THE PARALLEL RESPONSE OF ENZYME LOCI IN DROSOPHILA AND YEAST TO THE ENVIRONMENTAL STRESSES OF POLLUTANTS

BY

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ABSTRACT

The possible mutagenicity of the two pesticides, nudrin and meothrin were evaluated using two living systems: ***Drosophila melanogaster*** and ***Saccharomyces cerevisiae***. The results indicate that, the two pesticides showed a mutagenic effect on the genetic background of each of cholinesterase (ChE) and aliesterase (AliE) in Drosophila and yeast. Meanwhile, nudrin and meothrin induced gene conversion, reversion and mitotic crossing over in ***S. cerevisiae*** strain D7.

The results obtained in the present study indicate that the two pesticides proved to be mutagenic in two eukaryotic systems; Drosophila and yeast.

Key words: Mutagenic activity, pesticides, Enzymes, Drosophila, Yeast.

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Contents

page

List of Tables

List of Figures

Introduction

INTRODUCTION

One of the most important trends of mutation research in recent years is to study the mutagenic effects of chemical compounds in different organisms. The wide use and sometimes abuse of pesticides nowadays should be considered in this respect. Several reports indicate that many chemical pollutants which are widely spread in the environment, such as pesticides and drugs, are mutagenic in various test systems (Tripathi, *et al.*, 1988., Salam *et al.*, 1993). In spite of that, pesticides are still widely used and many new forms are annually produced. This can be attributed to the fact that the application of pesticides is still the most effective tool in pest control programs. Subsequently, pesticides are considered on of the important (components) of modern agriculture. Although mammalian species are the most favourable organisms for testing the mutagenicity of pesticides due to their resemblance to human, a wide spectrum of other living systems is still employed in such tests for the facility in handling them. Many laboratories working on the problem of environmental pollutants consider that ***Drosophila melanogaster*** and ***Saccharomyces cerevisiae*** are suitable eukaryotic organisms for testing the mutagenicity of such pollutants. ***Drosophila melanogaster*** has been used to test the mutagenicity by several workers. Sex-linked recessive lethals test in Drosophila provides one of the quickest point mutation tests in eukaryotes. Mean while, the structural gene (s) coding for cholinesterase enzyme (ChE) proved to be highly linked to the genetic background of some pesticides resistance (Tobgy, *et* *al*., 1976 and Salam and Pinsker 1981). Furthermore, the isozyme polymorphism which was mainly studied by applications of starch gel electrophoresis technique (Ayala, *et al*., 1972) proved to be a good tool for countering the mutagenic potentiality of such pollutants. The induction of mitotic gene conversions, revertants and mitotic crossing over in the diploid yeast ***S. cerevisiae*** are strongly correlated with mutagenic effects, and these tests reacts very sensitively with compounds which induce base-pair substitutions as well as frame-shift mutations. This system has revealed the genetic activity of a large number of carcinogens, pesticides and many other chemical mutagens (Siebert and Elsenbrand, 1974).

The aim of the present investigation is to study the potential genetic effects of two pesticides representing two different chemical groups, carbamates and pyrethroids, the carbamate group is represented by nudrin and the pyrethroids group is presented by meothrin, using various methods in the two organisms, i.e., ***D. melanogaster*** and ***S. cerevisiae***

These methods are:

- Sex-linked recessive lethals (SLRL) test.
- Effect of pesticides on enzyme activities using spectrophotometric analysis.

- The potentiality of the two pesticides as mutagens on eleven enzyme loci. These enzymes are Est, Adh, Acph, Ao. Aph, Odh, 6-pgd, α-Gpdh, Mdh, Me and Pgm.

- The induction of mitotic gene conversion, reverse mutation and mitotic crossing over in ***S. cerevisiae*** strain D7.

- The induction of total protein variation in ***S. cerevisiae*** strain D7.

- Effect on enzyme activities in yeast using spectrophotometric analysis.

Review of Literature