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Evaluation of Nutraceutical Properties of Cacti under Salinity Stress

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Summary

Opuntia spp., which is grown as vegetable crops in America, Africa, and the Mediterranean region, has become an important alternative crop in the context of climate change, due to its high water-use efficiency and heat/drought tolerance. It is also promising as a high value-added novel crop because of its health-promoting effects such as suppression of blood glucose elevation and insulin level regulation. In this study, the effect of salinity stress treatment on plant physiological response and health-promoting effects as food was evaluated. Growth of *Nopalea cochenillifera* cladodes was affected differently under four salt treatments for 12 weeks, with NaCl (500 mM) treatment in particular having a significant negative effect. The stress response of the cladodes, the rhizosphere microbial population, and the effects of cladode extracts on cultured animal cells were analyzed, and the results of proteome analysis showed that the abundance of Isoflavone reductase homolog P3 was altered in the cladodes. Changes in secondary metabolism for plant defense against the stress might affect their functionality as food. The DPPH radical scavenging capacity of the extract was measured as antioxidant capacity was expected to increase, but enhancement was not observed by the treatments; the ACE activity inhibitory capacity of the extract from all salt treatment conditions was higher compared to control extract derived from condition without stress. It was suggested that the abundance of proteins that can bind to ACE was increased by the treatments. In assays using cultured cells, cladode extract had no effect on the survival of SH-SY5Y neuroblastoma cells, but altered cell morphology. This morphological change varied among the treatments under which cladodes were grown, indicating that health-promoting effects of *N. cochenillifera* cladodes can be enhanced by controlling the cultivation conditions optimally.