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Effect of Liquid Digestate of a Biogas Plant Using Rice Straw, as Biofertiliser in Paddy Rice Cultivation in Comparison with Mineral Fertiliser in Tien Giang Province, Vietnam

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Abstract

Appropriate fertilisation is very important for sustainable environmental friendly agriculture, in particular in paddy rice cultivation the main agricultural crop in Vietnam. Therefore, mineral fertilisers should be partly replaced with organic fertilisers, e.g. by using of liquid digestate of biogas plants, using mainly rice straw and cow dung. First experiments in containers in 2017 showed there are possibilities to change the traditional fertilisation methods. In the first field experiment from January to April 2018, conducted in the Mekong delta district Cai Be, province Tien Giang, the aim was to verify whether the first results can be confirmed and to test the effect of biofertiliser under typical field conditions with digestate from the same biogas plant. This experiment was designed with three different mineral and organic fertiliser treatments (MF and OF) using different ratio of nitrogen source: (1) 100 % mineral fertiliser (2) 100 % biofertiliser and (3) 50 % mineral fertiliser and 50 % biofertiliser. Following parameters were determined, length of the paddy rice inflorescences, the number of seeds, and the marketable rice grains. The results showed that, the length of the paddy rice inflorescences and the marketable rice grains of treatment 1, 2, 3 were 22.75 ± 0.48 cm; 24.68 ± 0.28 cm; 21.67 ± 2.72 cm and 92.64 ± 1.39%; 88.55 ± 4.01%; 91.48 ± 0.82 %, respectively. The most important parameter is the yield that means the length of the paddy rice inflorescences and the marketable rice grains. The highest length was determined in the treatment 2 in comparison to other treatments, but their marketable yield was lowest comparison to other treatments. The results also showed that the yield of treatment 3 (MF: OF 50:50) was similar to control treatment (100 % MF). It can be concluded that it is possible to replace mineral fertiliser in rice cultivation to some extent with biofertiliser as for example with digestate from biogas plants. Further experiments regarding the amount of biofertiliser, the frequency of application and their dosage, as well the influences of the microbial activity in the soil are necessary.

Keywords: Biofertiliser, biogas, liquid waste biogas systems

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