldrin 25, Antimucin (organo mercurial - compound), Azodrin 60 (Monocrotophos), Deenol 25 (DDT), Dipterex 50 (Trichlorphon), Endrin 20, Fenbar 50 (Sumithion), Folidol (Parathion), Gamalin 20 (BHC), Gramaxone (Paraquat), Heptachlor 23, Intox 8 (Chlordane), Lebaycid 100 (Fenthion), Malathion 50, MCPA 20, Metasystox (Methyl-demeton), Nicotox 20 (Nicotine), Rogor 40 (Dimethoate), and Stam 34 (Propanil) were screened for sex-linked lethal mutations, visible mutations with the specific locus method and crossing over in the male using Drosophila melanogaster as the test organism.
2. The method of treatment used was to feed first-instar larvae on food media to which known concentrations of the pesticidal formulations had been added and then testing the adult males for the above genetic effects.
3. In order to find out the concentrations of the respective pesticides that had to be given to the larvae so as to obtain sufficient number of adult flies for these genetic tests, preliminary concentration-mortality studies had to be conducted. In these studies food media containing various concentrations of each pesticide were tested on first-instar larvae of Oregon a (wild type) D. melanogaster and the percentage emergence of adults recorded.
4. The concentration-mortality studies showed that Folidol, Dipterex, Intox, Aldrin, Heptachlor, Rogor, Malathion and Lebaycid were extremely toxic to larvae even at such low concentrations as 0.8 ppm.
5. The concentration mortality curves for the other pesticides showed that Deenol (DDT), Gamalin (BHC), Endrin, Metasystox (Methyl-demeton), Fenbar (Sumithion) and Antimucin (organo mercurial compound) had a somewhat linear relationship between concentration and mortality.

6. The pesticides Gramaxone, Stam 34, MCPA and Nicotox which below a certain threshold value showed low mortality for a fairly wide range of the concentrations but toxicity increased rapidly above this threshold value.
7. From the above data approximate  $LC_{50}$  values were calculated and these concentrations, approximated further for practical purposes, were used in the subsequent genetic tests.
8. The following pesticides, namely, Endrin, Gamalin, Deenol, Azodrin, Fenbar, Lebaycid, Rogor, Metasystox, Nicotox, MCPA, Stam 34, Gramaxone and Antimucin were tested for sex-linked lethal mutations using the Muller 5 technique and scoring approximately 250 - 500 X chromosomes per test. No detectable sex-linked lethal frequency above that of the spontaneous rate were observed for any of the pesticides, except with two pesticides (Azodrin and Nicotox) which in one experiment each showed frequencies above 2% when the spontaneous sex-linked lethal rate was 0.55% in two tests and is known to be about 0.3%. This would indicate a low induced frequency of mutations although, due to the small numbers which were scored valid statistical conclusions could not be drawn. These results agree with those of Benes and Sram (1969) who injected tolerable doses of sixteen pesticides into *Drosophila* adults and failed to detect any increases in the sex-linked lethal mutation frequency over the spontaneous rate.
9. The specific locus test with the "rucuca" stock did not induce any visible mutations in approximately 5000 to 8000 flies were scored in each experiment. Scoring 5000 to 8000 flies using the "rucuca" stock which has eight markers would mean that, assuming a visible mutation rate of  $2 \times 10^{-5}$  in *Drosophila*, only anything above a five-fold increase in mutation frequency could be detected.  
A control experiment using EMS (0.075%) gave  $B e^5$  (ebony sooty) mutations out of 2582 flies that were counted.
10. Adult males heterozygous for gpbcbw (dumpy, black, cinnabar and brown) showed cross-over flies in the progeny of their 1st three day brood when their first instar larvae had been treated with the following pesticides : MCPA, Stam, Gramaxone, Antimucin, Nicotox, Deenol, Endrin, Gamalin, Azodrin and Fenbar.

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