



YARD WASTES GENERATION, MANAGEMENT AND UTILIZATION IN NIGERIA

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ABSTRACT

Yard waste is a major constituent of municipal solid waste (MSW) that contain elements that can be used by microorganisms during biological degradation of MSW but whose economic values are less than the cost of collection, transportation, and processing for beneficial use. It is generated from the gardens, plant nurseries, road sweepings, and so on. Yard waste generation is inevitable in any society, and it is clear that rapid urbanization has resulted in significantly more yard waste generation than previously. Gardening is common in communities, whether rural and urban, resulting in garden wastes such as leaves, wood trimmings and grass clipping. At present, most of the yard wastes in Nigeria are illegally dumped into abandoned waste lands or burn up which is very harmful and had raised concerns for the environmental and human health. However, due to a lack of corresponding policy support and management requirements for yard waste usage in Nigeria, this study proposes remedies and proposals for yard waste utilization that are appropriate for Nigeria, based on successful technologies and regulations. So based on the real situation in Nigeria, it is imperative to replace the traditional methods of yard waste management with innovative ones to promote their proper utilization..

KEYWORDS: Environment, Management, Policy, Utilization, Yard wastes

INTRODUCTION

Yard waste is a type of organic waste generated from the maintenance of gardens, plant nurseries, nature parks, road sweepings, horticulture and landscaping (Shi et al., 2013; Yoshida et al., 2012; Mohee, 2007). Yard waste consists of grass clippings, brown dry leaves, green fresh leaves, roots, shoots of small plants, woody debris and tree branches being produced continuously all year round (Li et al., 2011; Shahudin et al., 2013) from parks, gardens, and public spaces to

cemeteries and green spaces (Bilitewski et al., 1997) (Figure 1). Most of this content is seasonal or cyclical in nature (Rogoff et al., 1994). During certain seasons of the year, yard waste accounts for a larger portion of the waste stream (between 35 and 40 percent) and is one of the most important parts of municipal solid waste (MSW). Yard waste is carbon-rich and naturally ligneous (Hemalatha, 2013), biodegradable, and decomposable in both aerobic and anaerobic circumstances. (Boldrin et al., 2011; Yazdani et al., 2012).

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Figure 1: Yard wastes generated and gathered at the nursery section of Moist Forest Research Station, Benin City, Nigeria.

Yard waste contains nutritional components that microorganisms can utilize during the aerobic biological MSW decomposition. (Christopher and Suffian, 2012). Aside from delivering nutrients to microbes, yard waste can also act as a bulking agent for the growth of other organisms in the waste compost pile, as well as improve air circulation. The yard waste added to MSW helps in sustaining C/N ratio of the degradable mixture. In the developing countries like India, MSW contains large fraction of wet organic waste (i.e., food waste) along with yard waste (~40% by wt. as received) (CPHEEO, 2000). Therefore, the biological degradation has been recognized as the most suitable method for MSW treatment.

Usually, when it comes to waste management, the operators of solid waste facilities usually collect small portions of yard waste and municipal solid waste. However, in most cases for instance in Nigeria, they refuse to deal with bulky yard waste such as leaves, grass clipping, stumps and logs, which are considered as MSW. Yard waste is small in weight but takes more volume for transporting and it is considered not economical to transport this waste to the site, thus abandoning a considerable amount of the yard waste. The improper disposal of significant amounts of yard waste may result in odor issues at dumping sites. (Bary et al., 2005; Lopez et al., 2010). Unfortunately, some of the yard waste being incinerated ends up as toxic gases that are released into the air which causes various environmental issues and human health concerns. As a result, for long-term MSW management, efficient treatment and disposal of yard waste is critical.

In developing countries, local authorities often set up schemes to reclaim yard waste and turn it into valuable materials. This method of disposal is becoming a commercial waste. Yard waste scored fourth in terms of decomposed waste percentage in municipal solid waste composition and appears to have composting potential similar to other non-decomposed waste (Muttamara et al., 2004). Therefore, the objective of this paper is to review the management and utilization of yard waste in Nigeria. This study also seeks to make recommendations necessary for the appropriate management and utilization of yard wastes in Nigeria.

YARD WASTE MANAGEMENT

Yard waste management entails the regulation of yard waste collection, transportation, processing, and disposal in accordance with environmental guidelines, and can aid in the prevention of health and other environmental repercussions. Yard waste management is an important subject in Nigeria that has gotten insufficient attention and development due to a lack of technical support, incentives, laws and regulations, and other factors.

