

## Organic wastes Management:

- Organic wastes produced in nature by various means can exist either in a solid-state or liquid state.
- Solid organic waste is primarily understood as organic-biodegradable waste, and it contains about 80-85% moisture content.
- The most common sources of organic wastes include agriculture, household activities, and industrial products.
- Green waste like food wastes, food-soiled paper, non-hazardous wood waste, landscape waste, and pruning wastes are some of the examples of biodegradable or organic wastes.
- Even though most of the organic wastes in the soil add up nutrients and minerals for soil fertility and plant growth, inappropriate disposal practices might cause severe damage to the environment.
- Recently, however, the concept of organic waste management and

recycling has been introduced and implemented.

Organic wastes have been an important source of pollution in the environment. Some of the common types of organic wastes usually found in nature include the following;

- [1. Municipal solid wastes](#)
- [2. Cattle wastes](#)
- [3. Food wastes](#)

Methods of organic waste recycling

1. Animal feed
2. Composting
3. Anaerobic digestion
4. Rendering
5. Rapid thermophilic digestion
6. Immobilized

## Composting

Composting is the process of decomposition of organic material where the organic material is acted on by soil organisms resulting in the recycling of

nitrogen, phosphorus, potassium, and other soil nutrients into humus-rich components.

Composting is an aerobic process that takes place under correct conditions of moisture and biological heat production.

Even though all organic matter can be composted, some materials like woodchips and paper take much longer to compost than food and agricultural wastes.

However, some amount of woodchips is essential to increase aeration in the composting process.

The overall process of composting includes both the composting time followed by a period of stabilization to produce a final stable product that can then be applied to the land.

There are different composting systems ranging from simple, low-cost bin composting to highly technical high-cost reactor systems.

Compost bins are most suitable for use in houses to compost simple kitchen waste and garden cuttings. One of the major issues with compost bins is the time taken for the completion of the process.

Large scale composting is conducted in large reactors with an automated supply of oxygen and moisture to generate large tons of compost for industrial applications.

Green manures

Topics:

Livestock Farming

Organic farming

### **Green manures**

Green manures are crops grown specifically for building and maintaining soil fertility and structure, though they may also have other functions. They are normally incorporated back into the soil, either directly, or after removal and composting. Green manures have generally been little used in the United Kingdom by conventional (nonorganic) producers, but have been enthusiastically adopted by organic producers.

### **Why use green manures?**

Green manures are crops grown within a rotation for the purposes of:

- ❖ building soil organic matter and soil structure
- ❖ supplying nitrogen and other nutrients for a following crop

- ❖ preventing leaching of soluble nutrients from the soil
- ❖ providing ground cover to prevent damage to soil structure
- ❖ bringing crop nutrients up from lower soil profiles
- ❖ smothering weeds and preventing weed seedling growth

### **Green manures in field vegetables**

Where a farm-type rotation including vegetables is in operation, the incorporation of grassclover leys and grazing livestock probably reduces the need and opportunity for using green manures. In this situation, field vegetables are likely to be grown as a rotational break that also allows reseeding of the leys.

Green manures might, however be grown say between two vegetable crops, or a vegetable crop and one or two cereal crops, if an extended break is desired.

### **Composting green manures**

In some circumstances it is feasible to cut and compost a green manure crop for application to another part of the farm.

An example of this would be taking and composting a cut from a pure red-clover or redclover/Italian ryegrass green manure

crop, perhaps with the addition of straw to the mix. Further growth would not be cut, but would be regularly topped and mulched back onto the soil, taking care not to smother the clover and ryegrass plants.

### **Cropping and grazing green manures**

In some instances it is possible to take a crop from a green manure or to graze it with livestock for a while. Examples include harvesting field beans, saving a hay crop, grazing red clover or making silage from a cereal/legume mixture.

Whilst this may initially seem attractive, and provide an output from the green manure, it should be remembered that cropping and grazing removes nutrients and organic matter from the field which are not necessarily returned to the soil until later on.

The benefit of the green manure is therefore only partial and the consequences for the following crop and the rotation as a whole should be considered very carefully.

### **Types of green manure crop**

Green manures are essentially of two types:

#### **Legumes (clover family)**

Legumes develop on their roots (in association with special bacteria) nodules that have the ability to take nitrogen from the air and convert (fix) it into a form that the plant can use. This can then be utilised by

crops grown after the legume has been ploughed and incorporated into the soil.

### **Non-legumes**

Non-legumes do not fix nitrogen, but can provide useful amounts of organic matter and retain nutrients that might otherwise be leached.

Some non-legume green manures are very quick growing and can be incorporated within gaps in production during the growing season.

