
EFFECT OF DIMECRON ON SOMATIC CELLS OF ALLIUM SATIVUM L

C. PADMAJA, T. MOGILI and VIDYAVATI
Department of Botany, Kakatiya University, Warangal 509 009, India.

Environmental chemicals, biocides, are known to induce cytological abnormalities in plant and animal cells. In many cases the cytological abnormalities caused by biocides are very similar to those induced by mutagenic agents1-8, and hence screening of biocides for their mutagenic potential is gaining in importance. Dimecron is mostly used as a systemic insecticide on various crop plants. Therefore, it was considered desirable to test the mutagenic potential of dimecron on plants, as this information will be helpful in understanding the mechanism of cytological damage as well as its implication on environmental pollution. In the present investigation an attempt is made to study the effect of dimecron on the course of mitosis and on the mitotic chromosomes of Allium sativum L.

Healthy roots of A. sativum were treated at room temperature with 0.05, 0.1, 0.15 and 0.2% of dimecron in distilled water for 2, 4 and 16 hr. Simultaneously, adequate controls were maintained under identical conditions in distilled water. The root tips of both treated and controls were excised and fixed in 1:3 acetic alcohol. Cytological preparations were made using aceto-orcein. The cytological observations were recorded on 500 cells selected from ten different root tips of each treatment.

The data presented in table 1 show that the mitotic indices at various concentrations were consistently low in all treatments and the decline is greater at higher concentrations (0.15 and 0.2%). After treatment with 0.05% for 16 hr the fall in the mitotic index was 39.2% but it was 71.2% after 2.0% concentration for 16 hr. A similar decline was observed both in short and long durations (table 1). The abrupt fall in the mitotic indices soon after dimecron treatment indicates that the preceding G2 stage affected many cells entering the mitosis and suggests the chronic effect on all or some of the preceding stages3.

The spectrum of cellular responses included scattering of chromosomes (C-mitosis, figure 2) and the daughter chromatids held together only at the centromeric regions referred to as diplomorphic. This is possibly due to the inactivation of the spindle apparatus and consequent delay in the division of centromere9. The spectrum of anomalies also includes sticky metaphase followed by disturbed anaphase giving rise to tripolar and tetrapolar cells. Nuclear pycnosis and chromosome clumping were observed in considerable number. Cytogenetic effects such as fragmentation (figure 1), breaks (figure 3) and bridges were observed at ana- and telophases. The chemical also induced chromosomal contraction at all concentrations and at longer durations (16 hr) of study. The insecticide treatment also resulted in bi-, tri- and tetranucleate cells indicating the inhibition of cytokinesis.

Differences in nuclear pattern, size and shapes were observed in the cells treated for longer duration. In many cells the nuclei were seen located eccentrically. Non-synchronization of chromosomes
Table 1  *Mitotic index and percentage abnormalities following Dimecron treatment*

<table>
<thead>
<tr>
<th>Concentration (in %)</th>
<th>Duration of treatment (in hr)</th>
<th>Mitotic index</th>
<th>Mitodepression</th>
<th>Stickiness</th>
<th>Unoriented chromosomes</th>
<th>Bridges</th>
<th>Breakage</th>
<th>Bridges</th>
<th>Breakage</th>
<th>Diagonal spindles</th>
<th>Unequal groupings</th>
<th>Disturbed cells</th>
<th>Binucleate cells</th>
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<td>7.6</td>
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material (figure 5) and unoriented chromosomes (figure 4) were also commonly observed.

Dimecron in the present study interfered with the spindle and cell plate formation giving rise to C-metaphases. However, after the recovery no tetraploid cells were recorded, indicating that impairment of spindle function may be partial as reported earlier for dexon\(^5\) and topsin\(^10\). Dimecron also induced clastogenic effects after recovery period revealing its effect on G\(_2\) phase of the cell cycle\(^11\). Similar clastogenic effects in plant cells have been recorded earlier\(^4,12\).

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NEW REPORT ON THE NODULATION STATUS OF SOME TROPICAL WEA LEGUMES

G. SUBRAMANIAN and K. MANJULA
Department of Botany, Bharathidasan University, Tiruchirapalli 620 023, India.

With a view to establishing a Rhizobial gene bank and also to make an exhaustive study of nodulation