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Effect of Colchicine on Metabolic Activities of Plants

Dr. Sadia Fatima
Asst. Professor, Department of Botany, Anwarul Uloom College , New Mallepally, Hyderabad.

Abstract: ***Colchicine is an alkaloid extracted from Colchicum autumnale a plant, belonging to Liliaceae. Colchicine has antagonistic effect on cell division and this chemical directly acts on Tubulin proteins, present in Microtubules, thereby de-activating spindle formation and inhibits cell division. There is no segregation of chromosomes and they get highly condensed and the bulk volume of nucleus and cell size increases with the induction of polyploidy. Colchyploidy is tolerated in plant cells and it is fatal to animal cells. The present research work had been undertaken to study and estimate the cells showing induction of colchiploidy. The purpose of research is to estimate whether the extent of colchiploidy is more in underground stems. Colchicine treatrnents were given to the roots and stems at various concentrations of 0.01, 0.03 and 0.05 % . for about 4 hours.***

Keywords: Alkaloid , antagonistic effect, Tubulin ,condensed, Colchiploidy.

I. INTRODUCTION

The ability of this chemical to induce polyploids in crop species depend on the chemical concentration and duration of exposure . Colchicine binds to tubulin and prevents the polymerisation and formation of microtubules. As microtubules play major roles in basic functions of cell including protein assembly, mitosis, endocytosis, exocytosis, cell shape and motility, colchicine is toxic to all cell lines of the body.

II. METHODOLOGY

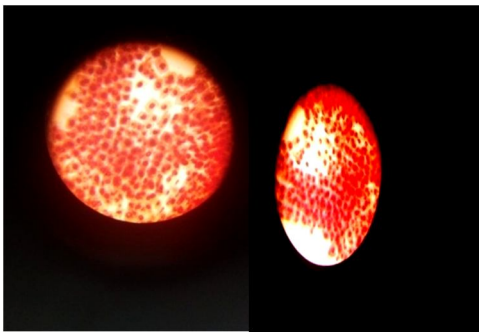
The present research work had been undertaken to study and estimate the cells showing induction of colchiploidy. The underground stems were grown in the Botanical garden of our department at Anwarul Uloom College. Colchicine treatments were given to the roots and stems at various concentrations of 0.01, 0.03 and 0.05 % for about 4 hours. The Squash preparations of under ground stem material was done using Aceto orcein. And 1NHCLmethod. Smears were also studied. The Colchiploid cells were observed in the field of Microscope and tissue changes which appeared in these stem and root meristems were all similar in character. Since AIlium root meristems offered material with large nuclei which were of advantage for cytological study this form was used most extensively for the detailed cytological studies . As chromosome segregation is induced by microtubules, colchicine is applied to inhibit mitosis to induce polyploidy and also mutations in plant cells. Mitotic polyploidization consists of doubling the somatic chromosome number using chemicals with antimitotic activity such as colchicine. Colchicum autumnale, blocks the cell at metaphase of mitosis. It binds to the tubulin and prevents its polymerization and causes disappearance of the mitotic spindle. Other chemicals with antimitotic activity similar to colchicine are colcemid, and recently oryzalin, is used.

Effect of Colchiploidy induction in Plants

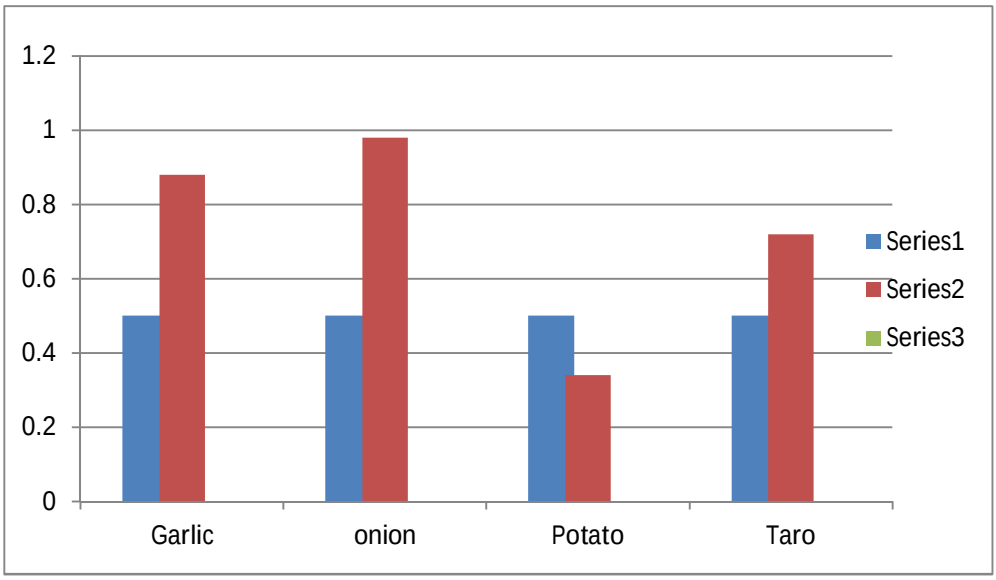
Garlic	S.No	Conc. Of Aqueous Solution	No. of Cells	% Of Colchiploidy	Colchiploid cells
	1	0.5	50	88%	44
	2	0.3	60	33%	20
	3	0.1	40	30%	12
Onion					
	1	0.5	235	98%	230
	2	0.3	80	31%	25
	3	0.1	65	23%	15
Potato					
	1	0.5	64	34%	22