Green manures suitable for Northern Ireland, and their uses

A wide range of green manures is available, but some are less likely to be successful in Northern Ireland due to soil and climatic factors.

### **Brassicas as green manures**

Because they are also susceptible to clubroot and can increase the level of infection, brassica (cabbage family) green manures should not be sown in close sequence with brassica crops. Crop rotations should be carefully planned to avoid this.

### **Incorporating green manures**

In general, all green manures should be incorporated whilst they are still relatively soft and green, and before they have chance to set seed.

However, in some cases such as long-term vetches, tougher organic matter will also be present in the long stems.

Traditional deep ploughing may not be the best way to incorporate a green manure as it may simply bury the green manure in a layer beneath the furrow where it will only slowly decompose.

Ideally, green manures should be incorporated throughout the surface few centimetres of the soil where most rooting of the following crop will occur.

This is also the place where decomposing organisms are most active.

Lush growth should be cut or mulched and allowed to wilt. Several passes of a rotavator, or an alternative cultivator, at intervals of a few days will then incorporate the green manure throughout the soil profile.

It is important to make sure that incorporation is complete so that the plants do not re-root and become weeds in their own right.

After incorporating a green manure, allow two to three weeks before planting the next crop, particularly if it is to be sown directly into the soil.

## Mulching green manures

During the growth of a medium to long-term green manure it may be desirable to mulch the crop occasionally by 'topping' it with a mower. The material removed will then decompose and be recycled to the growing green manure crop.

It is important that mowing and mulching are carried out whilst the crop is relatively short and that it is not cut so low so that regrowth is prevented, or the plants smothered by mulched material.

*any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies.*

## Types of Pesticides

These are grouped according to the types of pests which they kill:

### Grouped by Types of Pests They Kill

1. Insecticides – insects

2. Herbicides – plants
3. Rodenticides – rodents (rats & mice)
4. Bactericides – bacteria
5. Fungicides – fungi
6. Larvicides – larvae

### Based on how biodegradable they are:

Pesticides can also be considered as:

- **Biodegradable:** The biodegradable kind is those which can be broken down by microbes and other living beings into harmless compounds.
- **Persistent:** While the persistent ones are those which may take months or years to break down.

Another way to classify these is to consider those that are chemical forms or are derived from a common source or production method.

### Chemically-related pesticides:

- **Organophosphate:**

Most organophosphates are insecticides, they affect the nervous system by disrupting the enzyme that regulates a neurotransmitter.

- **Carbamate:**

Similar to the organophosphorus pesticides, the carbamate pesticides also affect the nervous system by disrupting an enzyme that regulates the neurotransmitter. However, the enzyme effects are usually reversible.

- **Organochlorine insecticides:**

They were commonly used earlier, but now many countries have been removed Organochlorine insecticides from their market due to their health and environmental effects and their persistence (e.g., DDT, chlordane, and toxaphene).

- **Pyrethroid:**

These are a synthetic version of pyrethrin, a naturally occurring pesticide, found in chrysanthemums( Flower). They were developed in such a way as to maximise their stability in the environment.

- **Sulfonylurea herbicides:**

The sulfonylureas herbicides have been commercialized for weed control such as pyriithiobac-sodium, cyclosulfamuron, bispyribac-sodium, terbacil, sulfometuron-methyl Sulfosulfuron, rimsulfuron, pyrazosulfuron-ethyl, imazosulfuron, nicosulfuron, oxasulfuron, nicosulfuron, flazasulfuron, primisulfuron-methyl, halosulfuron-methyl, flupyrsulfuron-methyl-sodium, ethoxysulfuron, chlorimuron-ethyl,

bensulfuron-methyl, azimsulfuron, and amidosulfuron.

- **Biopesticides:**

The biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.

### **Oil Cake**

**Oil Cake**, also known as **Press Cake** is a **coarse byproduct of oil extraction** from a variety of oilseeds and it is beneficial as a **fertilizer**, for **chicken**, and as other **animal feed** because it is **high in protein and minerals**. Mustard cakes, Neem Cakes, and Groundnut Cakes are **excellent examples** of oil cakes. It could be sold in chunks or processed into an **oil meal**. Certain oil cakes made from seeds like **castor beans and tung nuts** are poisonous and are used as **fertilizers** instead of animal feed.

### **What are Concentrated Organic Manures?**

- Concentrated organic manures are those that are naturally organic and have higher concentrations of important plant nutrients like **N, P2O5, and K2O** than bulky organic manures.

