Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

A Comparative Analysis of Salinity and Nickel Tolerance of Tomato (Solanum *Lycopersicon* L.) Genotypes

Muhammad Amjad[1], Nuzhat Ameen[2], Behzad Murtaza[3], Muhammad Imran[4], Muhammad Naeem[5]

[1] *Comsats Institute of Information Technology, Vehari Campus, Department of Environmental Sciences, Pakistan*
[2] *Comsats Institute of Information Technology, Vehari Campus, Department of Environmental Sciences,*
[3] *Comsats Institute of Information Technology, Vehari Campus, Department of Environmental Sciences,*
[4] *COMSATS Institute of Information Technology Vehari, Department of Environmental Sciences, Pakistan*
[5] *COMSATS Institute of Information Technology Vehari, Department of Environmental Sciences, Pakistan*

Abstract

Plants are usually exposed to different types of biotic and abiotic stresses simultaneously. The presence of one type of abiotic stress may aggravate or alleviate other biotic or abiotic stresses. There are very few plants species that have ability to survive in combined stress conditions, it is essential to introduce such crop species which have ability to tolerate salinity and Ni-toxicity simultaneously. The species tolerant against one type of stress may/may not be tolerant against other type of stress. However, the plant species/genotypes might show similar behaviour against stresses that have alike physiological impacts on plants. An experiment was conducted to elucidate the comparative tolerance of tomato genotypes/hybrids against salinity (NaCl) and nickel (Ni) toxicity. Eight tomato genotypes/hybrids were exposed to different levels of NaCl (0, 75 and 150 mM) and Ni (0, 15 and 20 mg L^{-1}) in hydroponics for four weeks. Increasing levels of NaCl and Ni significantly decreased growth of all the genotypes. Cluster analysis for relative tolerance of the genotypes/hybrids showed that the genotype "Naqeeb" is the most tolerant whereas the genotype "Nadir" proved to be most sensitive against both the NaCl and Ni-toxicity. Leaf tissues Na^+ and Ni concentration significantly increased by increasing NaCl and Ni levels in the growth medium with tolerant genotype "Naqeeb" showing lowest and sensitive genotype "Nadir" with highest concentration. Antagonistic relation between uptake of Na^+ and Ni was observed in all the genotypes/hybrids. Results revealed that tomato genotypes/hybrids shared same defense mechanism against salinity and Ni-toxicity tolerance. The genotypes tolerant against one stress can be regarded as tolerant against other stress as well.

Keywords: Cluster analysis, nickel, phytotoxicity, relative tolerance, salinity

Contact Address: Muhammad Amjad, Comsats Institute of Information Technology, Vehari Campus, Department of Environmental Sciences, Mailsi Road Off Multan Road Vehari, 61100 Vehari, Pakistan, e-mail: drmuhammadamjad@ciitvehari.edu.pk