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Composting zero waste way for sustainable agriculture

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Abstract
The most sustainable option for waste management is one that is friendly to the environment, such a technique must be effective, efficient, and less costly than many other options. Solid waste management is a huge task in developing nations all over the globe due to factors like poverty, population growth, urbanization, and lack of proper funding from government. Disposal methods such as incineration, landfills, pyrolysis, and gasification are efficient but have negative impacts on the environment and public health. Composting, when done properly, is sustainable and has various advantages, such as producing biofertilizer, relatively low air and water pollution, low operational costs, and income generation. The use of composting for bioremediation of contaminated soil has gained much ground in many developed countries. However, composting can lead to methane production, odour emission, and heavy metal build-up if not done properly.

Keywords: Sustainability, waste management, hidden hunger, composting and residues

Introduction
Composting is an excellent way to reduce waste and help environment. It allows you to recycle your organic waste, such as food scraps and leaves, into a nutrient rich soil amendment that can be used in your garden. Composting is easy to do and it’s a great way to reduce your carbon footprint. Compost can also be used as mulch which can help reduce weeds and conserve water. It is an ancient technology that still has the applications useful to now-a-day agriculture. It helps in reducing the volume of manure from dairy farms and livestock farms and provides nutrients and organic matter to other farms. The overuse of pesticides and chemical fertilisers in agriculture has cast a shadow on the value of compost, an organic fertiliser made from waste. The absence of composting in agricultural fields and the use of chemical fertilizers have a lot of detrimental effects, for instance, poor soil conditions, inadequate or bug infestations, excess nutrients, and solidified soil. Nevertheless, organic waste created in daily living can assist with soil fertility recovery if compost is made from it. According to The Food and Agriculture Organisation of the United Nations (2011), approximately one-third of the food produced worldwide a nearly similar amount is wasted reaching a mind-boggling 1.3 billion tonnes annually. To treat organic waste in an aerobic or anaerobic environment, including food waste, garden waste, livestock excrement, and other sorts of waste and neutralize harmful germs, viruses, and weed seeds by using microbial heat and fermentation. Create naturally occurring fertilizers that enhance soil quality and serve as a partial replacement for nutrients like nitrogen, the potassium and phosphorus content of chemical fertilizers are the basis for contemporary farming is completely dependent.

Benefits
1. Minimizing the damage that improper waste management does to the environment
Composting can lessen harmful environmental impacts of improper waste management at open landfills or dumping grounds. Many developing nations are wholly dependent on open dumping or their MSW management practices include unrestrained landfilling. Since, it is less expensive to build, practices and run websites. But the immediate disposal open dumping of unprocessed organic waste or landfills has undeniable environmental consequences. However, direct disposal of untreated organic garbage dumped in the open environmental damage from landfills or both impacts on a local as well as global scale. Improper open air organic waste disposal dumping, or land filling creates waste that must be disposed of GHG emissions and high BOD leachate, which contaminate rivers and ground water if not treated.

The consequences of such negligent MSW landfilling include smell, vermin, and fire outbreaks at disposal sites. MSW should be handled properly before it is landfilled to prevent serious environmental impacts. Composting is one of the finest solutions to decrease the volume of organic waste carried directly to disposal locations.

2. Improving the state of the soil

Because soil is influenced by geography, biology, and climate, it takes time for soil to form. The mixing of soil consisting of both organic and inorganic elements composed of volcanic ash, clay, sand stones, rocks, residues of plants and animals. The soil contains particles with different sizes and a cellular structure of air and moisture. The Compost can partly replace chemical fertilizers in terms of supplying nitrogen, phosphorus and potassium. Compost made from food waste can also be a source of humus, which cannot be created artificially (Hermann *et al.,* 2011) [4]. But exemplifies the different benefits in the development of a sustainable food recycling and soil management system.

Challenges and opportunities of compost in developing countries

The amount of waste has increased recently, particularly in urban areas, as a result, the significance of intermediate treatment facilities, like use of composting plants is increasing to decrease the amount of trash as demand on the capacity of current final disposal sites increasing. Centralized composting can be done effectively in cities or regions that me*et al*l or most the subsequent areas:

1. Cities or areas that seeking alternative treatment systems to replace landfilling.
2. Regions that can collect quality raw materials for composting and has institutional arrangements to develop and implement sustainable composting projects.
3. Areas that can secure enough demand for compost and adequate budget for composting plants.

