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Effect of the Nanocomposite Complex Bacterial Preparation Azogran on the Phenolic Profiles of Different Barley Varieties under Abiotic Stress Conditions

Abstract: Hordeum vulgare L. is a valuable cereal crop worldwide. However, its yield is decreasing due to increasing abiotic stresses. The prolonged action of oxidants creates an imbalance in the functioning of antioxidants. One of the stabilization ways of redox-homeostasis in the plants is the use of microbial preparations. Plant Growth Promoting Rhizobacteria (PGPR) are the main components of these preparations. PGPR are contribute to the development of stress-tolerance through activation of the synthesis of phenolic metabolites (Ph-OH) in the plants.HPLC was used to determine the composition of phenolic profiles extracted from the barley samples. Inoculation of seeds of barley varieties (Burkhant, Virazh and Copeland) with the nanocomposite complex bacterial preparation Azogran (Azotobacter vinelandii IMV B-7076 + Bacillus subtilis IMV B-7023 + nanostructured mineral bentonite) increased the levels phenolic acids and flavonoids in the free and bound fractions. Whereas in plants whose seeds were stressed with H_2O_2 and inoculated with Azogran, Ph-OH with a high ability to inactivate the harmful effects of H_2O_2 dominated. The concentration of free chlorogenic, syringic, benzoic, p-coumaric acids, rutin and bound chlorogenic, benzoic and trans-ferulic acids increased in plants of the Burkhant barley variety. In plants of Virazh barley, the levels of free caffeic and syringic acids, quercetin and bound 4-hydroxyphenylacetic (4-HPA), trans-ferulic, sinapic, trans-cinnamic acids, quercetin and kaempferol increased. In Copeland barley plants, only 4-HPA and trans-ferulic acids in the free fraction and syringic acid in the bound fraction were increased. Thus, in spite of the different responses of the different barley varieties to the action of the bacterial preparation Azogran, the synthesis of those Ph-OH which are an effective buffer against peroxide stress increased in their plants.