Assessment of compost production from mixed municipal solid waste: A case study in Shiraz city, Iran

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Extended abstract:

Introduction: In developing countries, putrescible waste is the main fraction of municipal solid waste (MSW) stream (Hoornweg and Bhada-Tata, 2012; Oviedo-Ocaña et al., 2016). Since disposal of putrescible waste in landfill leads to the environmental, economic and social impacts, separation and treatment of it has attracted a considerable attention. Along with the increase of population growth, putrescible waste generation and its environmental threats are predicted to increase in the future. Waste management strategies have to plan for putrescible waste treatment (i.e. composting, and anaerobic digestion) to have a sustainable waste management.

Composting is a well-known technology that not only reduces environmental impacts but also generates a useful product (compost) for plants and soil structure (Lim et al., 2016; Lou and Nair, 2009; Saer et al., 2013). However, there is still a lack of information and experiences regarding the successful application of this technology in large scale. The objective of this work is to present the findings of the large scale application of putrescible waste composting from mixed MSW in Shiraz city, Iran.

Materials and methods: In Shiraz, about 1000 ton per day mixed solid waste is transferred to the landfill. About 250 ton of the mixed municipal solid waste is entered to material recovery facility (MRF). Approximately 120 ton out of 250 ton is separated as biodegradable waste and transferred to the composting site. The composting process is monitored for temperature, moisture and oxygen content. The final compost product is screened into 0-5 mm and 5-15 mm and sold at a price of US$0.22/Kg and US$0.14/Kg, respectively. The composting process was

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monitored for 10 months from June 2015 to March 2016. The chemical and physical quality of the compost was examined and compared with the quality specifications of European standard.

Results and discussions: Chemical analysis of the produced compost showed that concentrations of heavy metals of cadmium and copper were higher than the European standard limits. That is related to the lack of source separation strategy and the leak of the heavy metals from the other non-putrescible waste. Assessment of the C/N ratio showed that this ratio is suitable for produced compost. Noticeable physical impurities (mainly fractions of glass) have been detected exceeding the quality control threshold limit of 0.5% w/w (plastics, metals and glass). That is related to the miss sorting of MSW by citizen and limited efficiency of the MRF in separation of putrescible waste.

Conclusions: The results indicate that it is necessary to have an effective source separation of biodegradable waste for good quality compost production. Furthermore, special consideration should be made to minimize glass impurities prior to composting. Laws have to be established for forcing citizen as well as vegetable, fruit and flower shops to cooperate with waste management organization.

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