INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: **COMPOSTING OF VEGETABLE WASTE THROUGH DIFFERENT COMPOSTING TECHNIQUES**

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SHORT ABSTRACT

Vegetable waste with high moisture content and readily biodegradable nature is causing major environmental problems due to improper waste management practices in India. So, composting and vermicomposting could be considered the best alternative for the treatment of these organic fractions. Therefore, studies were carried out on the degradation of vegetable waste by adding cow dung, saw dust and dry leaves during the 20 days of drum composting, 30 days of pile composting and 45 days of vermicomposting. Appropriate combination of waste materials i.e. vegetable waste, cow dung and saw dust in (5:4:1) ratio along with 10 kg of dried leaves to make a final mass of 100 kg wet weight was found successful. A maximum of 66.5^{o}C was observed with temperature in the range of 55 to 64^{o}C for 5-7 days resulting in higher organic matter degradation and destruction of pathogens. Further, the best (5:4:1) ratio of waste combinations was tested for pile composting under three different operating conditions i.e. agitated pile (AP), passive pile (PP) and forced aerated pile (FAP). Hence, piles operated in passive and forced aeration mode were observed with higher degradation of VS (19.6 and 22.9% respectively). Further, *Eisenia fetida* and *Eudrilus euginea* were employed for the degradation of vegetable waste during vermicomposting. *E. fetida* trial was observed with higher volatile solids (VS) reduction and biomass production at the end of composting period. However, pretreating the vegetable waste in drum composter for 8 days was found to be optimum for degradation during vermicomposting, as the overall composting period was shortened to 28 days. Further, waste carbide sludge and white rot fungi was inoculated to increase the treatment efficiency i.e. a maximum of 22.4 and 19.4% VS reduction was observed respectively. 16S Metagenome sequencing showed that 89.5% sequences belonged to bacteria, 9% to Eukaryota followed by 1.4% Archaea. Finally, it can be concluded that drum composting of vegetable waste with the combinations of cow dung and sawdust in (5:4:1) ratio along with 10 kg of dry leaves was successful. Further, pre-stabilization of vegetable waste in drum composter followed by vermicomposting can also be recommended.