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A STUDY ON MUNICIPAL SOLID WASTE COMPOST (MSWC)

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Abstract

Domestic and commercial wastes are commonly termed as MSW and both these account for bulk of the waste in developing countries. For beneficial management, wastes should be regarded as "a resource in the wrong place", as botanist regards weed as "a plant in the wrong place", waste generally refers useless remains with lack of value.

Keywords: Solid Waste, Municipal Compost.

Introduction

In India, composting of bio-degradable municipal solid wastes has been made mandatory by the Supreme Court (SC) following the recommendations made by the Burman Committee report in 1999. Evaluation of fertility sources for certified organic greenhouse vegetable production is necessary for further industry growth. Two experiments tested the effects of municipal solid waste compost (MSWC) and water extract tea made from it on potted greenhouse tomatoes. The first used MSWC alone (two levels) and soil tea drench alone (three application frequencies). The second used MSWC and tea in factorial combination at three levels (0, 1×, and 2×). The greatest yield and leaf tissue potassium (K) were obtained using the greatest level combinations of compost and foliar tea spray, and this was significantly greater than conventional nitrogen-phosphorus-potassium (NPK) fertilizer yield. Tissue magnesium (Mg) was affected by compost because of the antagonism from compost K. Tea increased tissue sodium (Na). No significant differences in heavy-metal tissue concentrations were found between treatments. While MSWC is an effective soil fertility amendment, the benefits of using tea may be increased with more frequent application. Subsequently, the Municipal Solid Waste (Management and Handling) Rules 2000, also encourage. In May 2007, the Supreme Court of India laid down that compost and bio-methanation technologies were appropriate in view of the quality of MSW generated. Such as MSW had high organic waste (40% - 60%), high moisture contents and therefore low calorific values around 800 - 1200 kcal/kg. Indian Government is also encouraging MSW management by the Jawaharlal Nehru National Urban Rural Mission (JNNURM) scheme, where a part of budget could be shared by state government for running waste processing plant in states and districts. On the other way as organic components is high in MSW from Indian cities, thus it is not suitable for waste to energy generation or for refuse derived fuel (RDF), incineration, pyrolysis etc.

The Municipal Solid Waste (MSW) generation has in- creased in India from 100 g/day/person to 450 g/day/ person after Independence (1947). The total MSW generation in India is around 48 million tons per annum and this would increase to 300 million tons by the year 2047. Municipal solid waste in Indian mega-cities is mainly disposed in landfills by means of open dumping however; a small fraction from that is used for composting in Delhi

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(National Capital Territory of India) and Mumbai, while in Chennai and Kolkata composting facility is being implemented and is presently, in pilot stage. In other cities like Bangalore and Ahmadabad is being taken up on an experimental basis by either Non-Government Organization (NGO's) or Private Companies. Jha et al., had also tabulated data of physical characterization of metropolitan cities of India for two decades (1971-2002) and that shows that there is not much difference in physical characteristics though MSW generation has increased to great extent.

Domestic and commercial wastes are commonly termed as MSW and both these account for bulk of the waste in developing countries. For beneficial management, wastes should be regarded as "a resource in the wrong place", as botanist regards weed as "a plant in the wrong place", waste generally refers useless remains with lack of value. A basic way to deal with waste is to restore value from it. But in most of the developing countries, in major cities MSW is made to compost. Generally, manual segregation has been done for MSW, but if segregation is not done properly, there is possibility of heavy metals to enter in our food chain. Therefore, need arises to inventories the metal in MSW.

Composting is a simplest way to restore value in MSW. Aerobic composting with windrows method after proper segregation of MSW is recognized as a cost-effective method that results in an end product that can be used as soil amendment. Several authors have reported beneficial effects of compost on soil productivity. These developments can be examined from the perspectives of waste management, agriculture and climate change. The technology to be used for this purpose is relatively simple and affordable, while the end-product is beneficial for soil and ensures significant saving of scarce land (required for land-filling). However, public-private partnership efforts are constrained due to quality requirements, marketing, pricing issues and ways to make it sustainable on a long-term basis. The reducing, reusing, recycling and rebuying - the 4 R's is key of diverting organic materials from landfill and prevents green- house gases (GHG's) emissions, reduces pollutants, conserves resources and reduces the need for new disposal facilities.

Chemical characterization for macronutrients (C, N and P) and heavy metals (Cu, Cr, Ni, Pb and Cd) of MSW compost had been done for three Indian mega cities *i.e.*, Ahmadabad (Gujarat), Bangalore (Karnataka) and Delhi (Capital of India) to assess its quality for applying as soil conditioner and fertilizers. There are limited works reported in India on the impact of MSWC on vegetative crops. Begum, reported application of MSWC of Bangalore city on tomato plant that on application of MSW compost around 192 g/pot, the Zn, Cu, Ni and Pb contents of tomato plant were found in high levels. Many other authors have reported metals uptake by the application of Industrial solid waste on plant in India.

