بسم الله الرحمن الرحيم

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MORPHO-ANATOMICAL STRUCTURE AND ITS RELATION TO ADAPTIVE MECHANISMS IN SOME EGYPTIAN PLANTS UNDER STRESS CONDITIONS

By

AYA MAHMOUD MEHANNY ALI
B.Sc. Agric. Sc. (Plant production), Fac. of Agric., Ain Shams Univ. (2016)

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Approval Sheet

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ABSTRACT

Aya Mahmoud Mehanny Ali: Morpho-Anatomical Structure and Its Relation to Adaptive Mechanisms in Some Egyptian Plants Under Stress Conditions, M. Sc. Thesis, Agric. Botany Dept., Fac. of Agric., Ain Shams Univ., 2022.

This work was achieved to study the morph-anatomical and physiological adaptations of two Mediterranean species under natural stress conditions in different seasons. *Chiliadenus candicans* and *Tamarix nilotica* are perennial plants that grow naturally in the Northwestern Mediterranean coast region. *C. candicans* grows in sand dunes while *T. nilotica* grows in salt marshes habitats. After studying the climate data and the result of soil analysis, it was evident that the plants growing in the study areas suffer from several environmental stresses, including drought and salinity, which are more intense in the summer season than in winter, in addition to the increase in both temperature and solar radiation in summer. The results of the study showed that both the studied plants require flexibility in their responses to abiotic stresses that they suffered. *T. nilotica* was distinguished by the presence of salt glands that it uses to expulsion excess salts outside its body as an adaptation mechanism against salinity. While *C. candicans* was distinguished by the seasonal dimorphism phenomenon and the presence of trichomes. *C. candicans* use these features to reduce the surface area of transpiration. Consequently, reduce water loss by transpiration as a stress adapting mechanism. Both the studied plants showed several combined morpho-anatomical and physiological adaptations that are very noticeable in the summer compared to the winter. The most important of these adaptations are the significant reduction of the leaf area. Also, the increases in the thickness of cuticle layer and the leaf thickness as a result of the increase in the thickness of the photosynthetic tissues. These changes were amid to reducing water loss by transpiration or maintaining the efficiency of photosynthesis process. On the other hand, the most noticeable

physiological changes were the increasing of some compounds concentration in summer more than in winter. This aims to osmotic adjustment to improve water retention efficiency or have antioxidant activity. These compounds include proline, total phenolic compounds, sugars and free amino acids. These traits improve the ability of plants to withstand the environmental stress conditions in the sand dunes and salt marshes habitats.

Key wards: *Chiliadenus candicans*, *Tamarix nilotica*, Salinity, Drought, Solar Radiation, Plant Adaptations, Sand Dunes and Salt Marches.

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