Changes in the stamen hairs of *Tradescantia* 4430 treated with mercury and γ-rays

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1. Introduction

Tradescantia 4430 clone is an interspecific hybrid made by artificially crossing *T. hirsutiflora* which is a species that blossoms indigo colored flowers with *T. subacaulis* with pink colored flowers. It has hereditary heteromorphy as its flower color and it blossoms indigo colored flowers that are normally dominant. Because of its genetic property, T-4430 is extremely sensitive to ionizing radiation. Mutations occur in the T-4430 stamen hair cells due to radiation, and their frequency shows the aspect of slowly increasing, reaching a maximum value, and then decreasing.

2. Material and Methods

The experimental plants were provided by vegetative culture from the stock plants of T-4430. Groups of inflorescence cuttings were irradiated with 0.3, 0.5, 1.0, 1.5 and 2.0 Gy. After irradiation, the cuttings were maintained at 24℃ under a controlled light : dark (14 : 10) cycle. Fully bloomed flowers were taken normally early in the morning on each day and stored in the refrigerator before scoring. Stamen hairs were carefully removed with forceps from the flowers and placed onto the slide glass upon which the proper amount of mineral oil was dropped. Scoring was performed to determine the pink, single pink and stunted cells frequency under a stereomicroscope (x25).

3. Results

The study was carried out to analyze the effects of ionizing radiation and mercury chloride on the stamen hairs of T-4430 flowers. It was found that average frequencies of pink mutation showed a clear dose response relationship in a dose range between 0 ~ 2.0 Gy. When the concentration of mercury was 0.3 mM, development of stamen hairs was inhibited, which meant that the applicable concentration of mercury to the experiment was below 0.25 mM (Fig. 1). When mercury was 0.2 mM, it caused no significant effect on radiation induced mutation but when it was 0.25 mM, frequency of radiation induced mutation was greatly increased (Fig. 2). It was found that mercury concentration below 0.25 mM is appropriate for investigating the combined effects of ionizing radiation and chemical substance on somatic cell mutations.

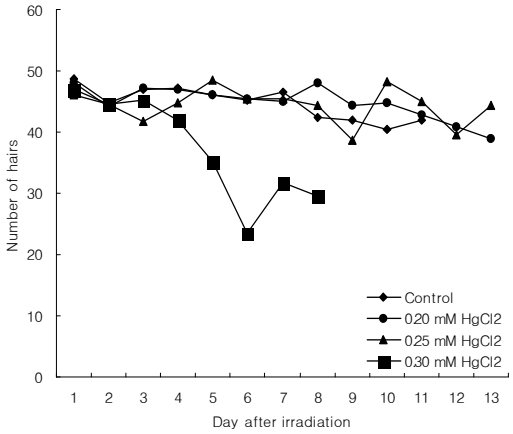

Fig. 1. Number of hairs in the flowers of T-4430 treated with different concentrations of mercury chloride.

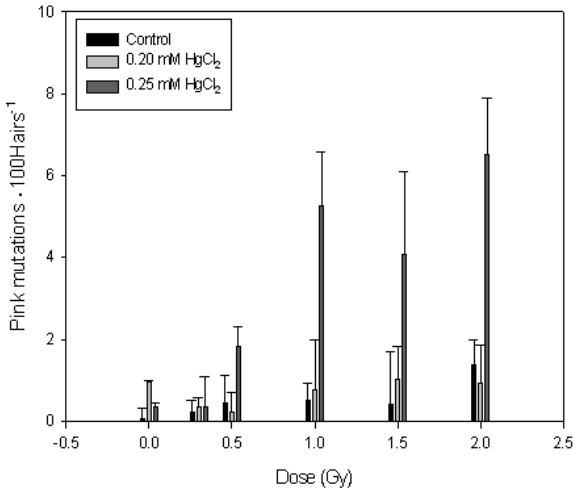

Fig. 2. Dose-response of the frequencies of pink mutation during the peak interval in T-4430 treated with different concentrations of $HgCl_2$.

3. Conclusions

Due to the heteromorphism of its flower color, T-4430 stamen hairs are one of the most appropriate experiment materials for detecting low level ionizing radiation which people often come across in the environment and generic effects of various chemical substances. The stamen hair in T-4430 clone is formed by continuous division of a single cell so if it is exposed to mutagen containing radiation during division process, it easily turns into mutation. At that time, a recessive factor is

manifested and the blue stamen hair cell turns into pink due to mutation of somatic cell. As a result, ionizing radiation and mercury chloride damage the cells of T-4430 stamen hair which in turn cause increment of somatic mutation and growth inhibition. At a relatively low dose rate, increment of mutation rate was seen without morphological changes in flower, stamen and stamen hair. It would be an appropriate tool for detecting generic changes due to low dose radiation.

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