AbstractID: 10116 Title: Effects of Ionizing Radiation Exposure on Arabidopsis thaliana

Purpose: The effects of ionizing radiation on plants were examined in order to investigate the possibility of utilizing plants as a biodosimeter. Different radiation doses, ages of radiation exposure, and treatment methods were considered for the analysis of the complex and dynamic mechanisms of ionizing radiation effects.

Method and Materials: The investigation was performed by irradiating *Arabidopsis thaliana* with 6MV x-ray produced by a linear accelerator. Photosynthesis and respiration rates, chlorophyll fluorescence fv/fm ratio and yield, plant height, total leaf area, stem mass, leaf mass, and above-ground biomass were measured in order to evaluate both physiological and physical impacts of ionizing radiation. The statistical analysis of the radiation effects with respect to four different total doses (0.5Gy, 5Gy, 50Gy, and 150Gy), two different treatment types (single and fractionated), and three different life stages at irradiation (15-day, 20-day, and 25-day old) revealed the details of dynamic responses of *Arabidopsis thaliana* to radiation exposure.

Results: The age at the time of irradiation is a key to determine the overall effects of radiation exposure, and the irradiated *Arabidopsis* indicated much greater contrast in physical growth compared to physiological responses immediately after the irradiation. Radiation hormesis was not observed among the irradiated *Arabidopsis* older than 15-days. In order to discern such phenomenon in *Arabidopsis*, perhaps, ionizing radiation needs to be delivered at earlier than 30% of its entire life cycle with the total dose lower than 0.5Gy.

Conclusion: The results suggest plants like *Arabidopsis* are capable of being utilized as a biodosimeter, and further studies can be performed on specific areas (e.g. less than 0.5Gy of very low dose radiation exposure, microscopic analysis of plant cells, etc.) in order to assess the effects of ionizing radiation for a practical application.