

"Transforming Soil Fertility Enriching Agriculture"



## What is a Compost?

Compost is a humus rich organic matter that has been decomposed in a process called composting.

## What is composting?

It is a natural biological process of decomposing organic solid waste (complex waste/ mixed waste) with the help of various microbes.

## Why composting?

Composting is the only cost-effective & simple method of treating our solid organic waste. Waste can be converted into a valuable resource & returned back to the soil in the form of quality compost. Compost returns valuable nutrients to the soil to help maintain soil quality and fertility.

Compost is a mild, slow release, natural fertilizer that won't burn plants like chemical fertilizers. Compost provides organic matter and nutrients which will improve plant growth and lead to better yields.

Everyone can do this simple composting process with the help of Micro110 culture.

Micro110 enhances the rate of the composting process so as to reduce the time.



Fig.1. Compost

## **Methods of composting:**

### **1. Pit Composting:**

The waste is arranged in a pit. The recommended size of pit is 3 Feet in depth. Length should be as per availability of land space. Width should be 4 Feet. For aeration purposes, the upper portion should be kept open or can be covered with a perforated sheet if necessary. Pit can be dug out in open land or concrete built up.

#### **Procedure:**

- a) All organic waste can be utilized for pit composting.
- b) Add some shredded dry leaves/grass clippings at the bottom of the pit.
- c) Before adding organic waste, shred it carefully. Shredding can be done manually. For large amounts of wastes, use a shredder available.
- d) Maintain the moisture in optimum level 35 to 50 % w/w
- e) If the moisture is more than 70%, add some dry wastes such as sawdust or coco pit to reduce the moisture level.
- f) Add culture in a proportion of 1 gm for 1 Kg. of Waste. Turn the mixture thoroughly and leave it as it is for 6-7 days.
- g) Check the temperature after one week. The temperature will rise to 50-75° C.  
Turn the mixture thoroughly
- h) If the waste gets too dry add an adequate quantity of moisture by spraying water.
- i) Repeat this process till the time you get temperature rise in the waste.
- j) Stabilisation of temperature at an ambient or low temperature (room temperature) indicates the composting process is over.



Fig.2. Pit Composting



Fig.3. Pit Composting

## 2. Bin Composting:

Get a readymade composting bin which available in the market or you can make your own Composting bucket. Take an old bucket and make 4-5mm holes randomly on all sides including the bottom to make the aeration possible. To collect drained water from the wet waste, always keep a plate at the bottom of a bucket.

### Procedure:

- a) Shred the waste into small pieces
- b) If initially, waste is too wet e.g. kitchen waste. Try to squeeze out the moisture and then add into the bin or add dry waste such as shredded dry leaves/ grass clippings at the bottom of the bucket. You can add coco pit or saw dust also to reduce the moisture.
- c) Mix this matter properly
- d) Add Micro110 Culture at a ratio of 1 gram per 1 kg of waste, Turn and mix thoroughly.
- e) Add Culture adequately with an addition of fresh waste each time or you may add a dose of culture once or twice in a week considering the quantity of waste you receive weekly.
- f) After 6-7 days, the temperature will rise up to 50° to 70°C. Turn the waste thoroughly to provide aeration. It will speed up the process.
- g) Stabilisation of temperature at ambient or lower levels indicate that the process of composting is over.
- h) Compost will be ready in 4-6 weeks

i) You can use this compost for your plants, Gardens & surroundings.



Fig.3. Compost Bin

Fig.4. Layers of waste in Bin

### 3. Windrow Composting:

Windrow Composting method is used for treating large amounts of waste. The quantity of waste is in Tonnes. Municipal Corporations follows the method of Windrow Composting on their sites. Sugar Industries has been doing windrow composting since last 25 years. In this process, solid waste is arranged in a row (elongated piles) shaped like a haystack in cross-section 1 meter in height and 1.5m in width. Length can be adjusted as per the availability of land or space. More space is required for this process as compared to other

methods. This process can be followed on a concrete land or hardened land. Windrow is normally turned with the help of an Aero Tiller machine or a Tractor Loader.

**Procedure:**

- a) Shredding of waste is always recommended for better & fast composting. Mix Micro110 Culture in the ratio of 1 gram per 1 Kg of waste (1 Kg of Culture for 1 Tonne of waste and likewise) thoroughly.
- b) The Culture can be directly spread on to the windrows. Turn the waste thoroughly with the help of Aero Tiller Machine or a tractor loader.
- c) Level of moisture recommended is 35-50% w/w.
- d) Keep the windrows as it is for 5-7 Days. Check the temperature, it will rise up to 50° to 70°C. Turn the windrow to provide sufficient aeration.
- e) Turn the windrow twice in a week or at least once. frequently turning will enhance the process.
- f) Adjust the moisture as the windrow gets dry with spraying wastewater or spent wash in case of Sugar Industry.
- g) Keep repeating the process till the time you are getting temperature rise.
- h) Within 4-6 weeks compost will be ready



Fig.5. Windrow Composting



Fig.6. Turning of Windrows

#### **4. Heap/ Pile Composting:**

Waste is arranged in a Heap or Pile. As this method accommodates large amounts of waste in a very less area as is used where space is a constraint. Municipal Corporations, Waste management contractors & farmers follow the method of Heap Composting. This is an effective composting method but, due to food waste and kitchen waste excess moisture and acidic condition creates problems in the process of composting. This problem is observed when the heap contains moisture above 70%.

