**ORAL PRESENTATION**

**Plant Programmed Cell Death in Plants**

**Filiz Vardar**

*Marmara University, Faculty of Arts and Science, Department of Biology, İstanbul, Turkey*

\*E-mail: [filiz.vardar@gmail.com](mailto:filiz.vardar@gmail.com)

Programmed cell death (PCD) is a genetically controlled mechanism, which allows retired, dysfunctional, overproduced, irregularly developed, or genetically damaged cells to be destroyed safely for organism. Plants do not undergo apoptotic cell death, and cell death is classified into two groups as vacuolar and necrotic cell death. In vacuolar cell death, alterations in nucleus morphology, chromatin condensation, DNA fragmentation, protoplast condensation, vacuolization, generation of reactive oxygen species, alterations in the cytoskeleton and caspase like enzymatic activities are observed, as in animal cells. Necrotic cell death has different features from vacuolar cell death such as ATP depletion, cell and mitochondria swelling. PCD appears in different organs and tissues of plants during vegetative-generative organ development and under biotic-abiotic stress conditions. Under stress factors, the balance between antioxidant enzymes and generation of reactive oxygen species (ROS) changes. These alterations in the cellular structures lead to oxidative stress. ROS accumulation also causes caspase-like activities by activating vacuolar processing enzymes, metacaspases, saspases and phytaspases. PCD can be visualized by light, fluorescence, and electron microscopy. Besides DNA fragmentation during cell death is determined by TUNEL, comet assay and gel electrophoresis. Moreover, cytoplasmic cytochrome c identification, caspase like activities and alterations of mitochondrial membrane potential can be identified by biochemical analyses. Molecular characterization of PCD will lead in the future to a better understanding of the mechanisms of plant development and stress tolerance for developing high quality plants.

**Keywords:** Necrotic cell death, programmed cell death, reactive oxygen species, vacuolar cell death