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	2	0.3	60	17%	10
	3	0.1	65	5%	3
Taro					
	1	0.5	73	72%	52
	2	0.3	52	57%	30
	3	0.1	50	44%	22



Induction of Colchiploidy in Plants



Induction of Colchiploidy

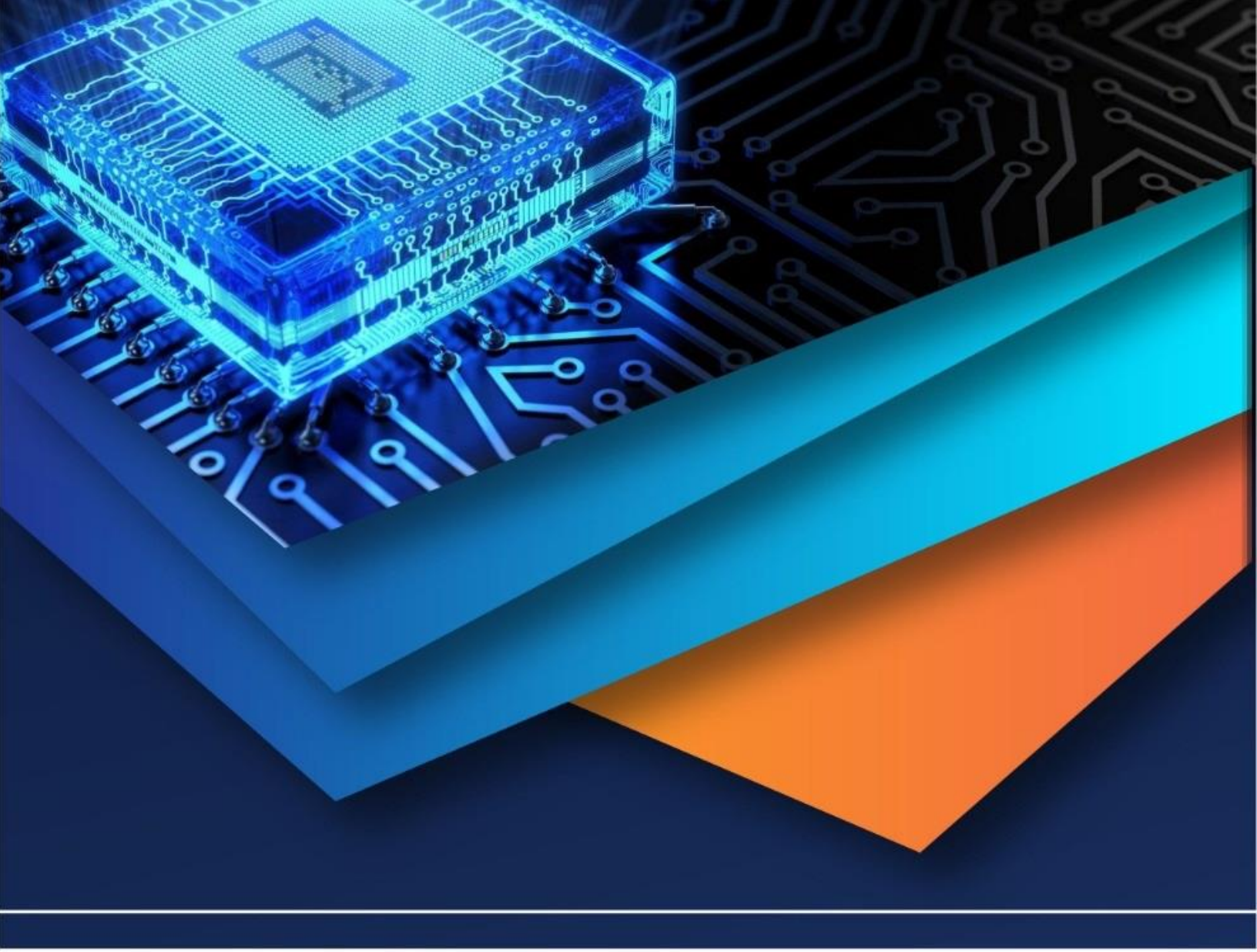
III. RESULTS & CONCLUSION

The intensity of colchicine complex should be proportional to the polyploids inducing capacity of this mutagen. Besides, the dose required for high mutation efficiency of a chemical mutagen is dependent on the properties of the agent, the solvent medium and the biological system. After studying the extent of colchiploidy , in roots of underground stems ,it has been observed, onion and garlic show high % of induction of Colchicine at different concentrations of 0.5 , 0.3 and 0.1 and treatment is given for 4-5 hours .

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