Research Article

Analysis on the mutagenicity of insecticide quinalphos and dimethoate

Steni Jose, A. Manikandan*, P. B. Ramesh Babu, T. Jayalakshmi

ABSTRACT

Introduction: Mutagenesis is proved to analysis the organism changes and its effect on characteristics and products**.** The Ames test can identify mutagens that work specifically to modify DNA. In people, in any case, numerous synthetic concoctions are promutagens, specialists that must be actuated to end up evident mutagens. Initiation, including a synthetic alteration, frequently happens in the liver as a result of ordinary liver movement on bizarre substances. **Materials and Methods:** In this research, Ames test is for determining chemical nature having properties to cause mutation. The organism is highly sensitive to histidine and many chemicals which can explore different pesticides. **Results and Discussion:** It is a simple, reasonable, and helpful starting screen for mutagens. The main chemicals used in the pesticides are quinalphos and dimethoate, respectively. **Conclusion:** From research work, I concluded that these two are strong mutagens. They have high carcinogenic activity.

KEY WORDS: Ames test, Carcinogen, Mutagenicity, Quinalphos and dimethoate, *Salmonella typhimurium*

INTRODUCTION

DNA breakage is an unusual modification in the structure of DNA that cannot, itself, be reproduced when DNA repeats. Two-fold strand breaks in DNA might be fixed by a mistaken fix process, non-homologous end joining, which produces changes.[2] The concoction utilized is synthetic concoctions are quinalphos and dimethoate. Quinalphos is an organothiophosphate compound predominantly utilized as a pesticide. Dimethoate is a generally utilized organophosphate bug spray used to execute creepy crawlies on contact.[1]

The Ames test can identify mutagens that work specifically to modify DNA. In people, in any case, numerous synthetic concoctions are promutagens, specialists that must be actuated to end up evident mutagens. Initiation, including a synthetic alteration, frequently happens in the liver as a result of ordinary liver movement on bizarre substances. Microbes, for example, *Salmonella typhimurium* do not create the proteins required to enact promutagens, so promutagens would not be identified by the Ames test except if they were first actuated. An imperative piece of the Ames test additionally includes blending the test compound with proteins from rat liver that converts expert mutagens into dynamic mutagens.[3]

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MATERIALS AND METHODS

Microbial Strains

Escherichia coli – 14 microbial species were dissected. The bacteria (numbered from 1 to 3) were taken from global accumulations and are delicate to the anti-infection agents recorded beneath.

- *Staphylococcus aureus*
- *S. typhimurium*
- *Pseudomonas aeruginosa*, thus selected *S. typhimurium*.

Culture Media and Antibiotics

Nutrient agar and Mueller-Hinton agar were used. Antibiotic solutions were prepared before incorporation into the liquid medium. Pour plate and streak plate method are used to prepare agar plates. Obtain an agar plate and streak it with the appropriate bacterial culture using the quadrant streak plate method. This will result in the isolation of individual colonies

Procedure

Ultraviolet (UV) mutagenesis test

For this, I had used four Petri plates having *S. typhimurium* culture. By careful technique, I exposed the Petri plates 1, 2, and 3 to UV radiation

Department of Genetic Engineering, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India

***Corresponding author:** A. Manikandan, Assistant Professor, Department of Genetic Engineering, BIHER, Chennai-73. E-mail ID: manikandana188@gmail.com

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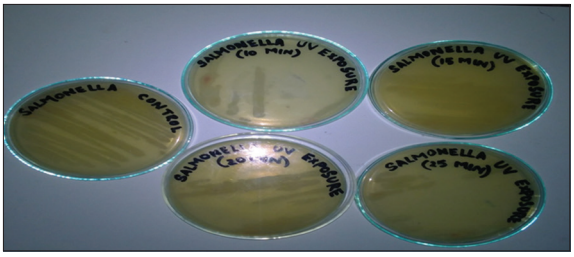

Figure 1: Ultraviolet mutagenesis of *Salmonella typhimurium*

Figure 2: Mutagenesis test

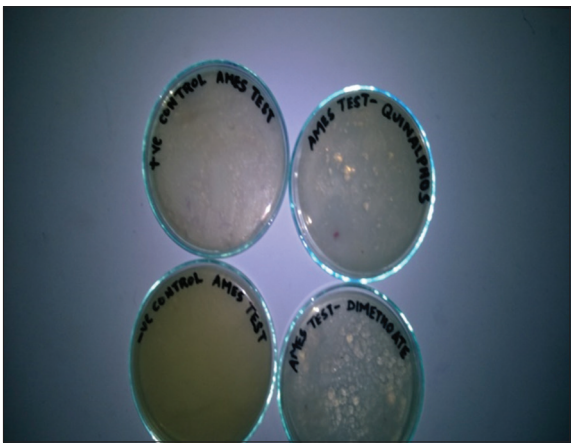

Figure 3: Ames test

for 15 min, 20 min, and 25 min, respectively. Culture should be well maintained without any contamination. Moreover, then, the UV exposed culture should be placed in incubator for 37 h.[7] Colonies will be formed in the plates of bacteria's and the main step of studying of colonies should be done.

