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**FOLIAR ZINC SUPPLEMENTATION ENHANCES YIELD AND MITIGATES OXIDATIVE
DAMAGE IN SALT-STRESSED BINA DHAN-8**

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Foliar Zinc Supplementation Enhances Yield and Mitigates Oxidative Damage in Salt-Stressed BINA dhan-8

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ABSTRACT

Soil salinity is one of the fastest-growing constraints on rice (*Oryza sativa* L.) productivity worldwide, currently affecting nearly 1.4 billion hectares of land, with a further one billion hectares at risk. Salinity-induced osmotic and ionic stress triggers excessive reactive oxygen species (ROS) accumulation, disrupting membrane integrity and nutrient homeostasis; zinc (Zn), a cofactor of key antioxidant enzymes, is itself often rendered less available in saline soils, compounding the damage. This study evaluated whether foliar Zn nutrition could mitigate salt-induced oxidative stress and sustain the yield of the salt-tolerant rice variety BINA dhan-8. A pot experiment was conducted in a Completely Randomized Design with two factors: four foliar Zn levels (0, 0.05, 0.10 and 0.15%) and four salinity levels (0, 3, 6 and 9 dS/m) - replicated three times (48 pots) during the 2025 Aman season at EXIM Bank Agricultural University, Bangladesh. Chapainawabganj. Both factors and their interaction significantly ($p < 0.05$) affected all growth and yield-contributing traits. The combination of 0.05% Zn with moderate salinity (6 dS/m) produced the tallest plants (85.30 cm), the highest number of effective tillers (14.33 hill⁻¹), the longest panicles (24.10 cm), the most filled grains (97.33 panicle⁻¹) and the highest grain yield (22.57 g pot⁻¹); 68% above the unsprayed, most severely salinized control (Zn₀S₃, 13.47 g pot⁻¹). Excess Zn (0.15%) did not add further benefit, pointing to an optimum foliar dose near 0.05%. Correlation analysis confirmed grain yield was most strongly associated with panicle length ($r = 0.98$) and negatively associated with unfilled grain number ($r = -0.98$). These results demonstrate that a single, low-cost foliar Zn spray schedule can substantially buffer rice yield losses on moderately saline soils, offering a practical, scalable option for salinity-prone deltas such as coastal Bangladesh.



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