

Introduction

Digestate (anaerobic ferment) is an organic substance remaining after anaerobic processing (fermentation, fermentation) of organic matter or biodegradable waste - biogas extraction or anaerobic alcoholic fermentation - bioethanol extraction. Biogas production waste digestate is a valuable fertilizer in agriculture, but there are issues with odour emissions and contribute to pollution without comprehensive management strategies. Raw material, processing technology and process operating conditions greatly influence the characteristics of the digestate product (Lamolnara et al., 2022). To date, no data are available on digestate production, but according to EU-28 estimates, around 180 million tonnes of digestate are produced annually, of which 68% is of agricultural origin (Catenacci et al., 2022). Cascade pre-treatment with ozonation and ammonia removal is applied for sustainable liquid digestate treatment, nutrient recovery and value-added biomass production (Zhu et al., 2022).

Methodic

In order to reduce environmental air pollution, the efficiency of integrating a homogenized bio-additive - an activator of rotting residues into the digestate for ammonia emission was evaluated by scientific studies of ammonia gas emission. The purpose of the study is to evaluate the effect of homogenized biosolution in the digestate on reducing ammonia emissions. Biosolution is rotting residue activator (carrier molasses without GMO, calcium carbonate, dolomite, sodium hydrogen carbonate, magnesium sulphate) complies with EC Eco-BasisVO 834/2007 and 889/2008, has ECOCERT approval, is listed in FiBL Switzerland, manufactured by Roland With Plocher integral technik technology, the physical and chemical structure of molasses does not change after processing. It is recommended to add 1.5 - 2 l/100 m³ of biosolution to the liquid part of the digestate. The assessment of ammonia gas emission was performed by measuring the average ammonia concentration values fixed in time intervals every 15 min by automatic switching of the analyzer channels, in order to first assess the sudden immediate effect of the bioadditive and the regular gradual long-term effect.

