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Jill M. Farrant

Department of Molecular and Cell Biology, University of Cape Town, South Africa

Understanding desiccation tolerance as a tool for climate smart agriculture

Drought poses a significant threat to global agriculture, with climate change driving increased aridification across key food-producing regions. This challenge is particularly critical in Africa, where approximately 95% of agriculture depends on rainfall. Most conventional crops do not survive even moderate water loss, and while some progress has been made in improving drought resistance, these adaptations often fail under severe and prolonged dry conditions. A promising avenue for enhancing crop resilience involves the study of resurrection plants—approximately 240 species of Angiosperms that exhibit vegetative desiccation tolerance. Understanding the molecular and physiological mechanisms underlying this phenomenon could pave the way for developing crops with enhanced resilience to water deficit stress. Using a multidisciplinary systems biology approach, we have investigated how various resurrection plant species, each serving as a model for crop improvement, regulate molecular and physiological responses to withstand extreme drought conditions. Recent research has also focused on root-associated microbiomes and their potential role in desiccation tolerance, with implications for producing natural biostimulants that support plant growth under water-scarce conditions. In this presentation I will provide an overview of the molecular physiological processes associated with desiccation tolerance in resurrection plants and their associated microbiomes and point to future applications for improving agricultural sustainability in increasingly drought prone environments.

Biography

Jill Farrant holds a South African Research Chair in “Systems Biology Studies on Plant Desiccation Tolerance for Food Security” and is an acknowledged world leader in the field of plant desiccation tolerance. She has received considerable recognition for her research, including being a Laureate of the L’Oreal-UNESCO For Women in Science awards and the Humboldt Foundation Georg Foster award for a life time of excellent research in a developing/transitioning country that has value for all humanity.