

Determination of total organic matter of mature compost prepared by using municipal solid waste

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Abstract- Organic matter is an important chemical parameter to check the stability and maturity of compost prepared by municipal solid waste. This study was designed to determine the percentage of organic matter that must be below 30% after 3 months of composting process. The higher value of organic matter indicates the less stable and immature compost. The organic waste was treated with inoculum and it was concluded that the windrows give stable and mature compost in terms of organic matter analysis because the results showed the organic matter content 30 and below in all windrows.

I. INTRODUCTION

The best and environmentally safe method to get rid of organic waste is to make compost by the process of composting. The composting is naturally occurring process but it can be improved and speed up by the optimization of many parameters. These important parameters are proper turning and oxygen, temperature, pH and moisture percentage of compost heap. The composting process takes 3 months to give mature compost with the addition of some inoculums. Physical tests include moisture content which determines the quantity of water in a compost sample and bulk density is the dry weight of the compost its use to find the porosity. The most important chemical tests include cation exchange capacity use to determine the total capacity of exchangeable ions in a compost sample, pH, C: N and electrical conductivity (Carlile and Wilson, 1991).

To determine the maturity of compost organic matter is considered the important chemical parameter. The compost stability refers to the degree to which the organic content is stabilized. If the compost gives large concentration of biodegradable matter than it is not stable and mature. The less mature compost is less stable and can contain phytotoxins which are harmful for the plants. The stability of compost holds nutrients without being so much utilized by the microbes. To determine the maturity of compost, organic matter is considered the one of most important chemical parameters. In improvement of compost quality the humification is the important factor in maintaining the structure and fertility of soil (Iqbal *et al.*, 2012). The low organic matter content below 30 showed that the degradation rate is high and humification index is also high (Burke *et al.*, 1995). The mount of organic matter should not be very high at the end as it is not a positive sign of good composting and it result in low humification index (Haug *et al.*, 2004).

II. MATERIAL AND METHODS

The field trials were planned in Lahore compost Pvt Ltd. The four windrows were prepared with the weight of 471 and 550 metric ton. The two windrow were sprayed with commercial inoculum BST and two were sprayed with BST and molasses.

Each windrow composed of screening matter of municipal solid waste, cow dung, saw dust and green waste. The table 1 shows the quantity and composition of organic waste used for composting.

Table 1

| Windrow No. | Composition of organic waste | Quantity of organic ingredients | Total weight (MT) | Inoculum |
|-------------|---|---------------------------------|-------------------|------------------|
| W1 | Screening matter, Green waste, Saw dust, Cow dung | 16.7, 273, 17, 165 | 471 | BST |
| W2 | Screening matter, Green waste, Saw dust, Cow dung | 16.7, 273, 21, 168.4 | 479 | BST and molasses |
| W3 | Screening matter, Green waste, Saw dust, Cow dung | 16.7, 273, 21, 168.4 | 479 | BST and molasses |
| W4 | Screening matter, Green waste, Saw dust, Cow dung | 16.7, 273, 21, 168.4 | 479 | BST |

Determination of total organic matter from compost

The empty crucible was weight (D1). The crucible was filled with 5 g of cmpost sample and weight (D2). The sample was dried after 8 hours. The cucibles having dried compost sample was placed in muffle furnace at 800° C for 2 hours. The

crucibles with ash was weight (D3) (Yeomans and Bremner, 1988).The percentage of organic content was determined by deducting W1 from W2 and W1 fromW3.

