

Inoculation of Cyanobacteria Improves the Lignin Content of *Thymus vulgaris* L.

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Abstract : Cyanobacteria are one of the most promising sources of new biostimulants and have received much attention due to their diverse applications in biotechnology. These microorganisms enhance the growth and productivity of plants by producing plant growth stimulants and fixing atmospheric nitrogen. *Thymus vulgaris* L., a valuable medicinal plant from the Lamiaceae family, is widely distributed across the globe. essential oil of *T. vulgaris* is best characterized by the prominence of phenols, making them the key compounds in its composition. Lignin biosynthesis as a natural plant polyphenol plays a crucial role in promoting plant growth, strengthening cell walls, and increasing resistance to pathogens. In this study, the bioelicitor activity of five cyanobacterial suspensions including *Anabaena torulosa* ISB213, *Nostoc calcicola* ISB215, *Nostoc ellipsosporum* ISB217, *Trichormus doliolum* ISB214, and *Oscillatoria* sp. ISB2116 on the lignin content of the *T. vulgaris* L. was investigated. Pot experiments were performed by inoculation of a %2 algal extract to the soil of treated plants one week before planting and then every 20 days. After four months, the lignin content in the leaves of both treated and control plants was evaluated. The results demonstrated that the application of cyanobacteria significantly increased the lignin content in the leaves of treated plants compared to the control. The treatment with *Oscillatoria* sp. ISB216 and *N. ellipsosporum* ISB217 resulted in the highest lignin content, with an increase of 93.33% and 86.67%, respectively. These findings highlight the potential of cyanobacteria as bioelicitors, offering a viable alternative for enhancing the production of secondary metabolites in *T. vulgaris*. Consequently, this could contribute to the economic value of this medicinal plant.

Keywords : cyanobacteria, bioelicitor, *thymus vulgaris*, lignin

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