ENHANCEMENT OF NITROGEN LEVEL IN COMPOST BY ALTERING THE DEGREE OF NITROGEN FIXATION, DENITRIFICATION AND AMMONIFICATION

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Nitrogen (N) is a critical macronutrient for plant growth. Despite the fact that N is the most abundant element in the atmosphere, most agricultural lands do not meet the required level of N for crop requirements. Global population growth will demand about a 76% increment in N fertilizer supply in 2050 compared to 2010. High-quality compost has great potential to enhance the fertility of agricultural soil-eco systems sustainably. Given the importance of N in agroecosystems, this study aimed to look into methods for increasing the N content of compost. The biological N_2-fixation efficacy of non-symbiotic N_2-fixing bacteria was first assessed. To this end, bacterial strains were isolated from organic farms representing five different ecological zones of Sri Lanka, and then identified and screened for N-fixing efficacy. An antagonistic test was performed to evaluate their potential for consortia formulation. Nitrogen capture additives were used to reduce N losses from compost. A leaching experiment was conducted to study the efficiency of the additives at different ratios mixed with the matrix. According to the N_2 fixation efficacy assessment, the N21 isolate showed significantly higher nitrogen fixation among other isolates. The genomic DNA of isolates was extracted, and the v3 and v4 regions of the 16s rRNA gene were amplified for identification. The antagonistic test indicated synergistic growth among selected isolates. Notably, the 2% treatment demonstrated the highest efficacy of ammonium adsorption by N-capture additives. The study showed that non-symbiotic nitrogen-fixing bacteria and the addition of nitrogen-capturing additives have a higher capacity to enhance nitrogen levels in compost.

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