Results and discussion

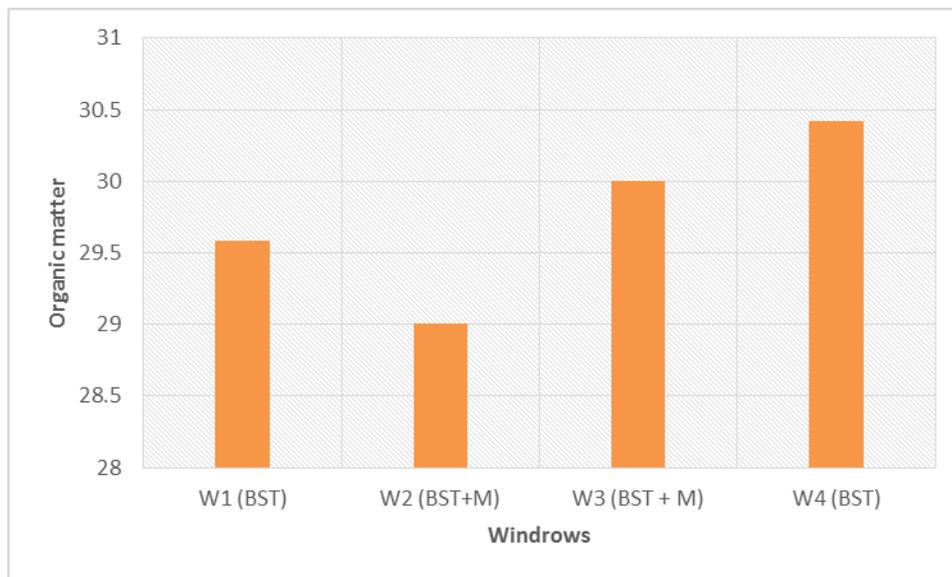
The organic matter was decreased by increase in the time of composting process. There was no any significant difference

found when the windrows that had BST with molasses and only BST inoculum were compared. The highest value of organic matter was observed in windrow W3 and W4 which is 30.00 and 30.42. The lowest value of OM was recorded in windrow W2 which is 29.00. Table 2 shows the results of organic matter.

Table 2

| Windrows | Organic matter % |
|----------|------------------|
| W1 | 29.58 |
| W2 | 29.01 |
| W3 | 30.00 |
| W4 | 30.42 |

Figure 1



The mature compost must contain organic matter below 30%. The total organic matter should be decreased during the process of composting by the mineralization of organic matter by microbes (Grigatti *et al.*, 2004). The organic matter should not be very high in the mature compost as it indicates that the degradation rate and humification index is low (Haung *et al.*, 2004). There is an inverse relation between organic matter, temperature and time of composting (Tiquia and Tam, 2000). It was concluded that the organic matter of mature compost must not exceed from 30%, below 30% the results are satisfactory it indicates the stability and maturity of compost.

REFERENCES

- [1] Burke, I. C., Elliott, E. T., and Cole, C. V. (1995). Influence of macroclimate, landscape position, and management on soil organic matter in agroecosystems. *Ecological applications*, 124-131.
- [2] Carlile, W. R., and Wilson, D. P. (1990, September). Microbial activity in growing media-a brief review. In II Symposium on Horticultural Substrates and their Analysis, XXIII IHC 294 (pp. 197-206).
- [3] Grigatti, M., Ciavatta, C., and Gessa, C. (2004). Evolution of organic matter from sewage sludge and garden trimming during composting. *Bioresource Technology*, 91(2), 163-169.
- [4] Huang D.Y., Lu W.J., Wang H.T., Zhou H.Y. and Wang Z.C. 2004. Application of high-efficient cellulose utilization microorganisms in co-composting of vegetable wastes and flower stalk. *Huan Jing Ke Xue*. 25(2):145-149.
- [5] Iqbal, M. K., Khan, A. H. M. E. D., Nadeem, A., and Hussnain, A. (2012). Comparative study of different techniques of composting and their stability evaluation in municipal solid waste. *Journal of Chemical Society Pakistan*, 34(2), 273.
- [6] Tiquia, S. M., Tam, N. F. Y., and Hodgkiss, I. J. 1996. Microbial activities during composting of spent pig-manure sawdust litter at different moisture contents. *Bioresource Technology*, 55(3): 201-206.
- [7] Yeomans, J. C., and Bremner, J. M. 1988. A rapid and precise method for routine determination of organic carbon in soil 1. *Communications in Soil Science and Plant Analysis*, 19(13), 1467-1476.

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