

Summary

The thesis presents the results of a three-year strict field experiment carried out on the 'Bingo' oat (*Avena sativa* L.). The research was performed on a heavy brown soil formed from loess, with a granulometric composition of clay dust, which belongs to the soil quality classification IIIa (a good rye soil complex). The experiment was carried out using a split-block system in 4 replications, by introducing two factors: (I) fertilization with algae biomass (*Ascophyllum nodosum*) and (II) pre-sowing stimulation with three doses of a slow-changing magnetic field (50 mT).

The influence of experimental factors on crop and its structure, organic and mineral composition of grains, and qualitative changes were all tested. It was expected that these factors would have positive effects on the oat (*Avena sativa* L.) crop and its structural elements, and that they would induce qualitative changes in the grain as well.

The beneficial effects of fertilization with algae on oat crop were observed, among other things, by the improvement of parameters, such as the quantity and weight of grains, while the beneficial effects of pre-sowing seed stimulation with a magnetic field on these parameters were irrelevant under field experiment conditions. Moreover, the crop and chemical composition of oat grains were significantly modified by varied weather conditions. Fertilizing with algae led to a significant reduction in the total protein and ash content in the grains, which accumulated with the increase of the dose. It was also found that the contents of calcium and iron in the oat grains decreased as a result of the amount of algae applied. In addition, fertilization with algae can enhance the contents of sodium and molybdenum in oat grains. Pre-sowing stimulation with a magnetic field may in turn lead to an increase in the content of copper in oat grains. Likewise, fertilization with algae increased the contents of amyloses and amylopectins in the grains.