Arsenic is the one of the most toxic elements naturally occurring on the Earth and is a common health threat in many parts of the world. The inorganic forms of arsenic have been classified by the International Agency for Research on Cancer (IARC) to the first group of compounds with carcinogenic properties. In the literature are described many physical and chemical methods dedicated to the removal of arsenic from contaminated soil, nevertheless the costs of such methods are very high and a have negative impact on the soil properties and indigenous (micro)organisms. The solution to the problems associated with the high cost of such methods and negative affect for soil properties may be the use of the method based on the phytoextraction process. Phytoextraction is an ability of plants to uptake of contaminants from the soil by the root system, and then transport and accumulate in tissues. The efficiency of this process depends on many factors, including the composition and activity of soil microorganisms.

An important role in remediation of arsenic contaminated environments play microorganisms able to oxidation of arsenite, the most toxic arsenic compounds. Microbiological oxidation of arsenites is a selective process, during which no side effects harmful to the environment arise. The question therefore arises whether this group of microorganisms may also affect the efficiency of the phytoextraction of arsenic process from contaminated soil. The activity of arsenic-oxidizing bacteria may lead to the uptake of less toxic form of arsenic (arsenates) by plants, what can contribute to the plants growth promotion and/or increasing the arsenic phytoextraction efficiency.

To verify this relationship, obligatory is the reply for the following questions: (i) what is the influence of the activity of the arsenite oxidizing bacteria (AOB) on plant growth (ii) may AOB affect the arsenic phytoextraction efficiency and (iii) what is the mechanism of this process.

Thus, **the main objectives of this project are:** the investigation of **influence of soil enrichment with AOB on the morphology, growth and arsenic bioaccumulation efficiency of plants**, and the investigation of **impact of AOB on changes in the structure and functionality of microbial community** in soil well as verification of the **effect of changes in microbial community structure and activity** (under influence of AOB) **on growth of plants and arsenic phytoextraction efficiency**.

In the proposed project, cultures of plants (*Medicago sativa* L.) in arsenite contaminated soil and enriched by arsenite oxidizing strain (*Sinorhizobium* sp. M14) will be carried out. This stage of research involves the determination the effect soil enrichment with AOB on the general condition, the degree of bioaccumulation of arsenic and its distribution in the plant.

Moreover, the proposed project involves performing of experiments on the microcosms scale in constant temperature and humidity. These experiments will be performed with the use of naturally, arsenic contaminated soil enriched with *Sinorhizobium* sp. M14 strain. In this phase, the analysis of (i) the quality of arsenic contaminated soil and (ii) the structure and activity of the microbial community in the soil under influence of arsenic-oxidizing bacteria will be performed.

The last stage of the proposed project involves experiments concern the effect of changes in microbial community structure and activity (under influence of AOB) on growth of plants and arsenic phytoextraction efficiency. Plant cultures in soil enriched with AOB (soil obtained from microcosms experiments) will be performed. This stage of research include the analysis of (i) general condition of plants, (ii) quality of soil and (iii) microbial community structure and activity in soil at the end of plants culture.

Characterization of the influence of soil enrichment with AOB on structure of the soil microorganisms community and arsenic phytoextraction efficiency may be a base for further applications in biotechnology and environmental pollution reduction. The acquired basic knowledge regarding possibilities as well as mechanisms of enhancement of arsenic phytoextraction can be useful to develop the low cost, efficient and environmental friendly methods dedicated for removal of arsenic form contaminated soil.