**Summary of the dissertation**

Małgorzata Martyna Woźniak

**Bacterial endophytes of selected crops and weeds -biodiversity and assessment of biotechnological potential in promoting plant growth and development**

**Keywords:** endophytes, 16S rRNA gene sequencing, genetic diversity, metabolic profile, properties to promote plant growth and development, sustainable agriculture, bioproducts

With the global need for food security, climate change and increasing pollution due to the indiscriminate use of dangerous agrochemicals, i.e. pesticides and fertilizers, there has been increased interest in finding alternative methods of fertilizing and controlling crop pests. Consequently, the use of endophytic bacteria in agriculture is proving to be a promising tool in the development of sustainable agriculture. The biological potential of bacterial endophytes in promoting plant growth and alleviating biotic and abiotic stresses offers an economical and environmentally friendly way to increase plant growth and crop productivity and maintain soil health.

The aim of the dissertation was to identify and characterize native strains of endophytic bacteria isolated from surface-sterilized roots and stems of local crops and weeds, and to determine their potential of biostimulation for plant growth and development. A total of 45 endophytic bacterial isolates were selected, which were identified by comparative analysis of the 16S rRNA gene sequence and differentiated using fingerprinting methods: PCR-DGGE, BOX-PCR and ERIC-PCR. The isolated bacteria were classified into the genera *Rhizobium*, *Delftia*, *Agrobacterium*, *Stenotrophomonas*, *Brevundimonas*, *Novosphingobium*, *Variovorax*, *Collimonas*, *Achromobacter* and *Comamonas*. Based on selected molecular techniques, it was found that plant genotype significantly influences the composition and diversity of endophytic bacteria. After *in silico* nucleotide similarity analysis, 23 bacterial strains were selected for further study. Using the Biolog GEN III MicroPlate System, the catabolic potential of the analyzed strains towards selected substrates was determined. The analysis made it possible to select the most metabolically active bacteria - *Stenotrophomonas maltophilia*, *Novosphingobium resinovorum* and *Delftia acidovorans*. The metabolic and phenotypic properties of the bacterial endophytes were strictly dependent on the type of bacteria and were not correlated with the host plant species. A series of biochemical analyses were then performed to determine the biostimulatory potential for plant growth and development. All endophytic bacterial strains synthesised indolyl-3-acetic acid (IAA)-like compounds. Most of them (95%) were active diazotrophs, 74% of the strains showed the ability to produce siderophores, and only 13% of the strains showed phosphate solubilization activity. The analyses carried out made it possible to select 23 strains of endophytic bacteria possessing numerous mechanisms for promoting plant growth and development. An important aspect of the study was the identification of a relatively high number of bacteria that have a wide range of plant hosts (e.g. *Delftia* spp.). Consequently, these bacteria may represent the so-called core of endophytic bacteria in a given area (core of native bacteria) and may also possess so-called endophytic competence related to the efficiency of establishing interactions with plants. The combination of genetic analysis and metabolic testing is a key element in selecting the most suitable strains as effective components of biopreparations that stimulate plant growth and development in an environmentally sustainable manner. The endophytic bacterial strains characterized in this study show potential for further research into practical applications as components of plant growth-promoting biopreparations.