

Morphological, Anatomical and Physiological Adaptations of Desert Succulents to Water Stress

Reena Rastogi

Assistant Professor, Department of Botany,
Ramabai Ambedkar Government Degree College, Gajraula, Amroha, UP.

Abstract: *Succulent plants inhabiting arid ecosystems exhibit remarkable morphological, anatomical, and physiological adaptations that enable them to survive under severe and prolonged water stress. Important adaptations include water storage in succulent stems and leaves, extensive and plastic root systems, thick cuticles, specialized epidermal structures, reduced leaf surfaces, stomatal regulation, and, in many species, Crassulacean Acid Metabolism (CAM) photosynthesis. These characteristics enable succulents to maximize water acquisition, minimize water loss, maintain cellular hydration, and sustain metabolic activity during periods of drought. This review synthesizes major structural and functional adaptations of desert succulents and discusses their ecological significance, evolutionary convergence, and potential applications in agriculture, sustainable landscaping, bioenergy, and climate resilience. Understanding these adaptations may provide useful insights into plant responses to increasing water scarcity and environmental variability.*

Keywords: succulence, CAM photosynthesis, desert ecology, morphological adaptation, anatomical adaptation, drought tolerance, water-use efficiency