History of composting

As far as the 1960's magazines devoted to dependable waste administration, and specifically to produce were few in number and were to take place mainly in the form of project reports and items in obscure periodicals that were rather troublesome to acquire. Abundant share of the shortage ultimately may be from professional fairness and possibly some presumption. The apathy and presumption gone on until conservation, capability conservation and referring to practices or policies that do not negatively affect the environment kind became big concerns of public. Prior to the 1970s, organic gardening and farming accounted for most of the interest and activity in composting. Since this paper is not destined to be a history review the list of remarks named in it is with difficulty exhaustive nor inevitably representative. In addition, spatial and temporal constraints preclude the full coverage warranted by an historical review, the account that follows is of necessity somewhat abbreviated. Finally, it should be mentioned that although this paper mainly deals with the situation of solid waste compost in the United States, it does have relevance to European situation, because the course developments in both locales has been somewhat parallel.

The following four assertions serve as an overview of composting's past, present, and potential future ways a method for managing solid waste

1. Prior to 1970, composting had a very minor impact due to severely unfavorable economic comparison between it and the main alternative, the open dumb. The general lack of interest in resource conservation was a secondary factor.
2. Beginning in the 1970, composting's popularity began to soar because of the following factors:
   - The end of the open dump.
   - The issues brought on by the growth of sanitary landfilling.
   - The realization of benefits of composting's as a method for sewage sludge disposal.

3. Although a little better, composting's role in the management of municipal solid waste is still quite small.

4. Similar to what happened with the quick development of bio solids composting, MSW composting's present and future success depends largely on managing food and yard waste.

Significantly positive changes and trends that have and will benefit MSW composting include:

- Sharp decline in the decline in economic disparity between it and its rivals.
- Mandatory source separation
- Rising significance of yard and food waste management and disposal -tasks that composting is well suited for.

Many variables will affect how large- scale composting develops in future. Some of the most significant ones have to do with site selection, having enough money to design and construct the facility in accordance with specifications, following fundamental engineering and biological principles, and managing liquid and gaseous discharges. Finally, the planning design, and construction of the facilities must involve professionals in all phases.

The history of MSW composting is a long and tumultuous one with ups and downs in its fortunes. It has finally found a place in MSW management, and all signs point to the fact it will play a crucial part in MSW management in the near future.

Nutrient composition of compost

It is necessary to grasp the nutrient composition of the compost getting used since nutrient concentrations will vary significantly particularly for phosphorous and potassium. It is necessary to perform a lab analysis for compost nutrient content to work out the quantity of nitrogen, phosphorous, potassium, carbon and salts (it may be more complex including heavy metals and other component, if necessary). Nitrogen content will vary in step with the carbon-to-nitrogen ratio of the compost feedstuff. If the ratio is poor on the carbon side, then the nitrogen within the compost are going to be lower. Nitrogen concentration tends to be more uniform. Much of nitrogen in compost is present in an organic form that's not readily available to plants.

Organic nitrogen is converted is converted to inorganic by soil organisms within the mineralization process. Compost nitrogen mineralization is 8 % and 12 % each year. Mineralization could be a complex process and far work remains to be done to see how organisms of the soil food web behave differently in numerous cropping systems.

Composting Process - 3 Phases

In the composting process, microorganisms utilize an organic substrate - such as manure, bedding, grass clippings, municipal waste - as a food source. Microbes harness the energy contained within the chemical bonds of the substrate in an exceedingly process that needs oxygen and water. Heat and C02 result, and also the remaining carbon skeletons are recalcitrant humic substances that are largely liable for the soil - amending ability of compost.