The population of the studied cities is Ahmadabad 5.8 millions, Bangalore 6.5 millions and Delhi 13.8 million. Around 100 - 300 tones of segregated MSW per day are collected to make compost in Delhi, Bangalore and Ahmadabad. In Delhi and Ahmadabad, MSW is collected by municipal authorities and given to private companies to make compost. In Bangalore, Karnataka Compost Development Corporation (KCDC) Limited is collecting MSW and making compost. The compost collected for present study is being made by aerobic composting by windrows methods with mechanically or manual segregation. A regular monitoring of quantification of heavy metals should be necessary as excessive application of compost may lead to the accumulation of heavy metals in soil surface. Not only are these heavy metals non-bio-degradable and become toxic at some levels, but also they tend to accumulate along the food chain,

where human is the last link. Beside that, for heavy metals distribution and transportation to soil and ground water was studied by sequential extraction. Regulatory compliance has given more focused then agricultural productivity to study the quality of compost.

Literature Review

The MSW amount is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020 Sharma and Shah (2005), CPCB (2004), Shekdar *et al.,*(1992). Poor collection and inadequate transportation are responsible for the accumulation of MSW at every nook and corner.

The management of MSW is going through a critical phase, due to the unavailability of suitable facilities to treat and dispose of the larger amount of MSW generated daily in metropolitan cities. Unscientific disposal causes an adverse impact on all components of the environment and human health Rathi, (2006) Sharholy *et al.,* (2005) Ray *et al.,* (2005) Jha *et al.,* (2003) Kansal (2002) Kansal *et al.,*(1998) Singh and Singh (1998) Gupta *et al.,*(1998). The waste generated is consequently released into the nearby environment. Consequently, the management of the MSW needs to be revamped to accommodate the changes in the quantity and quality to ensure the longevity of the

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environment. Due to several legislative, environmental, economic and social constraints, the identification of most sustainable disposal route for MSW management remains an important issue in almost all industrialized countries Adani *et al.,* (2000).

Generally, MSW is disposed of in low lying areas without taking any precautions or operational controls. Therefore, MSWM is one of the major environmental problems of Indian megacities. It involves activities associated with generation, storage, collection, transfer and transport, processing and disposal of solid wastes. But, in most cities, the MSWM system comprises only four activities, i.e., waste generation, collection, transportation, and disposal. The management of MSW requires proper infrastructure, maintenance and upgrade for all activities. This becomes increasingly expensive and complex due to the continuous and unplanned growth of urban centers.

Noteworthy Contributions

The difficulties in providing the desired level of public service in the urban centers are often attributed to the poor financial status of the managing municipal corporations Mor *et al.,* (2006) Siddiqui *et al.,* (2006) Raje *et al.,*(2001) MoEF (2000) & Ahsan (1999). Agricultural application of MSW, as nutrient source for plants and as soil conditioner, is the most cost effective MSW disposal option because of its advantages over traditional means such as land filling or incineration. According to Canellas *et al.,*(2001), the use of MSW in agricultural lands can be justified by the need of finding an appropriate destination for waste recycling. However, agricultural application of MSW may present a potential threat to the environment due to the presence of pathogens and several pollutants (i.e. heavy metals or organic pollutants). An attractive alternative to recycling such wastes is composting. Composting is a stabilization process through aerobic decomposition of waste, which has been widely used for different types of wastes Cai *et al.,* (2007). During composting, through microbial action organic nutrients present in the wastes are converted into plants available forms Ndegwa and Thompson (2001). The process can effectively reduce the mixture volume by 40-50% and by means of the metabolic heat generated in the thermophilic phase destroy the pathogens Epstein (1997). Composting cannot be considered a new technology, but among the MSW management strategies it is gaining interest as suitable option for chemical fertilizers with environmental profit, since this process eliminates or reduces the toxicity of MSW Araujo *et al.,* (2001) Kaushik and Garg (2003), Arau'jo and Monteiro (2005) and leads to a final product which can be used in improving and maintaining soil quality Larney and Hao (2007). Application of MSW compost in agricultural soils can directly improve soil physicochemical properties such as: soil structure, water retention capacity, buffering capacity and nutrient status Reeves (1997). In relation to soil biological properties, numerous researchers have reported different effects of MSW compost on soil microbial biomass and activity Moreno *et al.,* (1999) Selivanovskaya *et al.,* (2001) Saviozzi *et al.,* (2002) Arau'jo and Monteiro (2006) Pedra *et al.,* (2007) Barral *et al.,* (2009) RocaPerez *et al.,* (2009).

Research Methodology

Considering the nature and objective of present study as well as resources of investigator normative survey method of research has been used. In the present investigation all the steps and characteristic have been followed which are essential for normative survey method of investigation.

Sample Collection

The samples of municipal solid waste compost will collect from three metropolitans cities of India, *i.e.*, from Ahmadabad, Bangalore, Delhi and then will analyze accordingly.

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