



## CYTOLOGICAL IMPACT OF COPPER STRESS ON THE ROOT OF *ALLIUM CEPA* (L.)

NAINA SRIVASTAVA<sup>1</sup> and ARCHANA SRIVASTAVA<sup>2</sup>

<sup>1</sup>Dept. of Botany, D.A.V. College, Dehradun

<sup>2</sup>Dept. of Botany, D. G. College, Kanpur

\* Corresponding Author's Email: [drnainasrivasta@gmail.com](mailto:drnainasrivasta@gmail.com)

Cytotoxic effect of heavy metal and copper were found as chromosomal abnormalities like stickiness, laggards, fragments and micronuclei. There is a linear correlation between concentration of copper and mitotic index. Chromosomal aberration is also increase with increasing concentration of copper. Copper sulphate showed direct effect on mitotic division. The abnormalities are micronuclei, stickiness, fragmentation etc. In present experiment we have studied about mitodepressive changes due to different concentration of copper. Copper sulfate showed potential impact on cell division. Chromosomal stickiness was commonly observed. Total aberration percentage was totally related with concentration of copper sulphate. There is remarkable decrease in mitotic index while increasing concentration of copper sulphate. Normal Aberration like stickiness, fragments micronuclei, laggards were observed.

Key words: Chromosome aberration, Copper sulfate, Cytotoxicity

### Introduction

The influence of cadmium, mercury other chemical concentrations on somatic cells as well as gametic cells of soyabean, is investigated where pronounced effect of heavy metals is seen on plant development is growth inhibition, which is connected inseparably with cell division. It seems that the scientific community at the international level also recognizes the value of these systems. Eleven countries participated in validation project using four major Plant bioassays i.e. *Allium* root chromosome aberration, *Arabidopsis* embryo mutation, *Allium* cell mutation and micronucleus tests. Antioxidant and antimicrobial activity of ethanol and water extracts of leaves Allelopathic effects of aqueous extract of *Argemone mexicana* L. on germination and growth of seeds. In particular *Allium* root, micronucleus bioassay was selected as one

of the assays for this IPCS collaborative study owing to its recognized potential monitoring capabilities, as well as its broad data base. *Allium* micronucleus assay has been used in the monitoring of air waste water contaminated soil insecticide and drinking water as well as with the testing of many mutagens or carcinogens. Cytotoxic effects of pesticides in somatic cells of *Allium cepa* L. and noted the inhibition of cell division and chromosomal aberration Evaluation of a possible contamination of the waters of River Basin with the mutagenicity tests using *Allium cepa* Inhibitory activities of plants were observed. *Allium* mutation assay is adapted for the detection of mutagenic airborne agents volatile organic compounds and still later for the evaluation of chemical agents in liquid form. Chromosome aberration and micronucleus frequencies in *Allium cepa*

cells exposed to petroleum polluted water is very common.

### Material and Methods

The bulb of *Allium cepa* were treated with different concentration of copper sulphate solution 0.1 %, 0.2%, 0.3%, 0.4% and 0.5%. The treated *Allium cepa* bulbs were dipped and after three hours paradichlorbenzene was used at 10° c for four hours. Then material was fixed with 1: 3 acetoalcohol solution. Squash technique was used and for staining acetocarmine is used and observation and calculation of mitotic index was done. Present observations are based on mitostatic and mutagenic effect of some chemicals like copper sulfate.

Mitotic index = No. of dividing cells / No. of dividing cells + No. of interphase cells. X100

The mitotic inhibition = (mitotic index in control - mitotic index in treated cells) X 100 / mitotic index in control.

Chromosome abnormalities were scored in the pro-metaphase and anaphase stages.

Copper sulfate concentration	Mitotic index	Normal prophase % aberration	Normal ab Metaphase % aberration	Normal Ana-telophase % aberration
control	22	0.00	0.0	0.00
0.1 %	20	4.58	3.87	2.38
0.2%	18	6.45	4.5	3.8
0.3%	17	9.67	8.98	8.57
0.4%	13	12.0	9.67	13.0
0.5%	12	14.7	12.56	14.21

Table : Effect of different concentration of copper sulfate on root cell of *Allium cepa*

### Results and Discussion

In Metaphase Some chemicals show genotoxic effect and their evaluation gives valuable information about aberration. Same observation was found in Carbofuran induced cytogenetic effects in root meristem cells of *Allium cepa* and *Allium sativum* which was spectroscopic approach for chromosome damage<sup>1</sup>. Late separation due to disturbance in cytochemical changes, doubling of chromosomes and c mitosis. Non separation causes bridges and acentric

fragments are found due to late anaphase movement. Retardation and early effected interphase cause lowering in mitotic index and in the correlation with same finding in *Vicia faba*<sup>2</sup>. Abnormalities and chemical concentration have exponential relationship. Chemical solution in increasing concentrations creates significant decrease<sup>3</sup> in mitotic division. In comparison to control concentration and time of treatment duration causes mitodepressive effect. *Allium cepa* root meristem acts as bioassay to observe aberration percentage. Sometime recovery of treated root by normal water. The mitotic index is observed by Mousa (1982). In lower concentration the abnormalities start like stickiness, chromosome clumping. After increasing concentration abnormal extruded chromosomes show abnormal polarity. Polarity abolition was very distinct in copper sulphate treatment<sup>4</sup>. Other chemicals also create abnormal scattering of chromosomes. Same observation of cytotoxicity was observed<sup>5</sup>. Heavy metal, copper stress, mutagenic chemicals food additives effected and it was also observed by mutagenic and mitoderessive<sup>6,7</sup>. So the mitotoxic potentiality which is proved due to all concentration of copper sulphate on *Allium cepa* is exponentially related with increasing abnormality.

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