1. Initial mesophilic innovate the initial or mesophilic phase of composting, the population of microbes increases exponentially as readily available food sources of the substrate are metabolized. Temperatures of the compost heap gradually rise from ambient to quite 10F.
2. Second thermophilic phase: The next phase, thermophilic, occurs during the following week or two when temperatures may reach 147 F to 16 F. Microbes that may endure the high temperatures of the pile are responsible for decomposing more resistant parts of the substrate. It is important to possess adequate moisture and oxygen during this stage to take care of the high population of microbes within the heap. During this stage, all of the easily decomposable material are going to be ran down, leaving only the foremost resistant materials.
3. Final (second mesophilic) phase: This is a curing period where composting slows down and also the compost becomes relatively stable. During this stage, soil microbes recolonize the pile and also the formation of humic substances increases. The presence of soil microbes is important because they're to blame for the disease suppressive qualities of compost. The curing stage begins when the mound fails to re heat after turning and end when the pile approaches ambient temperature (Seyedbagheri, 2010).

Waste Management Techniques

Waste management is that the assortment, transportation, processing, treatment, recycling or disposal of waste materials to scale back their adverse effects on human health or amenities (www.wastewikipedia). Waste can be in the form of liquid, gas, or a solid substance, it's an unwanted material the owner is on the point of discard or has discarded. The waste management in developing countries varies greatly from what's tired advanced communities and additionally from urban to rural and from residential to industrial settings. In developing country like Nigeria, there are a unit less of metal and plastic wastes compared to high organic wastes (Cointreau, 1982) [5]. drawback of waste management in developing countries include less effective garbage trucks, low technology and unplanned and haphazardly created sprawling slums with narrow roads (Cointreau, 1982) [5] Political and economic framework is another major drawback of waste management in developing countries. Non-hazardous residential and institutional waste is that the responsibility of regime authorities in Nigeria. However, the unholy sights of refuse, dirt's, wastes, loitering our streets, highways and neighbourhood a confirmation of unskilfulness on a part of the regime, even supposing they claimed responsibility of paying vast quantity of cash on waste related problems.

Table 1 shows the percentage of waste compositions in all the continents of the world. Food wastes carried the highest percentage followed by paper-cardboard and woid, respectively.

Table 1: Percent waste compositions in all the continents

Continent	Food	Paper / Card board	Wood	Textile	Rubber / Leather	Plastic	Metal	Glass	Others
Asia	37.8	20.3	7.8	2.9	0.8	8.6	2.8	3.2	12.8
Africa	42.4	15.2	7.0	1.9	1.1	4.3	2.5	2.1	4.9
Europe	28.9	24.2	9.8	3.4	1.4	9.6	5.3	9.0	14.6
Oceania	51.8	18.0	13.3	-	-	-	-	-	
North America	33.9	23.2	6.2	3.9	1.4	8.5	4.6	6.5	9.8
South America	45.2	15.9	6.7	5.2	1.5	9.1	3.5	4.2	3.2

Adapted from Inter - Governmental Panel on Climate Change (2006)

Severally type of waste management techniques that ought to be applied for correct management of waste rely upon the composition of waste, though composting is going to be acceptable for all organic wastes: wastes such as plastic, metals and glasses area unit higher handled through recycling. Waste management techniques occur in many ways viz., landfill, incineration, pyrolysis, and gasification, composting and anaerobic digestion.

1. Landfilling: Landfilling is a cheap technique of wastes disposal in developing countries involving pitching refuses into a depression, abandoned, mining void, excavated land, or borrowed pits (Daskalopoulos *et al.*,1998) [6]. It's the foremost ancient means of true waste disposal practiced in several countries. The subsequent area unit varied styles of landfills.

1.1 Open-dump system/ordinary landfill: This disposal of waste materials is in pits, excavated lands, canals, sloping landscapes or flat surface while not covering the waste. From time to time, open dumps burn resulting in pollution of air. Alternative environmental implications of landfill are the site's ugliness, wind blow of litters on the landscape, presence of faecal matters, intrusion of vermin like mice and rats, odour, smoke with resultant effects on human health and piece of land for illness vectors (cockroaches, flies and mosquitoes).

