Types of Composting - A Review

M. Nandhini[1], D. Suwethaa sri[2], Dr. P. Jothimani[3]
[3]Assistant Professor, Dept of Sericulture,
[1, 2, 3]Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam – 641301

Abstract- *The amount of annual litter production in India accounts to be 35.5 tonnes per hectare in forests of India. Even tough the production of leaf litter is high it was not utilized so far in the country for there tention of nutrients in the leaf litter to the plants or soils. There are many techniques to utilize these leaf litters. One such technique is composting. There are many types of composting .This review provides effective types of composting that can be used for large scale production and it can be used as a source of income. It is also environment friendly that meets our environment requirement by enriching soil nutrient.*

Keywords- leaf litter, nutrients, large scale production ,eco friendly

I. INTRODUCTION

Composting is the natural process of recycling organic matter, such as leaves and food scraps, into a valuable fertilizer that can enrich soil and plants. Anything that grows decomposes eventually; composting simply speeds up the process by providing an ideal environment for bacteria, fungi, and other decomposing organisms (such as worms, sowbugs, and nematodes) to do their work. The resulting decomposed matter, which often ends up looking like fertile garden soil, is called compost. Fondly referred to by farmers as "black gold," compost is rich in nutrients and can be used for gardening, horticulture, and agriculture. Organic discards can be processed in industrial-scale composting facilities, in smaller-scale community composting systems, and in anaerobic digesters, among other options. This guide focuses primarily on composting, which is a great way to keep your organic discards out of the waste stream and produce a valuable soil amendment for your own use.

II. TYPES OF COMPOSTING

2.1. Backyard or Onsite Composting

Types of Waste and Waste Generators: Backyard or onsite composting is suitable for converting yard trimmings and food scraps into compost that can be applied on site. This method should not be used to compost animal products or large quantities of food scraps. Households, commercial establishments, and institutions (e.g., universities, schools, hospitals) can leave grass clippings on the lawn-known as "grass cycling"-where the cuttings will decompose naturally and return some nutrients back to the soil. Backyard or onsite composters also might keep leaves in piles for eventual use as mulch around trees and scrubs to retain moisture.

Climate or Seasonal Considerations: Climate and seasonal variations do not present major challenges to backyard or onsite composting because this method typically involves small quantities of organic waste. When conditions change-for example, if a rainy season approaches-the process can be adjusted accordingly without many complications.

Environmental Concerns: Improper management of food scraps can cause odors and also might attract unwanted attention from insects or animals.

Requirements: Backyard or onsite composting requires very little time or equipment. Education is the most critical aspect of backyard or onsite composting. Local communities might hold composting demonstrations and seminars to encourage homeowners or businesses to compost on their own properties.

Results: The conversion of organic material to compost can take up to two years, but manual turning can hasten the process considerably (e.g., 3 to 6 months). The resulting natural fertilizer can be applied to lawns and gardens to help condition the soil and replenish nutrients. Compost, however, should not be used as potting soil for houseplants because of the presence of weed and grass seeds.

2.2. Vermicomposting

Through this method, red worms-not night crawlers or field worms found in gardens- are placed in bins with organic matter in order to break it down into a high-value compost called castings. Worm bins are easy to construct (they are also commercially available) and can be adapted to accommodate the volume of food scraps generated.

Types of Waste and Waste Generators: Worms will eat almost anything you would put in a typical compost pile (e.g., food scraps, paper, plants). Vermicomposting can be ideal for apartment dwellers or small offices that want to derive some of the benefits of composting and reduce solid waste. It is

frequently used in schools to teach children conservation and recycling.

Climate or Seasonal Considerations: Worms are sensitive to variations in climate. Extreme temperatures and direct sunlight are not healthy for the worms. The optimal temperatures for vermicomposting range from 55° F to 77° F. In hot, arid areas, the bin should be placed under the shade. By vermicomposting indoors, however, one can avoid many of the problems posed by hot or cold climates. The primary responsibility is to keep the worms alive and healthy by providing the proper conditions and sufficient food.

Requirements: Vermi composting has only a few basic requirements, among them: worms, worm bedding (e.g., shredded newspaper, cardboard), and a bin to contain the worms and organic matter. Maintenance procedures include preparing bedding, burying garbage, and separating worms from their castings.

Results: One pound of mature worms (approximately 800-1,000 worms) can eat up to half a pound of organic material per day. It typically takes three to four months for these worms to produce harvestable castings, which can be used as potting soil. Vermicomposting also produces compost or "worm" tea, a high-quality liquid fertilizer for house plants or gardens.

2.3 Aerated (Turned) Windrow Composting

Organic waste is formed into rows of long piles called "windrows" and aerated by turning the pile periodically by either manual or mechanical means. The ideal pile height, which is between 4 and 8 feet, allows for a pile large enough to generate sufficient heat and maintain temperatures, yet small enough to allow oxygen to flow to the windrow's core. The ideal pile width is between 14 and 16 feet.

Types of Waste and Waste Generators: This method can accommodate large volumes ofdiverse wastes, including yard trimmings, grease, liquids, and animal byproducts (such as fish and poultry wastes), but only with frequent turning and careful monitoring. This method is suited for large quantities, such as that generated by entire communities and collected by local governments, and high volume food-processing businesses (e.g., restaurants, cafeterias, packing plants).

Climate or Seasonal Considerations: In a warm, arid climate, windrows are sometimes covered or placed under a shelter to prevent water from evaporating. In rainy seasons, the shapes of the pile can be adjusted so that water runs off the top of the pile rather than being absorbed into the pile. Also, windrow composting can work in cold climates. Often the outside of the pile might freeze, but in its core, a windrow can reach 140° F.