Control digestate

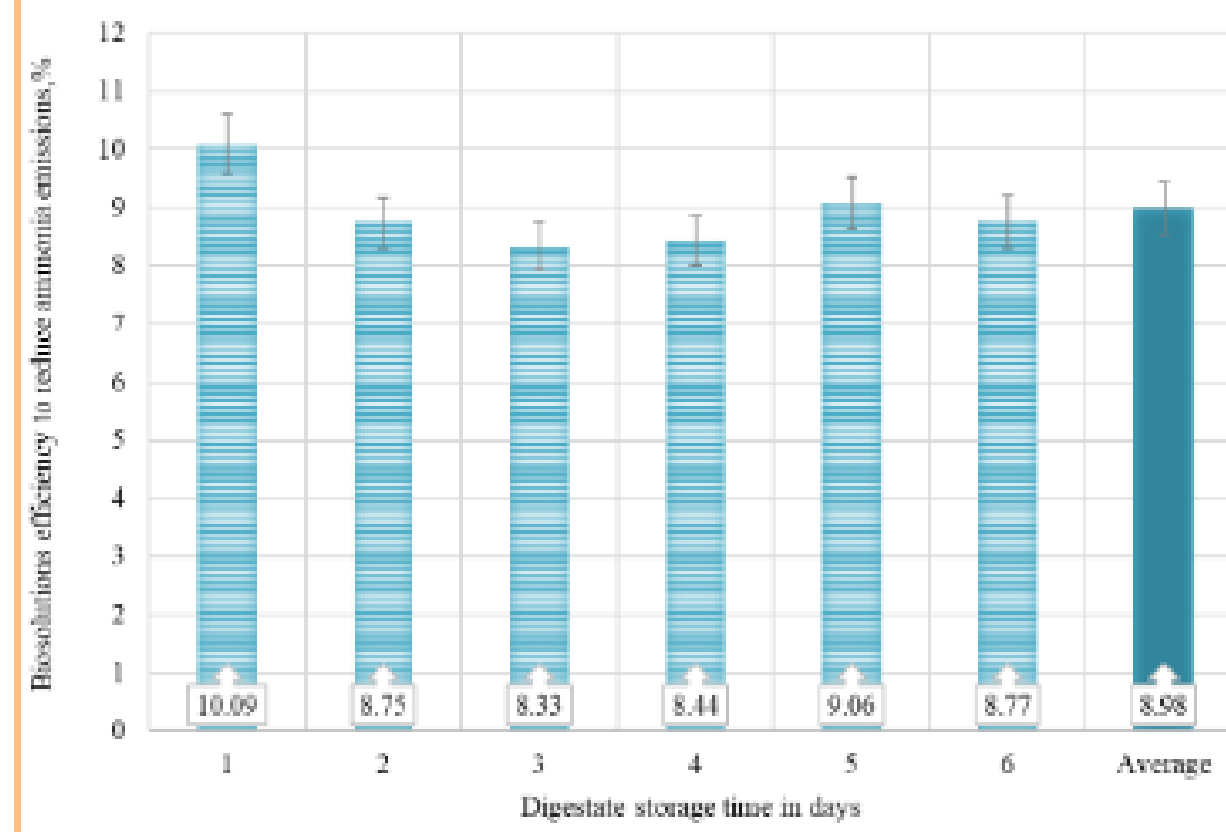
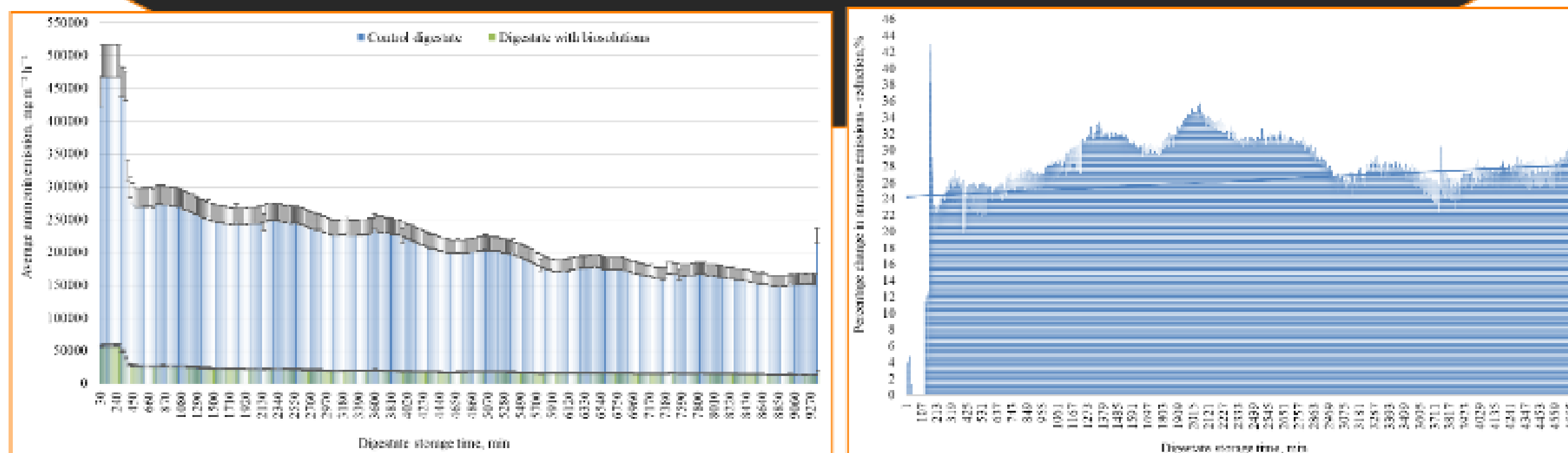


Digestate with biosolution



Results

After evaluating the average concentration and emission of ammonia gas from the control and digestate with bio-additives depending on the duration of digestate storage, the correlation of the values compared with each other was established and the effect of the allocation of the bio-additive - rotting residue activator in the digestate on the reduction of ammonia concentration and emission was recorded. The highest efficiency of the biosolution in reducing ammonia emissions ranged from 3 to 43% in the period from 1 to 100 h, which reached up to 450,000 mg m⁻²h⁻¹. After evaluating the overall average reduction of ammonia emissions from digestate with bio-additive over the entire period, the essential effect of the use of bio-additives was proven and the highest effect was recorded in the first 24 hours. After the allocation of the bio-additive - the activator of rotting residues in the digestate. Thus, supplementing the digestate with various nutrients and specialized bio-additives provides an even better fertilizing value and prospects for reducing odour emissions.



Conclusions

- After identifying the variation of the change in ammonia emission after affecting the digestate with the bio-additive, the significant efficiency of the bio-additive in reducing the ammonia emission in the first days of storage was determined, on average from 8.33 to 10.09%.
- The highest effectiveness of the bioadditive in the first 24 hours, justified the desired immediate effect and maximum efficiency immediately after the allocation of the rotting residue activator in the digestate.

References

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