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EFFECT OF SALT STRESS ON ROOT PLASTICITY AND EXPRESSION OF ION TRANSPORTER GENES IN TOMATO PLANTS

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ABSTRACT

One of the most adverse abiotic stresses affecting agriculture worldwide is soil salinity. Salt stress results in decreasing plants growth, yield and, consequently, affecting the domestic and global economy. Tomato is an economically important salt-sensitive vegetable grown all over the world, and is considered the main vegetable grown in Egypt in terms of area and production. The first part of this study aims to evaluate the plasticity of Root System Architecture (RSA) of Egyptian tomato cv. Agyad-16 under salt stress. For this purpose, minirhizotron system was used to monitor the growth and RSA of the plants using soil substrate, where tomato seedlings were irrigated with either tap water (control) or 125 mM NaCl (salt treatment). Salinity significantly decreased main root length (MRL), lateral root length (LRL), number of lateral roots and total root size. In addition, there was a significant inhibition in root growth rate and fresh weight of roots. In the second part of this study, the aim was to examine the response of potted cv. Agyad-16 plants to salt stress at an early growth stage. In potted plants subjected to control (tap water) or salt stress (125 mM NaCl solution) treatments, salt stress increased Na+ contents and Na+/K+ in both leaves and roots, while the content of K+ slightly decreased. Also, a significant increase in proline accumulation was detected in response to salt treatment, while total chlorophyll content were only slightly affected. At the molecular level, salt treatment resulted in a slight increase in the gene expression of both SlSOS1 and SlNHX3 cation transporters in roots, both triggered as a tolerance mechanism against the high salt levels in the external environment. All in all, our results are in harmony with similar previous studies on other tomato accessions, indicating that Egyptian tomato cv. Agyad-16 seems to be mildly sensitive to salt stress.

KEYWORDS: Salinity, Salt Stress, Ion Transporter Genes, Tomatoes

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