Evaluating Phenotypic and Biochemical Parameters of Wheat (*Triticum aestivum* Jinmai No. 1) in Response to Biostimulants Under Salinity-induced Stress

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Bread wheat (*Triticum aestivum* L.) belongs to the Poaceae family, is a widely cultivated cereal crop worldwide. However, increasing soil salinity has led to significant yield losses in wheat. Amino acid (AA)-rich biostimulants induce crop resilience to abiotic stress. Still, its efficacy for overcoming salinity stress in cereals remains unexplored. Recent studies show the capability of fish biostimulants (FB) to alleviate salinity stress in Asteraceae crops. Therefore, in this study, we investigated the salinity impact by applying different treatments(T) (0, 1%, 2%, 3%, 4% v/v) of FB on Jinmai No. 1 wheat subjected to induced salinity levels (0, 40 mM, 80 mM, 120 mM NaCl) with non-treat controls, Experimental setup arranged in a completely randomized design with 4 replicates. Data were analyzed in a two-way ANOVA using SPSS. Results showed the abundance of stress-responsive AAs in FB, which significantly improve seed germination and plant growth parameters while mitigating the negative impact of salinity. T1 reported the highest seed germination and plumule development. Under severe salinity (S120 mM), results showed significantly higher values for relative water content (0.81±0.00%), leaf count (5.25±0.25), carotenoids (0.23±0.03 gml^{-1}), in T1 and internode count (2.87±0.3), total chlorophyll count (1.68±0.03 gml^{-1}) in T2 and shoot weight (1.46±0.12 cm) in T3 conversely, significantly lower soluble carbohydrates (78.60±10.0 mg g^{-1}) in T2 and antioxidants including superoxide dismutase (31.02±0.20 μml^{-1}), peroxidases (2.68±0.63 μml^{-1}), in T4 compared to the control. Moreover, these parameters fluctuated depending on their role in plant stress alleviating mechanisms. Therefore, it can be elucidated that the use of FB is a sustainable approach for improving crop resilience under salinity stress, contributing to eco-friendly modern agriculture.

Keywords: Antioxidants, Fish biostimulants, Nutrient supplements, Salt stress, Sustainable agriculture