Figures 2–4. C. marchica. 2. From basal inorganic medium in light (× 445); 3. From fructose-supplemented medium in light showing thick sheath layer around the trichome (× 385); 4. From fructose-supplemented medium in dark showing elongated trichome surrounded by thick sheath layer (× 360).

synthesis of sheath layer around the trichome.

Financial assistance from UGC, New Delhi is gratefully acknowledged.

12 March 1987; Revised 23 July 1987

1. Adhikary, S. P. and Pattnaik, H., Hydrobiol-


RADIO PROTECTIVE EFFECT OF GIBBERELLIC ACID IN WHEAT VARIETY C 306

S. UPPAL and N. MAHERCHANDANI
Department of Genetics, Haryana Agricultural University, Hisar 125 004, India.

Chromosomal damage produced by gamma irradiation was reduced in the germinating barley¹,², oats³ and wheat⁴ seeds with GA₃ post-treatment. Growth-promoting effect of GA₃ has been observed in many plant species including barley⁵, rice⁶, corn⁷ and wheat⁸. The present study was planned to see the effect of GA₃ concentrations on the seeding height and chromosomal damage in a responsive wheat variety C 306.

Seeds of wheat variety C 306 were exposed to 20 kr of gamma irradiation at a dose rate of 370 R per min. The moisture content during irradiation was 11%. After irradiation the seeds were soaked, either in water or in GA₃ solution of different concentrations, for 16 h. The seeds were then removed from the solutions and germinated in 9 cm petri dishes on filter papers soaked with solutions of the same concentrations. Root tips were fixed for cytological studies, after 36 h. After keeping in fixative for 24 h, the root tips were transferred to 70% ethanol and kept in refrigerator. Seedling height was recorded on 7-day-old seedlings.

GA₃ reduced the frequency of cytologically aberrant cells as seen at different mitotic stages (table 1). Also it may be seen that increasing GA₃ concentra-
Table 1 Frequency of chromosome aberrations induced by gamma radiation with various concentrations of GA3 in wheat variety C 306

<table>
<thead>
<tr>
<th>Concentration of GA3 (ppm)</th>
<th>% cells with bridgess at anaphase and fragments at metaphase</th>
<th>% cells with early telophase at interphase</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>28.73 (181)</td>
<td>28.95 (525)</td>
</tr>
<tr>
<td>2</td>
<td>27.93 (111)</td>
<td>23.47 (455)</td>
</tr>
<tr>
<td>5</td>
<td>25.49 (111)</td>
<td>22.46 (325)</td>
</tr>
<tr>
<td>10</td>
<td>19.87 (151)</td>
<td>21.16 (567)</td>
</tr>
<tr>
<td>30</td>
<td>20.15 (134)</td>
<td>19.42 (618)</td>
</tr>
<tr>
<td>50</td>
<td>10.79 (139)</td>
<td>18.08 (730)</td>
</tr>
</tbody>
</table>

Figures in parentheses refer to total number of cells studied.

The chromosomal damage results from the absorption of energy and formation of free radicals after irradiation. Removal of peroxo radicals should lead to the reduction in the extent of the damage produced. GA3 results in enhanced activity of several enzymes and peroxidase is one of them. This increased peroxidase activity probably eliminates the surviving peroxo radicals resulting in less cytological damage. Another reason for reduced cytological damage could be that GA3 by its stimulatory action on metabolic processes promotes repair of the radiation damages.

The seedling height also increased with GA3 post-treatment (table 2). However, there was no effect of increasing concentrations of GA3. The reason for absence of dose effect on seedling height is that 2 ppm concentration of GA3 is sufficient for eliciting maximum growth response and an increase in concentration beyond 2 ppm has no further effect.

It may also be noted that cytological damage per unit concentration of GA3 applied decreases as GA3 concentration increases. It appears that further increase in GA3 concentration beyond 50 ppm may have little effect.

The concentration required for eliciting maximum growth is much lower than that required for maximum effect on cytological damage suggesting that these two aspects of GA3 effects may be independent. This differential effect of GA3 is seen because the cellular mechanisms which affect repair of radiation damage are different from those which affect seedling growth. The first one is the nuclear phenomena modifying microenvironment in the chromosomal vicinity and the second is the cytoplasmic phenomenon resulting in cell enlargement.

21 March 1987; Revised 15 June 1987


Table 2 Effect of various concentrations of GA3 on gamma-irradiated seeds of wheat variety C 306

<table>
<thead>
<tr>
<th>Concentrations of GA3 (ppm)</th>
<th>Seeding height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5.95 ± 0.44</td>
</tr>
<tr>
<td>2</td>
<td>8.63 ± 0.23</td>
</tr>
<tr>
<td>5</td>
<td>7.71 ± 0.21</td>
</tr>
<tr>
<td>10</td>
<td>7.87 ± 0.21</td>
</tr>
<tr>
<td>30</td>
<td>8.50 ± 0.15</td>
</tr>
<tr>
<td>50</td>
<td>8.74 ± 0.24</td>
</tr>
</tbody>
</table>

C. D. (5% level of significance) = 1.67 seeding height based on 4 replicates, each replicate having 25 seedlings.