Enhancing the phytoremediation of arsenic contaminated soil by the use of arsenite-oxidizing bacteria

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Plants biofortification strategy

AOB (arsenites oxidizing bacteria) are useful in remediation of various arsenic contaminated environments since are contribute to the decreasing of the toxicity of this element. As we showed, AOB activity in soil (transformation As(III) to As(V)) also had a positive influence on the efficiency of the phytoremediation of arsenic contaminated soils. The presence of AOB in soil contributed to the increasing of the fresh mass (Table 1) and efficiency of the arsenic uptake (Table 2).

Our experiments were conducted using the alfalfa plant (*Medicago sativa*) in the interaction with the *Ensifer* (*Sinorhizobium*) sp. M14, able to arsenites oxidation.

	+M14	-M14
Aboveground parts	0.68	0.42
Roots	0.14	0.10

Table 1: Fresh mass of plants [g] after 28 days of cultivation in arsenic contaminated soil with/without inoculation of M14.

	+M14	-M14
Soil	45.47	52.67
Plants	49.61	31,77

Figure 2: Total arsenic concentration in soil [mg/kg] and plants [mg/g] after phyremediadiation process carried out in the presence /absence of M14.

Discussion of Results

The improvement of the plants fitness and increase of arsenic phytoremediation efficiency may be caused by the reduction of the toxicity of this element and/or changes in microbial community structure in soil under the influence of the activity of AOB. As we also showed, the presence of AOB in soil contributed to the change in the original composition of microorganisms. Moreover, analysis of the dehydrogenases and cellulase activity, as well as arsenic speciation in soil showed, that the AOB-plants system contributed to the significant improvement of the quality of the soil.

Our results indicate, that AOB have high application potential and may be successfully used as a plant growth promoting factor in the context of the phytoremediation of arsenic contaminated soil.