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REGULATORY ROLE OF EXOGENOUS MELATONIN IN MAINTAINING MINERAL NUTRIENT HOMEOSTASIS IN RICE (*ORYZA SATIVA* L.) DURING ARSENIC STRESS

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Mineral nutrients play a crucial role in developing plant tolerance against arsenic (As)-induced phytotoxicity; however, the effect of melatonin (Mel) in the regulation of mineral nutrient homeostasis during As-stress is not yet explored. The present investigation was conducted to examine the impact of exogenous Mel on mineral nutrient status during As-stress in two different rice cultivars, viz., Khitish (As-susceptible) and Muktashri (As-tolerant). The levels of the representative macro-elements [phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S)], and micro-elements [iron (Fe), copper (Cu), zinc (Zn), manganese (Mn)], and silicon (Si) (a beneficial nutrient) have been detected through energy dispersive-X-ray fluorescence (ED-XRF) spectrometry in As-stressed rice seedlings, both in absence and presence of exogenous Mel. Mg, P and Cu level showed a decreasing trend in the stressed seedlings of both the cultivars. While Mn, K and Zn levels were lowered in the stressed Khitish seedlings, no significant changes were detected in case of Muktashri. The concentration of S, Si, Ca and particularly Fe was enhanced with As-exposure in both the cultivars. Exogenous Mel application during As-stress enhanced the level of all the mineral elements, except Fe and Cu, in Khitish, pointing to the fact that Mel largely mediated the ionome and mineral element homeostasis in the susceptible cultivar to enhance the tolerance mechanism. Overall, the present elemental analyses highlighted the fact that exogenous Mel maintains nutrient balance in rice seedlings, so as to stabilize growth and proper metabolism during As-stress.