

ROLE OF ORGANIC MANURE IN AGRICULTURE: A REVIEW

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Introduction

Manure is organic matter which is prepared by rotting animal dung, crop residues, peels of fruits and vegetables etc. After decomposition, they provide a wide range of nutrients to the plants. It is the most natural and chemical free substance to increase the yield of crops and to improve the production efficiency of the soil. The methods of this preparation are very old and popular among farmers. Today, where earlier farmers were use chemical fertilizers to increase the maximum production of their crops, but now they are giving more importance to natural fertilizers than chemical fertilizers. In this generation, chemical fertilizers have so much adversely effected on the land that the yield of the crop has increased but the outbreak of diseases and pests has increased in the cereals, that is why most of the farmers have now turned towards natural fertilizers instead of chemical fertilizers (TNAU, 2016).



Some scientists did research on a mixture of chemical and organic fertilizers. It assessed the integrated effect of poultry manure (PM) and cattle manure (CM) with (CF) i.e. urea on soil properties, plant physiology and rice grain yield. Thus, (PM) or (CM) i.e. poultry manure with 70% N from CF i.e. urea and Combination of 30% N from cattle manure is a promising alternative for improving soil quality and rice grain yield. Furthermore, our study provides a sustainable nutrient management plan to increase rice yield with high N use efficiency (Iqbal, *et. al.*2020).

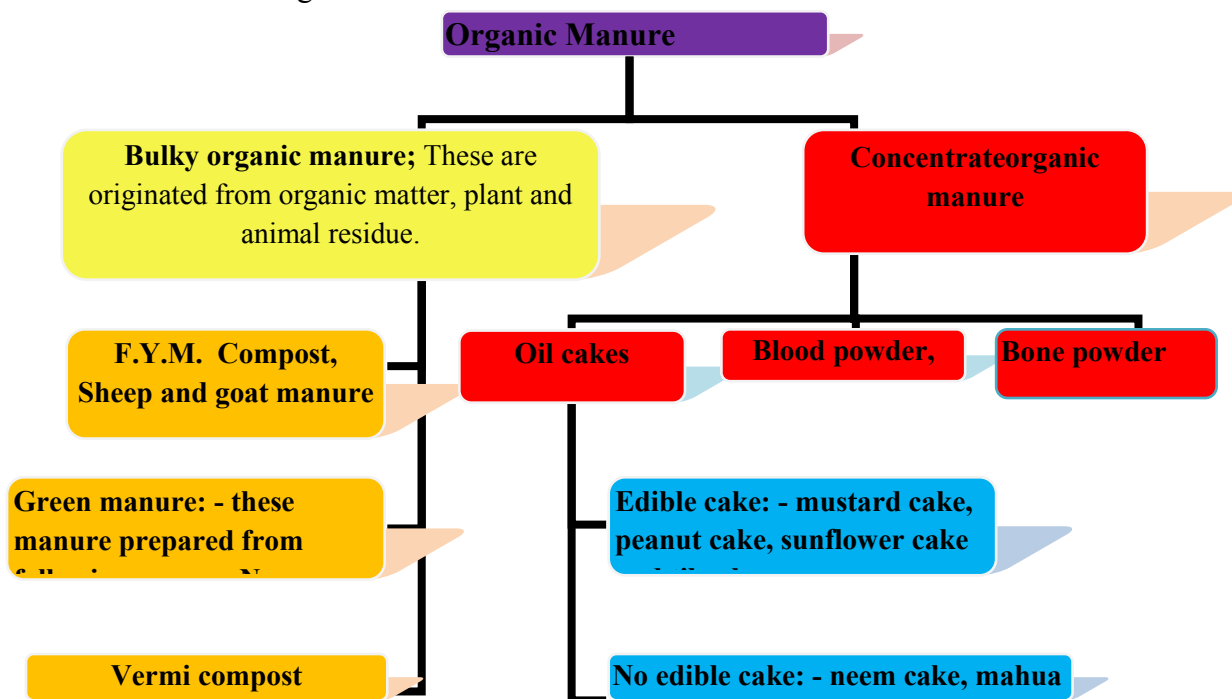
Instead of chemical fertilizers with high nutrients, low nutrient fertilizers improve the physico-chemical and biological properties of the soil, no special type of material is required

for its preparation and their effect also remains for a long time. It contains naturally occurring synthetic chemicals and nutrients.

Classification of Organic Manure-

The different types of organic fertilizers available in the market are classified into two broad groups: light organic fertilizers and heavy organic fertilizers.

