Manures and Chemical Fertilizers

This project report have full information about Project Report on Manures, Project Report on Fertilizers, Project Report Chemical Fertilizers, Quality of Good Fertilizers, natural fertilizers, Advantages Disadvantages of Manures, Types of Nutrient, Artificial Fertilizers, Differences between Manure and Fertilizers.

Project Report on Manures and Chemical fertilizers

Manures

The deficiency of plant nutrients and organic matter in the soil is made up by adding manures and fertilizers to the soil of crop-fields. **Both manures and fertilizers are major sources of nutrients of plants, so they are used in crop production.**

Besides water CO_2 and sunlight plants required no. of elements for their growth. These elements are known as nutrient. Plants get their elements from the salt of these elements present in the soil. But after repeated cultivation of plants soil become poor in these elements. The substance added to the soil to make up the deficiency of the essential elements these by increasing the fertility of soil are called fertilizers.

Qualities of Good Fertilizers

1. The elements present in good fertilizers must be easily available to plants.

2. Good fertilizers must be sufficiently soluble in water.

3. Good fertilizers should contain nothing injurious to plants.

Theory of Chemical Fertilizers

The majority of the chemical fertilizer whether simple or mixed are in organic compounds, the generally contain cation likes Ca_2^+, K^+, NH_4^+etc. and are soluble in

water. Therefore, these can be identified from their aqueous solution by the regular systematic scheme used for qualitative mixture analysis.

Analysis of Chemical Fertilizers

All the plants need nutrients for their growth but each plant may not require the same kinds, to meet the requirement of particular crop we first need to analyse the soil and then select the fertilizer. This proper selection of fertilizer is possible if we know the cation and anion present in a particular fertilizer.

The analysis means identification of acid and basic radicals present in fertilizers.

In general, a chemical fertilizer may contain :

Anions : Cl^{-}, NO_3–, SO_4^{2-}, PO_4^{3-} etc.

Cations : Ca_2^{+}, K^{+}, NH_4^{+} etc.

Manures or natural fertilizers

Manures are natural fertilizers. They are bulky sources of organic matter which supply nutrients in small quantities but organic matter in large quantities. Manures include farmyard manure (FYM), compost, green manures, vermicompost, etc.

Advantages of Manures :

Manures affect the soil in following three ways :

(i) The manures enrich the soil with nutrients. They replenish the general deficiency of nutrients in the soil. Since manures contain nutrients in small quantities, they are needed to be applied in large quantities.

(ii) The manures add organic matter (called humus) to the soil which restores the soil texture for better retention of water and for aeration of soil. For example, organic matter present in the manures increases the water holding capacity in sandy soils and drainage in clayey soil.

(iii) The organic matter of manures provide food for the soil organisms (decomposers such as bacteria, fungi, etc.) which help in making nutrients available to plants.

Thus, organic matter help to improve the physical properties of soil, reduce soil erosion, increase the moisture holding capacity of soil and above all these advantages, they are low cost nutrient carriers.

Disadvantages of Manures :

Manures are bulky with low nutrient content. The nutrients of manures are released slowly, not keeping pace with the high and rapid demand of nutrients by improved high-yielding hybrid varieties of crops. Being bulky and voluminous, they are inconvenient to handle, store and transport. Moreover, a manure is not nutrient specific and hence it is not much useful when a particular nutrient is required in the soil for a particular crop.

Types of Nutrient

1. **Farmyard Manure (FYM) :**

FYM is the decomposed mixture of cattle excreta (dung) and urine along with litter (i.e., bedding material used in night under cattles) and left over organic matter such as roughage or fodder. These waste materials are collected daily from the cattle shed and stored in a pit for decomposition by the microbes (bacteria, fungi, etc.). FYM contains nitrogen, phosphorus and potassium. Thus, a well decomposed farmyard manure contains about 0.5 percent nitrogen (N), 0.2 percent phosphorus pentaoxide (P2O5) and 0.5 percent potassium monoxide (K_2O).

2.**Compost :**

Compost is prepared from farm and town refuge such as vegetable and animal refuse **(e.g., excreta of domestic animals such as cattle, goat, sheep, horse, donkey, camel, dogs, cats, etc.)**, faecal matter of human beings, sewage waste (Box 7-2), weeds, crop stubble, straw, rice, hulls, forest litter, etc. Composting is a biological process in which both aerobic *(organisms requiring the presence of oxygen for the respiration)* and anaerobic (organisms, in which respiration takes place in the absence of oxygen) microorganisms decompose the organic matter. It takes about 3 to 6 months for decomposition of organic refuse. The nutrient contents of farm compost and town compost are not the same. For example, farm compost generally contains about 0.5 percent nitrogen (N), 0.15 percent phosphorus pentaoxide (P_2O_5) and 0.5 percent potassium monoxide (K_2O), whereas compost prepared from town refuse (garbage and night soil) contains about 1.4 percent nitrogen (N), 1.0 percent phosphorus pentaoxide (P_2O_5) and 1.4 percent potassium monoxide (K_2O).