1.2 Sanitary land fill: Disposing of solid wastes uses skinny layers, compacted into the littlest sensible volume and cover with ash at the top of every operating day. Environmental effects of landfill area unit production of landfill Gases (LFCs), leachate and heavy metals LFC are created once methanogens are primarily decomposed into methane (CH_4) and CO_2 and gases like carbon monoxide gas (CO), nitrogen (N_2), alcohols, hydrocarbons and organo-sulphur compounds (El-Fadel *et al*, 1997) [8]. CH_4, and CO_2, are greenhouse gases. Leachate might contain high levels of nutrients (nitrogen, phosphorus and potassium), heavy metals and toxins like cyanide and dissolved organics (El-Fadel *et al.*, 1997) [8]. Leachates could infiltrate into groundwater resource and pollute it thereby resulting in public health issues (Orebiyi *et al.*, 2010) [20] in plants and animals may well be injurious to health. Alternative potential issues of landfill are unit high price of planning loss of diverseness and impact on landscape.

1.3 Secured landfill: It is for hazardous wastes disposal like hospital and radioactive wastes. If it's not designed properly, the resultant result may well be just like that of a sanitary landfill.

2. Incineration: Refers to temperatures of combustion of waste in a very high-efficiency chamber to produce steam and ash (EPA, 1995) the advantages of incineration are a significant decrease in waste volume and production of energy in form of electricity and production of heat but, the issues of waste incineration cannot be overemphasized within following: construction and start up prices of facilities, that may well be too costly for developing countries (Rand *et al*, 2000) [21]acid gases production sulphur oxide, hydrochloric acid, nitrogen oxide, ash management, non-combustible waste like metals and toxicants like metals (lead, mercury,organics (dioxin. polychlorinated biphenyl), CO and dirt.

3. Pyrolysis and gasification: Managing wastes by heating under controlled conditions to supply low to medium heating fuel gases, tars, char and ash; under a high temperature with limited oxygen (Heimlich *et al*, 2005) [11] typically, this process takes place in an sealed vessel beneath a high pressure. Whereas pyrolysis converts the solid wastes into solid, liquid and gas products, gasification converts organic materials into a syngas (co and H_2). The impact of pyrolysis to the setting is loss of diverseness, desertification and emission of acid and green-house gases. The employment of pyrolysis and gasification for waste management is rare in developing countries thanks to the expense of apparatus. Another reason why pyrolysis and gasification may not be sustainable is because of the emission of greenhouse gases throughout thermal treatment.

4. Composting and anaerobic digestion: Composting could be a controlled methodology of exploitation microbial organisms to decompose the organic fraction of solid waste. Solid wastes in developing countries are composed of over 50% organic materials (Hoornweng *et al*., 1999). Incineration of such waste could be a waste of time whereas disposal in land fill are a waste of resources. The sole viable choice to sustainably manage wastes in developing nations is composting due to the subsequent advantages: low operational value, reduced water pollution, decreased environmental pollution and useful end products Cointreau (1982) [5] found that in developing nations like Indonesia, national capital and Ceylon. Residential wastes are 78,81 and 89% compostable. In composting, a method of property waste management is recycling of organic wastes to a helpful and valuable finish purpose. Composting as a waste management possibility has very little record of operation in continent, geographical region and in places wherever most of the facilities unsuccessful worldwide. The failures were attributed to lack of understanding and maintaining biological conditions, high value of mechanization, higher economic value, poor pre-sorting of incoming wastes and failure to know market condition (Hoornweg *et al*, 1999) [12]. For instance, 9 out of 11 plants are enclosed Republic of India and eighteen out cardinal facilities unsuccessful in Brazil between 1974 and 1998 (UNEP 1998-Hoornweg, 1999) [12]. Composting has been used effectively to rectify soils and sediment with hydrocarbons (Williams and Keehan, 1993) [22]. Charles *et al*. (2009) [23] reported that explosive-contaminated soil, metals in organic residues, wastes and by-products were remediated with success through composting. The employment of composting accelerates destruction of contaminants (Briggs *et al*., 2002) [24]. However, issues like serious metal accumulation and health hazards associated with infectious agent cannot be found wanting during this methodology despite the benefits. These issues are circumvented through sorting wastes properly at the supply, addition of lime (reduces heavy metals availability) and proper compost maturity (Ciavatta *et al*, 1993) [25]

Compositions of Compost

Compost positions can confirm its quality. Addition of compost shouldn't result in soil pollution. Compost should be of prime quality, no leaching or heavy metal uptake by plants will occur even underneath acidic soil conditions. Compost ought to be directed to develop and maintain structure, improve physical properties of soil, decrease soil-susceptibility to erosion, encouraging microbial activity also as providing potentially available plants nutrients The suggested C: N quantitative relation of a decent compost is between 25:1 and 40:1. Inappropriate use of wastes with high C: N quantitative relation will result in reduced soil fertility.

