Hard coal mining spoil heaps are one of the most difficult environments for the biological life. This is due to: limited availability of macronutrients necessary for plant growth and development, low water retention, high content of chlorides and/or sulphide minerals, and low pH.

Supplementation of nutrients such as nitrogen and phosphorus plays a key role in the growth and development of plants. Mineral fertilization can mitigate the adverse impact of environmental stresses by increasing the efficiency and activity of the photosynthetic apparatus, and consequently increasing the production of plant biomass.

Arbuscular mycorrhizal fungi (AMF) are symbionts to the most of plant species. AMFs receive from the plant the carbohydrates and lipids required for their functioning, and in return they provide minerals and water, which supports the growth and survival of plants even under stress conditions.

The aim of this study was to investigate how fertilization and mycorrhizal inoculation influence the growth and physiological parameters of plants inhabiting post-mining spoil heaps (*Calamagrostis epigejos*, *Poa compressa*, *Daucus carota* and *Tussilago farfara*).

Low and high doses of mineral fertilization, commercially available AMF inoculum as well as AMF inoculum isolated from the spoil heap substrate were used in the experiment. The production of plant shoot biomass, roots mycorrhizal colonization rates as well as changes in the content of chlorophylls, flavonols, anthocyanins, H_2O_2 and MDA (Malon-di-aldehyde) were examined. In addition, catalase activity and parameters obtained by measuring chlorophyll fluorescence were analyzed.

The obtained results showed that mineral fertilization has a positive effect on the investigated parameters among all of the tested plant species. Species specific response were found for different doses of mineral fertilizers. *Daucus carota* and *Calamagrostis epigejos* showed a better results under the high dose of fertilizer, in contrast to *Tussilago farfara* and *Poa compressa*, in which the effect of a high dose of fertilization was not observed.

In the treatments without mineral fertilization, none of the tested species showed a general positive response to the commercial mycorrhizal inoculum (M) or to the inoculum isolated from the spoil heap substrate (Z). The only positive visible effect of the M inoculum was observed for *P. compressa* and it occurred only for the oxidative stress parameters. In the fertilized treatments, *C. epigejos* obtained the best results under the influence of the M inoculum, *D. carota* under the influence of the Z inoculum, *T. Farfara* under the influence of both inocula, while *P. compressa* did not show a positive response under the influence of any of the tested inocula.

None of the inocula affected the frequency of mycorrhiza occurrence (F%), the degree of colonization (M%) or the abundance of arbuscula (A%), which proves the importance of indigenous flora supplied with the substrate.

The high level of oxidative stress, low production of fresh shoot biomass and low efficiency of the photosynthetic apparatus in the tested plants are the effect of mineral nutrients deficiency. Thanks to the results obtained in this work, it can be concluded that mineral fertilization, to a greater extent than inocula, improves the physiological condition of plants. Applying inocula without fertilizers will not provide the plants with minerals, but will only increase the availability of those present in the substrate, which in turn may be insufficient in not fertilized treatments.