Proceedings of the LXVI SIGA Annual Congress
Bari, 5/8 September, 2023
ISBN: **978-88-944843-4-2**

Poster Communication Abstract – 2.46

THE ROLE OF SIO2-BASED NANOPARTICLES IN TOMATO PLANTS SALT STRESS MITIGATION

CARLO S.*, PAGANO L.**, BONANNI V.***, GIANONCELLI A.***, MARMIROLI M.*, MARMIROLI N.**

*) Department of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Parma 43124, Italy
**) Consorzio Interuniversitario Nazionale per le Scienze Ambientali (CINSA), University of Parma, 43124 Parma, Italy
***) Elettra, Sincrotrone Trieste, Trieste 34149, Italy

tomato, salt stress mitigation, SiO2 nanoparticles, transcriptomics, abiotic stress response

The increasing salinization of cultivable soils exposes crops to abiotic stresses, leading to the need of sustainable and effective technologies able to mitigate the reduction of crops yield. In particular, the widespread drought during the last few years has led to saline water rising from the sea to rivers and wells, increasing the overall salinity level. The brackish water from the Po river delta lagoons in Romagna as well as salinized water in Foggia plains, is often used for field irrigation causing a reduction of tomato plants yield and a progressive soil salinization. The use of SiO_2 nanoparticles (NPs) on crops with notable economic impact such as tomato (Solanum lycopersicum L.), could be a potential strategy for the regulation of plants response to salt stress. The present study aims to assess the effects of SiO_2 NPs in salt stress tolerance on tomato cultivar Heinz 3402, widely used in industrial cultivation. This cultivar has been selected for its great productivity and yield as well as fruit properties such as thick pulp and excellent consistency. Tomato plants were transplanted after 21 days from germination in soil (amended with 1% NaCl) with SiO_2 NPs or sodium metasilicate (Na_2SiO_4). Physiological and phenotypic parameters were monitored during plants growth: photosynthetic activity (SPAD) and biochemical assays (TBARs assay, TTC assay, determination of proline content) were performed after 6 weeks of treatment. Leaves and roots samples were analyzed through scanning

X-ray microscopy, to obtain X-ray fluorescence elemental maps. Transcriptomic analysis through RNAseq were also performed on leaves and roots samples. The results showed a positive role of SiO_2 NPs in reducing lipid peroxidation of plant roots under salt stress condition, although it did not affect proline content. X-ray fluorescence elemental maps analyses suggest a greater translocation and accumulation of silicon to the stems. The reduced SiO_2 NPs translocation (as compared with sodium metasilicate) results in a differential gene expression regulation. Interestingly, a modulation of silicon-mediated salt stress response in chloroplast gene expression has been observed.