#### **Procedure:**

- a) Make a waste heap which may be mixture of all organic wastes. (layers of dry waste and green waste can be arranged in heap in case of agriculture waste.)
- b) Culture should be mixed in the material thoroughly before making a heap.
- c) Dose of culture : 1 kg. for 1 tonne of waste.
- d) The temperature will rise after 7-10 days. (Temperature range 50° to 70° C)

- e) Turn the heap every 7-10 days for adequate aeration and mixing. It will boost the composting process. Turning can be done with an excavator or a tractor loader.
- f) Keep repeating this process till the time there is a temperature rise in the heap.
- g) Compost will be ready within 4-6 weeks.



Fig.7. Heap Composting

Fig.7. Heap Composting

**3 Common problems in composting:**

Problem	Cause	Solution
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<b>1) Foul odour, slow composting,</b>	<b>1. Moisture level too high 2. Too much of green waste or leaves etc.</b>	<b>Add saw dust/ coco pit/ paper chips/ dry waste, leaves, soil etc. Give aeration or turn the waste.</b>
<b>2) No process, no temperature</b>	<b>1. Dry waste 2. Insufficient culture</b>	<b>Spray adequate water or mix micro110 by preparing slurry. Give aeration or turn the waste.</b>
<b>3) Partial composting</b>	<b>Waste is not shredded</b>	<b>Shredding of waste is a must chop waste into small size.</b>

### **Suggestions for composting:**

- a) In heap composting method, if the waste is too wet then make minimum 250 tonnes heap to reduce or drain out the moisture. Give at least 3 turning to this heap before culturing. (Turning period 7-10 days).
- b) Excess moisture affects composting process by forming lumps, and waste become smelly and such products are formed which are harmful to the plants. Similarly, too acidic condition is observed due to wet waste. In such cases ground lime or wood ash can be spread on the heap which will maintain the pH in between 6.5 to 7.5 and add dry material to reduce the moisture.
- c) Maintain the balance of dry and green waste at 30:1 or less. It is very important to maintain carbon: nitrogen ratio because it directly related to composting process. The optimum level Carbon (Brown waste): Nitrogen (Green waste) is 10:1 to 20:1



- d) If the moisture decreases sprinkle tap water to maintain the moisture level and it is not more than 60%. (Optimum moisture level is 50%w/w)
- e) Due to high moisture maggots and other insects can be formed. To overcome this problem keep turning the waste regular interval of time and provide aeration and maintain dry/ brown-green balance.
- f) Carefully observe the temperature, because if temperature is continuously at the range of 70° C may create thermophilic condition, in such condition the mesophilic microbes cannot work or may get killed due to heat therefore the process can be affected. Hence every 7-10 days (after checking temperature) the heap or pit should be turned out. If possible, then forcefully sparge the air into the heap when need. It will give aeration to the heap and maintain effective aerobic composting process and ultimately boost the process.

### **Compost with Micro110:**

- Micro110 enhances composting of all bio-degradable organic wastes.
- Compost produced is a very good biofertilizer and is rich in micro and macro nutrients.
- It's safe to humans and animals, free from pathogens, weed seeds & smell.

### **Micro110 is used for:**

- |                    |                      |
|--------------------|----------------------|
| a) Municipalities  | g) Agriculture waste |
| b) Society waste   | h) Households        |
| c) Gram panchayat  | i) Animal waste      |
| d) Restaurants     | j) Parks and gardens |
| e) Poultry waste   | k) Canteens          |
| f) Food industries | l) Temples           |

### **Application procedure:**

- Recommended dosage is 1gm per kg of waste
- Arrange waste in a heap / pits/bins/ windrows etc.
- Spread Micro110 onto waste or prepare slurry and spray

- Maintain moisture by spraying additional water if needed
- Turn the waste every 4-6 days to provide proper Aeration.
- Compost will be ready in just 4 to 6 weeks.

### **Precautions:**

- If initially waste is moist then spread Micro110 culture directly onto the waste instead of preparing slurry.
- Temperature should rise up to 50<sup>0</sup>-70<sup>0</sup>C in first week if not then add some more Micro110 culture till optimum temperature is reached.
- If moisture decreases then maintain it by spraying additional water.
- Control the carbon to Nitrogen ratio (C: N) at 30:1 or less by adding brown and green waste as per requirement
- The most efficient composting occurs with the optimal carbon: nitrogen ratio of about 10: 1 to 20:1
- Micro110 culture store in cool and dry place. Keep away from direct sunlight.

