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Economic Evaluation of Miscanthus (Miscanthus Sinensis Giganteus) Field Crops in The Context of Sewage Sludge Ash and Nitrogen Fertilization Management: A Study in Southeastern Poland*

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Abstract

In view of the growing needs for climate protection and practical and ecological energy sources, research and use of biomass are gaining special application. The application with the use of devices is the cultivation of Miscanthus sinensis giganteus using ash from municipal sewage sludge devices (TUoMSS) as an alternative to mineral fertilizers. Existing works focus on the main laboratory conditions, however, there is a lack of comprehensive analyses on the use of TUoMSS in field conditions, which means a research gap.

In order to fill it, a two-year field experiment in southeastern Poland, a split-block system with three levels of nitrogen fertilization (0, 45, 90 kg·ha^{-1}) and three levels of TUoMSS ash fertilization (0, 1.85, 3.70 t·ha^{-1}) were analyzed. Biometric parameters of plants, dry mass yield and biomass calorific value were analyzed. Statistical results of ANOVA analysis results.

Results confirming the use of biomass and plant parameters. The highest yield of 8.88 t·ha^{-1} was obtained with fertilization of 3.70 t·ha^{-1} ash and 45 kg·ha^{-1} nitrogen. Additional increase in the nitrogen dose did not bring economic benefits. The study confirmed that ash from TUoMSS can be used as a research tool in the cultivation of miscanthus for energy purposes.

Keywords: Environmental Protection; Thermal Utilization Of Municipal Sewage Sludge; Fertilization Of Energy Crops; Miscanthus, Economic, Management

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