- These concentrated manures are made from basic materials that are **either plant- or animal-derived**.
- These are also referred to as **organic nitrogen fertilizers**. Before their organic nitrogen is utilized by the crops, it is transformed by bacterial action into easily available ammoniacal nitrogen and nitrate nitrogen.
- As a result, these organic fertilisers are **relatively slow acting**, but they provide available nitrogen for a longer period of time.

#### **What is an Oil Cake?**

- Following the extraction of oil from oilseeds, the remaining solid portion is dried as cake and can be used as manure. There are two kinds of oil cakes:
- Edible oil cakes that can be safely fed to livestock, such as groundnut cake and coconut cake.
- Non-edible oil cakes that are not suitable for feeding livestock, such as Castor cake, Neem cake, Mahua cake, and so on.
- Manures can be made from both edible and non-edible oil cakes.
- Edible oil cakes, on the other hand, are fed to cattle, while non-edible oil

cakes are used as manures, particularly for horticultural crops.

- After mineralization, nutrients in oil cakes become available to crops 7 to 10 days after application.
- Oilcakes must be thoroughly powdered before use to ensure even distribution and faster decomposition.
- Oil cake, which is made up of the leftovers from the oil extraction process at the processing plant and contains a high nitrogen content, is one of the natural organic fertilizers.
- Among the products whose processing results in oil cakes are olives for olive oil, peanuts for peanut oil, coconut flesh for coconut cream and milk (sapal), grapes for wine, apples for cider, and soybeans for soy milk.
- Other frequent oil cakes are made from sunflower, cottonseed, and flax seed (also known as linseed).
- Some specific varieties, however, may be poisonous and are instead utilized as fertilizer. For instance, cottonseed includes the toxic pigment gossypol, which must be removed before processing.

#### **How is Oil Cake used for Plants?**

- A **compressed mixture** of the leftover meal from the extraction of vegetable oils from seeds like cotton

and groundnuts, etc. is known as an oil-seed cake.

- These are excellent particularly as fertilizers for plants as they are **high in protein and minerals**.
- Food and vegetable growers frequently utilize oil cakes as a **source of plant nutrients** and **as a nematode control method**.
- Oil cakes can be **sprinkled or placed in pellet form on the soil**, watered, and let to break down. Their nematicidal effect grows as the **decomposition** time grows.
- Before planting, plant **seeds can also be treated with oil-cake extracts** to nematode-proof the crop.

### Importance of Oil Cakes

- Many non-edible oil cakes, such as castor, neem, madhuca, karanja, linseed, rape seed, and cotton seed, can be used as organic manure because they contain high levels of plant nutrients.
- The majority of non-edible oil cakes are highly valued for their alkaloid content, which inhibits the nitrification process in soils.
- The alkaloids nimbin and nimbicidine found in neem cake effectively inhibit the nitrification process.

- Similarly, Karanjin (*Pongamia pinnata*) and (*Madhuca butyracea*) are potent nitrification inhibitors with the same efficiency as nitrotyrin in retarding ammoniacal nitrogen nitrification and increasing rice yield, nitrogen uptake, and grain protein content.
- Madhuca cake has been successfully used for rice cultivation in coastal saline soils.

### Cow manure,

Cow manure, also known as cow dung, is mostly digested grass and, depending on the cattle's diet, grain, fruits, or vegetables. It's not just cow droppings, as it contains tracks of hay, straw, bedding, grains, and other organic matter used to feed the animals.

Cow manure is rich in nutrients and is suitable for plant growth. It has 3% nitrogen, 2% phosphorus, and 1% potassium—3-2-1 NPK, making it the right type of fertilizer for almost all types of plants and crops. That's because it brings back nutrient balance to fields organically.

However, cow manure is also rich in ammonia and, sometimes, can contain dangerous pathogens and bacteria, such as E Coli. So, an aging or decomposition process is necessary to break down the organic matter and eliminate the harmful



substances before the manure gets to the fields.

Fertilizing your crops with cow manure has pros and cons, so you should analyze the implications before gathering cattle poop on your property. To help you make an educated decision, here are the advantages and disadvantages of using cow manure as compost.

#### **Advantages:**

1. Cow dung improves soil structure, helps regenerate the soil, and is an effective source of nutrients needed for growing plants of all types, from grains to garden plants to fruit and vegetables.

2. It's organic, so you can grow plants with no need for chemical products. Moreover, using cow manure as fertilizer is an eco-friendly way to manage cattle waste so that it doesn't end up in fields where it can impact air and water quality.

3. If you control the composting process to enable anaerobic digestion inside biogas units, you can obtain biogas for cooking or heating, besides fertilizer.