Ames test basic procedures

Inoculating top agar with S. typhimurium

Working with the best agar, it is fundamental that total every one of your exchanges rapidly. Quickly fire the lip of the cylinder and gradually include the 100 µL of medium-term culture arrangement. Fire the lip again and supplant the top. Quickly (3–5 s) vortex the test container of the best agar and microscopic organisms. Tenderly pour the best agar onto a marked negligible glucose agar plate.

Ames test

The *Salmonella* histidine point change examines of Maron and Ames was utilized to test hostile to mutagenic movement of the concentrates with certain adjustments as depicted by Kaur *et al*.[8] A blend of test plant concentrate and mutagen each have a volume of 0.1 ml of various fixations was prehatched at 37°C for 30 min before expansion to bacterial culture. 0.1 ml of mutagen and 0.1 ml of plant separate pursued by the expansion of 2.5 ml of best agar at 45°C enhanced with 0.5 mM histidine-biotin.[8] The plates were hatched at 37°C for 48 h, after which number of histidine-independent revertant provinces were scored. Inhibitory movement was communicated as rate abatement of turn around transformation.

Percent inhibition = [(A–B)/(A–C)]×100

A = number of histidine revertants induced by mutagens
B = number of histidine revertants induced by mutagens in the presence of plant extract
C = number of revertants induced in negative control.

RESULTS

The chemicals, quinalphos and dimethoate, were subjected to Ames test activities and the result was got as the chemicals, quinalphos and dimethoate, are mutagenic in nature and it is represented in Figures 1-3.

Effect of *S. typhimurium*

- In its normal growth in incubator for 24–48 h
- In exposure to UV for 10 min
- In exposure to UV for 15 min
- In exposure to UV for 20 min
- In exposure to UV for 25 min

and compared this with mutagenesis test.

Compare the growth of the selected bacteria, *S. typhimurium* in Mueller-Hinton agar with the presence of the chemicals, quinalphos and dimethoate, in mutagenesis test with the growth in UV mutagenesis test. We all know that ultraviolet rays are highly mutagenic in nature.[13]

From this analysis, we found that these chemicals, quinalphos and dimethoate, possess a mutagenic effect on the bacteria, *S. typhimurium* as seen in the effect of UV on the bacteria. For confirmation, we were done the Ames test (carcinogenic test).

Ames test gives information about the confirmation of our project that these chemicals, quinalphos and dimethoate, are mutagenic in nature.

DISCUSSION

Pesticides establish a heterogeneous classification of synthetic substances to control plant infections.[11] Pesticides mainly involved in chromosomal aberrations and cause cell death.[22] Organic compound is non-hazardous than pesticides and it can rectify problems

caused by infectious agents.[15] Cytogenetic studies have revealed the cell growth and development of various cells inside and outside chromosomes.[24] Cell damage can be prevented using natural products which has been derived from agricultural farms.[17] Clashing outcomes from cytogenetic examinations mirror the heterogeneity of the gatherings considered as to synthetic substances utilized and presentation conditions. Hereditary harm related with pesticides happens in human populaces subject to high introduction levels due to escalated use, abuse, or disappointment of control measures.[18] Most of concentrates on cytogenetic biomarkers in pesticide-uncovered specialists have demonstrated some portion subordinate impacts, with expanding term or power of introduction.[14] Chromosomal harm actuated by pesticides seems to have been transient in intense or broken introduction, yet aggregate in constant presentation to complex agrochemical blends.

CONCLUSION

Hereditary harm related with pesticides happens in human populaces subject to high introduction levels because of escalated use, abuse or disappointment of control measures. Most of concentrates on cytogenetic biomarkers in pesticide-uncovered specialists have demonstrated some portion subordinate impacts, with expanding term or power of introduction. Chromosomal harm actuated by pesticides seems to have been transient in intense or broken introduction, yet aggregate in constant presentation to complex agrochemical blends.

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