Utilizing Ants to Mitigate MSW Landfill-Generated Methane Production Through Novel Aerobic Digester System for Anthropogenic Food Waste Decomposition

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Ants – with their ability to assist in seed dispersal and scavenging – are an often overlooked foundational part of our ecosystems. In fact, according to the Journal of Animal Ecology, ants contribute to over 61% of scavenging in forests. Because of their excellent decompositional abilities, the aim of this research is to utilize ants to combat food waste and methane emissions from Municipal Solid Waste (MSW) landfills. This research is crucial in today's world, with climate change altering our global climate rapidly. In this research, a novel aerobic digester composed of ants successfully decomposes food waste into fertile compost and utilizes the biogas produced for electricity generation. Through microdosing and testing the metabolic rates of ant species from varying genera, the species with the best ability to break down food waste was determined to be C. castaneus ants. A computational model was developed with C. castaneus ants showing an achieved reduction in methane of 20% with just 43,000 of these ants per capita breaking down the food waste in the digester system, making this a viable solution for a sustainable future. The ants were then employed in the aerobic digester design to test the efficiency of the prototype. The digester design exhibited an average efficiency of 83.333%. Ants hold the power to drastically slow down climate change through altering food waste management across the world.

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