

# Organic Farming : Common Organic Manures

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## ORGANIC FARMING

**Sir Albert Howard** – ‘Father of Organic farming’

- A production system that sustains the health of soils, ecosystem and people
- A form of Agriculture that relies on techniques such as
  - ✓ Crop rotation
  - ✓ Green manuring
  - ✓ Composting
  - ✓ Use of Biofertilizers
  - ✓ Biological pest control etc. to maintain soil productivity and control pests.

**Excludes or strictly limits the use of**

- **manufactured fertilizers**
- **Pesticides – herbicides, insecticides and fungicides**
- **Plant growth regulators - hormones**
- **Genetically modified organisms.**

# ORGANIC MANURES

## Manures or Organic manures

- Substances which are organic in nature, capable of supplying plant nutrients in available form.
- Complex in nature having complete organic compounds
- No definite composition
- Have no analytical value
- Bulky in nature

- **Take 30 days or more to decompose, release nutrients slowly and available for more number of seasons.**
- **Contain all the nutrients including trace elements.**
- **Do not cause any side effects.**

- **Most of them are obtained from natural sources - animal and plant waste products.**

**Include**

- **excreta of animals**
  
- **Animal matter – blood, bones, flesh, horn etc.**
  
- **Decomposed vegetation.**

## **COMMON ORGANIC MANURES**

### **1. BONE MEAL**

- **Bones are rich in Calcium, Phosphorus, Nitrogen etc.**
- **Bone is slow in action and it is used in powdery form known as bone meal - A mixture of finely and coarsely ground animal bones and slaughter- house waste products.**
- **Bone meal is available in two forms – raw bone meal and steamed bone meal.**
- **Finely ground bone meal may provide a quicker release of nutrients than the coarsely ground one.**

- **It is primarily used as a source of Phosphorus and Proteins.**
- **Bone meal is mixed with soil - It is applied to the soil either at sowing time or just before it.**
- **Bone meal is a most suitable fertilizer for acid soil and is considered as a safe manure for all crops.**
- **It is usually used for growing vegetables, fruits and ornamentals.**



## **2. COW DUNG**

- **Composted Cow dung is usually used as a manure.**
- **It is rich in nutrients.**
- **It contains about 3% Nitrogen, 2% Phosphorus and 1% Potassium .**
- **It also contains some beneficial bacteria – convert nutrients into easily accessible forms.**

### **3. POULTRY WASTES**

- **A mixture of poultry excreta, spilled feed, feathers etc. – good source of organic manure.**
- **Poultry manure contains about 1.46% of Nitrogen, 1.17% of Phosphorus and 0.62% of Potassium.**
- **A good organic manure for all crops.**
- **It should be applied as a basal dressing.**

## 4. OIL CAKES

- Oil cakes are residues left after the oil is extracted from oil seed crops .
- They are good sources of Nitrogen - Contain about 3 to 5 % of Nitrogen - Amount of Nitrogen varies with the type of oil cake.
- Also contain 1.5 to 2% of Phosphorus and small amount of Potassium etc.

Two types

- i) **Non- edible cakes – used as manures** - Castor cake, Neem cake, Sunflower cake etc.
- ii ) Edible oil cakes – used as a cattle feed – Coconut cake, Mustard cake, Ground nut cake, Sesame cake etc.

## ORGANIC MIXTURES

- Adding one or more types of organic matter to the soil
- Improve soil conditions and fertility
  - Organic materials most commonly used include
- **Farmyard manure (F.Y.M)** – produced from liquid and liquid excreta of cattle mixed with litter used for breeding purposes of cattle.
- Animal wastes
- Crop residues
- Green manures
- Vermicompost
- Biodynamic preparations ( e.g. cow horn manure , **Preparation 500** - is basically fermented cow dung- Preparation 500 is made by filling a cow's horn with cow dung, and burying it in the soil during the cooler months - November through February).