The conventional disposal practice in Nigeria involves the landfilling and burning of yard waste, which is preferable due to low processing fees and technological barriers. In Nigeria, the need for a comprehensive solution to overcome yard waste and disposal problems in the cities across the country is very important, as many traditional disposal methods are no longer adequate to handle increasing yard waste generation. The existing yard waste disposal may be generally summarized as follows:

Landfill – In landfills, the waste is placed in an engineered area that has various safeguards to prevent it from contaminating the ground, but the waste still poses health risks because it generates certain greenhouse gases. In Nigeria, landfilling may be the most cost-effective form of disposing of yard waste. Yard wastes or bio-solids not only take up valuable landfill space, but they also decompose, releasing methane gas and polluting leachates into the environment. Although, landfills are to be constructed to prevent movement of air and moisture in order to protect the surrounding environment from being contaminated or polluted. Yard waste collection and delivery to landfills or dump locations is also costly. On the other hand, yard waste should not be dumped because it is a reasonably clean biodegradable component that can be repurposed for soil enhancement and other agricultural purposes.

Open Burning –Open burning is an ancient and common method of yard waste disposal in Nigeria. It entails burning of waste in an open area (Figure 2a) without considering the weather conditions such as air or wind. Smoke is emitted uncontrollably into the surroundings using this process (Figure 2b). It is commonly acknowledged that open-air burning has a

proclivity for polluting the environment. Sometimes, when burning of equipment lacks an emission control device or a lid, it is considered open burning. Smokes are also frequently emitted into the air, which can result

in fog, acidulated precipitation, acid rain, and ozone layer depletion due to aerosol emission into the atmosphere. (Barrett and Lawlor, 1995; Foday et al., 2013; Lekan & Charles, 2017).



Figure 2: (a) Open burning of yard wastes (b) Smoke from open burning into the environment.

Incineration—Another technique of managing yard waste is incineration, which is common in areas where landfills are scarce. Combustible components in yard waste have a high calorific value, resulting in an overall heat content of roughly 6 MJ/kg (Tchobanoglous et al., 1993). The heat that is released can be collected and used as a source of energy. Steam, electricity, or a combination of both can be sold from the recovered energy (Cogeneration). In comparison to conventional power plants, cogeneration facilities can achieve 90% efficiency and save 15 to 400 hours of energy. The sale of recovered energy can assist pay the facility's operating and maintenance costs. However, the downsides of incineration include the generation of disposable garbage and unpleasant gaseous pollutants, as well as the inability to store the energy produced.

Composting – Composting is a process of recycling organic wastes such as leaves, grass clippings, and fruit and vegetable scraps by putting them in an open pile or container and allowing them to decay through microbial action to generate compost, a dark-brown product that can be used as a soil conditioner. Composting yard waste yields fertilizer that replenishes the soil's nutrients. Composting also cuts the volume of yard waste by 50% to 70%. (Wilson & Feucht 2011). When yard waste is collected separately at the household level, composting can be beneficial.

Stringent air and water pollution regulations, as well as numerous waste disposal requirements, have accelerated the development of yard waste composting as a viable waste management option where tropical plants can thrive all year. Yard waste management issues can be solved by collecting, processing, and composting yard waste as efficiently as possible. Composting yard waste has a lot of advantages which includes:

- Lowering the cost of waste disposal
- Natural resource conservation
- Creating a useful soil amendment

- Minimizing environmental effect

UTILIZATION OF YARD WASTE

Non-hazardous waste application to land is a waste management option that is both environmentally and economically sound. Utilization of yard waste is a function in a waste management system employed for a beneficial purpose, for bioproduct development and as a means of ensuring environmental safety which can be done through any of the following:

Mushroom Cultivation – In some developing countries, farmers use wood waste such as sawdust, tree pruning, and yard clippings to grow mushrooms. Oyster mushroom production appears to be possible using lawn clippings as a substrate. As an alternative to traditional disposal options, oyster mushroom cultivation can help manage and recycle organic waste (Nirmalendu and Mukherjee, 2007). Composting waste can be utilized as a soil conditioner after mushroom harvesting. The project is long-term since it can help urban poor people live better lives.

