Online Proceedings

POSTER SESSION 2

Balcony, Easel 104

1:00 PM to 2:30 PM

Detection of 8-Oxoguanine Lesions in Plastid DNA of Maize Plants

Ardizon Cajuguiran Valdez, Senior, Biology (Molecular, Cellular & Developmental)
Mentor: Diwaker Tripathi, Biology

The level of plastid DNA (ptDNA) declines as plastids develop from colorless proplastids to green chloroplasts. The decline in ptDNA is associated with an increase in DNA damage resulting from oxidative stress and ultraviolet (UV) radiation. 8-oxoguanine (8-oxoG) is a lesion in ptDNA that results from the oxidation of guanine. Our lab previously found a reduced amount of ptDNA in light-grown plants compared to dark-grown plants, likely due to increased oxidative stress that increases ptDNA damage. Here, our objective is to quantify ptDNA damage by assessing 8-oxoG lesions during the greening of maize leaves. We hypothesize that as plastids mature, 8-oxoG lesions increase. Our experimental outline involves the quantification of 8-oxoG by the enzyme-linked immunosorbent assay (ELISA), as well as immunofluorescence microscopy using antibodies that target 8-oxoG. We are examining plastids isolated from light-grown and dark-grown stalk and leaf tissues. As 8-oxoG lesions are one of the markers of oxidative DNA damage, our results will be used to assess DNA damage during development of maize plants. This research will provide a better understanding of role of oxidative stress in plant development

POSTER SESSION 4

MGH 206, Easel 165

4:00 PM to 6:00 PM

Quantification of Oxidative Damage Caused by Reactive Oxygen Species during Development of Maize Plants

Jerry Chen Bryan, Senior, Biology (General)
Mentor: Diwaker Tripathi, Biology

Reactive oxygen species (ROS) are partially reduced oxygen molecules produced during cellular metabolism in all aerobic organisms including plants. ROS derivatives such as superoxide (O2–) and hydrogen peroxide (H2O2) cause several types of cell damage in plants. Chloroplasts and mitochondria are major sources of ROS because of photosynthesis and aerobic respiration in these organelles, respectively. Previously, our lab showed that light-grown maize plants have more damage in plastid DNA (ptDNA) and mitochondrial DNA (mtDNA) than dark-grown plants and that ptDNA and mtDNA levels decline during leaf development. Here, we hypothesize that increased damage to ptDNA and mtDNA in light-grown leaves is linked to increased ROS generation compared to dark-grown and germline stalk tissues. We used absorbance- and/or fluorescence-based assays to quantify levels of ROS in chloroplasts and mitochondria isolated from leaf and stalk tissues during seedling development. Our data suggest that light-grown leaf has more ROS than light-grown stalk, dark-grown leaf, and dark-grown stalk. Our findings indicate that highly damaged DNA is a consequence of ROS generation in light-grown leaves of maize. Overall, this research will help us further understand the oxidative damage caused by various reactive oxygen species during the development of maize plants.