Bacteria, using complex mechanisms, are able to produce microscopic vesicles and release them into the surrounding environment. These structures are produced by microorganisms in response to highly variable external conditions. These vesicles are also a way of communication between bacteria and other microorganisms as well as a host colonized by them. The vesicles may contain bacterial metabolites, toxins, antigens, virulence factors and genetic material (DNA, RNA). A number of recent studies is focused on the characteristics of outer membrane vesicles (OMV) produced by gram-negative pathogenic bacteria and their influence on a colonized organism. However, our knowledge on the role of OMVs released by endophytic bacteria, which can promote plant growth, is sparse. Inside a plant, endophytic bacteria can activate immune mechanisms which protect a plant from fungal and bacterial pathogens. Therefore, the aim of our project is to verify if OMVs produced by endophytic bacteria can stimulate systemic immune response in plants, and if they have any effect on physiological mechanisms responsible for plant growth and development. Vesicles isolated from bacterial cultures will be characterized using advanced microscopic techniques, considering their size and morphology. With the use of advanced molecular methods and chemical analysis we will investigate OMV content. It will help us to understand what bacteria can load inside them. Furthermore, we are going to develop an interesting system of tracking OMVs and their fate inside plant tissues (labeling with green fluorescent protein, GFP). We will try to find out a plant reaction on the presence of these structures and what is a character of such potential response. We expect that the results of our project will contribute to better understanding of the function of bacterial OMVs and their influence on plant physiology and activation of immune mechanisms. Obtained results might be useful in the development of new, sustainable strategies of the enhancement of plant productivity and their protection from pathogens.