Environmental benefit of composting

Compost operation promotes clean and readily marketable finished products, minimum potential and is simple to work. There was a discount in land fill space wherever composting is operated as waste management. There's a reduction in surface and groundwater contamination that could be a development in land fill. According to WHO, 900 million individuals' expertise diarrhoea or contact diseases like centric fever (typhoid) and cholera from contaminated wate. Through composting waste blocking of rivers, drainages, canals may be reduced. As a flexible waste management, composting enhances use of materials, low cost for transportation. In composting there's a minimalizing of greenhouse emission with subsequent effect on global climate change and warming. Moreover, addition of compost to soil decreases soil erosion as well as improvement of soil structure, aeration and water retention. The utilization of chemical fertilizer result in ground water pollution. But compost can reduce it. Torkashvand *et al*., 2010) [26]

Table 2: Chemical composition of some selected composts (on dry weight basis)

Element	Source					
	USA	**USA**	**Italy**	**Spain**	**France**	**Netherland**
C(%)	27.00	33.80	39.50	28.40		
N(%)	1.30	0.51	1.78	1.40	0.90	0.96
P(%)	0.26	0.15	0.27	0.60	0.26	0.33
K(%)	0.97	0.14	0.07	0.70	0.25	0.27
Ca(%)	4.60	1.20		7.50	4.00	2.14

Na(%)	0.67	0.20			0.30	0.30
Mg(%)	0.60	0.08		0.50	0.30	0.17
Fe(%)				0.22		
Cl(%)					0.50	0.32
S(%)		0.20	0.2	0.20	0.60	0.32
Cu(mg kg^{-1})	100.00	200.00	422.0	200.00	250.00	630.00
Ni(mg kg^{-1})				0.76	190.00	110.00
Mn(mg kg^{-1})		300.00		500.00	600.00	400.00
Zn(mg kg^{-1})	1500.00	500.00	857.0	700.00	1000.0	1650.00
B(mg kg $^{-1}$)				3.00	60.00	60.00
Hg(mg kg $^{-1}$)					4.00	5.00
Pb(mg kg^{-1})			605.0	9.00	600.00	900.00
Cd(mg kg^{-1})		100.00	8.0	0.004	7.00	6.00
Cr(mg kg $^{-1}$)			215.0	2.00	270.00	220.00

Compost pile management

To produce a decent yield of top quality compost, several variables must be managed to produce for needs of composting microbes. The foremost important variables are substrate, oxygen content, moisture and temperature.

Substrate

Organic materials must provide the nutrient needed for microbial growth. One amongst the foremost important factors is that the ratio of carbon to nitrogen (C:N). carbon and nitrogen are both needed by microbes within the composting process. A high C:N ratio (too much carbon) implies that there's not sufficient N to satisfy the microbe's needs. A carbon ratio means is more N microbes can decompose. The mound will have a nasty odor. Substrate physical properties that affect composting

- Porosity air space determined by particle size, air space, and particle uniformity
- Structure rigidity of particle
- Texture where microbial activity takes place in a thin layer of water surrounding particles. Composting occurs more rapidly as substrate surface area increases. therefore, decreasing particle size improve texture. Texture decreases porosity which restrict air flow in compost pile.
- Oxygen content in pore space should be at least 5%
- Moisture should be maintained between 40%-65%
- Sufficient water needs to meet microbial needs without any restriction in air moment
- Temperature-Moderate-50°F~105°F
- Higher-105~150°F
- At temperature above 160°F even thermophilic microbes suffer, and composting flows down leads to quality decline.