1. Bulky Organic manure
2. Concentrate Organic manure



(Das,D.K. 2020)

1. Bulky Organic manure

➤ Farm yard manure (F.Y.M.)

It is a mixture of material such as cattle dung, urine, litter or crop straw etc. The part of the fodder which is not consumed by the cattle and the domestic waste such as ash etc. is collected and thrown in a pit or heap in the corner of the backyard. It is left there and allowed to rot until it is taken out and planted in the fields. This compost is ready in about three to four months and there is **0.5% N**, **0.2% P₂O₅** and **0.5% K₂O** % in well-rotted manure (TANU, 2016).

Recently, Arunima, a government school student, surprised all the farmers by conducting a research in Kasaragod. She found that many traditional farmers of Kasaragod admire the cow dung of indigenous breeds dependent on organic manure. He credits the qualities of the dung of the world's smallest breeds Vechur and Kasaragod Dwarf. Dung plays an important role in making farm yard manure. He broke this myth, he told from his research that Holstein Fregeian cow dung has the power to increase crop production more than other Indian breeds, that is, dung plays an important role in making farm yard manure (Poikayil,G. 2021).

Sheep and goat manure: - Manure prepared from the feces of sheep and goats contains more nutrients than chemical fertilizers. On average, this manure contains 3 % N₂, 1 % P₂O₅ and 2 %K₂O

Poultry manure: - The excreta of bird’s ferment very rapidly. If left uncovered, it loses 50 percent of its nitrogen within 30 days. Poultry manure contains more nitrogen and phosphorus than other heavy organic manures. Average nutrient content 1.2 % N; 1.4 %P₂O₅ and 0.8 % K₂O. Others- horse manure, swine manure

Table 1: - Nutrient content in bulky organic manure

No	Manure	N (%)	P ₂ O ₅ (%)	K ₂ O (%)
1.	F.Y.M. Manure	0.5	0.2	0.5
2.	Sheep Manure	0.8-0.9	0.35	1
3.	Poultry Manure	1.2-1.8	1.4-1.8	0.8-0.9
4.	Compost Manure	0.5-0.1	0.4-0.8	0.8-1.2

Katyayan, A. (2019)

Green manure

Green manure crops are grown in the field either as pure crop or as an intercrop with the main crop and are suppressed before maturity in the same field. The prevalent green manure crops are sun hemp, dhaincha and guar. Tender green twigs and leaves are collected from the barren land which are spread over the field and covered with soil.

- a) In situ manuring
- b) Ex-situ manuring

Important points of green manure: -

1. Green maturation is an effective and inexpensive way to improve soil fertility.
2. Legumes are better for green manure crop. It acts as a cover crop in soil erosion areas.
3. It is a good amendment source for problem soil improvement.
4. New leaves can be incorporated soon after planting, suppressed by the old crop 4-8 weeks before planting.
5. The optimum dosage of biomass is 4 to 5 t/ha.
6. Green manure is as effective as ammonium sulphate or urea.
7. Improves low fertility condition of soil.
8. Important component of low cost natural farming (TANU, 2016).



Sewage and sludge

In the modern system of sanitation adopted in cities and towns, human excreta are carried away by water which is called sewage. The solid part in sewage is called sludge and the liquid part is called sewage water. Both components of sewage are separated and treated by preliminary fermentation and oxidation to reduce bacterial contamination and offensive odors (Bhaduri. A., 2020).

Vermiculture: -

In vermi-culture technology, the potential of earthworms is being used as a natural bio-degrader of non-toxic organic waste to improve soil and mobilize nutrients. Earthworm populations in organic matter-rich soils act as natural bioreactors decompose a beneficial soil micro-flora, destroying soil pathogens and organic wastes such as biofertilizers, vitamins, enzymes, antibiotics, growth hormones and permanent worms convert it into a valuable product such as biomass (Paschimpara, K.,2018).

Earthworms after properly established in the soil modify the physical-chemical-biological characteristics of the soil and enhance the nutrient cycling by the ingestion of soil and humus and convert it into nutrients. Convert it into rich manure. The quick availability of various nutrients like P, Ca, Na, Mg, K etc. is very high in earthworm manure as compared to the surrounding soil.

Materials for making compost: - Animal dung, agricultural waste, forestry waste, leaf litter, waste paper, cotton cloth, city waste, biogas slurry and non-toxic industrial waste of organic nature(Sharma,K., *et.al*, 2019).

