



**INSTITUT ZA POVRTARSTVO
SMEDEREVSKA PALANKA**

**Biotehnologija i savremeni pristup
u gajenju i oplemenjivanju bilja**

Nacionalni naučni skup sa
međunarodnim učešćem

ZBORNIK IZVODA

Smederevska Palanka, 6. novembar 2025.

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UTICAJ INOKULACIJE ODABRANIM *BACILLUS* SOJEVIMA NA PRINOS BILJNE MASE JEČMA

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Izvod








Ječam (*Hordeum vulgare* L.) zauzima četvrto mesto među najznačajnijim žitaricama u svetu, sa dugom istorijom gajenja i ključnom ulogom u globalnoj poljoprivrednoj proizvodnji. Njegov značaj potiče iz visoke prilagodljivosti različitim klimatskim uslovima, nutritivne vrednosti i široke primene – od stočne hrane i osnovne sirovine za pivarsku industriju do upotrebe u proizvodnji prehrambenih proizvoda za ljudsku ishranu. U kontekstu porasta svetske populacije i izazova koje nameću klimatske promene, neophodno je razvijati održive i efikasne strategije za unapređenje prinosa i kvaliteta ječma. U tom smislu, sve veća pažnja usmerava se na primenu mikroorganizama kao ekološki prihvatljive alternative sintetičkim đubrivima i pesticidima. Posebno su perspektivne bakterije iz roda *Bacillus*, od kojih se pojedine vrste svrstavaju u rizobakterije koje podstiču rast biljaka (PGPR). Ove bakterije poznate su po sposobnosti da poboljšaju usvajanje hranljivih materija (npr. putem fiksacije azota i rastvaranja fosfata), sintetišu fitohormone rasta i štite biljke od patogena. Stoga je cilj ovog istraživanja bio da se proceni uticaj dva soja roda *Bacillus* na prinos ječma (*Hordeum vulgare* L.) u polukontrolisanim uslovima, u eksperimentu u saksijama. Odabrani sojevi su prethodno okarakterisani kao bakterije sa osobinama koje pospešuju rast biljaka, kao što su produkcija indol-3-sirćetne kiseline, siderofora i sposobnost solubilizacije fosfata. Seme ječma inokulisano je sojevima *Bacillus thuringiensis* BHC 2.4 i *Bacillus velezensis* BHC 3.1, dok je tretman bez inokulacije služio kao kontrola. Eksperiment je sproveden u stakleniku Instituta za zemljište od maja do avgusta 2025. godine. Biljke su gajene u saksijama prečnika 15 cm, raspoređenim po principu potpuno slučajnog rasporeda, sa tri ponavljanja po tretmanu. Na kraju oglada

nadzemna biljna masa je pokošena, osušena i izmerena (g). Oba bakterijska tretmana značajno su povećala prinos biljne mase u poređenju sa kontrolom. Detektovano je povećanje prinosa suve biljne mase za do 29,93% kod biljaka inokulisanih sojem *B. thuringiensis* BHC 2.4 i do 48,91% kod biljaka tretiranih sojem *B. velezensis* BHC 3.1. Dobijeni rezultati ukazuju da ispitivani sojevi roda *Bacillus* poseduju visok potencijal kao bioinokulanti koji podstiču rast ječma, doprinoseći održivoj poljoprivrednoj proizvodnji i smanjenju zavisnosti od hemijskih đubriva. Buduća istraživanja treba da obuhvate potvrdu efikasnosti ovih sojeva u poljskim uslovima.

Ključne reči: inokulacija *Bacillus* sojevima; rast ječma; prinos biljne mase; ogled u stakleniku

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IMPACT OF SELECTED BACILLUS STRAINS INOCULATION ON BARLEY BIOMASS YIELD

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Abstract






Barley (*Hordeum vulgare* L.) ranks as the world's fourth most important cereal crop, boasting a long history of cultivation and a pivotal role in agricultural production across the globe. Its significance stems from its adaptability to diverse climatic conditions, high nutritional value, and versatile utility—ranging from livestock feed and a primary brewing raw material to human food products. In the context of a growing global population and the challenges posed by climate change, it is imperative to develop sustainable and efficient strategies to enhance barley yield and quality. To this end, there is a growing focus on utilizing microorganisms as an ecologically friendly alternative to synthetic fertilizers and pesticides. Strains of bacteria from the genus *Bacillus* are particularly promising; as some of them are classified as Plant Growth-Promoting Rhizobacteria (PGPR). These bacteria are renowned for their ability to improve nutrient uptake (e.g., through nitrogen fixation, phosphate solubilization), synthesize plant growth hormones, and protect crops against pathogens. Therefore, the present study aimed to evaluate the effect of two *Bacillus* strains on the growth performance of barley (*Hordeum vulgare* L.) under semi-controlled conditions, in a pot experiment. *Bacillus* strains were selected based on their previously confirmed PGP traits, such as the production of indole-3-acetic acid, siderophore and phosphate solubilization ability. Barley seeds were inoculated with *Bacillus thuringiensis* BHC 2.4 and *Bacillus velezensis* BHC 3.1, while a non-inoculated treatment served as the control. The experiment was conducted

in the greenhouse of the Institute of Soil Science from May to August 2025. Plants were grown in pots (15 cm in diameter) arranged in a completely randomized design with three replications per treatment. At the end of the experiment, aboveground biomass was harvested, dried and measured (g). Both bacterial treatments significantly enhanced plant biomass compared to the control. The dry biomass yield increased by up to 29.93% in plants inoculated with *B. thuringiensis* BHC 2.4 and by up to 48.91% in those treated with *B. velezensis* BHC 3.1. These results suggest that the tested *Bacillus* strains have a strong potential as plant growth-promoting inoculants for barley cultivation, contributing to sustainable crop production and reduced dependence on chemical fertilizers. Future research should include confirmation of efficiency of the selected strains under field conditions.

Keywords: *Bacillus* inoculation; barley growth; biomass yield; greenhouse pot experiment

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