#### **Disadvantages:**

1. You need relatively large quantities of fertilizer to ensure high-quality crops.

2. Composting cow dung outside biogas units will release high amounts of methane into the atmosphere.

3. Collecting, storing, and managing cow manure is time-consuming and dirty. Moreover, incidents can quickly turn into public health issues.

#### **Vermicomposting Definition**

***“Vermicomposting is a process in which the earthworms convert the organic waste into manure rich in high nutritional content.”***

#### **What is Vermicomposting?**

Vermicomposting is the scientific method of making compost, by using earthworms. They are commonly found living in soil, feeding on biomass and excreting it in a digested form.

Vermiculture means “worm-farming”. Earthworms feed on the organic waste materials and give out excreta in the form of “vermicasts” that are rich in nitrates and minerals such as phosphorus, magnesium, calcium and potassium. These are used as [fertilizers](#) and enhance soil quality.

Vermicomposting comprises two methods:

- **Bed Method:** This is an easy method in which beds of organic matter are prepared.

- **Pit Method:** In this method, the organic matter is collected in cemented pits. However, this method is not prominent as it involves problems of poor aeration and waterlogging.

### **Process of Vermicomposting**

The entire process of vermicomposting is mentioned below:

#### **Aim**

To prepare vermicompost using earthworms and other biodegradable wastes.

#### **Principle**

This process is mainly required to add nutrients to the soil. Compost is a natural fertilizer that allows an easy flow of water to the growing plants. The earthworms are mainly used in this process as they eat the organic matter and produce castings through their digestive systems.

**The nutrients profile of vermicomposts are:**

- 1.6 per cent of Nitrogen.
- 0.7 per cent of Phosphorus.
- 0.8 per cent of Potassium.
- 0.5 per cent of Calcium.
- 0.2 per cent of Magnesium.
- 175 ppm of Iron.

96.5 ppm of Manganese.

24.5 ppm of Zinc.

### **Materials Required**

- Water.
- Cow dung.
- Thatch Roof.
- Soil or Sand.
- Gunny bags.
- Earthworms.
- Weed biomass
- A large bin (plastic or cemented tank).
- Dry straw and leaves collected from paddy fields.
- Biodegradable wastes collected from fields and kitchen.

### **Procedure**

- I. To prepare compost, either a plastic or a concrete tank can be used. The size of the tank depends upon the availability of raw materials.
- II. Collect the biomass and place it under the sun for about 8-12 days. Now chop it to the required size using the cutter.

- III. Prepare a cow dung slurry and sprinkle it on the heap for quick decomposition.
- IV. Add a layer (2 – 3 inch) of soil or sand at the bottom of the tank.
- V. Now prepare fine bedding by adding partially decomposed cow dung, dried leaves and other biodegradable wastes collected from fields and kitchen. Distribute them evenly on the sand layer.
- VI. Continue adding both the chopped bio-waste and partially decomposed cow dung layer-wise into the tank up to a depth of 0.5-1.0 ft.
- VII. After adding all the bio-wastes, release the earthworm species over the mixture and cover the compost mixture with dry straw or gunny bags.
- VIII. Sprinkle water on a regular basis to maintain the moisture content of the compost.
- IX. Cover the tank with a thatch roof to prevent the entry of ants, lizards, mouse, snakes, etc. and protect the compost from rainwater and direct sunshine.
- X. Have a frequent check to avoid the compost from overheating. Maintain proper moisture and temperature

### **Result**

After the 24th day, around 4000 to 5000 new worms are introduced and the entire raw material is turned into the vermicompost.

### **Advantages of Vermicomposting**

The major benefits of vermicomposting are:

1. Develops roots of the plants.
2. Improves the physical structure of the soil.
3. Vermicomposting increases the fertility and water-resistance of the soil.
4. Helps in germination, plant growth, and crop yield.
5. Nurtures soil with plant growth hormones such as auxins, gibberellic acid, etc.

### **Disadvantages of Vermicomposting**

Following are the important disadvantages of vermicomposting:

1. It is a time-consuming process and takes as long as six months to convert the organic matter into usable forms.

2. It releases a very foul odour.
3. Vermicomposting is high maintenance. The feed has to be added periodically and care should be taken that the worms are not flooded with too much to eat.
4. The bin should not be too dry or too wet. The moisture levels need to be monitored periodically.
5. They nurture the growth of pests and pathogens such as fruit flies, centipede and flies.

Vermicomposting turns the kitchen waste and other green waste into dark, nutrient-rich soil. Due to the presence of microorganisms, it maintains healthy soil.

Vermicomposting is an eco-friendly process that recycles organic waste into compost and produces valuable nutrients.