Method of Preparing Compost :

For the preparation of compost, a trench of suitable size 4 to 5 m. long, 1.5 to 1.8 m. broad and 1.0 to 1.8 m. deep in dug. A layer of well-mixed refuse of about 30 cm. thickness is spread in the trench. This layer is well moistened by slurry (water paste) of cattle dung and water or earch and water. A second layer of mixed refuse is spread in trench till the heap rises to a height of 45 to 60 cm. above ground level. The top of this heap is then covered with a thin layer of mois earth. After three months, the partially decomposed biomass is taken out of the trench and collected in conical heap. This heap is moistened if necessary and covered with earth. After another one or two months, the compost is ready for use in the field.

3. **Green Manuring :**

The practice of green manuring includes growing, turning or ploughing and mixing of green crops with soil to improve physical structure and soil fertility. Green manures may

include both leguminous and non-leguminous plants, e.g., Sannhemp (Crotalaria juncea), Egyption clover ('Berseem', Trifolium alexandrium), Sesbania or 'Dhaincha' (Sesbania aculeata) and cluster bean or 'Guar' (Cyamopsis tetragonoloba). These plants are used by Indian farmers to add nitrogen and organic matter to the soil for the improvement of crop yield.

The green manure crops are grown in the field for about 6 to 8 weeks and turned into field in the tender stage, i.e., at flowering stage. These crops remain buried for about one to two months. During this period, plants should be completely decomposed before sowing of next crop. Generally the crops which require high nutrient input, are raised in the green manured field. Such crops are rice, maize, sugarcane, cotton, wheat, etc.

Artificial Fertilizers or Chemical Fertilizers :

Fertilizers are the sources of plant nutrients, manufactured commercially from chemicals. They contain much higher amount of nutrients in comparison to the manures and are, therefore, used in very small quantities. These fertilizers may supply one or more nutrients. Chemically they may be inorganic compounds (e.g., ammonium sulphate) or organic compounds (e.g. urea). On the basis of the availability of nutrients from them, fertilizers are divided into following four groups :

1. Nitrogenous Fertilizers :

These fertilizers supply the macronutrient nitrogen. Examples of nitrogenous fertilizers are the following :

(i) Urea, $CO(NH_2)_2$;

(ii) Ammonium Sulphate, $(NH_4)_2 SO_4$;

(iii) Calcium ammonium nitrate ;

(iv) Sodium nitrate, $Na NO_3$;

(v) Ammonium Nitrate, NH_4NO_3 ;

2. Phosphatic Fertilizers :

They are the source of the macronutrient phosphorus. Examples of phosphatic fertilizers are the following :

(i) Single Superphosphate ;

(ii) Triple Superphosphate ;

(iii) Dicalcium phosphate.

3. Potassic Fertilizers :

These fertilizers supply the potassium which is one of the essential macronutrient to the plants. Examples of potassic fertilizers are the following :

(i) Muriate of potash or potassium chloride, KCl ;

(ii) Potassium Sulphate, K_2SO_4 ;

(iii) Potassium nitrate, KNO_3 ;

4. Complex Fertilizers :

When a fertilizer contains at least two or more nutrients (N, P_2O_5 and K_2O), it is called Complex Fertilizers. Examples of complex fertilizers are the following :

