

Management of Leaf Compost – A Way for Sustainable Development

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Abstract: Chandigarh is a green city which hosts numerous evergreen and deciduous trees with the green cover of 33%. The Municipal Corporation, the house owners and the residents wanted dried leaves to be removed from the streets and public spaces. The fallen leaves were seen as a waste, a nuisance and burden. The Municipal Corporation collected the dried leaves and dumped them into the truck for landfill site. This was such a short sighted strategy. Leaf litter needed to be treated with much more respect. Leaf litter should not be sent to landfill as well as these should not be burnt but it must be composted. Soil microorganisms like bacteria, cyanobacteria and fungide composed organic matter. When key ingredient like moisture, aeration, temperature, pH were given in right condition, the mother nature cooked up a miracle. Leaf composting was simple to manage and produced good quality manure when performed in the campus of Post Graduate College for Girls, Sector-11, Chandigarh, with the help of pure culture of isolated *Bacillus sp.*, *Sacchromyces sp.* and *Paenibaecillus sp.*

Keywords: leaf compost, bacterial consortium, landfill, nutrients, sustainable development

1. Material and Methods

Two pits 1m x1mx1m were maintained (Figure:1) and enclosed by green garden mesh for aeration. Dried leaves were collected and filled in the pits up to one feet height. A thin layer of soil containing good amount of natural bacteria was sprinkled on the leaves. About two litres of water was sprinkled on the leaves to make the pile wet but not saturated. Pit was marked as C (control) and E (experiment) and to the pit E (Figure:4) 20 ml of bacterial consortium mixed with 100 ml of lukewarm water was added. Then the leaves were added up to one feet height again and the same procedure was repeated. Daily record of ingredients like moisture, aeration, temperature and pH was maintained. After every week the pile was tossed with the help of rod.

Preparation of microbial consortium: Added 13 g of nutrient broth powder to one litre of distilled water. Mixed it well and sterilized it and to this added pure culture of isolated *Bacillus sp.*, *Sacchromyces sp.* and *Paenibaecillus sp.*(Figure:3).

2. Observations

Composting was a natural process of decomposing organic matter by using micro-organism under controlled condition. The micro-organisms fed on organic matter and consumed oxygen and generated considerable amount of heat, carbon dioxide and water. Composting reduced both volume and mass of the raw material and transformed into valuable end product (Figure:1). The fallen leaves were excellent organic material for making compost. They contained 50%to 80% by of nutrients a plant extract from the soil and air during the season. The pile of leaves needed to be monitored regularly to ensure that all the elements were in optional range. Added another key ingredient, time and on waited for two months, nature took over and cooked up wonderful compost. Leaf composting was speed up by shredding the leaves before adding to the pile, as the smaller pieces

decomposed faster. On the top of each layer of dried shredded leaves when handful of grass clippings and hedge cutting were added, the breakdown process of leaves became faster as it provided fresh source of nitrogen to the pile. When plastic sheet was spread over the compost pile it retained moisture and thereby enhanced the process of composting. Lukewarm water sprinkled in winter helped the growth of thermophilic bacteria and enhanced the process. Addition of two kilogram manure per pit increased the decomposition process. Regularly turning up of pile was further boom to compost pile.



Figure 1



Figure 2

3. Discussion and Results

Fallen leaves, the gardener's gold, provided outstanding matter and nutrients to the soil. The amount of time it would take to produce compost depends upon its size, composition and condition. Since most of trees were deep rooted, they absorbed minerals from deeper layer of soil and major portion of these minerals went to leaves. Leaves in summer provided much needed shelter from heat and rain for wildlife and humans as well were the transducer of solar energy into chemical energy in the form of food. These leaves seemed to end up in three places for a typical Indian household in the sprawling urban and suburban areas (Figure:2) :

- Heaps on the side of the roads for landfill
- Blown onto the side of the road and left there
- Burn pile

Mixing and incorporation of the leaves with the soil was critical to accelerate mineralization of the leaves, and to avoid carbon nitrogen imbalances in the soil. These leafy gifts were most valuable fibrous organic material which aerated clay soil, prevented sandy soil from drying out too fast, soaked up rain water and checked evaporation. The ability to retain moisture by leaf compost was miraculous as it can hold about 300% water of its weight.

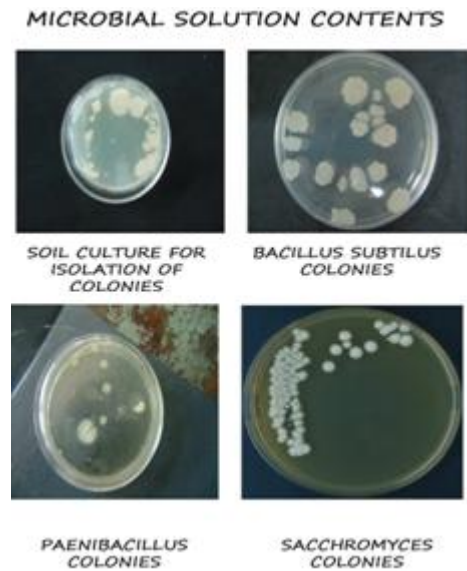


Figure 3



Figure 4

4. Conclusions

Composting leaves made a dark rich earthy organic matter that added nutrients to soil and thereby loosening the compact soil. In terms of chemical makeup, compost was a heterogeneous mixture of substances that included a variety of compounds synthesized by the microbial populations of complexes resulting from decomposition and of materials resistant to further breakdown (Figure:5). Thus, derivatives of lignin, proteins, certain hemicelluloses and celluloses were compost's principle constituents.



LEAVES IN COMPOST BIN



LEAVES AFTER 20 DAYS



LEAVES AFTER 40 DAYS (COMPOST)

Figure 5



EXPERIMENTAL FIELD SETUP



FIELD WITHOUT COMPOST



FIELD WITH COMPOST



PLANT IN FEILD WITHOUT COMPOST



PLANT IN FIELD WITH COMPOST

Figure 6

Leaf compost not only retained moisture but also lowered the soil exposure to sun and wind. It also repelled the growth of weeds when used as top dressing and thereby reduced the use of herbicide. Leaf composting returned nutrients back to the soil and reduced the dependence on fertilizers. Huge sum of money could be saved by managing the leaf composting on the site by eliminating the cost of carriage and fuel to landfill. Therefore leaf compost was significant in improving soil texture, profile and fertility (Figure:6). Composting leaves was a terrific way to recycle and create a nutrient rich soil amendment and at the same time diminished the strain on landfill for sustainable development of ecosystem.

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