

Gibberellic Acid Increases Photosynthesis and Alleviates Cd-induced Effects by Boosting Antioxidant System and Osmoprotectants in *Mentha arvensis*

Abbu Zaid*¹, Firoz Mohammad¹ and Shabir H. Wani²

¹Plant Physiology and Biochemistry Laboratory, Department of Botany Aligarh Muslim University, Aligarh 202002, Aligarh, India.

²Mountain Research Centre for Field Crops, Khudwani Anantnag-192101, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, J&K, India
E-mail: zaidabbu19@gmail.com

Abstract—The challenges of heavy metal stress on plants' morphology, growth and physiology are continuously increasing due to manmade activities. Heavy metal stress like cadmium (Cd) is known to negatively affect agricultural productivity, primarily in developing countries like India. In this context, researchers are engaged in cutting area research towards devising sustainable and adaptation strategies to nullify the metal-induced impacts in plants. Among various strategies for engineering Cd stress tolerance in plants, plant growth regulator (PGR) application is gaining momentum in this regard. In the present work, we evaluated the potentiality of 1 μ M of gibberellic acid (GA) in overcoming Cd-induced effects in *Mentha arvensis*. Plants were grown in 50 μ M Cd spiked soil in potted conditions and GA was foliarly sprayed thrice at 50, 60 and 75 days after transplantation of suckers. Cd stress reduced plant growth, photosynthesis and, mineral nutrient contents but increased oxidative stress biomarkers, osmolytes, and antioxidant enzymes. Cd also induced stomatal inhibition was overcome by GA spray. GA overcomes Cd stress inhibition by further boosting antioxidants activities and triggering osmolytes biosynthesis. Therefore, GA-mediated strong antioxidant defense system can be ascribed for reducing the effects of Cd stress in mentholmint plants. Thus, the use of PGRs can provide a promising sustainable remedy to be used by farmers in the global changing environment for increasing their produce.

Keywords: Cadmium stress; plant growth regulators; gibberellic acid; *Mentha arvensis* stomata.