Contribution ID: **67** Type: **Poster**

The Molecular Mechanisms of Plant Stress Adaptation

Plants, as sessile organisms, have evolved intricate molecular strategies to perceive and adapt to a myriad of environmental stresses, including drought, salinity, and extreme temperatures. This review paper synthesizes the current understanding of these sophisticated mechanisms, starting with signal perception and transduction at the cellular level, where specific receptors initiate a cascade of downstream events. We delve into the transcriptional regulation of stress-responsive genes, highlighting how master transcription factors precisely orchestrate gene expression to activate adaptive responses. A key focus is on post-translational modifications (PTMs), such as phosphorylation and ubiquitination, which rapidly modulate protein function and stability, providing a swift regulatory layer. We also explore the roles of osmoregulation and compatible solute accumulation, which help maintain cellular turgor and protect macromolecules under osmotic stress. The paper further discusses the critical function of antioxidant defense systems in neutralizing reactive oxygen species (ROS) and mitigating oxidative damage. Finally, we examine the emerging field of epigenetic modifications, which contribute to a "stress memory" that allows plants to mount a more robust response to subsequent stress encounters. By integrating these diverse molecular pathways, this review provides a comprehensive overview of how plants achieve resilience in a dynamic and challenging world.

Authors: Ms SURESH, GOPIKA; Ms V, Kalaivi; Ms DESAI, Palak; Mr VEDADHARWIN, R.M.

Presenters: Ms SURESH, GOPIKA; Ms V, Kalaivi; Ms DESAI, Palak; Mr VEDADHARWIN, R.M.

Track Classification: Biological Sciences