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Innovative strategies for alleviating temperature stress in lepidium latifolium i., a sleeper weed from trans himalayas

Abstract:

Plants at high altitudes in the Ladakh Himalayas experience extreme temperature variations during vegetative growth. This study investigated the photosynthetic response of a sleeper weed, Lepidium latifolium L., to short-term temperature fluctuations. This plant kept photosynthesis going at higher temperatures by modulating photochemical efficiency of photosystem II. Many physiological processes, such as stomatal opening that is both independent and dependent on VpdL, an increase in energy fluxes, reaction center closure, and an increase in chlorophyll content, all affect temperature tolerance. The excess energy was released at higher temperatures using a dynamic and effective non-photochemical quenching process using PsbS and zeaxanthin. Increased expression of the component proteins compensates for the deterioration of the photosynthetic system. Other genetic elements that aid in apparatus repair and stabilization were also stimulated. The regulation of the stomatal aperture by allyl isothiocyanate works as a quick response mechanism for CO2 exchange and evapotranspirational needs. These activities, when combined, help to offset the negative effects of high temperature on the photosynthetic process. This information will aid in planning the spread of Lepidium latifolium in the environmentally fragile Ladakh Himalayas during a climate change scenario.

Biography

Manu Khajuria has earned her Ph.D. in Botany, specializing in plant adaptive biology. Since 2014, her research has been dedicated to understanding the adaptive potential of high-altitudinal plants in the Ladakh Himalayan region. Furthermore, her studies explore the correlation between photochemical efficiency and Δ9 – tetrahydrocannabinol content in Cannabis sativa L., presenting a novel investigation within the realm of plant biology. Currently positioned as a Scientist in the Plant Sciences and Agrotechnology Division at CSIR-Indian Institute of Integrative Medicine in Jammu, India, she continues to advance scientific knowledge in the intricate field of plant adaptation. Her work serves as a valuable contribution to the broader scientific community, shedding light on the intricate interplay between environmental factors and plant physiology in challenging ecosystems.