

CHARACTERIZATION OF GLUTAMATE DEHYDROGENASE ENZYME IN SELECTED MARCHANTIOPHYTA – A STUDY TO EXPLORE NITROGEN MANAGEMENT IN LIVERWORTS

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Abstract

Glutamate dehydrogenase (GDH) is a ubiquitous enzyme that catalyzes the reversible amination of 2-oxoglutarate in glutamate, contributing to both the amino acid homeostasis and the management of intracellular ammonium. It is considered one of the key players at the junction of carbon and nitrogen assimilation pathways in plants. To date, all the available information about the GDH of terrestrial plants refer to a very few, vascular plant species only. In addition, due to biochemical and molecular aspects involved in its enzymatic activity its role in the plant metabolism is still considered intriguingly controvert. By focusing on selected Liverwort species belonging to different orders, we provided the first panoramic overview of GDH in non-vascular land plants; from the species- and organ-specific isoenzymatic profile to the protein's thermal stability, from the post-translational pattern to the ammonium-dependent response, some characterizing features of this fascinating and not yet completely understood enzyme have been unraveled. A multifaceted approach that exploited proteomic and metabolomic techniques, as well as electrophoretic analyses and electron microscopy investigations has been used. Our results offer an accurate portrait of GDH enzyme in Liverworts, addressed to provide a better understanding of Bryophytes metabolism strategic to survival and adaptation, and shed light on some key properties of the enzyme that could have contributed to their success in colonizing the most various environments.