

Influence of Biochar and Potassium Humate on the Growth of PhytoIndicators Growing on Substrate from Reclaimed Coal Dumps in Western Donbass

Tetiana Soroka, Iryna Klimkina

Dnipro University of Technology, Dnipro, Ukraine

Aims:

- to study an effect of biochar and potassium humate on the growth of *Triticum aestivum* growing on the soil from coal dump;
- to compare their impact on the growth of wheat;
- eliminate some literature data about biochar and potassium humate.

Object of research

The soil for the research was taken from the coal dump in Western Donbass. Ph of the soil substrate is 6, electrical conductivity is 30 mS/m.

Method of analysis

A sheet of filter paper was placed in each Petri dish, on which 6 grams of dried and crushed soil were poured and evenly distributed throughout the dish. Then 5 ml of purified tap water was added and 14 seeds of *Triticum aestivum* were planted on the soil. The control substrate was purified tap water.

There are seven samples in the experiment:

1. purified tap water
2. sand
3. dump soil
4. dump soil + 1% of biochar
5. dump soil + 3% of biochar
6. dump soil + 1% of potassium humate
7. dump soil + 3% of potassium humate



Biochar is a charcoal-like substance that is obtained by burning organic materials from agricultural and forestry waste using a special process to reduce pollution and store carbon safely - pyrolysis. During pyrolysis, organic materials are burned in a container with a very low oxygen content. When materials burn, they give off practically no harmful vapors. During the pyrolysis process, organic material is converted into biocarbon, a stable form of carbon that cannot easily escape to the atmosphere. The energy or heat generated during pyrolysis can be captured and used as clean energy.

In terms of physical characteristics, biochar is black, highly porous, lightweight, fine-grained and has a large surface area. About 70 percent of its composition is carbon. The remaining percentage consists of nitrogen, hydrogen, and oxygen, among other elements. Biochar's chemical composition varies depending on the raw materials used to make it and the methods used to heat it.

Biochar is used as a soil additive to both sequester carbon and improve soil health. Biochar can increase fertility in low pH soils, increase agricultural productivity and provide protection against certain leaf and soilborne diseases.

Potassium humate is the potassium salt of humic acid. It is manufactured commercially by alkaline extraction of brown coal (lignite)

Potassium humate derived from lignite brown coal are alkaline, rich in carboxylic and phenolic groups, aromatic in nature and provide favourable conditions for biological activity, chemical reactions and physical improvement of soil. Accumulation level of natural humic acids like potassium humate has shown to reduce the need for commercial fertilizers because it improves fertilizer efficiency.

It is used in agriculture as a fertilizer additive to increase the efficiency of fertilizers especially nitrogen and phosphorus based fertilizer inputs.

Conclusions

Experiment is still in force. this experiment will help to find out the effect of organic additives on a possible reduction the toxic effects of heavy metals and other harmful substances Thus the results can be seen later in my master thesis.