

Review

Food Waste Composting and Microbial Community Structure Profiling

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Abstract: Over the last decade, food waste has been one of the major issues globally as it brings a negative impact on the environment and health. Rotting discharges methane, causing greenhouse effect and adverse health effects due to pathogenic microorganisms or toxic leachates that reach agricultural land and water system. As a solution, composting is implemented to manage and reduce food waste in line with global sustainable development goals (SDGs). This review compiles input on the types of organic composting, its characteristics, physico-chemical properties involved, role of microbes and tools available in determining the microbial community structure. Composting types: vermi-composting, windrow composting, aerated static pile composting and in-vessel composting are discussed. The diversity of microorganisms in each of the three stages in composting is highlighted and the techniques used to determine the microbial community structure during composting such as biochemical identification, polymerase chain reaction denaturing gradient gel electrophoresis (PCR-DGGE), terminal restriction fragment length polymorphism (T-RFLP) and single strand-conformation polymorphism (SSCP), microarray analysis and next-generation sequencing (NGS) are discussed. Overall, a good compost, not only reduces waste issues, but also contributes substantially to the economic and social sectors of a nation.

Keywords: organic food waste; sustainability; composting; microbial community structure

1. Introduction

The need for food has its impacts on the environment in ways we never expected, from emissions of greenhouse gasses, water and air pollution, abstraction of water, loss of biodiversity, land-use change, eventually risking food security and sustainability. Statistics from Food and Agriculture Organization (FAO) and United Nation (UN) projects food demand to rise meeting the global population estimated at approximately 10 billion in 2050 [1]. Since the demand for food is resource-dependent, food loss and