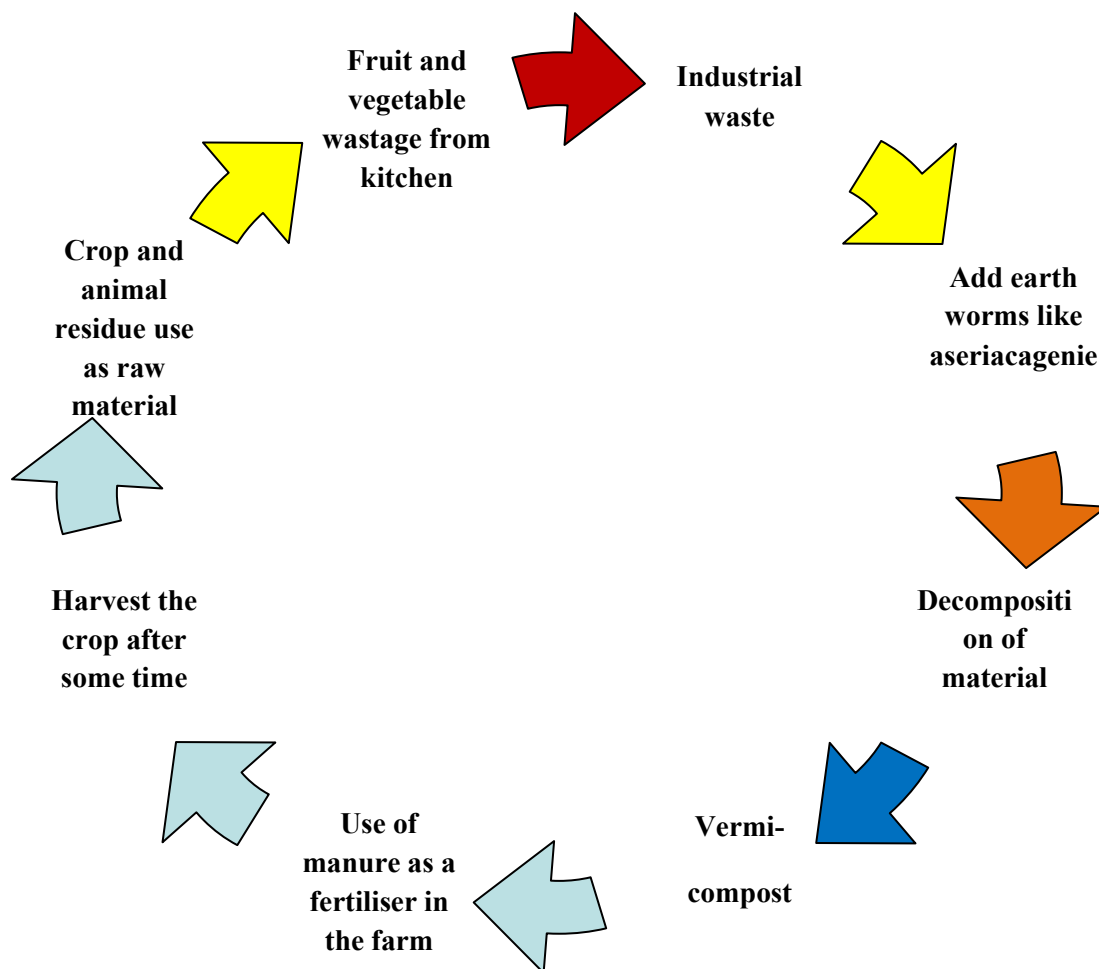


Fig: Vermicompost cycle

Concentrate Organic Manure

Oily oilseeds: - After oil is extracted from oilseeds, the remaining solid part is dried into cake form which can be used as manure. There are two types of oily oilseeds:

- 1) **Edible oil cakes:** - which can be safely fed to animals; like peanut cake, coconut cake etc.

Table 2: - Nutrient Content in Concentrate Organic Manure

No	Manure	N (%)	P ₂ O ₅ (%)	K ₂ O (%)
1.	Safflower	7.9	2.2	1.9
2.	Peanut	7.3	1.5	1.3
3.	Till	6.2	2.0	1.2
4.	Linseed	4.9	1.4	1.3
5.	Mustard	5.2	1.8	1.2

Sathyamarayana, *et al.* (2020)

Non-edible oil cakes: - Which are not suitable for feeding animals; Like Castor Cake, Neem Cake, and Mahua Cake etc.

Other animal-borne concentrated organic manures: The blood of animal can be dried and their powdered form to be used as manure. Concentrated organic manure has more nutrients than heavy organic manure.

