Chapter 3
Biodegradable Waste a Nutrient Asset for Upholding Soil Health and Crop Production

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ABSTRACT

Management of solid wastes is a grave concern because of its associated significant negative impacts on quality of the environs. Accretion and putrefaction of solid wastes have potent hazardous effects on biotic and abiotic factors of the environment including human beings. Unmanaged solid wastes especially organic in nature add efficient quantity of greenhouse gases in the atmosphere. For dealing with wastes purely organic in nature, there is a need of an adequate waste management technology to reduce the quantity of organic waste being disposed of traditionally. Composting is an environmentally sound and sustainable approach to manage biodegradable fractions of solid waste. It has received considerable attention in the last few decades because of its potential of redressing the environmental pollution concerns associated with other waste disposal methods. This chapter is aimed to review supremacy of composting over other waste disposal methods.

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INTRODUCTION

Globally, steady growth in the population, urbanization and industrialization has triggered generation of mammoth quantity of wastes. These waste spurts have steered a number of socio-economic and environmental challenges principally in the developing countries (Awasthi et al., 2014; Sukholthaman & Sharp, 2016). Annually, about 2 billion tonnes of municipal solid waste (MSW) is produced at global level (Wilson et al., 2015). India being densely populated generates massive amount of wastes of the order of 48 million tonnes of solid waste which had exceeded to 52 million tonnes in 2016 (Kumar et al., 2017).

Solid waste management has been a matter of grave concern since years, particularly for developing countries like India. It is considered a predicament of every civilization (Wolny-Koładka & Malinowski, 2015), wastes being mostly disposed off by landfilling and incineration globally (Tweib et al., 2011). Landfilling has been widely harnessed because of many advantages associated with it, be its simple approach or low investment and operating cost or greater handling capacity (Li et al., 2017; Wang et al., 2018), non-obligation of skilled labor (Ali et al., 2014). A landfill is a storehouse for waste which is deposited in a runs of tamped layers in specifically fabricated compartments either superficially on the land surface or beneath the surface in pits (Crowley et al., 2003). Although the land filling is most prevalent method of waste disposal, yet there are many environmental hazards associated with it particularly production of highly contaminating leachate and gases including methane gas, carbon dioxide and some other toxic gases at low concentrations (Crowley et al., 2003; Damgaard et al., 2011; Danthurebandara et al., 2012; Vaverková et al., 2012). Many environmental problems like global warming, eutrophication of water bodies, depletion of ozone layer, acidification, degradation of human health and ecosystem are caused due to the induction of these by-products of landfilled wastes in environment (Emeryet al., 2007; Damgaard et al., 2011). The leachate compounds pollute the groundwater (Szymański et al., 2018) and surface water bodies if nearby (Giang et al., 2018). Groundwater contamination is more precarious than surfacewater body contamination because recuperation of the aquifers entail mammoth period (Crowley et al., 2003). The 40% of the waste generated at global level finds its way in dumpsites; 38 out of 50 largest dumpsites directly imperiling the marine and coastal areas. Due to faulty management of wastes at dumping sites death of more than 750 people occurred in the first half of 2016 (Somani et al., 2018).

Another widely used approach of getting rid of wastes is incineration which involves the thermal oxidation of wastes at high temperatures in excess of 850 °C. Combustion of wastes yields a variety of volatile and gasiform emanations, which negatively affect the environmental quality and human health (Crowley et al., 2003). An instance of negative implication of burning of wastes reported by Gadde et al., 2009, is 0.05% contribution to greenhouse gases (GHG) emission due to burning of 23% of rice straw (RS) in the farms in India. But incineration in India is unwarranted because of high organic, inert or moisture content in Indian MSW of the order of about 30% to 60% each and low calorific value (800–1,100 kcal/kg) in MSW (Joardar, 2000; Kansal, 2002; Sharholy et al., 2008). Burning of organic matter (OM) generate huge amount of GHG emissions and the extra fuel need to be expended for burning the wastes having high moisture content or low calorific value (Joshi & Ahmed, 2016).

Due to rapid industrialization and urbanization, not only the quantity of wastes has increased but their characteristics have also been altered. Consequently, the upgradation of solid waste management system (SWMS) necessitates to be done to harmonize with the quality, quantity and composition of wastes (Manaf et al., 2009). A conventional SWMS in developing countries depicts an assemblage of problems, encompassing inefficient waste collection and pooling, crude open dumping, multiplication of flies and mosquitoes, burning in absence of air, control of environmental degradation, and the regulation