IOP Conf. Series: Earth and Environmental Science **1487** (2025) 012042 doi:10.1088/1755-1315/1487/1/012042

Effect of Plant Extracts and Nano-Selenium on the Anatomical Characteristics of Mango Seedling Leaves (*Mangifera indica* L.) Under Stress Conditions

Noor Abdulrazzaq Abdullah[1], Wasen Fawzi Alpresem[2] and Ahmed Yousef Lafta Hzaa[3]

[1]Department of Horticulture and Landscape Design, College of Agriculture, University of Basrah, Basrah, Iraq.
[2]Unit of Medicinal and Aromatic Plants, College of Agriculture, University of Basrah, Basrah, Iraq.
[3]Department of Marine Biology, Marine Science Centre, University of Basrah, Basrah, Iraq.

[2]E-mail: wasen.fadel@uobasrah.edu.iq

Abstract. This study was conducted at the Agricultural Research Station and Laboratories of the College of Agriculture, University of Basrah, Department of Horticulture and Landscape Design, on two-year-old mango seedlings planted in 25 kilograms pots. The study included a factorial experiment with two factors and six replicates, resulting in 54 experimental units. The first factor consisted of three treatments: Moringa extract and Damas leaf extract at (100 mg L^{-1} and 100 mg L^{-1}) as well as control treatment. The second factor was nano-selenium at (0, 25, 50 ppm). The Anatomical characteristics of the leaves were analyzed using the paraffin technique. The results showed that the control treatment significantly outperformed the others, recording the highest cuticle layer thickness of 3.03 µm, while the Damas extract treatment recorded the lowest thickness of 1.59 µm. Regarding the effect of nano-selenium, the control treatment outperformed the other concentrations with an average thickness of 2.66 µm, while the 50 mg L^{-1} concentration recorded the lowest value of 1.66 µm. The interaction between Damas extract and nano-selenium at 50 mg L^{-1} recorded the lowest thickness of 0.99 µm compared to the control treatment recorded the highest cuticle layer thickness of 3.23 µm. Additionally, the interaction between Damas extract and 50 mg L^{-1} nano-selenium resulted in the highest values for epidermal cell thickness, palisade cell length, spongy cell diameter, and the thickness of the xylem and phloem layers, measuring 92.34 µm, 94.25 µm, 15.89 µm, 17.86 µm, and 8.49 µm, respectively. The study also suggested that the observed damage to the Anatomical characteristics of the leaves could be attributed to the sharp increase in temperature and low relative humidity during the summer growing season. These environmental stresses likely caused a reduction in key Anatomical features, such as the thickness of the xylem and phloem layers within the vascular bundles, while significantly increasing the cuticle layer thickness. This thickening of the cuticle layer may represent an adaptive response by the plant to mitigate the effects of environmental stress.

Keywords. Anti-transpiration, Nano-selenium, Anatomical characteristics, Mango, Stress.