Types of composting:

There are four methods useful for farm composting

1. Passively related static pile method
2. Aerated static pile method
3. Turned pile method
4. In vessel method

What to Compost?

Organic materials like leaves, corn stalk, straw, bark, paper, saw dust, wood chips, which are high in carbon. Other materials like manure, hay, vegetable scraps, grass clippings, which are high in nitrogen for great microbial activity C:N ratio should be 30:1. Kitchen scraps like coffee grind, egg shell, fruit and vegetable peeling, blood and bone meal can also be added.

Source: Fast-growing-trees.com

Fig 1: Materials that can be composed

Materials should not be composed
- Human or pet feaces.
- Wastes like meat, bones, eggs, peanut butter, etc. Which attracts rodents.
- Corn cobs, corn stalk, corn husk, citrus rind, nut shells, palm frond etc. materials which decomposes slowly.

Charcoal coal ashes auto motive petroleum products which contains high levels of sulfur and iron which are harmful to plants.

Source: Fast-growing-trees.com

Fig 2: Materials shouldn't use for composting

Composting Methods

Coimbatore Method: Composting is done in different sizes of pits depending on waste material layer of waste material laid in pit and moisten pit with 5-10kgs of cow dung in 2.5-5 liters of water and 0.5 to 1 kg bone meal sprinkle over it. Similarly, layers are laid till 0.75m height reached, finally cover it with mud and leave undisturbed for 8-10 weeks. Then remove the cover, moisten the material with water, give a turning. Anaerobic decomposition followed by aerobic fermentation.

Indore method: Organic waste spread in cattle shed serve as bedding material. Dung along with urine -soaked material formed into a layer of about 15 cm thick. Urine-soaked earth is mixed with water and sprinkle over the layer for twice or thrice a day. This layering process continue for about a fortnight. Then thin layer of well decomposed composed added over the top of the heap and given a turning and reformed. Old composed acts as inoculum for decomposing material. This heap is undisturbed for about a month then it is moisture thoroughly and given a turning.

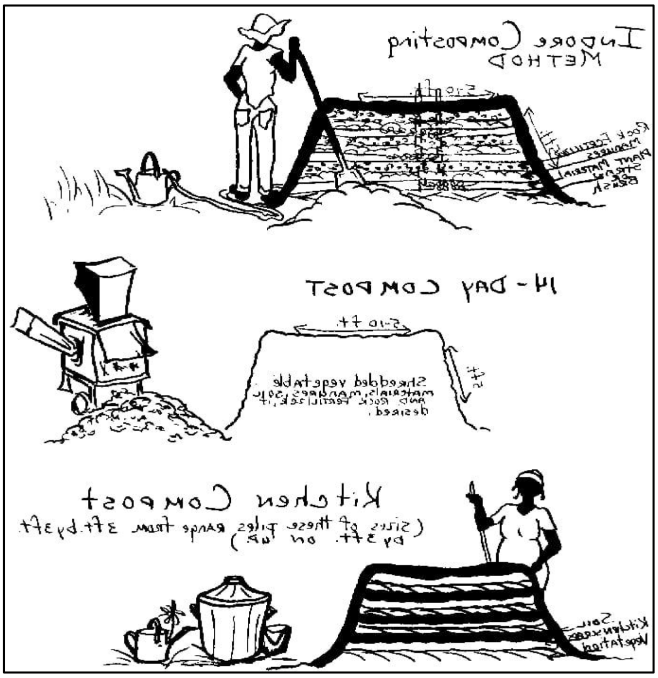
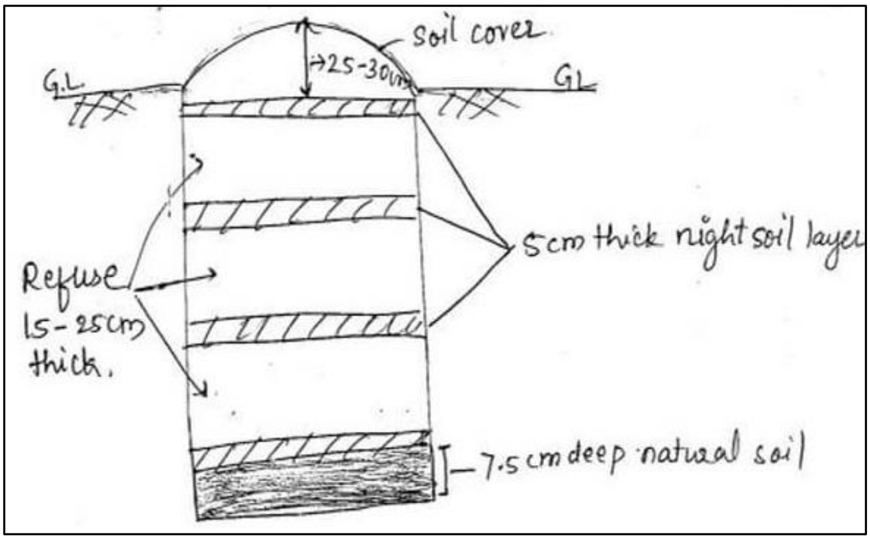


