Organic matter

Any substance of either plant animal or microbial origin produced with in the soil or added to the soil in order to improve soil properties and supply essential plant nutrients is known as organic matter.

Composition:

All the sources of organic matter contain.

(I) Water (II) Mineral matter (III) Organic compound

(I)-Water:

Water content of organic matter ranges from 20-90% on fresh weight bases depending upon nature of the plant, plant organs and plant age.

(II)-Mineral Matter:

It ranges from 1-10% on dry weight bases and it includes Nitrogen, Phosphorous, Calcium, Potassium, Magnesium, Sulphur, Copper, Iron, Zinc etc.

(III)-Organic Compound:

These are comprised of

(I) Carbohydrates (1-5%) (Sugar, Starch, Pectin and Hemicelluloses)

(II) Lignin (Woody material 10-60%)

(III) Nitrogenous compound (Proteins, amino acid, nucleic acid, (1-15%)

Decomposition of organic matter:

Decomposition of organic matter takes place in 3 over lapping phases.

Phase I: Break down of large pieces of plant residues into smaller fragments by soil fauna (earth worms, mice)

Phase II: Enzymatic break down of complex molecules into simpler one i.e. Proteins are converted into amino acids.

Molecules are decomposed in fol'owing sequence.

I) Sugar, Starch, Simple protein

II) Crude, Protein, Carbohydrates

III) Hemi cellulose

IV) Cellulose

V) Fats and Waxes

vi) Lignin

Phase III: A final stage of microbial break down is the oxidation in which Co_2 is produced and energy is released.

O compound + Oxygen $\longrightarrow$ Co_2 + Water + Energy

$C_6 H_{12} O_6 + 6O_2 \longrightarrow 6 CO_2 + 6 H_2O$ + Energy

At the same time.

Green Manuring:

Definition:

A growing crop that is ploughed under and mixed with the soil to enrich it with organic matter is called green manure while the practice of turning into soil, the undecomposed green plant tissues is refers to as green manuring (Rotavator is used).

If Carbon-Nitrogen (C N Ratio) is narrow then decomposition is fast. To make the CN ratio narrow nitrogen source (used) is applied.

Characteristics of Crops:

Following characteristics of the crop determines it's suitability as green manure.

(i) Crop should be growing rapidly.

(ii) It should produce an abundant biomass in a short period.

(III) Growth habit of crop should encourage ground cover soon after its establishment.

(IV) It should have the ability to grow on poor soils (Leguminous crops need very low Nitrogen).

(V) Plant material should have narrow CN ratio.

(VI) Crops which can enrich the soil with nutrients should be preferred (Legume).

(VII) It should not a wide climate and soil adaptation.

Most crops used as green manuring are alfalfa (Lucern), red clover (shaftal), Soyabean, Janter, (Susbinea), Guara, Berseem.

Farm Yard Manure:

Farm yard manure consists of excreta and feed wastage.

Excreta:

It is the combination of feces and urine.

Farm yard manure may be fresh or at various stages of decomposition. It is mostly partially decomposed.

Composition of Farm Yard Manure:

It is quiet variable as it is a mixture of feces and urine along with bedding and feed wastages. Moisture content of fresh manure is highly variable ranging from 65-85%.

Humus:

Compounds very resistant to microbial action and formed either through modification of compounds in original organic material or synthesized by micro-organisms.

Factors effecting the quantity of Manure and Composition:

I) Kinds and age of animal

II) Kind and amount of feed they consume.

III) Condition of animal.

IV) The milk produced or work performed by animal.

Manure:

Any natural material added to soil to improve plant growth and soil health.

Manuring:

Practice of adding manure to soil is known as manuring.

Types:

I) Manuring

II) Composting

Benefits of Manuring:

I) Manuring improves soil fertility, nutrient availability and supply to plants.

II) It improves physical properties of soil like structure, aeration and water holding capacity as well as chemical properties of soil such as CEC and buffering capacity.

III) It helps in the reclamation and management of salt-effected soils.

IV) It reduces soil erosion and improves soil productivity.

V) It enhances the micro-organism activity in soil.

Composting:

It is a controlled biological process which results in partial decomposition of organic/waste material. The product of composting is known as compost.

The Process of composting consists of rapid decomposition and self heating followed by a cooler, slower decay of remaining organic residues. All the three major groups of soil micro-organisms include Bacteria, Fungi and Actinomycetes are involved in this process.

Conditions for optimum composting:-

I) Availability of organic matter in bulk.

II- adequate supply of moisture to keep it moist

III- Proper air circulation

IV- Mix general material used as shown above

V- Room temperature for optimum decomposition

Advantages of Composting

1) Good technology to convert organic waste into useful soil amendment
2) Improves soil physical and chemical properties
3) Improves soil fertility, crop productivity and soil health.
4) Economical approach than other waste handling technologies
5) Reduces waste volume, which facilitate its transportation to the field for soil application.