

**Influence of High Dose Gamma Ray on Accumulation of Hydrogen Peroxide in Pumpkin  
(*Cucurbita ficifolia* Bouché) Seedlings**

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**Objectives**

In this study, we applied cerium chloride method to ultra-thin sections of each tissue in order to examine the effects of high dose gamma ray on H<sub>2</sub>O<sub>2</sub> production in pumpkin tissues and to gain more detailed information on the pattern of H<sub>2</sub>O<sub>2</sub> deposition after gamma irradiation.

**Materials and Methods**

- Plant material
  - pumpkin (*Cucurbita ficifolia* Bouché)
  
- Methods
  - Gamma irradiation
    - The 9-day-old seedlings were exposed to 1 kGy.
  - Methods
    - Cytochemical localization of hydrogen peroxide
      - H<sub>2</sub>O<sub>2</sub> was detected by the cerium chloride (CeCl<sub>3</sub>) method, as described by Bestwick et al. (1997).  $Ce^{3+} + 2H_2O_2 \rightarrow Ce(OH)_2OOH$  (electron dense deposits) + H<sup>+</sup>
    - Determination of H<sub>2</sub>O<sub>2</sub> content
      - H<sub>2</sub>O<sub>2</sub> content was measured colorimetrically as described by Jena and Choudhuri (1981).

**Results and Discussion**

- The accumulation of H<sub>2</sub>O<sub>2</sub> mainly increased on plasma membrane and middle lamella by gamma ray, especially in leaf.
- Parenchyma cells were more sensitive than vessel elements to gamma ray, in terms of H<sub>2</sub>O<sub>2</sub> production.
- The accumulation of H<sub>2</sub>O<sub>2</sub> varied depending on the different cell and tissue types of pumpkin. Further studies are needed to examine why senescence in cotyledon was delayed after gamma irradiation.

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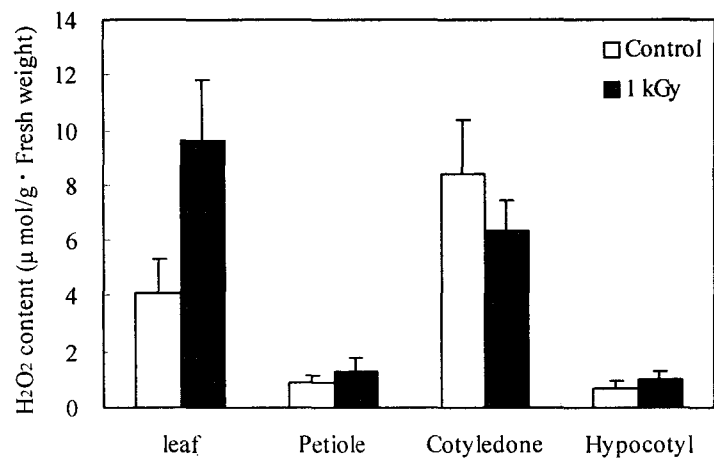


Fig. 1. The contents of  $H_2O_2$  in total homogenates from the tissues at 19 days after gamma irradiation. Data are the means with standard errors ( $n=4$ ).

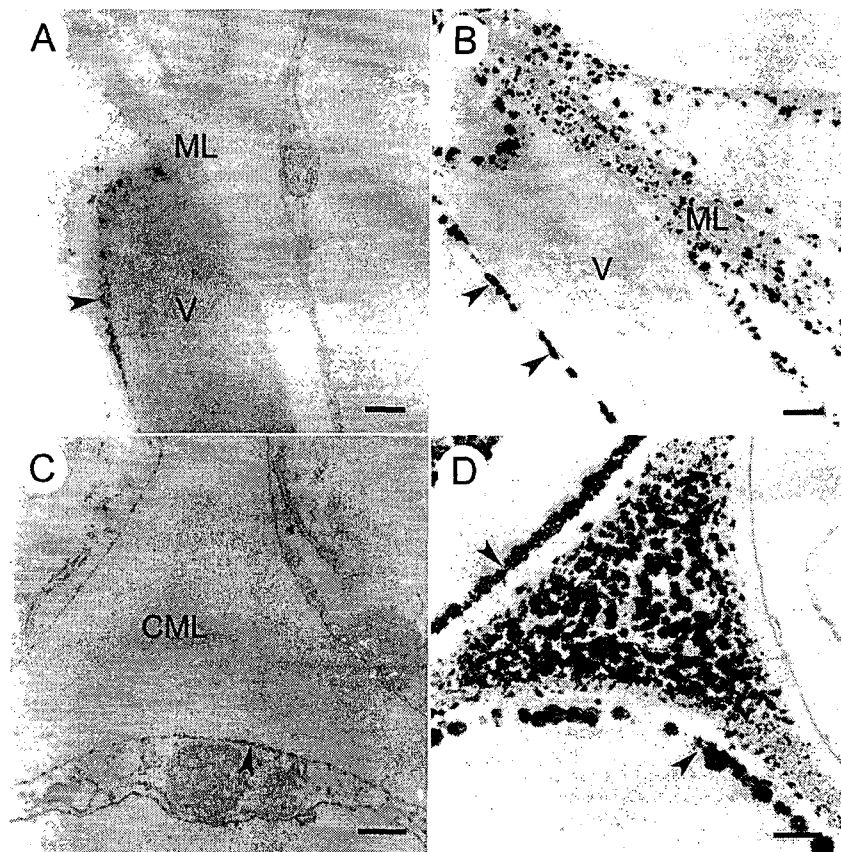


Fig. 2. Localization of hydrogen peroxide in vessel (A and B) and parenchyma cell (C and D) of leaf in control (A and C) and plant irradiated with 1 kGy (B and D). Note the cerium perhydroxide deposits were significantly increased in plasma membrane (arrow heads) and cell corner middle lamella after gamma irradiation. CML, cell corner middle lamellae; ML, middle lamella; V, vessel wall. Bar= $0.5\mu m$ .