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### CONTROLLING THE PROCESS OF COMPOSTING FARM BIOMASS WITH THE USE OF FUZZY LOGIC

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**ABSTRACT** Composting is a well-known method for solid organic waste utilisation. The process produces organic fertiliser. The natural course of composting consists of three main phases: mesophilic and thermophilic stages and cooling down and maturing. The characteristic features of the thermophilic phase include a relatively high temperature (45-80°C) and carbon dioxide emission. Extending this phase of the composting process may result in a reduction of the entire process time and in the amount of methane produced. The current process control method consists in adjusting the amount of air supplied to the compost heap based on controlling the temperature in the bed or oxygen content in the air leaving the heap. During the experiments a problem regarding precise control appeared and would help optimise the composting process in terms of heat reception, duration of the process and the temperature inside the bed. The heat may be used in another place, e.g. to warm the substrate in a greenhouse. However, if the amount of collected heat is too great, this may result in compost temperature reduction and – in consequence – slowing down (or even stopping) the thermophilic phase of the composting process. On the other hand, overheating the heap of the biological material which is being composted dramatically reduces the population of thermophilic microorganisms and slows down the process. The literature survey focused on complex non-linear processes and has shown that systems based on fuzzy logic are effective in controlling the process. The basic assumptions of the control systems operations are as follows: the following input variables were selected: temperature inside the bioreactor, aeration rate, heat collection rate. The following output variables were identified: aeration rate and heat collection rate. The operation of the control system can be adjusted by changing the distribution in terms of input and output variables. Changing the control parameters will be another method of adjustment. In order to perform this task, the control system will be equipped with a programmable controller with a fuzzy control system, as described above, implemented in it. The effects of controlling the process with the use of fuzzy logic will be presented at the conference.

**Keywords:** composting, energy, fuzzy logic