

## A Review on Effect of Colchicine on Selected Plants

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**Abstract:** The effect of different concentrations of colchicine on seeds, shoot and roots showed different variation in development of whole plant and rate of germination in seeds. Morphological & cytological characters analysis showed the increase of chromosome numbers. These polyploids may be helpful for further improvement in ornamental and horticultural value of plants.

**Key Words:** colchicine treatment, polyploidy.

### 1. INTRODUCTION:

All diploid organisms contain two sets of chromosomes but those who contain more than two sets of chromosomes are termed as polyploids and the phenomenon is known as polyploidy. Autoteraploids arise by the doubling of a 2x complement to 4x, which can occur spontaneously but it can also be induced artificially through the application of chemical agent colchicine (Kumar & Mina, 2016)<sup>[1]</sup>.

Colchicine is an alkaloid derived from a flowering bulb of lily family that known as the Autumn crocus (Snyder; 2000)<sup>[2]</sup>. In colchicine treated cells, S-phase of the cell cycle occurs but no chromosome segregation occurs during anaphase which leads to tetraploids with exactly four copies of each type of chromosome. All the modern plant breeders have used colchicine for the development of new plant (Snyder; 2000)<sup>[2]</sup>. Colchicine can be applied in various ways, it may be as a powder form or a premixed (Snyder; 2000)<sup>[2]</sup>. Colchicine is one of the pharmaceutically important alkaloids and useful agent in the treatment of acute attacks of gout (Nagahatenna *et al.*, 2008)<sup>[3]</sup>. Traditionally, colchicine was used for its antimitotic properties (Sivakumar *et al.*, 2004)<sup>[4]</sup>.

Colchicine is a mutagen that widely used for induction of polyploidy in various ornamental species like Pelargonium (Pelargonium graveolens) (Jadrna *et al.*, 2010)<sup>[5]</sup>, Salvia (Salvia hians) (Grouh *et al.*, 2011)<sup>[6]</sup>, Orchid (Dendrobium nobile) (Vichiato *et al.*, 2014)<sup>[7]</sup>. Colchicine treated plants possess large leaves and flowers, thicker stem and roots, darker green leaves, which are having compact growth habit a higher tolerance towards environmental stress (Kehr 1996; Kermani *et al.* 2003; Shao *et al.*, 2003)<sup>[8][9][10]</sup>. Colchicine was used for gene expression and gene amplification (Sivakumar *et al.*, 2004)<sup>[4]</sup>.

### 2. MATERIALS & METHOD:

Sr.no	Plant name	METHOD (colchicine treatment)	References
1	<i>Gladiolous grandiflorus</i>	Corms were soaked in 0.1%, 0.2%, 0.3% colchicine solution for 24h, then 2-3 drops of DMSO (dimethyl sulfoxide) were added in colchicine solution and single corm were planted in growing medium. (sand:soil:FYM 1:1:1)	Manzoor <i>et al.</i> , 2018 <sup>[12]</sup>
2	<i>Cosmos sulphureus</i>	20 young potted seedlings were selected for colchicine treatment. Cotton swabs are immersed either in 0.15 or 0.20% aqueous colchicine solution and apply to apical region between two cotyledonary leaves drop by drop. This treatment was done for 4-6 hr per 2-3 days.	Verma <i>et al.</i> , 2017 <sup>[13]</sup>

3	<i>Chrysanthemum carinatum L.</i>	Apical region of seedling of <i>C.carinatum</i> were treated with 0.2% to 0.25% colchicine solution through with the help of cotton swabs.This treatment was done for 6 h per 3 days.	Kushwah <i>et al.</i> ,2018 <sup>[14]</sup>
4	<i>Dracocephalum moldavica L.</i>	Seed of <i>D.moldavica</i> shoan in mixture soil,leaf mold,sand(1:1:2) and applied colchicine solution with DMSO on tip.Then allow to germination at six leaves stage and note down the morphological characteristics.	Omidbaigi <i>et al.</i> ,2009 <sup>[15]</sup>
5	<i>Sesame indicum L.</i>	Seed of <i>S.indicum L.</i> subjected to varying concentrations of sodium azide and colchicine (0-0.125%) for 24 h.allow it to germinate. After 7th day of seedling, transferred into pots containing sandy loam soils.	Mensah <i>et al.</i> ,2006 <sup>[16]</sup>
6	<i>Allium sativum</i>	Garlic seed treated with different concentration of colchicine (0, 0.1, 0.3%) for certain time duration i.e., (0, 6,12,18,24 h).	Ayu <i>et al.</i> ,2009 <sup>[17]</sup>

### 3. RESULT & DISCUSSION:

Sr.no	Plant name	Result & Discussion	References
1	<i>Gladiolus grandiflorus</i>	0.1% & 0.3% concentration of colchicine effectively enhanced the value of ornamental plants by improving its floral value such as vase life and floret diameter.	Manzoor <i>et al.</i> ,2018 <sup>[12]</sup>
2	<i>Cosmos sulphureus</i>	0.2% treated seedling gives a tetraploids. Shows Darker leaves colour, thick stem, high, leaf area was observed in higher amount.	Verma <i>et al.</i> ,2017 <sup>[13]</sup>
3	<i>Chrysanthemum carinatum L.</i>	0.2% colchicine treated seedlings result in to tetraploidy. Shows a larger number of genetic variant, such as thicker and larger leaves, stronger stem, plant structure, flower morphology.	Kushwah <i>et al.</i> ,2018 <sup>[14]</sup>
4	<i>Dracocephalum moldavica L.</i>	0.1% colchicine treated seedlings gives a most effective in to producing autoteraploids.The stage of two true leaves were observed.	Omidbaigi <i>et al.</i> ,2009 <sup>[15]</sup>
5	<i>Sesame indicum L.</i>	0.125% colchicine treated seedlings given a higher flowering, pollen sterility, chlorophyll content.	Mensah <i>et al.</i> ,2006 <sup>[16]</sup>
6	<i>Allium sativum L.</i>	0.3% colchicine treated plant showed highest results on stomatal densities.	Ayu <i>et al.</i> ,2009 <sup>[17]</sup>

### 4. CONCLUSION:

The colchicine treatment generated polyploids and also gives high rate of seedling, higher yielding and effective morphological & cytological characteristics than control.

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