Fig 3: Indore method of composting (source: www.nzdl.org)

Bangalore method: Dry waste material of 25 cm thick is laid in pit and thick suspension of cow-dung is sprinkled over it then add a thin layer of dry waste in this manner pit is filled alternatively with dry layers of waste materials and cow dung suspension till it reaches 0.5m height above ground it is left undisturbed without covering up-to 15 days then given a turning plaster with wet mud and left undisturbed for 5 months.



Source: Allaboutcivil.org

Fig 4: Bangalore method of composting

Aerobic fermentation followed by anaerobic fermentation

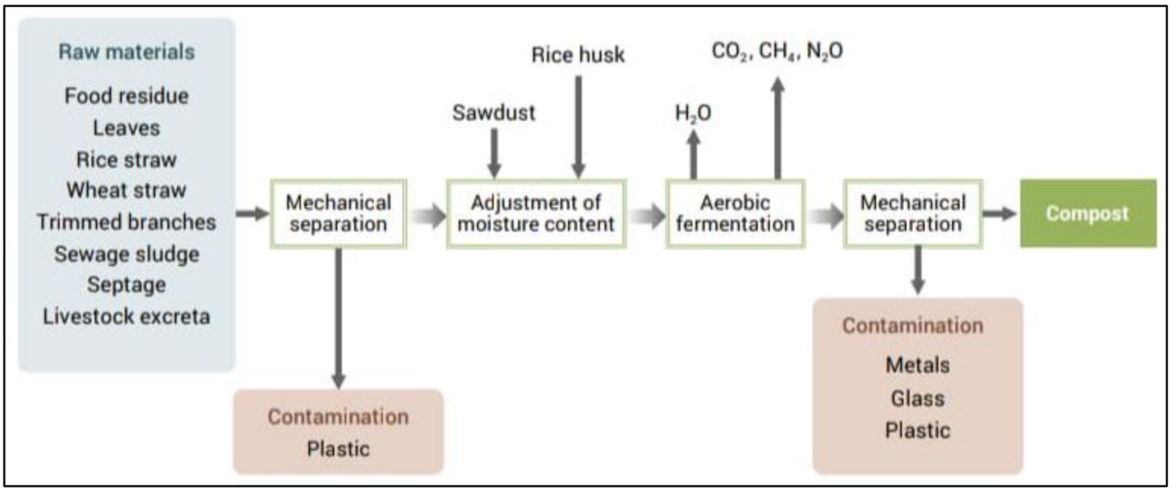


Fig 5: Typical flow chart of composting process

Composting process

Fermentation

Two types-1. Anaerobic treatment in which anaerobic bacteria performs decompositions and stabilizes the organic components in absence of air. It requires longer time minimum up to 10 months to ferment because of slow anaerobic reaction.

Aerobic reaction In which aerobic bacteria decomposes and stabilizes organic components in presence of air. It requires certain amount of amount of oxygen which can maintained by entering the air into the mixture through stirring and mechanical ventilation. This method requires shorter period of time to compost.

