MANURES AND FERTILIZERS

These are substances applied to the soil in order to increase the nt of crop produced or to increase plant nutrients content of soil.

The term "manure" as used at present, is applied to organic manure ly bulky materials, mostly derived from farm and animal waste ucts. Whereas the term fertilizer is usually applied to inorganic ical or commercial fertilizing materials.

FERENCE BETWEEN MANURE AND FERTILIZER

Manures do not always completely meet the needs of the soil, cially under modern methods of intensive cultivation. inorganic izer are rich source of nutrients and can meet requirements of plants. ure is not balanced in composition as regard the three important plant nutrients, namely N, P and K. manures are slower acting than izer but have the advantage of adding organic matter to the soil to ove its physical condition, as swell as nutrients, fertilizers are sources ant food nutrients only. Moreover N losses are less in manures than izer.inorganic fertilizers less bulky, easier transport and apply in the Manures supply NPK and other secondary and trace elements but izer only major nutrients.

SSIFICATION OF MANURES OR FERTILIZERS

According to origin these are of two types.

INORGANIC OR CHEMICAL OR COMMERCIAL FERTILIZER

These are made by chemical processes, also known as mineral or cial fertilizer. There are different kinds of fertilizer depending on their ent content. Fertilizer industry is mainly concerned with the primary ents, N, P and K. This is because these three nutrients are the most y lacking in our soils and are needed by plants in large quantities. mical fertilizers are usually classified according to whether they ain one or more; or three types of important plant food nutrients.

CLASSIFICATION OF CHEMICAL FERTILIZERS

i. According to types of nutrients

Chemical fertilizers are further classified according to types o nutrients as following

a. Nitrogenous fertilizers

The nitrogenous fertilizes are so called because they contai available N in large quantities. Urea, Ammonium sulfate, Ammoniu Nitrate.

b. Phosphatic fertilizers

These are those which are carriers of phosphorus, Single suppe phosphate (SSP), Triple super phosphate (TSP).

c. Potassic fertilizers

They contain potash as their chief constituent. Potassium sulfate Sulfate of potash (SOP), Potassium chloride or Murata of potash (MOP).

ii. According to number of nutrients present in fertilizer

a. Straight fertilizer

A fertilizer containing only one nutrient, of the major plant nutrient Urea, Ammonium sulfate, Ammonium Nitrate, SSP, TSP, SOP, MOP.

b. Compound fertilizer

A fertilizer containing a mixture of two or three of the major pla nutrients. Di-ammonium phosphate (DAP), Nitrophos (NP) and NPK.

Advantage and disadvantages of M- and F. fertilizers

Manure comparison

- organic in nature
- Not balanced in nature
- slowly available
- Manure has Micro & Macro (NPK) nutrient
- has residual effect
- Bulky in nature
- Improve the structure/texture
- add organic matter
- Less nutrients.

- Inorganic
- Balanced
- quickly available
- Specified nutrient
- no residual effe
- less bulky in natu
- not improve the phy structure
- not add organic mat
- More nutrients.

TYPES OF INORGANIC FERTILIZERS
NUTRIENT CONTENTS (%)

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NUTRIENT CONTENTS (%)

Fertilizer	Ch. Formula	N	P_2O_3	K_2O	Ca	Mg	S	Cu	B	Zn	Na	$CaSO_4$	pH
Urea	$CO(NH_2)_2$	.46	-	-	-	-	-	-	-	-	-	-	8
Ammonium sulphat	$(NH_4)_2SO_4$	21	-	-	2	-	23.7	0.3	-	0.3	-	-	4
Ammonium nitrate (AN)	NH_4NO_3	26	-	1	8	0.05	0.7	0.001	-	-	-	-	6.7
Single super phosphate	$Ca(HPO_4)_2$	-	16-18	0.2	16-20	0.2	9.12	-	-	.0 01	-	36-46	2
Triple super phosphate	$Ca(HPO_4)$	-	46	0.4	13.6	0.3	1.4	0.01	0.01	-	0.01	-	4
Sulphate of Potash(SOP)or Potassium sulphate	K_2SO_4	-	-	50	0.7	1.2	17.6	0.001	.002	-	-	-	7
Potassium chloride (KCl)or MOP	KCl	-	-	60	-	-	-	-	-	-	-	-	-
Di-Ammonium phosphate(DAP)	$(NH_4)_2HPO_4$	18	46	-	-	-	-	-	-	-	-	-	9
Nitrophos(NP)		23	23	-	9-10	0.1	2-3.6	0.02	0.02	0 03	0.02	-	3.5
NPK		10 13 10	20 23 21	20 21 21	-	-	-	-	-	-	-	-	-