### **Technical Specifications:**

<b>Microbial count:</b>	10 billion cells/grams
<b>Spectrum of micro-organisms:</b>	Saprophytic Fungi, Bacteria, Actinomycete, Enzymes.
<b>Moisture content:</b>	Not more than 10%w/w.
<b>Shelf Life:</b>	1 year
<b>Carrier:</b>	Sterilized, dried organic matter such as Calcium Carbonate, Rock phosphate, Sterilised Tobacco leaves, Lignite, Wheat bran, Molasses.
<b>Safety:</b>	Absolutely non-pathogenic to humans and animals.
<b>Dose:</b>	1000 grams of Micro110 per ton of waste.

## Features of MICRO110 Culture:

- a) Natural N.P.K. carriers.
- b) Enriches compost with addition of Phosphate solubilizing bacteria, Nitrogen fixing bacteria and Potassium mobilizing bacteria.
- c) Adds lost microflora in the soil with exceptional high microbial count.

## Technical Analysis of Composting Problems and Solutions:

Problems	Normal Range	Reasons/ effect on compost	Solutions
High Carbon - Total Carbon (minimum)  - Total Nitrogen (minimum)  - C: N ratio	12%/wt   0.8%/wt   20:1	<ul style="list-style-type: none"> <li>- Immature Compost</li> <li>- Composting process is going on</li> <li>- Composting Process Stopped/ Slowed/ altered</li> <li>- Less number of Microbes/ killed by heat generated</li> <li>- Waste is not properly mixed with culture/ not turned properly</li> <li>- Less Aeration</li> <li>- Unbalanced C: N Ratio (Unbalanced Dry: Green Waste)</li> <li>- Lack of Nitrogen</li> <li>- Lack of Moisture</li> </ul>	<ul style="list-style-type: none"> <li>- Add green material if carbon is high</li> <li>- Add brown material if nitrogen is high</li> <li>- Boost process by Culturing.</li> <li>- Temperature Should rise up to 70°C</li> <li>- Turn/ mix properly</li> <li>- Balance the Dry: Green Waste as 30:1</li> <li>- Moisture Should 50% w/w</li> <li>- Give the 21 Days Maturity period to the finished Compost</li> <li>- After maturity period the temperature should not rise above normal room temperature or environmental temperature</li> </ul>
Electrical Conductivity (EC) of Compost Salts having ability to conduct electricity	NMT 4.0 dS/m	<ul style="list-style-type: none"> <li>- High Salt Concentration</li> <li>- Used water having High EC</li> <li>- Drainage system is not proper</li> </ul>	<ul style="list-style-type: none"> <li>- If EC is High (Final Compost) use Deionised/ Demineralized water to drain out salts</li> <li>- Mix Small amount of compost with comparatively low EC of the compost</li> </ul>
High Acidity level in compost	6.5-7.5	<ul style="list-style-type: none"> <li>- Excess Moisture</li> <li>- Immature Compost</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce Initial Moisture level by adding Ground lime/ wood ash</li> <li>- Boost Composting by Culturing</li> </ul>

		<ul style="list-style-type: none"> <li>- Microbial Activity is stopped/ slowed</li> <li>- Unbalanced C: N Ratio (Unbalanced Dry: Green Waste)</li> </ul>	<ul style="list-style-type: none"> <li>- Give Curing/ Maturity time to compost</li> </ul>
High Bulk Density	<1.0 g/m <sup>3</sup>	<ul style="list-style-type: none"> <li>- Immature Compost</li> <li>- Degradation is not proper</li> <li>- Microbial Activity is stopped/ slowed</li> </ul>	<ul style="list-style-type: none"> <li>- Boost Microbial activity by culturing</li> <li>- Give time to Cure/ mature the compost (Well Degraded Compost)</li> </ul>
More Particle Size (Minimum 90% material should pass through 4:0 mm IS Sieve)	<4 mm	<ul style="list-style-type: none"> <li>- Immature Compost</li> <li>- Degradation is not proper</li> </ul>	<ul style="list-style-type: none"> <li>- Boost Microbial activity by culturing</li> <li>- Give time to degrade waste properly</li> </ul>
High Moisture	15-25.0%w/w	<ul style="list-style-type: none"> <li>- Wet Waste</li> <li>- More Food Waste</li> <li>- Slow composting</li> <li>- Anaerobic composting</li> </ul>	<ul style="list-style-type: none"> <li>- Reduce Moisture by adding Saw Dust, Wood Chips.</li> <li>- Add more Dry Matter</li> <li>- Make Heap</li> <li>- Effective Drainage System</li> <li>- Boost microbial activity which create heat.</li> </ul>
Too Dry Waste	Moisture should be 15-25%w/w	<ul style="list-style-type: none"> <li>- Too Dry waste</li> <li>- Garden waste, Forest waste, Agriculture waste etc</li> <li>- It disturbs the microbial growth s well as composting process</li> </ul>	<ul style="list-style-type: none"> <li>- Spray optimum water to maintain moisture 50%w/w</li> <li>- In this case culture should be spread by preparing slurry</li> <li>- Rewet when needed</li> </ul>

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