

Aerobic composting through passive aeration

1. Indian Coimbatore method

This method involves digging a pit (360 cm long × 180 cm wide × 90 cm deep) in a shaded area (length can vary according to the volume of waste materials available). Farm wastes such as straw, vegetable refuse, weeds and leaves are spread to a thickness of 15–20 cm. Wet animal dung is spread over this layer to a thickness of 5 cm. Water is sprinkled to moisten the material (50–60 percent of mass). This procedure is repeated until the whole mass reaches a height of 60 cm above ground. It is then plastered with mud, and anaerobic decomposition commences. In four weeks, the mass becomes reduced and the heap flattens. The mud plaster is removed and the entire mass is turned. Aerobic decomposition commences in at this stage. Water is sprinkled to keep the material moist. The compost is ready for use after four months.

2. Indian Indore pit method

An important advance in the practice of composting was made at Indore in India by Howard in the mid-1920s. The traditional procedure was systematized into a method of composting now known as the Indore method.

Raw materials: The raw materials used are mixed plant residues, animal dung and urine, earth, wood ash and water. All organic material wastes available on a farm, such as weeds, stalks, stems, fallen leaves, prunings, chaff and fodder leftovers, are collected and stacked in a pile. Hard woody material such as cotton and pigeon-pea stalks and stubble are first spread on the farm road and crushed under vehicles such as tractors or bullock carts before being piled. Such hard materials should not exceed 10 percent of the total plant residues. Green materials, which are soft and succulent, are allowed to wilt for two to three days in order to remove excess moisture before stacking; they tend to pack closely when stacked in the fresh state. The mixture of different kinds of organic material residues ensures a more efficient decomposition. While stacking, each type of material is spread in layers about 15 cm thick until the heap is about 1.5 m high. The heap is then cut into vertical slices and about 20–25 kg are put under the feet of cattle in the shed as bedding for the night. The next morning, the bedding, along with the dung and urine and urine-earth, is taken to the pits where the composting is to be done.

Pit site and size: The site of the compost pit should be at a level high enough to prevent rainwater from entering in the monsoon season; it should be near the cattle shed and a water source. A temporary shed may be constructed over it to protect the compost from heavy rainfall. The pit should be about 1 m deep, 1.5–2 m wide, and of a suitable length.

Filling the pit: The material brought from the cattle shed is spread in the pit in even layers of 10–15 cm. A slurry made from 4.5 kg of dung, 3.5 kg of urine-earth and 4.5 kg of inoculum from a 15-day-old composting pit is spread on each layer. Sufficient water is sprinkled over the material in the pit to wet it. The pit is filled in this way, layer by layer, and it should not take longer than one week to fill. Care should be taken to avoid compacting the material in any way.

Turning: The material is turned three times while in the pit during the whole period of composting; the first time 15 days after filling the pit; the second after another 15 days; and the

third after another month. At each turning, the material is mixed thoroughly and moistened with water.

3. Indian Indore heap method

Heap site and size: During rainy seasons or in regions with heavy rainfall, the compost may be prepared in heaps above ground and protected by a shed. The pile is about 2 m wide at the base, 1.5 m high and 2 m long. The sides taper so that the top is about 0.5 m narrower than the base. A small bund is sometimes built around the pile to protect it from wind, which tends to dry the heap.

Forming the heap: The heap is usually started with a 20 cm layer of carbonaceous material such as leaves, hay, straw, sawdust, wood chips and chopped corn stalks. This is covered with 10 cm of nitrogenous material such as fresh grass, weeds or garden plant residues, fresh or dry manure or digested sewage sludge. The pattern of 20 cm of carbonaceous material and 10 cm of nitrogenous material is repeated until the pile is 1.5 m high and the material is normally wetted until it feels damp but not soggy. The pile is sometimes covered with soil or hay to retain heat and it is turned at intervals of 6 and 12 weeks. In the Republic of Korea, the heaps are covered with thin plastic sheets to retain heat and prevent insect breeding.

Where materials are in short supply, the alternate layers can be added as they become available. Moreover, all the materials can be mixed together in the pile provided that the proper proportions are maintained. Shredding the material speeds up decomposition considerably. Most materials can be shredded by running a rotary mower over them several times. Where sufficient nitrogenous material is not available, a green manure or leguminous crop such as sun hemp is grown on the fermenting heap by sowing seeds after the first turning. The green matter is then turned in at the time of the second mixing. The process takes about four months to complete

4. Chinese rural composting – pit method

Under this method, the composting is generally carried out in a corner of a field in a circular or rectangular pit. Rice straw, animal dung (usually pig), aquatic weeds and green manure crops are used. Silt pumped from river beds is often mixed with the crop residues. The pits are filled layer by layer, each layer being 15 cm thick. Usually, the first layer is a green manure crop or water hyacinth, the second layer is a straw mixture and the third layer is animal dung. These layers are alternated until the pit is full, when a top layer of mud is added. A water layer of about 4 cm deep is maintained on the surface to create anaerobic conditions, which helps to reduce N losses. The approximate quantities of the different residues in terms of tonnes per pit are: river silt 7.5, rice straw 0.15, animal dung 1.0, aquatic plants or green manure 0.75, and superphosphate 0.02. In total, there are three turnings. The first turning is given one month after filling the pit and, at this time, the superphosphate is added and mixed in thoroughly. Water is added as necessary. The second turning is done after another month and the third two weeks later. The material is allowed to decompose for three months and produces about 8 tonnes of compost per pit.