2. MANURES OR ORGANIC FERTILIZER OR NATURAL FERTILIZER

Fertilizer which is of animal or plant origin. The chemical composition or value or quality of organic manures vary considerably with

i. The kind or age and individuality of animal that makes it

Cows and young stock utilize much of the N and phosphate in the food, their dung is poorer than that produced by fattening stock which return most of the nutrient elements in the manure produced. Pou manure is the richest in the amount of fertilizing materials, as it conta per unit weight almost twice the amount of ammonia found in cow manu almost three times the amount of phosphoric acid, and it also contains little more potash than is commonly found in the cattle manure. Sheep goat manure is also chemically better than cow manure but this deficie in fertilizing elements in cow manure is more than made by the quantity manure produced per animal.

ii. The kind of food fed to the animal

In general the richer the food in protein and minerals, the richer be the manure produced, since the animal usually retains only its bod requirement and the remainder is returned in the manure. But it uneconomical to feed a rich diet just to produce a riche manure or dung.

iii. The amount of straw used

The less straw used, the more concentrated will be manure and more rapidly will breakdown.

iv. Storage of manure before application

More than half of the agricultural value of the manure is lost wasted due to its storage in the open on the soil surface. Nitrogen loss are significant due to volatilization's and leaching.

COMPOSITION OF MANURE :–

Cow or buffalo manure is made up of two parts the solid and liq these are produced in the ratio of 3 to 1. As the urine contains abou times the amount of ammonia per unit weight contained in solid or d the fertilizing elements in the whole manure are derived in approxima equal quantities from the liquid and the solid portions of the man Hence if the liquid portion is lost or not conserved, approximately half fertilizing constituents is lost.

CLASSIFICATION OR TYPE OF ORGANIC MANURE (OR SOURCES OF ORGANIC MANURE)

Animal manure.

These are usually animal droppings or dung, urine and slaughter e waste. Animal waste provide the largest source of plant nutrients ng animal or organic manure, farmyard manure (FYM) is most non and important source. FYM is more or less decomposed mixture imal droppings, urine with the straw or other litter that is used in the to absorb the liquid portions and keep the animal clean; left over er, farm sweep and crop residues. Animal dung is the major ponent of FYM. One tone of fresh manure supplies 227kg organic er, 4.5 kg nitrogen, 2.5 kg P_2O_5 and 4.5 kg K_2O

Crop residues

It include straws, husks, leaves. Vegetable and fruit wastes, grass gs, weeds, etc. the major agriculture crops such as cotton , rcane , rice and wheat return about 8 to 45% of their air dried portions e soil in the form of stubbles , roots , shoots, leaves etc their position varies with the kind of materials and stage of plant growth.

Compost

A manure derived from decomposed plant residues (through the on of micro – organism) in soil. It is usually made by fermenting ted plat material (e.g., straw, grass, etc.) in heaps usually in alternate ers with added lime, N and water.it is usually used in green houses.

pes of compost.

Rural compost

p residues, stubbles, weeds , fallen leaves, leftover fodder and green nure, etc., can be collected and stored in heap or pit.

Urban compost

s is prepared from municipal / industrial waste comprising mainly of wn refuse and human excreta

Agro–industrial wastes.

Rice husk, leather flesh, fiber free straw, pith , pulp, peels, press ud and molasses

e) Weeds
f) Night soil (human excretion)
g) Green manure

Material	% (oven dry weight) N	P	K
1 Animal and human excreta			
Buffalo dung	1.23	0.55	0.69
Buffalo urine	2.05	0.01	3.78
Cattle dung	1.91	0.56	1.40
Cattle urine	9.74	0.05	7.78
Sheep dung	1.87	0.79	0.92
Sheep urine	9.90	0.10	12.31
Human feces	7.24	1.72	2.41
Human urine	17.14	1.57	4.86
2-Farmyard manure	0.80	0.21	0.68
3-Compost	1.10	0.29	1.37
4- Crop residues			
Wheat straw	0.49	0.11	1.06
Rice straw	0.58	0.10	1.38
Cotton stalks and leaves	0.88	0.15	1.45
Cotton seed meal	7.05	0.90	1.16
Sugarcane trash	0.35	0.04	0.50
5-Green manure			
Daincha	2.18	-	-
6-Oilseed cakes			
Rape	5.08	0.88	1.35
Mustard	4.93	0.53	0.65

RTILIZER APPLICAION METHODS

BROADCAST APPLICATION

Application of fertilizer by hand or by machine, as uniformly as ible to the surface of a field.

It is a good practice to apply half the quantity of fertilizer across the and the remaining half along the field. Fertilizer is usually dcasted at the time of last plowing. It should be incorporated into the r soil layer by plowing and planking. It may be left on the surface in e cases. Fertilizer applied at this stage is known as basal dressing.

antages

This method gives fairly good results in case of crops like cereals and millets (wheat, rice, oat, barley) which are planted in narrow rows or in crops sown by broadcast method because roots of such crops are present every where in field.