**The best organic soil mix for growing vegetables include**

- **Compost**
- **Manures - sourced from animals, typically livestock, provides an excellent source of Nitrogen**
- **Rock dusts with very fine particle size -  
Remineralization with rock dust stabilizes Phosphorus levels in deficient soil.**
- **Mulch - keeps soil moist, conserve nutrients, prevent weed growth etc.**

## **COMPOST**

- **Composting is the natural process of decomposing and recycling biodegradable organic materials into a humus-rich soil amendment by the successive action of saprophytic bacteria, fungi, actinomycetes or earthworms.**
- **Many biodegradable materials can be composted on-site, such as food wastes, leaves, grass clippings, plant trimmings, straw, shredded paper, animal wastes, municipal solid wastes etc.**
- **The compost is a dark-brown or black humus rich material.**

## Two Methods

### **i ) Aerobic composting**

- The wetted organic matter - mixed farm residues, leaves, food wastes etc. are collected in a heap.
- The complex organic compounds in the biodegradable waste materials break down into simple compounds after a period of weeks or months and form humus rich material.

**Select a suitable area.**

- **Biodegradable solid wastes are dumped on open ground as 5- 10 m long, 1 – 2 m wide and 0.5 – 1 m high piles.**
- **The top of each pile is covered with cattle dung.**
- **After a few weeks, the piles are turned upside down for cooling and aeration.**
- **The wastes will be converted into compost in about 4 – 6 weeks.**



## **2. Anaerobic Composting**

**In this method, anaerobic decomposition of organic matter takes place and several inorganic substances such as ammonia, hydrogen sulphide, carbon dioxide, organic acids etc. are produced.**

- **Make a trench , 4 – 10 m long, 2 -3 m wide and 0.7 – 1 m deep.**
- **Spread biodegradable solid wastes in the trench to form a 15 cm thick layer.**
- **Add semi-liquid cow dung and soil– 5 cm thick**
- **Make successive layers in this way to form a heap 30 cm or more above the ground level.**
- **Add soil on top of this heap , 5 – 7.5 cm thick .**

- **In anaerobic composting, the temperature of the wastes increases up to 70 °C within 7 days - This heat persists for 2-3 weeks and help for anaerobic decomposition of wastes and kill pathogenic microorganisms.**
- **Humus rich compost will be formed in about 4 – 5 months .**

## **COMPOST - ADVANTAGES**

Composting has many benefits to agriculture, environment and economy.

- Compost provides a stable organic matter that improves the physical, chemical and biological properties of soils, thereby enhancing soil quality and crop production.

Compost can be used as

- Soil amendment
- Fertilizer supplement
- Top dressing for pasture and hay crop maintenance
- Fertilizer substitute
- Potting mixture component
- Mulch for fruit trees.

- **Compost is an additive to soil , supplying humus and nutrients – a source of organic Nitrogen - using composts is an effective way to increase healthy plant production- It is a good growing medium for plants.**
- **Compost is highly porous – improves water holding capacity of the soil.**

- **Composting can destroy pathogens and unwanted seeds – Anaerobic composting (Thermophilic ) destroys many seeds and pathogens.**
- **Growth of weeds can be discouraged by covering with mulch/compost.**

- **Use of compost reduces the use of chemical fertilizers.**
- **Composting improves sanitation – eliminates bulk of waste materials at the point of their production .**

## **COMPOST - DISADVANTAGES**

- **Compost is bulky, making it expensive to transport.**
- **The nutrient value of compost is low compared with that of chemical fertilizers and the rate of nutrient release is slow so that it cannot usually meet the nutrient requirement of crops in a short time, thus resulting in some nutrient deficiency.**



- **The nutrient composition of compost is highly variable compared to chemical fertilizers.**
- **Compost made from mixed municipal solid wastes may contain high levels of heavy metals and other toxic contaminants which may be harmful to food crops.**

- **Over use of composts for long period in agricultural fields may result in accumulation of nutrients, salts, toxic heavy metals etc. in soil which in turn may adversely affect the growth of soil microbes and plants. Moreover, it may pollute water and reduce water quality.**
- **Composting is a time consuming process.**
- **Sometimes, composting may produce foul odour.**

# VERMICOMPOST

**Vermicomposting** - The technique of speeding up the process of composting by the use of earthworms - the process of producing **vermicompost**. It is also called as vermiculture or 'worm farming'.

