ABSTRACT

The basis for the preparation of the doctoral thesis were three pot experiments carried out in the Vegetation Hall of the Department of Plant Nutrition of the Wrocław University of Environmental and Life Sciences.

In this research 5 varieties of Naked oats (*Avena nuda* L.) and two varieties of hulled oats (*Avena sativa* L.) were used.

The aim of the research was to assess the possibility of using biopreparations in the cultivation of naked oat, which would be effective in improving the yield of this form of oat and in shaping good quality characteristics of the grain, in comparison with traditional mineral fertilization. The research was also aimed at assessing the use of nutrients by plants under the conditions of using these biopreparations

In the first of the experiments, the bacterial preparation Akra N-Bakterien Azoarcus was used, which was treated with oat grain before sowing. The experiment scheme also included the addition of a starting dose of nitrogen, which, according to the product's characteristics, should stimulate the proliferation of these bacteria in the soil.

In the second experiment, biopreparations intended for foliar application - Bombardier and BioFol Plex - were used, which, according to the manufacturer's instructions, were sprayed three times during the vegetation period - at the stage of tillering, heading and flowering. The experiment scheme also included an object with controlled water deficiency, maintaining soil moisture at the level of 30% of field water capacity.

In the third experiment, a biopreparation for soil application was used - Akra Kombi, alone and with a mixture of bacteria, which, as in the first experiment, was treated with grain before sowing. This scheme also includes an object with a shortage of water in the substrate.

In all experiments, the comparison objects were the zero object (without fertilization) and the object on which mineral fertilization was applied. All experiments were carried out in four replicates, and the results presented are the average of three years of research. Samples of grain and straw were used in laboratory tests. The yield of grain and straw was determined, as well as the content of nitrogen, phosphorus, potassium and magnesium, and among the microelements, iron, manganese, copper and zinc. The uptake of macronutrients with grain and straw was calculated.

The obtained results were statistically processed using the Statistica program, version 13.1. Based on multivariate analysis of variance, homogeneous groups were specified using Tukey's test.

Application of the preparations without supplying the plants with the starting dose of nitrogen did not increase oat yields. After adding the starting dose, the yields increased significantly, but did not reach the level comparable to mineral fertilization. Water shortage limited the yield of all oat varieties. The hulled cultivars achieved slightly higher yields than the naked cultivars. Among the five varieties of naked oat, the Amant cultivar was indicated as the most useful for cultivation under the conditions of biopreparation application, while the Polar and Maczo cultivars were the least useful.

It was found that the tested biopreparations cannot replace mineral fertilization in the cultivation of naked oats on large areas, but they can be used in organic farming where the starting dose of nitrogen can be introduced to the soil in an organic form.

Key words: naked oats, biopreparations, yields, grain quality, the efficiency of nutrents