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Enhancing Physiological Performance of Tissue Culture-Derived Date Palm Plants under Salinity Stress with Kelpak Seaweed Extract

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Abstract

Date palms are a valuable crop that is often grown on saline soils, which limits their development and yield. In this study, the effects of Kelpak seaweed extract on nutrient levels, photosynthetic pigments, and biochemical parameters in date palm leaves under salt stress were investigated. We applied different concentrations of Kelpak (0, 2.5, 5, 7.5, and 10 ml L-1) to date palm plants exposed to salt stress. The results showed that when compared to the control treatment, the Kelpak treatment significantly increased nutritional levels in date palm leaves, including nitrogen (N), phosphorus (P), potassium (K), and calcium (Ca). In addition, treatment with Kelpak extract increased the levels of photosynthetic pigments in the leaves, including chlorophyll a, chlorophyll b, total chlorophyll, and carotenoids, and this increase was associated with concentration increases. Moreover, biochemical analysis revealed that with increasing concentrations of Kelpak, total soluble protein and total soluble carbohydrates increased, whereas proline content decreased. According to the findings, Kelpak Seaweed extract boosted nutrient absorption, increased photosynthetic pigments, and altered biochemical markers related with plant development and stress responses. This study provides evidence that Kelpak may be a beneficial treatment for salt-stressed date palm plants. However, further studies are needed to fully understand the mechanisms of action and to optimize the application of Kelpak in date palm cultivation.

Keywords: carbohydrates, carotene, chlorophyll, proline, protein.