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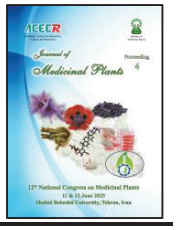

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Evaluating the Role of *Bacillus subtilis* in Enhancing Salt Tolerance in *Ocimum basilicum*

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ABSTRACT

Ocimum basilicum (basil), a widely utilized aromatic medicinal plant, is highly valued in culinary, perfumery, cosmetic, and health industries due to its rich flavonoid and polyphenol content. Historically, basil has played a significant role in traditional medicine, particularly for diabetes management, with multiple studies confirming its antidiabetic effects through animal models. To investigate the role of *Bacillus subtilis* in improving basil's tolerance to salinity, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The experiment consisted of 14 treatments, integrating seven salinity levels (ranging from 0 to 12 dS/m) and two bacterial conditions (presence and absence of *Bacillus subtilis*), with four replications per treatment. Key physiological and biochemical parameters—including plant height, fresh and dry biomass, essential oil yield, chemical composition of essential oils, and total phenol and flavonoid content—were measured to evaluate basil's response to varying salinity conditions. Results indicate that basil's tolerance threshold to salinity significantly increases in the presence of *Bacillus subtilis*, reaching up to 8 dS/m. Quantitative assessments reveal notable improvements in biomass accumulation, essential oil production, and phenolic content under saline conditions with bacterial inoculation. These findings underscore the potential of biological approaches, such as bacterial inoculation, in promoting the sustainable cultivation of medicinal plants in Iran by mitigating salt-induced stress.

References

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