Mostly uses aerobic fermentation because of simple technology which has higher potential for installing and operating composting plants in developing countries. The effectiveness of fermentation is influenced by temperature, oxygen supply, moisture content pH, C/N ratio, particle size, degree of compaction.

Fig 6: Primary aerobic fermentation process

Fig 7: Secondary aerobic fermentation process

Mechanical Separation

Removal of contaminants from the mixture both before and after fermentation process is called mechanical separation. It influences the quality of compost, it helps remove the contaminants.

Fig 8: Mechanical separation after fermentation process

Sieving

It is physically removing of large particles using screens before and after fermentation. During fermentation process the biodegradable components become smaller. This process can separate non-biodegradable components from the compost after fermentation. Screens are used to put through the movement to avoid blockages up and down back and forth, circular.

Fig 9: Trommel to remove contaminants

Ferrous Metal separation

These ferrous metal are sorted with magnets to attract iron form composting stream separated by magnetic separator or a magnetic drum.

Fig 10: Magnetically separated metals

Electromagnetic separation

The nonferrous metals are separated by eddy current's separators. The eddy currents are induced by series of rare earth magnetic or ceramic rotors. They induce temporary magnetic forces in non-magnetic metals of same polarity as rotor repelling the metals and then separating them.

Deodorizing

In composting plants the odors must be deodorized in composting plants if they are around the areas. Ammonia, Amines, Dimethyl sulfide, Acetic acid and volatile organic compounds are key causes of odors. In composting facilities to treat and reduce odors bio filters such as soil and compost itself are methods. The strategy for reducing odours is to pass through the initial low phase of ph. Accomplished through a combination of high aeration rates that provide oxygen and additives such as recycled compost.

Fig 11: Soil for deodorising

Advantages

- Reduces the volume of waste.
- Final weight of compost is extremely less.
  Composting temperature kill infectious agent, weed seeds and seeds.
- Matured compost comes into equilibrium with the soil.
- During composting range of wastes from many sources square measure mixed along.
- Acts as best soil conditioner.
- Reduces pathogen.
- Eliminates the necessity for chemical fertilizers.
- Removes solids, grease, and significant metals from storm water runoff.
- Destroys 99.6% of commercial volatile organic

chemicals (vocs) in contaminated air.

Drawbacks

The product is weighty and ponderous, creating it costly to move.

The nutrient worth of compost is low compared there with of chemical fertilizers, and therefore the rate of nutrient unharness is slow in order that it cannot typically meet the nutrient demand of crops in a very short time, so leading to some nutrient deficiency.

Nutrient composition is very variable compared to chemical fertilizers.

Significant application of composts to agricultural soils has been found to lead to salt, nutrient, or significant metal accumulation and will adversely have an effect on plant growth, soil organisms, water quality, and animal and human health.

Conclusion

Composting aims to treat organic waste biologically and to supply compost, an organic fertiliser that improves soil conditions chemically, biologically and physically. Composting helps to reduce the degree of MSW disposed in land fill site in developing countries and dramatically reduces environmental impacts by producing the compost that users need. Composting also reduces methane emissions from land fields and lowers carbon footprint. Additionally, household and community-based composting can specifically bring social and economic benefits to the users. Composting projects are strongly recommended for cities or areas that seek alternative treatment systems to switch land filling. Area should be ready to separately collect quality raw materials for composting, secure enough demand for compost, and safeguard an adequate budget to operate composting plants for many years. The city or area should even have a sufficient level of manpower and institutional capacity to confirm that composting projects are sustainable. Compost shouldn't contain any contaminants such as non-biodegradable or hazardous waste, as they can negatively impact quality. Separate collection of organic waste is a vital element in supplying quality raw materials for composting to provide high quality compost. There are several options available to residents for separate collection and transport of organic waste. The most suitable option should be adopted supported local situations and detailed feasibility studies to ensure that only high quality waste is collected. A composting system needs users, such us local farmers, who should be included from the very start of the look stage to confirm that their opinions are reflected within the system. Without the involvement of local farmers who use compost regularly, composting systems won't be successful in accomplishing in the goals of the local government to scale back the quantity of waste disposed in landfills and stream line waste management.

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