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IMPROVEMENT OF SOYBEAN RESPONSE TO DROUGHT STRESS BY INOCULATION WITH BRADYRHIZOBIUM AND BACILLUS STRAINS

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Background

Drought is one of the most adverse abiotic factors that affects crop yield. Crop production in a water-limited environment can be improved by inoculating plants with selected bacterial strains.

Objectives

The aim of this research was to examine the modulation of several antioxidant parameters in soybean plants inoculated with *Bradyrhizobium japonicum* and *Bacillus megaterium* under drought stress.

Methods

Bacterial strains were selected based on osmotic stress tolerance (36% PEG 6000) in liquid culture. The effect of soybean inoculation was evaluated in a soil pot experiment under drought stress (7 days withholding water). The effects of drought stress and inoculation were examined in soybean roots and nodules through guaiacol peroxidase (POX) and ionically cell-wall bound peroxidase (POD) activity and ABTS⁺ radical cation scavenging capacity.

Results

The obtained results showed a significant influence of inoculation to constitutive and drought-induced antioxidative parameters in nodules, while this effect in root was evident only during the water deficit. In the inoculated plants, POX activity increased by 145% in nodules and by 91% in roots, POD activity was elevated by 86% in nodules and by 54% in roots, while antioxidant capacity was elevated by 75% in nodules and by 60% in roots in respect to well – watered plants. Significant increase in all tested parameters was not recorded in non-inoculated plants under drought stress. Selection and application of bacterial strains with genetic potential for increased tolerance to stresses is useful in developing inoculants which would result in enhanced crop production under adverse environmental conditions.

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