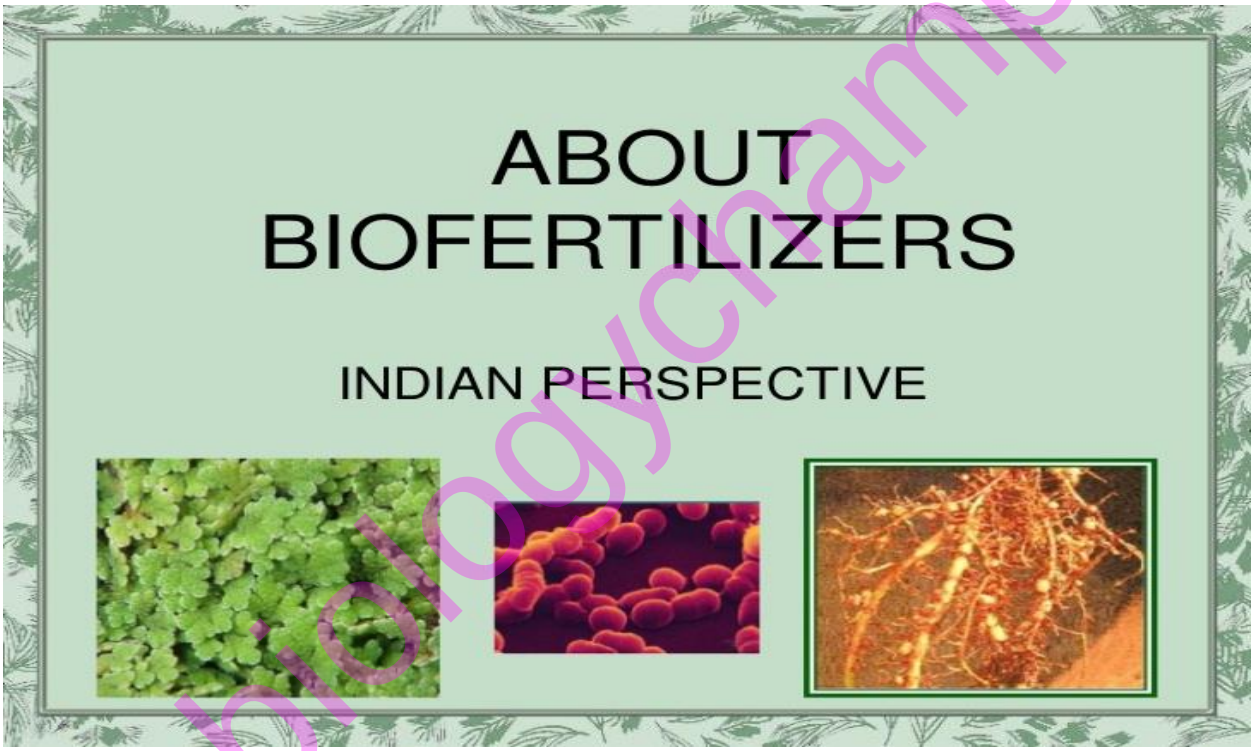
(i) Nitrophosphate ;

(ii) Ammonium phosphate ;

(iii) Urea ammonium phosphate.

Modern agriculture depends greatly on the chemical fertilizers. Indeed high doses of these chemicals greatly increase crop yield but then chemicals get washed off through irrigation, rainfalt as drainage and reach rivers, lakes, streams and pollute them (by causing toxicity, algal bloom and eutrophication) disturbing the ecosystem. The water of these water bodies become unfit for human consumption and even kills the aquatic animals such as fishes. So chemical fertilizers must be used carefully and judiciously.

5. Biofertilizers :



A Biofertilizers is Organisms which enrich the soil with nutrients are called biofertilizers. Biofertilizers are used for the specific crop plants such as pulses, legumes, oil seeds and rice. Biofertilizers are renewable and non-pollutant sources of plant nutrients such as nitrogen. They are not alternatives to chemical fertilizers but can play a supplementary role is supplying nitrogen to specific crops under specific soil conditions. Nitrogen fixing micro-organisms i.e., non-symbiotic and symboitic cyanobacteria and phosphate-solubilising micro-organism, are the main type of biofertilizers that are being used in India. Recently, two biofertilizers, namely

Rhizobium cultures and blue green algae (such as Anabaena and Nostoc) have gained popularity amongst farmers cultivating pulses, legumes, oil seeds and wet-land rice.

6. Mycorrhiza :

Mycorrihiza is a symboitic (mutualistic) association of certain fungi with roots of higher plants. Mycorrhiza increases water and nutrient uptake by plants and increase growth, vigour and yield of the plants.

Differences between Manure and Fertilizers :

Manure	Fertilizers
1. A manure is a natural substance. It is obtained by decomposition of animal wastes such as dung (gobar) of cattle and buffaloes and plant residues.	1. A fertilizer is a human made substance. It is an inorganic salt or an organic compound.

2. A manure contains small amounts of essential plant nutrients such as nitrogen, phosphorus and potassium. 3. A manure adds a great amount of organic matter in the form of humus in the soil. 4. Nutrients present in the manure are absorbed slowly by the crop plants since manure is not soluble in water. Nutrients exist locked inside the organic compounds of humus. 5. A manure is not nutrient specific and it tends to remove the general deficiency of the soil. 6. A manure is voluminous and bulky so it is inconvenient to store, transport, handle and apply to the crop. 7. A manure is cheap and is prepared in rural homes or fields.	2. Fertilizers are very rich in plant nutrients such as nitrogen, phosphorus and potassium. 3. A fertilizer does not add any humus to the soil. 4. Being soluble in water, a fertilizer is readily absorbed by the crop plants. 5. A fertilizer is nutrient specific. It can provide specifically nitrogen, phosphorus and potassium to the soil according to the need. 6. A fertilizer is compact and concentrated so it is easy to store, transport and apply to the crop. 7. A fertilizer is costly and is prepared in factories.

Bibliography

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