- i. Important concentrated organic fertilizers are oilseeds, blood powder, fish powder etc.
- ii. These are also known as organic nitrogen fertilizers. Before their organic nitrogen is used by crops, it is converted through bacterial action to the easily usable ammonia nitrogen and nitrate nitrogen.
- iii. Therefore, these organic fertilizers are relatively slow acting, but they supply the available nitrogen for a longer period.

Table 3:- NPK % present in different Oil Cakes

No.	Manure	N (%)	P ₂ O ₅ (%)	K ₂ O (%)
1.	Need	5.2	1	1.4
2.	Caster	4.3	1.8	1.3
3.	Karanj	3.9	0.9	1.2
4.	Mahua	2.5	0.8	1.8

Sathyamarayana, *et al.* (2020)

Table: 4 Animal originated concentrated manure:

No.	Manure	N (%)	P ₂ O ₅ (%)	K ₂ O (%)
1.	Blood meal	10-12	1-2	0.6-0.8
2.	Fish meal	10-11	2-2.5	0.7-1
3.	Bone meal	5-8	3-6	0.3-1.5

Sathyamarayana, *et al.* (2020)

Storage: -

If the manure fertilizers are stored properly, the manure can be saved from bad smell as well as loss of nutrients present in it, storage is a good option in adverse weather conditions. For this, we should choose that dry place where it can be loaded and unloaded

easily. Mainly such a place should also select for storage where there is no source or place for water to stay or come and there should be extra space to keep the manure. Use clay soil area for storage and keep a little slope.

Using polythene sheet to cover the heap reduces flies and odor and avoids contact with water. Bedding method of manure is gaining popularity in small farms as such pathogens are killed and odor is less. A spreader is used in some small areas for storage. Simply it can be hook to the tractor and spread it over the land at some other grassy area.

Another option could be to remove the manure; it can be taken into spread over a centralized manure facility. The use of dumpsters is quite expensive but it can be an additional option. In small farms you can use containers but it should not be contact to floor. Open containers should be resealed and labeled. Do not use food containers. There should be monthly inspection of storage.

Profits

1. Organic manure increases the water holding capacity and makes the soil porous and convenient for the movement of gases and increases the number of soil friendly micro-organisms. (Sanasha, 2014). In a 2018 study by Professor Rick Koalas at Michigan State University Extension, it was found that organic manure increases microbial biomass, which leads to rapid improvement in crop yield and helps to retain ammonium-nitrogen in the root zone until then (Miesel,2020).
2. It improves the physicochemical and biological composition of the soil as well as removes the deficiency of essential nutrients and this leads to healthy growth of plants and increases the production of crops. Due to this, the storage capacity and food composition of horticultural crops is improved and its quality also improves and their nutritional value is also seen to have a good effect, whereas the more use of chemical fertilizers increases the incidence of diseases and pests in the crops. The production itself is good, whereas using organic manure does not have any such effect (Nair, A. 2018).
3. Research from the School of Vegetable Gardening has shown that eating grains, fruits and vegetables produced by chemical fertilizers is causing various serious diseases in humans such as cancer, skin diseases, kidney problems, etc. Human beings today have turned towards natural manure, which has not only increased their yield, but also improved health by using organic fertilizers fruits and vegetables in daily life (Nirmala, B. *et al.*,2019).
4. Chemical fertilizers also spread water pollution, air pollution and land pollution, whereas organic food is free from all these. Many wildlife animals die due to water pollution whereas organic manure does not affect the ecosystem; it kills micro-organisms in the soil. Increases activity so that plants can get more nutrients easily. It also reduces evaporation of excess water and balances soil fertility and the ratio of carbon and nitrogen, as well as increasing the activity of roots. The rapid growth is a masterpiece (Kumar *et al.*,2019).
5. The effect of organic fertilizers and chemical fertilizers on the growth and development of *Stevie rebaudianabertoni* was studied in experimental plots at Qingdao Agricultural University. The results showed that organic manure cultivation promoted root activity at 40 days after transplanting compared with chemical fertilizer cultivation, and the above-

ground dry weight exceeded that of chemical fertilizer cultivation at 60 days after transplanting (Liu,X.*et. al.*,2011).

6. We cannot make chemical fertilizer at home, but we can easily make natural manure at home and the raw material is easily available for it, there is no special complicated method
7. From this, products like organic fuel gas, organic oil, biological insecticide and vermi-wash are obtained.

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