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EFFICACY OF BIOPREPARATIONS ON SEED GERMINATION AND EARLY SEEDLING DEVELOPMENT OF SOYBEAN (*Glycine max* L.)

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Seed germination and early seedling development represent important stages in establishing the biological potential of seed material. The use of biopreparations for seed treatment is of particular interest due to the ability of beneficial microorganisms to stimulate physiological processes involved in germination and initial plant growth.

The aim of the research was to evaluate the effectiveness of biopreparations on seed germination and early seedling development of soybean under laboratory conditions.

The research was conducted in the Biotechnology and Phytopathology Laboratory of the Institute of Genetics, Physiology and Plant Protection, State University of Moldova. The biological material used consisted of soybean (*Glycine max* L.) seeds of the Aura cultivar. The experiment included seven experimental variants, including a control variant (untreated seeds) and six variants with pretreated seeds: water treatment, chemical standard INSURE Perform, biological standard Fitocid (*Bacillus subtilis*), biological preparation Rizoplan (*Pseudomonas fluorescens* AP-33), biopreparation Trichodermin SC (*Trichoderma lignorum*), and amorphous silicon dioxide (SiO_2). Each variant was performed in three replicates of 50 seeds each.

Seed germination was carried out using the paper roll method, followed by incubation of samples in a thermostat at 27°C for 7 days under controlled temperature conditions. The germination process was monitored daily. At the end of the experiment, germination percentage, root length, and seedling vigor index (SVI) were determined, and the obtained data were statistically analyzed.

The application of pre-sowing treatments positively influenced seed germination and early soybean seedling development. Compared with the control variant (89.3%), all treated variants showed higher germination values, ranging from 95.3 to 98.0%. The highest germination percentages were recorded for the chemical standard INSURE Perform and Fitocid (98.0%), followed by Rizoplan and Trichodermin SC (97.3%).

More pronounced differences were observed in root system development. The average root length ranged from 33.46 mm in the control variant to 120.69 mm in the Rizoplan-treated variant. This variant also recorded the highest seedling vigor index value (SVI = 11747.13), demonstrating the stimulatory effect of the biopreparation on early seedling development. Fitocid promoted uniform root system development, while Trichodermin SC and amorphous silicon dioxide improved the analyzed parameters compared with the control variant.

The obtained results demonstrate that the use of biopreparations for seed treatment contributes to improving soybean seed germination and seedling vigor. Among the evaluated biological products, Rizoplan showed the highest biological efficacy, expressed through stimulation of root system development and increased seedling vigor index.

Keywords: soybean, germination, biopreparations, Rizoplan, seedling vigor

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