



EFFECT OF STREPTOMYCIN ON MITOTIC INDEX AND CELL DIVISION IN *ALLIUM SATIVUM L.*

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ABSTRACT:

Onion is one of the Indian cash crop, grown in maximum parts of India. It is used in spices and condiment. Streptomycin is an antibiotic (anti-mycobacterial) drug which is also used as pesticide to control bacteria, fungi and algae. In this investigation effect of different concentration of streptomycin (0.5, 1, 1.5, 2%) at different time interval on onion root meristem cells shows certain abnormalities at room temperature were done. The onion root meristems were not treated showed normal cell division. The value of cell division decreases as there is increase in concentration and time duration in streptomycin solution as well as rate of cell division most least at 2% concentration treated for 6hour duration. Above result revealed that streptomycin is cytotoxic to plant cell and bring mutation even decreases rate of cell division.

Key words: - *streptomycin, Allium sativum, garlic*

INTRODUCTION:

Onion is a biennial crop which grows globally but India rank second in production of Garlic. It is used in spices and condiment. Onion having pungent smell and taste. Streptomycin is an antibiotic (anti-mycobacterial) drug which is also used as pesticide to control bacteria, fungi and algae. In this investigation effect of different concentration of streptomycin (0.5, 1, 1.5, 2%) at different time interval on onion root meristem cells shows certain abnormalities at room temperature were done. The onion root meristems were not treated showed normal cell division. That can be untreated, control root meristems of garlic, exhibited a mitotic index of 70.39% (Table-1). Similarly the Streptomycin treated onion meristem showed certain abnormalities in cell division such as laggard metaphase, laggard telophase. sticky metaphase, disturbed and multipoler anaphase. While streptomycin treated roots of *Allium cepa* at 0.5%, showed 37.67%, 25.11% and 15.25%

mitotic index, while it is 30.66%, 23.03, 14% for 1% streptomycin concentration. Similarly for 1.5% concentration the value of mitotic indices obtained as 28% 17.23%, 12.05% and finally for 2% concentration of streptomycin were 22.95%, 16.25%, and 5.31% for 2,4, and 6hrs time duration. The value of cell division decreases as there is increase in concentration and time duration in streptomycin solution as well as rate of cell division most least at 2% concentration treated for 6hour duration. Above result revealed that streptomycin is cytotoxic to plant cell and bring mutation even decreases rate of cell division.

MATERIAL AND METHOD:

The healthy, dry mature onion bulbs of Pune Fursungi variety were selected as an experimental plant material. Those bulbs were washed out under running tap water to remove debris and adhering soil particles. Cloves were separated then plantation was done at 1cm in a tray containing fine soil particles. Adventitious root were grown within 4-5 days. The roots of

1cm long get selected, again gently washed. These cloves were then transfer to the beaker containing Streptomycin solution of 4 different concentration as 0.5%,1%,1.5%,and 2% for different time interval accordingly 2,4 and 6 hours at room temperature. Then cloves were washed and fixed in freshly prepared Carnoys fixative. Untreated roots serves as control were also fixed. It was used as plant material for squash preparation and acetocarmine stain is used for staining purpose, whole process is carried out accordingly standard protocol Sharma *et.al* (2007). Then slide were prepared and observed under a tri-nocular research microscope for satisfactory staining of metaphase chromosomes and significant stages were photographed, mitotic index was determined.

Determination of Mitotic Index:

Mitotic index was calculated from the Aceto-carmine stained squash preparations of control and streptomycin treated onion root meristematic cells, separately using the following formula.

$$\text{Mitotic Index} = \frac{\text{Number of cells in mitotic division}}{\text{Total number of cells}} \times 100$$

RESULTS AND DISCUSSION:

Effect of different concentration of streptomycin (0.5, 1, 1.5, 2%) at different time interval on onion root meristem cells shows certain abnormalities at room temperature. The garlic root meristems were not treated showed normal cell division. That can be untreated, control root meristems of garlic, exhibited a mitotic index of 71.39% (Table-1). Similarly, the streptomycin treated onion meristem showed certain abnormalities in cell division such as laggard metaphase, laggard telophase, sticky metaphase, disturbed and multipoler anaphase. While streptomycin treated roots of *Allium cepa* at 0.5%, showed 37.67%, 25.11% and 15.25%

mitotic index, while it is 32.30%, 24.1, 16% for 1% streptomycin concentration. Similarly for 1.5% concentration the value of mitotic indices obtained as 29.50% 18.23%, 13.24% and finally for 2% concentration of streptomycin were 21.9%, 16.00%, and 6.30% for 2,4, and 6hrs time duration. The value of cell division decreases as there is increase in concentration and time duration in streptomycin solution as well as rate of cell division most least at 2% concentration treated for 6hour duration. Above result revealed that streptomycin is cytotoxic to plant cell and bring mutation even decreases rate of cell division. The reduction in mitotic activity was clearly dose dependent. Mitotic index value was progressively decreased with the increase of streptomycin concentration.

DISCUSSION:

It was found increased in concentrations; the percent abnormality also increased. The worker like Kumar U, Sinha S. (1991) reported two pesticides (Rogor and Bavistin) and an Antibiotic (Streptomycin) in meiotic cells of Grasspea *Lathyrus sativus* L. According to Praticia and McManus (2006) reported effect streptomycin in disease management. Sharma D. *et.al* (2007). Showed mutational analysis of S12 protein and implications for the accuracy of decoding by the ribosome. Similarly Liu D. *et.al* (2009) revealed that cytogenetical and ultrastructural effect of copper on root meristem cells of *Allium sativum* L. Due to the action of streptomycin genotoxicity induces in root apices cell, i.e. it is found toxic and antimitotic to plant. Very rare work has been carried out regarding this approach, it requires further investigation.

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Table 1. Different concentration of streptomycin

| Concentrations of Streptomycin (%) | 2 Hours | 4 Hours | 6 Hours |
|---|----------------|----------------|----------------|
| Control | 71.40 | 71.40 | 71.40 |
| 0.5 | 37.67 | 25.11 | 15.25 |
| 1 | 32.30 | 24.1 | 16 |
| 1.5 | 29.50 | 18.23 | 13.24 |
| 2 | 21.9 | 16.00 | 6.30 |