**Classification of Manures and fertilizers**

Variety of manures and fertilizers available in the market are classified into two broad groups:
a) Natural or organic manures
b) Artificial or chemical fertilizers.

**Natural Organic Manures**

**1) Farm Yard Manure:**

It is a mixture of cattle dung, urine, litter or bedding material, portion of fodder not consumed by cattle and domestic wastes like ashes etc. collected and dumped into a pit or a heap in the corner of the backyard. It is allowed to remain there and rot till it is taken out and applied to fields. Well rotten Farm Yard Manure contains O.5.% N., 0.2 % P2 O5 and 0.5 % K2 O.

**2) Compost:**

Well rotted plant and animal residue is called compost. Composting means rotting of plant and animal remains before applying in fields. The essential requirements of composting are air, moisture, optimum temperature and a small quantity of nitrogen. It is an activity of micro-organisms and same people recommend addition of suitably prepared inoculums to introduce micro-organisms for decomposing the material.

**3) Green Manuring:**

Green manure crops are grown in the field itself either as a pure crop, or as an intercrop with the main crop, and buried in the same field. The most common green manure crops are sannhemp, dhaincha and guar. Tender green-twigs and leaves are collected from wastelands which are spread in the field and incorporated into the soil. Shrubs and trees are also cut and turned into the soil e.g. Shrubs like glyricidia, sesbania, karanj.

**Biofertilizers :**

The biofertilizers containing biological nitrogen fixing organisms are of utmost importance in agriculture Advantages Of Biofertilizer i) They help in the establishment and growth of crop plants and trees. ii) They enhance biomass production and grain yields by 10-20 percent. iii) They are useful in sustainable agriculture. iv) They are suitable in organic farming. v) They play an important role in Agrotorestry/ Silvi- pastaural system.

**Types of Biofertilizers :**

**Rhizobium**

Most widely used biofertilizer is Rhizobium which colonizes the roots of specific legumes to form tumor like growths called root nodules. These nodules act as factories of ammonia production. The Rhizobium – legume association can fix up to 100-300 KG/N. in one crop season.

**Azotobacter :**

Application of azotobacter has been found to increase yield of wheat, rice, maize, pearl-millet and sorghum by 0-30 p.c. over control. Apart from nitrogen this organism is also capable of producing antifungal and antibacterial compounds, hormones.

**Azospirillum :**

Certain micro-organisms like bacteria and blue green algae have the ability to use atmospheric nitrogen and transport this nutrient to the crop plants. Azospirillum is inoculated to maize, barley, oats, sorghum, pearlmillet and forage crops. It increases grain productivity of cereals by 5-20%, of millets by 30% and fodder by over 50%.

**Blue-green algae :**

- The utilization of blue green algae as a biofertilizer for rice is very promising. A judicious use of these algae could provide to the country’s entire rice acreage as much nitrogen as obtained from 15-17 lakh tones of urea. Algae also helps to reduce soil alkalinity.

**Azolla :**

A small floating water form Azolla is commonly seen in low land fields and in shallow fresh water bodies. These fern harbors a blue-green algae. Anabaena azollae. The Azolla – Anabaena association is a live floating nitrogen factory using energy from photosynthesis to fix atmospheric nitrogen accounting to 100-150 kg N/ ha / year from about 40 – 60 tones of biomass.

**Mycorrhizae:**

It is the symbiotic association of fungi with roots of vascular plants. It is useful in increasing phosphorus uptake e.g. in fruit crops like citrus, papaya.

**Vermi-compost**

It is the method of making compost with the use of earthworms, which generally live in soil, eat bio-mass and excrete it in digested form. This compost is generally called vermi-compost or wormi-compost. It is estimated that 1800 worms which is an ideal population for one sq. meter can feed up to 80 tones of humus per day.

**Procedure for preparing ideal vermi-compost :-**

Each shed measuring 20 ft. x 80 ft. is to be constructed with the help of locally available material like bamboos, stems of trees etc. A hut type structure is build with the help of these articles. The roof is made from dried grass, leaves, bamboo sticks etc. in such way that the hut may be protected from rainwater and heat. Each hut may accommodate at least four vermi beds of 3ft. width. These beds are prepared by putting 2 to 3 cm thick layer of farm manure as first layer followed by 10 to 15 cm of biomass with 200 – 250 worms per sq. ft. collected locally may be added and bed should be kept sufficiently moist. This layer should be followed by a layer of 10-15cm of half digested cow-dung layer which should be covered by a layer of leaves trash etc. and water is sprinkled on the entire bed. The bed may be covered with palm leaves or coconut leaves or with any indigenous material. The pit should be kept constantly moist but never flooded. A month later, the covered leaves should be removed and layers of organic waste not exceeding 6-7 cm should be added every alternate day. Watering should continue with each filling. When the pit is nearly full to a height of one meter, the material should be turned to provide aeration. After a month the heap will be ready for harvest with good quality vermi compost. The dug out vermi-compost should be heaped in an open place. The worms will find way to the bottom of the heap. The vermi-compost from the top can be removed, dried and sieved for application in the field. The compost can also be enriched with micro-nutrients, bacteria etc. by adding them externally. 16 tones of compost can be obtained from 4 beds in 30 days after 4 months period of gestation.