- Earthworms consume the organic wastes. The worms secrete enzymes – proteases, lipases, amylases, cellulases, chitinases etc. These enzymes act on the organic wastes and breakdown them. The excreta of the earth worms known as vermicastings (worm castings) form the vermicompost. It contains high amounts of Nitrogen, Potassium, Phosphorous, Calcium, Magnesium etc. and can enhance soil fertility.

**Requirements :**

- a) Biodegradable wastes** like crop residues, vegetable wastes , leaves, cattle dung etc.
- b) Containers for culturing** – pits of suitable dimensions (depth of pit should not be more than 45 cm), plastic tubs, wooden boxes, earthen pots etc. The culture tanks have an outer and inner vessel – The inner vessel will have an outlet at the lower side of the vessel. Avoid direct sunlight and rain.

### c) Earth worms

Most commonly used species are

- *Eisenia foetida*
- *E. andrei*
- *E. hortensis*
- *Lumbricus rubellus*
- *Eudrilus eugeniae*
- *Perionyx excavatus*

## **Steps**

- i. Select a container or dig a pit of suitable dimensions.**
  
- ii. Prepare a bed of 10 cm height using available agro wastes like coir waste, paddy husk etc. - Sprinkle water on it to get a moisture level of 40 – 45 %.**

**iii. Mix the organic wastes with cattle dung in equal quantity - pour enough water and make a homogeneous mixture - keep this mixture for two weeks . During this period , temperature will rise - Turn this material 2 – 3 times at 4 – 5 days interval and transfer it on to the prepared bed.**

- iv. Introduce selected species of earth worms into the bed at the rate of 2000 worms for 400 kg of feed mix and spread uniformly. 1 to 2 kg earthworms can be accommodated in 12 to 16 L capacity vessel. (Addition of 5 – 10 % Neem cake in the feed mix has a beneficial effect on the growth of earthworms).**
  
- v. Cover the bed with gunny cloth – Sprinkle water periodically. The worms will ingest organic matter and assimilate only 5 – 10 % and the rest is excreted as vermicastings. The organic wastes will be transformed into vermicompost in about 60 days.**



**vi. Take out the vermicompost and make a heap in sunlight on a plastic sheet – Keep it for 1 to 2 hours – The earthworms will gather at the bottom of the heap – Collect vermicompost from the top. The earthworms settled down at the bottom can be carefully collected.**

## **Vermiwash**

- It is the coelomic fluid extraction of earth worms in a vermicomposting unit. When the earthworms start feeding on the waste, water is slowly added into the vermicomposting unit in excess, which flows out through the outlet in the form of thick syrupy fluid which can be collected. After diluting , vermiwash can be used as foliar spray to different crops.

## **Advantages of Vermicomposting**

- **An efficient method for the management of biodegradable organic wastes.**
- **Vermicompost is rich in plant nutrients like Nitrogen, Potassium, Phosphorous, Calcium, Magnesium etc. and help to enhance soil fertility and plant growth.**
- **Reduce the need of chemical fertilizers.**
- **Addition of vermicompost help to improve the structure, texture, aeration, and water holding capacity of the soil and prevents soil erosion.**

## **DISADVANTAGES OF VERMICOMPOSTING**

- A time consuming method.
- Requires greater care than other composting methods.
- More expensive than other composting methods.
- Wastes should be added in thin layers. Addition of too much wastes will lead to rise in temperature resulting in the death of worms.
- Low temperature should be maintained. Otherwise the earthworms may die.
- Unpleasant odour may be formed.
- There may be pest and pathogens problems.

**THANK YOU**