Charcoal production – In rural locations, yard waste leftover, particularly stumps and logs, can be utilized as a domestic fuel for cooking stoves when burned (charcoal). Yard waste charcoal recovery is a cost-effective and environmentally friendly method of waste reduction. The primary benefit of charcoal recovery is that it reduces the amount of yard waste that must be disposed of and thus saves a lot of resources. Recycling used materials not only results in a lower cost product, but they also assist the environment by reducing energy demands and thereby reducing potential pollution (Roberts, et al., 2010)

Mulching – Another approach is to mulch with yard waste. Mulch is simply a layer of material, commonly organic, covering the soil surface to exclude sunlight. Organic materials frequently used as mulch include wood chips, leaves, grass clippings, straw, and compost. The practice of mulching produces a variety of wonderful benefits—spread over the soil surface, mulches help to suppress weeds; control erosion;

modify soil temperature (Stavi, 2020), keeping plant roots cool in the summer and warm in the winter; reduce soil compaction and water lost to run-off and evaporation; and keep fruit off the soil so it is less likely to bruise and rot. The soil environment beneath the mulch is favorable for earthworms, which are valuable for aerating the soil. As the mulch decomposes, organic matter is progressively introduced to the soil. Recycling your yard and garden waste is a free and easy alternative to purchasing commercial mulch.

Compost Application – Composting's most essential technical issue is that it improves soil structure by providing humus, encourages microbial activity, and can help keep fertilizers and moisture in the soil. The environment benefits from the recycling of organic wastes as compost (Sayara, et al., 2020), and financial gains from the sale of municipal composts can help offset collection and processing costs. Yard waste, on the other hand, includes a high percentage of organic matter and is less odorous, making it more suited for the formation of high-quality organic compost. Carbonaceous waste such as sawdust, logs, straw, and leaves can be mixed with high nitrogenous sewage sludge to make high-quality organic compost.

As an organic fertilizer and soil conditioner, compost is beneficial. It's an organic fertilizer that's rich in nutrients like nitrogen, phosphorus, and potassium. (Hoitink, 1993). Compost, as a soil conditioner, reduces the bulk density of the soil, making it easier for seeds to sprout and retaining more moisture. Furthermore, compost helps to neutralize acidic soils. Composting is a cost effective and environmentally sound alternative for ultimate yard waste disposal (Fogarty and Tuovinen, 1991). Composts can also be recycled and used in city parks, local gardens, nurseries, farms, and other disturbed land vegetation. Many communities are implementing yard waste composting programs as a way of achieving long-term sustainability. The programs also aim to produce more chemical-free fertilizer for agricultural land, reducing the environmental damage caused by leachate.

CONCLUSION

The level of capital cost, pollution risk, and environmental impact of the many options available to a waste disposal authority are all factors to consider when deciding on yard waste disposal methods. Every one of these options, in general, necessitates the use of land to dispose of the waste. As a result, new tactics have been developed to try to repurpose yard waste rather than discard it. It is important to note from the findings so far that proper yard waste collection, storage, treatment, transfer, and utilization is a panacea to a healthy environment. Yard waste minimization, like all other types of solid waste, should be a top priority for waste management. It is both inefficient and costly to have cities or metropolises handle leaves and yard trimmings when this waste can be simply reduced, re-used, and recycled right where it is generated – in your own backyard. As part of their entire yard-waste management program, municipal waste managers can promote backyard composting. Because conventional yard waste treatment methods, such as incineration and landfilling, are unable to meet the requirements of sustainable development, a safe and resourceful yard

waste treatment method, particularly in Nigeria, has become critical.

RECOMMENDATIONS

Based on this review the following recommendations were made:

- i. Though there are unspecific and in-exhaustive ways of treatment measures of yard waste, there is need to formulate corresponding policy to prohibit the burning of yard waste or increasing landfill costs, to deal with the root of the problem of resource re-utilization of yard waste and improve land utilization.
- ii. Providing all kinds of practical preferential policies, such that government can grant special funds for compost plant and allowance for yard waste collector, and to promote the government given priority to purchasing recycled yard waste products.
- iii. Development and utilization of necessary garden machinery technology is required to improve the products quality of yard waste and to reduce operating costs of yard waste treatment and disposal.
- iv. To encourage and fund scientific research units and institutions to carry out yard waste composting research and utilization, so as to make breakthrough as soon as possible in key technologies and popularizing application demonstration of resource re-utilization of yard waste.
- v. Also, educating and sensitizing the general populace on the proper management and utilization of yard waste is essential. Some things, however, will begin to appear less like wastes and more like resources when individual and institutional attitudes shift and a few basic good habits are formed.

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