Proceedings of the LXIV SIGA Annual Congress
Online, 14/16 September, 2021
ISBN: **978-88-944843-2-8**

Poster Communication Abstract – 5.13

TOMATO SYSTEMIN: A VALID WEAPON AGAINST BIOTIC AND ABIOTIC STRESS AGENTS

MOLISSO D.*, CIRILLO V.*, APRILE A. M.*, LENTINI M.*, ESPOSITO M.*, CHIAIESE P.*, MAGGIO A.*, RAO R.*

*) Department of Agriculture, University of Naples "Federico II", Via Università 100, 80055 Portici (Italy).

systemin, soil drench, salt stress, defense responses, plant growth

Plant signaling peptides trigger several signal transductions of external and internal stimuli that lead to the production of hormones and to the successive activation of genes modulating many physiological events including defense. Some of these peptides have been defined as plant resistance activators or elicitors that lead to improved protection of the plant's own defense. One of the best characterized signaling peptide is systemin (Sys), an octadecapeptide synthesized as a part of a larger precursor protein, prosystemin (ProSys). Sys was isolated from tomato leaves and proved to be able to activate the octadecanoid pathway, which leads to the production of the plant hormone jasmonic acid (JA) and its derivatives, which are powerful activators of plant defense genes. Transgenic plants constitutively expressing ProSys have shown a wide transcriptome reprogramming which reflected in novel phenotypes resistant to different pests and tolerant to moderate salt stress. It is well known that JA and its derivatives provide a direct way of alleviating the biotic and abiotic stresses activating the plant's defense mechanisms, which also involve antioxidative enzymes and other defensive compounds. Recently, by combining gene expression studies and bioassay with different pests, we demonstrated that the exogenous application of the Sys peptide to tomato plants enhances both direct and indirect defense barriers. Nonetheless, the ability of the exogenous supply of Sys peptide to reduce salt stress damages was not investigated. To contribute to this knowledge, we evaluated the effect of a single application of the peptide via soil drench, on the expression of abiotic stress-related genes, on plant growth characteristics and on metabolic parameters of tomato plants exposed to two concentrations of NaCl (100 and 150 mM). Our results indicate that the delivery of this peptide alleviated the negative effect of salinity on plant growth, as indicated by the higher shoot biomass evidenced in treated plants under 150 mM NaCl. This was correlated with higher leaf proline content and the upregulation of key salt stress related genes. It was also observed that under nonstress condition, Sys did not alter plant growth in terms of shoot fresh weight or leaf area but promoted a significant increase of root area. The present study indicates that Sys peptide can increase the resistance of tomato plants to salt stress, likely triggering plant defense responses. Our results may give new insights in the cross-talk between plant responses to biotic and abiotic stresses, understanding of which represents an important contribution for crop protection.