



Abstract

# Assessment of the Effect of Outer Membrane Vesicles of Endophytic Bacteria on the Growth and Physiological Response of *Arabidopsis thaliana* <sup>†</sup>

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**Abstract:** The world faces the challenge of producing a sufficient amount of food for the constantly growing human population in a sustainable manner. It means the usage of pesticides and fertilizers with minimized adverse effects on the environment and the wide application of beneficial microorganisms. Bacteria produce outer membrane vesicles (OMVs) that might affect plant development. The aim of the study was to evaluate the impact of OMVs on the *Arabidopsis thaliana* condition. The experiments were conducted with endophytic bacteria. To obtain OMVs, specific protocols for their isolation have been developed. OMVs' morphology, size, and surface charge have been studied with the use of SEM and TEM. The OMVs were added to the surface of sterilized seeds of *A. thaliana* that were grown on Murashige and Skoog agar medium for 14–21 days. To assess the impact of OMVs on plants, the rate of seeds germination, biomass, and the length of the shoots and roots were measured. Moreover, the level of oxidative stress and the activity of the antioxidant enzymes in the plants were evaluated. The experiments conducted so far have shown that OMVs produced by tested strains had a great ability to induce the germination and growth of seedlings. The OMVs that originated from the tested bacteria differently influenced the length of plant roots. *Serratia* sp. OMVs inhibited the growth of *A. thaliana* seedlings, whereas OMVs released by *Pseudomonas* sp. stimulated it. Furthermore, OMVs produced by both bacterial strains had a great effect on the activity of oxidative plant enzymes. The knowledge concerning plant response to OMVs is limited. Therefore, the preliminary studies seem to be important to obtain knowledge that may be applicable in the development of new natural compounds that can be used as plant growth stimulators.

**Keywords:** outer membrane vesicles (OMVs); endophytic bacteria; *Arabidopsis thaliana*; plant response

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