THE INFLUENCE OF BIODERIFIED ON THE BASIS OF URBAN WASTEWATER SEDIMENTS ON AGRICULTURAL PRODUCTIVITY ON THE EXAMPLE OF CORN ON GRAIN

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Abstract: Sewage sludge (SS) is a secondary resource that can be used in modern biotechnology to produce fertilizers. This is the bioconversion of organic waste – obtaining available organic raw materials (compost) with the participation of phosphate-mobilizing microorganisms with the addition of fillers. Biofertilizers based on SS of biological treatment plants (SBU) "Southern" and "Northern" of Odessa with different fillers (winter wheat straw and sunflower seed husk) were studied. The effectiveness of biofertilizers was studied in a field experiment on chernozem ordinary medium humus. Culture in the experiment: corn for grain (medium-ripe hybrid FAO 400). According to the results of determining the biological activity of the soil, the highest indicators of corn yield are shown when using new biofertilizers in comparison with the control, which provided an increase in corn yield per grain and improved economic performance.

Key words: biofertilizers, sewage sludge, biological activity of soil, corn yield, economic indicators.

Introduction

Due to the decline of livestock in agriculture, there is an acute shortage of organic fertilizers, which leads to intensive dehumidification and deterioration of agrophysical properties of soils. Over the past 20 years, the humus content in irrigated soils of Ukraine has decreased by almost 15% [1]. With the use of sewage sludge (SS) to improve the properties of chernozems, the problems of preserving the fertility of irrigated soils, increasing agricultural production and disposal of ERUs are solved at the same time.

The problem of processing and utilization of SS is very relevant and acute for many cities and businesses. Sediments have often been dumped on congested silt sites, dumps, and quarries for decades, leading to environmental degradation and living conditions.

In order to preserve the proper sanitary-epidemiological and ecological condition of large cities, it is necessary to address the issue of reclamation of silt sites [2]. Implementation of engineering measures for the return of decommissioned land within the city, in addition to environmental significance, has a high economic and social significance; sludge must be removed, recycled and safely disposed of, and the vacated area must be reclaimed for rational use.

In this regard, the bioconversion of organogenic waste (SS of municipal treatment plants) with the production of organic raw materials (composts) with the participation of phosphate-mobilizing microorganisms is relevant. SS contain nitrogen, phosphorus, potassium and other macro- and microelements necessary for crop production, nutrients in concentrations comparable to organic fertilizers, as well as a number of ecologically important microorganisms.

The object of research is biofertilizers based on SS of biological treatment plants (SBU) "Southern" and "Northern" of Odessa with different fillers (winter wheat straw and sunflower seed husk) with the participation of an active strain of microorganisms with phosphate-mobilizing properties. 1 - Mb). According to the composition of SS, the SBO of Odessa meets the requirements of regulatory documents that apply to fertilizers of this origin.

Materials and methods

The effectiveness of biofertilizers was studied in a field experiment on chernozem ordinary medium humus. Culture in the experiment: corn for grain (medium-ripe hybrid FAO 400). The experiment studied the effectiveness of direct action of the obtained composts. Doses of application of native SS and composts based on them in the soil were equalized according to their content of total nitrogen. Tillage - common (plowing to a depth of 20-25 cm, early spring harrowing). Maize was sown in the first decade of May at a stable stable temperature (over 10 °C). The layout of plants - 40-45 thousand pieces / ha. In the rhizosphere soil, the number of microorganisms - representatives of the differences of ecological and trophic groups was studied according to generally accepted methods [3-5]. Determination of soil biological activity using biofertilizers based on SS was carried out by the application method [3].

Results and discussion

The results of determining the biological activity of the soil by the degree of decomposition of linen fabric showed an increase in microbiological activity when applying biofertilizers based on SS. During the study period, the decomposition of linen fabric was determined to be the largest when applying fertilizer (SS SBO "Northern" + straw + *M.b.*), which in a layer of 0-20 cm was 25.3 %, which is 12.3 % higher than the control. When applying fertilizers (SS SBO "Northern" + husk + *M.b.*) the degree of decomposition of linen fabric was 23.5 %, which 10.5 % higher compared to control. When applying fertilizers based on SS SBU "Southern" with straw and husk, the degree of decomposition of linen fabric was almost the same and was 24.1 % and 24.7 %, which is 11.1 % and 11.7 %, respectively, higher than in the control.

It was also found that the quantitative composition of microorganisms of all studied physiological groups in the phase of full ripeness of corn increased due to the accumulation of

organic matter, which is easily absorbed in the upper soil layer. This improves the growth and development of plants, which provides an increase in yield.

The highest yields of corn were provided by the use of biofertilizers based on SS with the participation of phosphate-mobilizing microorganisms, which increases the yield of corn by

33.3 % (biofertilizers based on SS SBU "South") and 48.8 %, 51.1 % (biofertilizers based on SS SBU "Northern" + straw, + husks, respectively).

When calculating the economic efficiency of the use of experimental biofertilizers were determined: relatively net profit, cost and profitability of the crop.

According to the calculations, when using composts with the participation of phosphate-mobilizing microorganisms (excluding mineral fertilizers), the profit (per 1 ha of sown area) increased from 6969 UAH to 13547 UAH or from 48 % to 93 %. The combined use of composts with mineral fertilizers, which are bacterized *Microbacterium barkeri* LP-I, increased the amount of profit from 12344 UAH to 12587 UAH (or from 85 % to 87 %).

Conclusions

The use of biofertilizers based on sewage sludge from the biological treatment plants "Southern" and "Northern" in Odessa provides an increase in the yield of corn for grain and provides an opportunity to improve economic performance.

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