Environmental Concerns: Leachate is liquid released during the composting process. This can contaminate local ground-water and surface-water supplies and should be collected and treated. In addition, windrow composting is a large scale operation and might be subject to regulatory enforcement. Samples of the compost should be tested in a laboratory for bacterial and heavy metal content. Odors also need to be controlled. The public should be informed of the operation and have a method to address any complaints about animals or bad odors. Other concerns might include zoning and siting requirements.

Requirements: Windrow composting often requires large tracts of land, sturdy equipment, a continual supply of labor to maintain and operate the facility, and patience to experiment with various materials mixtures and turning frequencies.

Results: This method will yield significant amounts of compost, which might require assistance to market the end-product. Alternatively, local governments can make the compost available to residents for a low or no cost.

2.4 Aerated Static Pile Composting

In aerated static pile composting, organic waste is mixed together in one large pile instead of rows. To aerate the pile, layers of loosely piled bulking agents (e.g., wood chips, shredded newspaper) are added so that air can pass from the bottom to the top of the pile. The piles also can be placed over a network of pipes that deliver air into or draw air out of the pile. Air blowers might be activated by a timer or a temperature sensors.

Types of Waste and Waste Generators: Aerated static piles are suitable for a relatively homogenous mix of organic waste and work well for larger quantity generators of yard trimmings and compostable municipal solid waste (e.g., food scraps, paper products), which might include local governments, landscapers, or farms. This method, however, does not work well for composting animal byproducts or grease from food processing industries.

Climate or Seasonal Considerations: Like windrow composting, in a warm, arid climate, aerated static piles are sometimes covered or placed under a shelter to prevent water from evaporating. In the cold, the core of the pile will retain its warm temperature, but aeration might be more difficult in the cold because this method involves passive air flowing

rather than active turning. Some aerated static piles are placed indoors with proper ventilation.

Environmental Concerns: Since there is no physical turning, this method requires careful monitoring to ensure that the outside of the pile heats up as much as the core. One way to alleviate bad odors is to apply a thick layer of finished compost over the pile, which can help maintain high temperatures throughout the pile. Another way to deal with odor, provided that the air blower draws air out of the pile, is to filter this air through a bio filter made from finished compost.

Requirements: This method typically requires equipment such as blowers, pipes, sensors, and fans, which might involve significant costs and technical assistance. Having a controlled supply of air enables construction of large piles, which require less land than the windrow method.

Results: This method produces compost relatively quickly-within 3 to 6 months.

2.5 In-Vessel Composting

Organic materials are fed into a drum, silo, concrete-lined trench, or similar equipment where the environmental conditions-including temperature, moisture, and aeration-are closely controlled. The apparatus usually has a mechanism to turn or agitate the material for proper aeration. In-vessel composters vary in size and capacity.

Types of Waste and Waste Generators: In-vessel composting can process large amounts of waste without taking up as much space as the windrow method. In addition, it can accommodate virtually any type of organic waste (e.g., meat, animal manure, biosolids, food scraps). Some in-vessel composters can fit into a school or restaurant kitchen while others can be as large as a school bus to accommodate large food processing plants.

Climate or Seasonal Considerations: In-vessel composting can be used year-round in virtually any climate because the environment is carefully controlled, often by electronic means. This method can even be used in extremely cold weather if the equipment is insulated or the processing takes place indoors.

Environmental Concerns: In-vessel composting produces very little odor and minimal leachate.

Requirements: In-vessel composters are expensive and might require technical assistance to operate properly, but this method uses much less land and manual labor than windrow composting.

Results: Conversion of organic material to compost can take as little as a few weeks. Once the compost comes out of the vessel, however, it still requires a few more weeks or months for the microbial activity to stabilize and the pile to cool.

III. CONCLUSION

Composting is the most effective way of maintaining our environment clean and making our environment free from chemical fertilizers which are unsafe to our environment and human. Composting also acts as a source of income and helps in employment generation. It acts as a new venure for upcoming enterpruner. Above methods are most effective methods of composting and hence it can be used in efficient manner for larger quantity production and getting huge profit out of it.

REFERENCES

[1] Masters, Gilbert M. (1997). Introduction to Environmental Engineering and Science. Prentice Hall. ISBN 9780131553842.
[2] "Composting for the Homeowner - University of Illinois Extension". Web.extension.illinois.edu. Archived from the original on 24 February 2016. Retrieved 18 July 2013.
[3] "Composting for the Homeowner -Materials for Composting". uiuc.edu. Archived from the original on 25 December 2009. Retrieved 13 April 2010.
[4] Lal, Rattan (30 November 2003). "Composting". Pollution a to Z. 1.
[5] Tilley, Elizabeth; Ulrich, Lukas; Lüthi, Christoph; Reymond, Philippe; Zurbrügg,
[6] Chris (2014). "Septic tanks". Compendium of Sanitation Systems and Technologies (2nd ed.). Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag). ISBN 978-3-906484-57-0.
[7] Haug, Roger (23 July 1993). The Practical Handbook of Compost Engineering. CRC Press. ISBN 9780873713733. Retrieved 26 October 2015.
[8] Klickitat County WA, USA Compost Mix Calculator Archived 17 November 2011 at the Wayback Machine
[9] "Chapter 1, The Decomposition Process". aggie-horticulture.tamu.edu. Retrieved 11 July 2016.
[10] "How to Make Compost at Home". asthegardenturns.com. Retrieved 11 July 2016.
[11] "Composting Compost Microorganisms". Cornell University. Retrieved 6 October2010