

# A Study on Composting by using Natural Accelerating Ingredients

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**Abstract** - Solid waste management has become a critical issue in cities as well as in rural areas (villages) due to increasing urbanization and changing lifestyle. This paper studies on the composting process of organic waste. Organic wastes are wastes that easily bio degradable. These wastes are produced from many sources. Without proper management, these waste could create several environment problem. Therefore, composting is the best low cost alternative solution to overcome this problem. The composition from organic waste that could be used as nutrients for crops, soil additive and for environmental management. Normally the time taken for compost preparation in most methods is rather long, ranging from 100-180 days. But in this paper work has therefore been done to accelerate the composting process. It is possible by the introduction of suitable natural accelerating ingredients with demonstrate efficiency in the rate of organic matter decomposition. Compost will be made using organic waste and for accelerating ingredients, accelerators like Cow dung, Wheat bran, saw dust, Coconut coir, Sugarcane powder, Sugarcane bagasse charcoal, Jaggery, Egg shell powder, Wooden ash, Used tea powder, Lime powder and Dry neem leaves were used. Composts prepared from different organic wastes differ in their quality and stability, which further depends upon the composition of raw material used for the compost production. However many factors can contribute to the quality of the compost products as different types of organic wastes have different concentrations of nutrients Nitrogen, Phosphorous and Potassium (N, P, K) which are the common macro nutrients present in fertilizers. The main focus of this project work was to test for the possibility and feasibility of producing compost/organic fertilizer from the waste streams generated from the different phases and analyze the best natural accelerating ingredients proportion, as an alternative to chemical or artificial fertilizers.

**Key Words:** Accelerators, Coconut coir, composting, Cow dung, Dry neem leaves, Egg shell powder, Jaggery, Lime powder, Saw dust, Sugarcane bagasse charcoal, Sugarcane powder, Used tea powder, Wheat bran, Wooden ash.

## 1. INTRODUCTION

Several environmental problems arise from waste as they are not being properly managed. At present, there is a big problem regarding collection, transportation and disposal of waste. The main methods of disposal includes dumping, heaping, land filling and burning and the main problems are environmental pollution, leachate, foul smells, greenhouse gases, spread of diseases and other health hazards. We are facing environmental and socio- economic problems in dealing with current and future planning of disposal and management of waste. Though, proper legislative rules and Standards regarding waste disposal have been made which are not strictly obeyed and waste stuffs are not properly handled and they often pollute the environment. Hence more sustainable and eco-friendly waste management systems are to be made and adopted. However, inappropriate waste management technique is the main control in production of good quality compost. Composting of waste results into several benefits such as increased soil fertility and soil health thereby increased agricultural productivity, improved soil biodiversity, reduced ecological risks and a better environment. It destroys harmful pathogens and reduces the volume of waste.

Composting is the process in which aerobic micro-organisms converts organic matter into hygienic, biostable product by thermophilic. This natural process is affected by some environmental conditions like temperature, moisture content, pH and aeration and substrate characteristics like C/N ratio, particle size, nutrients contents and free air space. During degradation of organic matter, moisture content influences the changes in physical and chemical properties of waste material. The composting process may be more fruitful when the carbon to nitrogen ratio and the moisture content will be specific according to the material of compost. For maintaining the moisture and carbon to nitrogen ratio the natural accelerating ingredients play a very vital role in the composting. The accelerating ingredients are very effectual to control the air supply, moisture and maintain the Nitrogen (N), Phosphorus (P), Potassium (K) content and other important composting parameters. Compost will be made using organic waste and accelerators like Cow dung,

Wheat bran, saw dust, Coconut coir, Sugarcane powder, Sugarcane bagasse charcoal, Jaggery, Egg shell powder, Wooden ash, and Used tea powder, Lime powder, Dry neem leaves. The production of organic fertilizer contains small amount of nitrogen and low mineralization rate needing more nitrogen for crop production. Amount of nitrogen ranges from 0.05% to 2.5% at the maximum depending on the substrates used in producing organic fertilizer, as observed. In this study, proportion of accelerating ingredients of different samples was applied in composting to increase the N, P, K content of the organic fertilizer. Farmers conducted different composting methods based on the simplicity of the methods, availability of materials and the capability of the farmers to do the method. The intricacy of the method determines the quality of the organic fertilizer output. There are different researches published into the use of different sources to its effect in decomposition. However, limited researches published on the production of natural accelerators and efficiency of different composting methods in terms of yield and economic value which include income, profit and production costs.

### 1.1 METHODOLOGY

This study utilized the Accelerating Ingredients in Composting Technique and preparation of accelerators for waste management. The methodology includes different phases of the dissertation work, viz collection and preparation of samples along with preservation, determining various pre-treatment characteristics of the samples and obtaining, recording the results of the laboratory tests.



