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Abstract

Analysis and Usage Perspective of Solid Digestate †

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Extremely intensive and chemicalized agriculture severely damages the naturally formed eco-system [1]. This issue encourages concern about soil conservation and improvement of its quality, human health, and environmental protection; therefore, it is necessary to look for alternative methods of agriculture. One of these methods is organic farming, where mineral fertilizers are not used and nutrients needed for plants are provided using biological substances of organic origin. On the other hand, the accumulation of such biodegradable organic waste and its disposal in landfills causes various environmental, economic, and social problems. One such waste is digestate [2]. Most of the digestate (about 120 million tons) is agricultural digestate (a mixture of manure and plants). The rest is obtained by mechanical biological treatment from municipal solid waste, separated biological waste, sewage sludge, or the agriculture and food industries. In various EU countries, renewable energy policies and subsidies for the production of electricity, gas, and heat from biomass have improved economic conditions for the anaerobic digestion of biological waste or food waste, but in this process, digestate is also produced. However, it was also noted that a lot of detailed scientific research should be conducted concerning the risk factors, environmental effects, fertilizer treatment methods, and enrichment during long-term use [3–5]. Because the digestate is rich in organic matter, during this study, when three different digestates were used, the organic carbon content was first determined. The tests were carried out on dried digestates, which were of two types: whole and chopped. It was found that the content of organic carbon is higher in whole samples and ranges from 39.0 to 50.0%, and ranges from 34.8 to 45.2% in chopped. In order to obtain the maximum concentration of organic carbon from the used digestates, extracts were produced on the basis of water, potassium alkali, and different production conditions. The samples were kept for 3, 6, and 9 days at room temperature and for 3, 6, and 9 h at different temperatures, mixed with a mechanical stirrer, and in an ultrasonic bath. Also, the samples were heated at temperatures of 50 °C, 70 °C, and 90 °C. A higher concentration of organic carbon was found in potassium-based extracts, and the higher temperature had a positive effect on the concentration of organic carbon in the samples.

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