ASSESSMENT OF DIFFERENT PRACTICES FOR COMPOSTING THE ORGANIC FRACTION OF MUNICIPAL SOLID WASTES

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ABSTRACT

The uncontrolled disposal of solid waste in dumps has been the practice of managing municipal solid waste (MSW) for decades. However, dumps do not fulfill any prescription that would prevent the pollution of ground and water. In addition, they are implicated for contributing to global warming by the emission of methane and other gasses to the atmosphere. Furthermore, incidents of spontaneous ignition are often observed in dumps. Explosions and even demolition of areas that are nearby a dump have occurred. Therefore, alternative practices ought to be developed for this purpose.

According to the Greek Joint Ministerial Decision 50910/2727/2003, in conformity to the Council Directive 91/156/EC for solid waste management, the uncontrolled disposal of waste is forbidden. The deadline for the elimination of the use of dumps in Greece was initially in 2008 and has been extended to December 2014. In addition, the Directive 99/31/EC on the landfill of waste, sets limitations on the amount of organic matter of waste disposed in landfills.

While municipal waste becomes a major issue to deal with, composting seems to bring a solution to the problem of solid waste management, concerning the shortage of landfill capacity and the penalties for the use of dumps, along with their environmental impact. Composting is the process of decomposition, under aerobic conditions and by the activity of microorganisms, of the organic materials, resulting in the production of a humus-like matter, with the simultaneous release of heat, water and CO_2.
The aim of this work is the evaluation and optimization of compost treatment method for the solid wastes of Kalamata Municipality.

Keywords: solid waste management, composting, recyclable materials, piles

1. Introduction

Composting had, primarily, been a practice in agriculture as well as the method of managing municipal yard trimming. However, it is not earlier than the late 1980's that composting Municipal Solid MSW had been under serious consideration (Gajalakshmi & Abbasi, 2008).

Municipal solid waste holds a remarkable amount of organic matter, representing the 70% of the total weight (Tchobanoglous *et al.,* 1993).

Composting not only brings a solution to the accumulation of waste and the reduction of greenhouse gasses but it also offers a product that can be used as soil amendment in various cases. Therefore, it is between the beneficial methods of handling the organic fraction of MSWs. A simple categorization of the composting technologies is introduced in the decision maker's guide, 1995, chapter 7. According to that, composting is classified into four categories; windrow, aerated static piles, in-vessel composting and anaerobic processing. A more extent categorization of aerobic and anaerobic processing technologies is presented in the Technical Document on Municipal Solid Waste Organics Processing (Canada, 2013). Concerning the aerobic processing, it is classified in two

general categories; the passively aerated and turned composting systems and the actively aerated composting system. While windrow technology belongs to the first one, aerated static pile technology belongs to the second one.

The present review is focused on the above two composting methods; windrows and aerated static piles. The aim of this work is the evaluation and optimization of compost treatment method for the solid wastes of Kalamata Municipality. During the period of study, three composting systems were compared:

1. Four actively aerated covered static piles. Aeration begins 2- days after the deposition of the organic material in the plastic container
2. Two non-covered (open-type) piles. Aeration is performed with mechanical stirring (approx. once a week)
3. One actively aerated covered static pile in which sawdust was added

The project began in October 2013 and until today the total quantity of treated municipal solid waste is more than 60.000 tones.

2. Results

Below a number of figures are presented that provide an insight on the performance of different systems (covered, open, covered with addition of sawdust).

