

الملخص الإنجليزي للبحث رقم ٥

عنوان البحث باللغة الإنجليزية :

Acidified compost and silymarin-enriched bio-stimulators integratively improve morpho-physio-biochemistry, antioxidant capacity, and polyamine metabolism enzymes of *Atriplex nummularia* lindl seedlings under saline-calcareous conditions

Authors:

Mostafa M. Rady¹ , Hesham F. Alharby^{2,3} , Doaa' A. M. M. Tarfayah¹, Safia Mahmoud Abdel-Mageed Ahmed¹

¹Botany Department, Faculty of Agriculture, Fayoum University, Fayoum, Egypt.

²Department of Biological Sciences, Faculty of Science, King Abdulaziz University, Jeddah 21589, Saudi Arabia.

³Plant Biology Research Group, Department of Biological Sciences, Faculty of Science, King Abdulaziz University, Jeddah 21589, Saudi Arabia.

ABSTRACT:

When the plant is subjected to stress conditions on saline-calcareous soil, it is severely damaged and may die. Overcoming these stresses is a challenge for the sustainability of human and animal feeding. Evaluation of potential enhancing impacts of treating saline-calcareous soil with acidified leguminous compost (AcC) and *Atriplex nummularia* plants with silymarinenriched bio-stimulators on growth and nutritional value under saline-calcareous stress conditions. During 2020 and 2021, after treating the defective soil with AcC at 20 t per ha, *A. nummularia* plants were foliar-treated three times with a silymarinenriched bio-stimulator [2% maize grain embryo extract enriched with 200 µg silymarin per L of extract (BsS₍₁₎) or 1% bee-honey solution enriched with 200 µg silymarin per L of solution (BsS₍₂₎)] to investigate potential enhancing impacts of this integrative treatment on plant growth, physio-biochemical traits, nutritional value, and antioxidant systems under saline calcareous stress conditions. Soil treatment with AcC improved plant growth, root activity, photosynthetic efficiency, leaf cell integrity, soluble protein, osmo-regulatory compounds (ORCs), different antioxidants, nutritional status, polyamines, and polyamine metabolic enzymes, while markers of oxidative stress (hydrogen peroxide; H₂O₂ and superoxide; O₂⁻), oxidative damage (lipid peroxidation and electrolyte leakage), total phenols, and Na⁺ levels were suppressed. In untreated or AcC-treated soil, leaf spraying with BsS₍₁₎ or BsS₍₂₎ conferred the same trend as the above positive results obtained with AcC application. The outcomes obtained with BsS₍₂₎ slightly exceeded those obtained with BsS₍₁₎. Compared with single treatments, the integration of soil treatment with AcC and plant treatment with bio-stimulators conferred further improvements in plant growth, root activity, photosynthetic efficiency, leaf cell integrity, soluble protein, ORCs, different antioxidants, nutritional status, polyamines (PAs), and polyamine (PA) metabolism enzymes, while H₂O₂, O₂⁻, lipid peroxidation, electrolyte leakage, total phenols, and Na⁺ levels were further declined. The best results were obtained by integrating soil treatment with AcC and plant treatment with BsS₍₂₎, which effectively minimizes the saline-calcareous stress impacts, and thus can be recommended for producing satisfactory plant productivities under these adverse conditions.