Incorporation of fertilizer into the soil elevates the fertility status of entire plow layer and reduces the loss of N by volatilization.

dvantages

It reduces the fertilizer utilization efficiency because of uneven distribution as some plants will receive too much, other too little or other may be receiving none particularly in row crops.

Application without incorporation or mixing with the surface soil can lead to N losses though NH_3 volatilization.

It stimulate weed growth.

Broadcast application in which would be less effective in barani areas as the surface would dry up quickly and fertilizer can not move to the root zone and may be beyond the reach of roots. Particularly with P which is immobile in the soil.

PLACEMENT

Method of application in which fertilizer is distributed or placed in cified location either below on the soil surface by hand or by machine.

Fertilizer is usually placed on one side of crop row at the time of ing at a distance of 2 inches and depth of 2–4 inches from seed with d cum fertilizer, single row cotton drill or animal drawn drill.

8. To increase availability of certain nutrients (P,K and Ca) to plants.
9. To increase crop yield.
10. To lessen the number of cultivations.
11. To reduce the chances of insects attack.
12. To reduce soil erosion.

GREEN MANURE CROPS

Both the legumes and non-legumes can be grown as green manure crops. The former supply N and organic matter while the latter only organic matter. The most commonly used green manure crops are Dhaincha, Jantar, Guara, Sunhemp, Cowpeas (Kharif season), and Berseem, Senji, (Rabi season)

CHARACTERISTICS OF GREEN MANURE CROPS.

i. The crop should be of herbaceous mature and quick growing with more vegetative growth.
ii. It Should belong to legume family.
iii. It should be adopted to the climate, soil, farmer's available resources and cropping system.
iv. Production cost should be less.
v. Duration and water requirements should be less.
vi. Crop should be able to with stand abnormal conditions.
vii. Crop should rot quickly.

Among the leguminous green manure crops sunhemp, dhaincha and guara have been most widely used. Sunhemp is less tolerant to salinity and water–logged conditions than Dhaincha under good moisture conditions. Dhaincha shows better response but under limited water supply sunnhemp performs better. Dhaincha is less tolerant to atmospheric and soil drought than sunnhemp.

GREEN MANURING FOR DIFFERENT CROPPING SYSTEMS

1. Sunnhemp, guara and cowpeas should be raised in areas which remain fallow during pre-wheat season.
2. An existing gap of 40 to 70 days between wheat harvest and transplanting can be utilized by growing short duration

manure crops like dhaincha, guara, etc. It should be buried one day before transplanting rice.

Last cutting of berseem should be buried in soil before sowing of cotton.

Sowing of sugarcane in standing crop of berseem which is later on buried in the soil.

Senji is grown in standing crop of cotton in October which is turned down by end of January or early February before sugarcane planting. Similarly berseem can also be sown.

When sugarcane is well established after sowing in February sunnhemp is sown between rows of sugarcane which is ploughed up at the time of earthing up of sugarcane.

E FOR GREEN MANURING

Best time for burying green manure crop is that when it just starts ming. Because plants have completed their vegetative growth at that e and more organic matter is obtained from them. Moreover, plants ender and take less time for rotting.

HOD FOR BURYING GREEN MANURE CROPS

Irrigate the crop just at the start of flowering. When soil comes in ar (friable condition), run the heavy sohaga over the crop in the ction along which ploughing is to be done. When the crop is laid flat, it into the soil by furrow turning plow (mould board plow) in the ction of planking. If mould board plow in not available desi plow may sed. But in this case there should be a few men to assist in putting s in the furrows by hand, so that soil moved by the plow in making the furrow may cover them properly. Again run sohaga to cover the s with soil completely. Tractor drawn mould board plow can also be instead of animal drawn. Crop buried in this way takes about 4–5 ks for rottening. If soil becomes dry then irrigate it to enhance ening. Rottening process can be increased by application of one bag of SO_4. For complete chopping and easy rottening rotavator should be d in standing crop.

SIDUAL EFFECTS OF GREEN MANURING

Experimental studies indicate that 50 tc 80 % of the N requirement ucceeding crop can be obtained from green manuring. The residual ct of green manuring remains in the plot long enough to benefit the d crop in succession.

Table Amount of nitrogen and organic matter turned under by some green manure crops.

Green Manure Crop	Nitrogen turned under (kg ha^{-1})	Organic Matter (kg ha^{-1})
Sunhemp	75-80	18500
Guara	60-118	18500
Dhaincha	75-88	15950
Senji	113	14250
Berseem	60	14000
Mung	40	-
Masoor	37	-
Arhar	45	-
Cowpea	58	-