Title : Interactive effects of salinity and nutrient enrichment on growth performance and biomass productivity of *Wolffia globosa*

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ABSTRACT

This study investigated the interactive effects of salinity stress and nutrient enrichment (nitrogen and phosphorus) on the growth performance, biomass productivity, and biochemical composition of *Wolffia globosa*. Cultivation was conducted under both laboratory (16:8 h light/dark, 25°C) and greenhouse conditions (natural sunlight, 25-30°C) for 72 hours and 7 days, respectively. The experimental design consisted of 12 treatments (T1-T12) with varying concentrations of NaCl (0, 10, and 100 mM) combined with nitrogen (N) and phosphorus (P) supplementation. The results indicated that a moderate salinity level (10 mM NaCl) combined with both N and P enrichment (T11) promoted the highest growth performance. Under greenhouse conditions, T11 achieved the maximum net biomass gain of 142.89 g and a Specific Growth Rate (SGR) of 13.79%, significantly higher than the control (T1: 116.93 g, 11.38% SGR). In contrast, high salinity stress (100 mM NaCl) consistently inhibited growth across all nutrient conditions. Biochemical analysis revealed that the synergistic effect of 10 mM NaCl and N+P enrichment in T11 also stimulated the highest accumulation of photosynthetic pigments, including chlorophyll a (22.50 μgg -1DM), chlorophyll b (17.94 μgg-1 DM), and carotenoids (1884.434 μgg-1 DM). Furthermore, T11 yielded the highest protein content at 40.42 g 100 g-1 DW. While bioactive compounds like total phenolics generally increased under mild stress (T8: 574.73 mg GAE g-1), they were lower in the highest growth treatment (T11). These findings suggest that *W. globosa* exhibits a hormesis response, where low-level salinity stress triggers physiological adaptations that, when supported by adequate nutrients, enhance biomass and nutritional value. This study demonstrates the potential of *W. globosa* for high-efficiency biomass production in saline environments, with practical implications for sustainable food systems or bioremediation in extreme conditions.

Keywords: *Wolffia globosa*; salinity stress; nitrogen; phosphorus; biomass productivity; protein content; nutrient enrichment

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