

Chapter 9

Waste Management Technology for Sustainable Agriculture: Waste Management

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ABSTRACT

The process of collection, transport, disposal, recycling, and monitoring of wastes is called waste management. The waste management is undertaken to recycle the wastes so as to reduce the ill effects of wastes on environment, health, and aesthetics. There are several kinds of wastes produced such as agricultural wastes, municipal wastes, industrial waste, mining waste. Some wastes are more hazardous such as medical wastes and nuclear wastes. Various techniques are used for the management of wastes which includes landfilling, incineration, anaerobic digestion, pyrolysis, plasma gasification, recycling, composting. Anaerobic digestion produces biofuel in the form of biogas. Plasma gasification results in the generation of electricity from wastes. Recycling of wastes involves the collection, sorting, and reprocessing of wastes into new products. Vermicomposting is the preferred form of composting as it results in the formation of vermicompost called black gold due to the presence of rich nutrients and growth promoting factors in it.

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INTRODUCTION

Due to industrialization, urbanization and increase in population density, there has been an increase in the accumulation of wastes. The wastes include radioactive substances, agricultural wastes, food wastes, industrial wastes, municipal wastes, garbage, paper waste etc. There has been decrease in the availability of open land space for the disposal of wastes due to intensive use of land for residential, industrial and commercial purposes. In order to reduce the load of wastes on earth, the collection, transport, recycling and disposal of wastes needs to be improvised (AshaAalok et al., 2008).

The process of collection, transport, disposal, recycling and monitoring of wastes is called as waste management (Burke et al., 2005). Waste management can be costly so it is important to understand the various effective, sustainable and safe means of its management (El-Haggar, 2007). The three R's "reduce, reuse, and recycle have become the basic tenet in waste management due increase in generation of wastes, increase in processing costs and decrease in available landfill space (El-Haggar, 2007; Seadon, 2006; Suttibak & Nitivattananon, 2008; Tudor et al., 2011). There should be flexibility in waste management systems in light of changing environmental, social and economic conditions (McDougall et al., 2001; Scharfe, 2010). To optimize, evaluate, adapt and define waste management systems, the information and feedback can be obtained from system analysis (Pires et al., 2010).

The reduction of wastes is placed at the top of waste management hierarchies because the best means of waste management is to reduce waste by not creating it in first place (USEPA, 2010). The reduction of wastes can also be achieved through the reuse of products. The reduction and reuse of wastes saves natural resources, reduces generation of wastes and reduces the costs associated with waste disposal (USEPA, 2010).

The waste management is undertaken to recycle the wastes so as to reduce the ill effects of wastes on environment, health and aesthetics (Gajalakshmi & Abbasi, 2003). The wastes may be either in solid, liquid or gaseous form. The process of waste management varies for rural and urban areas, for municipal and industrial wastes, for developed and developing nations. The management of municipal wastes is the responsibility of local government while as the management of industrial waste is the responsibility of generator (Verdone & De Filippis, 2004). The developed nations use various novel technologies to reduce the negative impacts of waste or use an effective management to exploit it (Henry & Heinke, 1989; Cunningham et al., 2007).

WASTE CATEGORIES

There are several kinds of wastes produced; some are more hazardous such as medical wastes and nuclear wastes (British Medical Association, 1999). Wastes are released into air, water or land. Following are the main categories of wastes:

Solid Waste

Solid wastes are the wastes that are deposited at the site where they are produced. They are further categorized into following types:

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