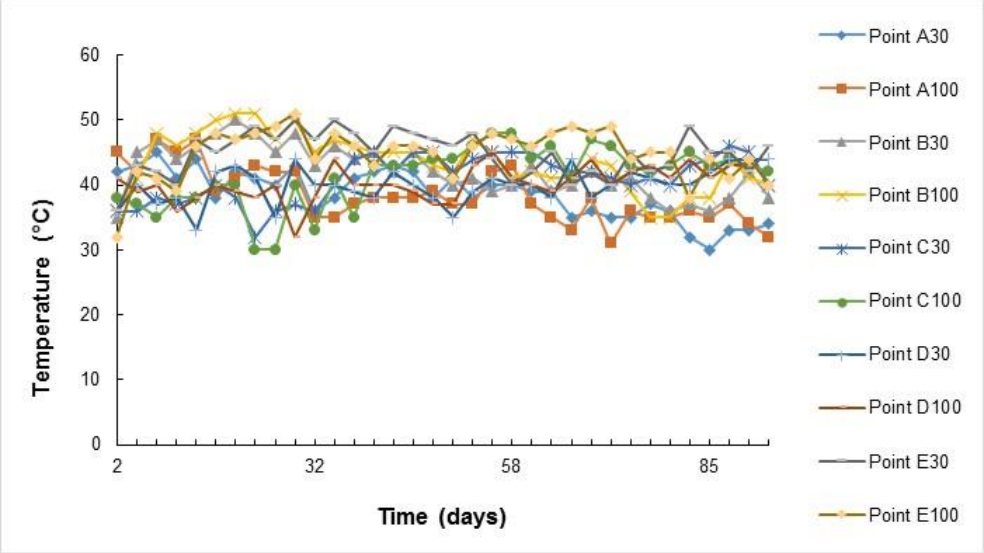

Figure 1. Variation of temperature values in covered pile

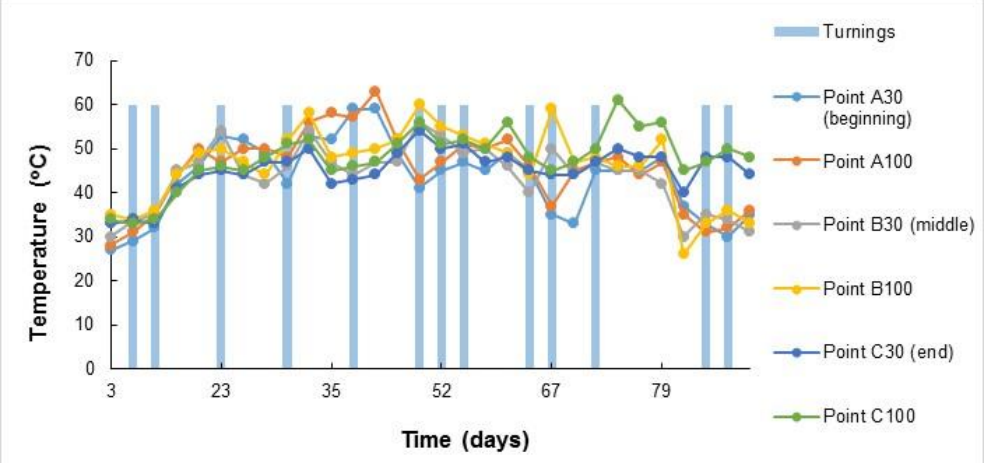

Figure 2. Variation of temperature values in open pile

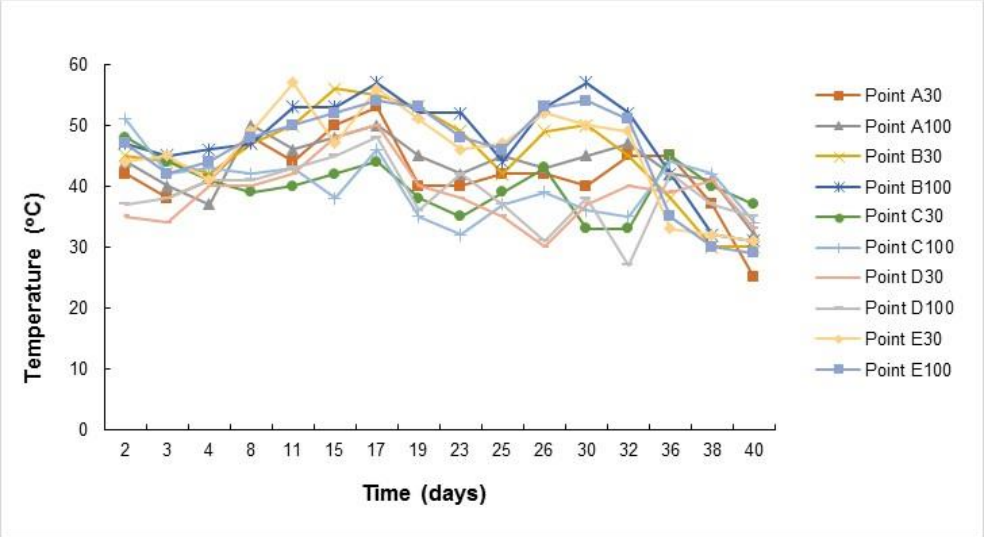

Figure 3. Variation of temperature values after addition of sawdust in covered pile

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