Figure 1.1: Flowchart of Preparation of Accelerators

#### 1.1.2 Collection of Accelerating Ingredients

Fresh cow dung, wheat bran, saw dust, coconut coir powder, sugarcane bagasse charcoal, sugarcane bagasse powder, jaggery powder, eggshell powder, lime powder, neem leaves powder, used tea powder, wooden ash were collected from household and Local Market, Amravati. They are easily available in any local market. Following table shows the Various types of Accelerating ingredients and their function;

Accelerating Ingredients	Functions
Cow dung	Regulates carbon content, bulk density, pH
Wheat bran	Regulates potassium, phosphorus content
Saw dust	Regulates moisture, pH, aeration, bulk density, temperature

Eggshell powder	Regulates water and gases & it contains calcium carbonate
Jaggery powder	It improves potassium
Sugarcane bagasse powder	Regulates carbon content, pH, moisture
Sugarcane bagasse charcoal	It improves carbon
Lime powder	It improves Nitrogen, phosphorus, potassium
Coconut coir powder	Regulates pH, temperature
Neem leaves powder	It contains higher level of nitrogen
Wooden ash	It contains calcium carbonate, iron, zinc
Used tea powder	It contains Nitrogen

Table 1: Various types of Accelerating ingredients and their function

#### 1.1.3 Storage of Ingredients

After collecting all accelerating ingredients which were in powdered forms stored in the plastic container.

#### 1.1.4 Sample Collection, Transportation and Preservation

Sample collection is another step in any experiment. A well collected representative sample from the source can help to determine the characteristics of the whole lot more accurately. This in turn proves vital in increasing the reliability of the tests and its applicability to the field conditions. The containers used for collection of the sample need to be clean and washed thoroughly. There are high chances of getting contaminated while its handling and preservation. Another aspect of sampling is accurate and clear recording of the sampling data. It contains the details of the sample like volume of the sample, identification number, date and time of sampling. The documentation of the sampling data helps in correctly identifying and correlating the results of analysis with the right sample.

#### 1.1.5 Preparation of Accelerators samples

Various samples shall be prepared with keeping basic ingredients constant such as Fresh cow dung, Cow dung powder, Wood ash and Saw dust. This samples shall be chemically analysed for basic components of compost such as Carbon, Nitrogen, Potassium, Phosphorus.

##### Procedure:

1. Weight all the ingredients and plastic bottle with the help of electric weight machine.
2. Put all the measured ingredients in a container separately.
3. Mixed all the ingredients properly with water.
4. Separate lumps in mixture if any.
5. Fill that prepared mixture in plastic container.
6. Take weight of that mixture.

7. Closed the plastic bottle and keep it in room temperature.
8. Open the plastic bottle and give aeration to that prepared sample after 15 days for some time and again closed the container.
9. After 30 days, Send these sample to Laboratory for NPK test.
10. This same procedure will repeated for all the 6 samples.

Table 1: Various accelerating ingredients and their proportions for Sample 1

Accelerating Ingredients	Sample 1 (g)
Fresh cow dung	150
Dry cow dung powder	150
Saw dust	150
Wood ash	150
Sugarcane bagasse powder	150
Sugarcane bagasse charcoal	150
Jaggery	100
Speedup compost	10
Water	500ml

Table 2: Various accelerating ingredients and their proportions for Sample 2

Accelerating Ingredients	Sample 2 (g)
Fresh cow dung	100
Dry cow dung powder	50
Saw dust	75
Wood Ash	80
Sugarcane bagasse charcoal	20
Tea powder	70
Coconut coir powder	30
Jaggery	75
Speedup compost	10
Water	340ml

Table 3: Various accelerating ingredients and their proportions for Sample 3

Accelerating Ingredients	Sample 3 (g)
Fresh cow dung	100
Dry cow dung powder	100
Wheat bran	100
Saw dust	100
Wood ash	80
Sugarcane bagasse charcoal	20
Sugarcane bagasse powder	10
Speedup compost	10
Water	350ml

Table 4: Various accelerating ingredients and their proportions for Sample 4

Accelerating Ingredients	Sample 4 (g)
Fresh cow dung	100
Dry cow dung powder	100
Wood ash	80
Sugarcane bagasse charcoal	20
Neem leaf powder	200
Lime powder	1 tsp
Speedup compost	10
Water	350ml

Table 5: Various accelerating ingredients and their proportions for Sample 5

Accelerating Ingredients	Sample 5 (g)
Fresh cow dung	100
Dry cow dung	100
Wood ash	80
Sugarcane bagasse charcoal	20

Coconut coir powder	100
Jaggery	25
Egg shell powder	25
Neem leaf powder	25
Lime powder	25
Speedup compost	10
Water	350ml



Figure 2: Schematic Representation of Sample

Table 6: Various accelerating ingredients and their proportions for Sample 6

Accelerating Ingredients	Sample 6 (g)
Fresh cow dung	100
Dry cow dung	100
Wood ash	80
Sugarcane bagasse charcoal	20
Saw dust	100
Speedup compost	10
Water	350ml



Figure 3: Schematic Representation of accelerator



Figure 1: Schematic Representation of Sample



Figure 4: Schematic Representation of Prepared 6 accelerators

## 2. RESULTS AND DISCUSSION

The aim of this chapter is to study the most influential parameters and to get a consistent product quality. Laboratory studies are the most satisfactory method for obtaining results. N, P and K is an essential nutrients needed by plants in large quantity. When the samples get mature, it will have nice smell and in dark brown or blackish color. Since the compost is the organic fertilizer for plants, it must contain the nutrients that a plant requires. The nutrients that plants require in large amount are called macronutrients such as Nitrogen, Phosphates, Potassium, Calcium, Magnesium, and Sulfur. The compost will be sent to Fertilizer control laboratory, Amravati to determine the content of the Accelerators. Fertilizer control laboratory







