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# Effect of Foliar Application of Nano-selenium on the Anatomical Characteristics of Date Palm *Phoenix dactylifera* L. Barhi Cultivar under Salt Stress

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**Abstract:** This study investigated the effect of salinity on the anatomical features of date palm (*Phoenix dactylifera* L.) and the potential roles of nano selenium (Se NPs) in alleviating the adverse effects of salinity. Two concentrations (80 and 160 mg.L$^{-1}$) of SeNPs were applied as a foliar spray on date palms irrigated with different concentrations of saline water (2.5 [control], 5, 10 and 20 ds.m$^{-1}$). Results showed that 5 ds.m$^{-1}$ salinity had no significant effect on the anatomical structure of date palm, whether applied alone or in combination with foliar spray of Se NPs. However, the vascular bundle dimensions and thickness of the xylem, phloem and mesophyll were significantly higher in plants exposed to 10 ds.m$^{-1}$ salinity compared with the control plants. In particular, foliar spray of SeNPs at 80 mg.L$^{-1}$ concentration enhanced the effect on these plants. By contrast, 20 ds.m$^{-1}$ salinity significantly reduced all studied parameters except for the thickness of the upper and lower cuticle, which increased. Se NPs at 80 mg.L$^{-1}$ concentration had a significant effect in alleviating the adverse effects of salinity at high levels. The results of this study proved that SeNPs at 80 mg.L$^{-1}$ concentration were more effective in alleviating the adverse effects of salinity on the anatomical structure of date palm leaves than 160 mg.L$^{-1}$ concentration.

**Keywords:** Barhi date palm, *Phoenix dactylifera* L., Leaf, Vessels, Xylem, Nano-Selenium, Foliar Application, Salt Stress.

## Introduction

Date palm (*Phoenix dactylifera* L.) belongs to the Arecaceae family and is a dioecious, perennial, monocotyledonous tree cultivated primarily for its nutritive fruits (Abass, 2013). For over 5000 years, it has played an important role in sustainable agriculture in many countries around the world, including the Middle East and North Africa (Al-Khayri *et al*., 2015). Date palms are exposed to a variety of stress in their natural habitat, including drought, heat, air pollution and salinity (Hazzouri *et al*., 2020). Saline environments present a severe harm to agriculture around the world, owing in part to the irrigation of agricultural fields with salt-containing water. This is common in arid and semiarid environments with high evaporation rates and limited fresh water resources, which require salt leaching into deeper soil layers.

Because of the detrimental effects of salt, appropriate strategies to improve salinity