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Approaches to the mitigation of ammonia inhibition during anaerobic digestion – a review

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Approaches to the mitigation of ammonia inhibition during anaerobic digestion – a review

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Abstract

Parthenium hysterophorus is an invasive weed that poses significant threats to crop production. The digestion process of organic waste rich in high ammonia content has always been a gridlock during methanogenesis process. The free ammonia may increase inhibition/toxicity, which in turn affects the microbial community in the digester and eventually leading to process failures. Substantial methods have been proposed and assessed for curtailing ammonia emissions in anaerobic digesters to attain a safe and steady process so that along with high methane production, high quality of effluents can also be recovered. There are several means for lowering the erratic ammonia in organic wastes which has been in use currently such as the decrease of pH, which favour the formation of ammonium over ammonia in the equilibrium. For example, the use of chemical additives that attach ammonium-N. Ammonia can also be removed from nitrogen-rich substrates during anaerobic digestion through other methods such as struvite precipitation, membrane distillation, air stripping, ion exchange, and adsorption. A thoroughly survey from different articles has shown that ion exchange, adsorption and changing of the C/N ratio through co-digestion technique, are the most commonly studied methods for mitigating ammonia inhibition in wastewater during anaerobic digestion. A detailed review of these methods in the context of nitrogen-rich substrates will be discussed in this paper.

KEYWORDS: ammonia, ammonium, anaerobic digestion, methane, pH and temperature