



Government of Tamilnadu

Department of Employment and Training

Course : TNPSC Group II Exam
Subject : Chemistry
Topic : **Fertilizers, Pesticides, Insecticides**

© Copyright

The Department of Employment and Training has prepared the TNPSC Group-II Preliminary and Main Exam study material in the form of e-content for the benefit of Competitive Exam aspirants and it is being uploaded in this Virtual Learning Portal. This e-content study material is the sole property of the Department of Employment and Training. No one (either an individual or an institution) is allowed to make copy or reproduce the matter in any form. The trespassers will be prosecuted under the Indian Copyright Act.

It is a cost-free service provided to the job seekers who are preparing for the Competitive Exams.

**Commissioner,
Department of Employment and Training.**

FERTILIZERS, PESTICIDES AND INSECTICIDES

Plant nutrients

- ❖ Plants like human beings and animals require food for their growth and development.
- ❖ The food of plants is composed of certain chemical elements known as plant nutrients (or) plant food elements.
- ❖ Plants get nutrients from air, water and soil.

1. Air → Carbon, Oxygen
2. Water → Hydrogen
3. Soil → Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Iron, Manganese, Boron, Zinc, Copper, Molybdenum and Chlorine.

- ❖ Nearly 16 elements are essential for plant growth and reproduction.

Classification of nutrients

Macro Nutrients

- ❖ Elements which are needed in large quantities for growth of the plants are called Macro Nutrients.
- ❖ They are Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorous, Sulphur, Potassium, Calcium, Magnesium and Iron.

Micro Nutrients

- ❖ Elements which are needed by the plants in very small quantities are called micro nutrients.
- ❖ They are Manganese, Copper, Molybdenum, Zinc, Boron and Chlorine.

Zeolite is used to remove hardness of water.

Deficiency diseases for plants

Sl. No.	Nutrient	Adverse effects
1.	Nitrogen	The plant becomes yellowish (or) light green and remains stunted. The leaves and young fruits tend to drop prematurely and growth gives poor yield.
2.	Phosphorus	Root and shoot growth is restricted and plants become thin and spindly leaves may shed prematurely and there may be considerable delay in flowering and fruiting.
3.	Potassium	Deficiency of potassium may cause chlorosis (ie) yellowing of leaves and scorch in the case of fruit trees.
4.	Calcium	The normal growth of the plant is arrested. Roots may become short, stubby and brown.
5.	Magnesium	Chlorosis the yellowing of the older leaves. This is called chlorosis.
6.	Sulphur	Young leaves may turn yellow and roots, stems may become abnormally long and may also develop woodiness.
7.	Iron	In deficiency of iron, chlorosis of young leaves takes place but the veins remain green. In severe deficiency, leaves become almost pale white because of loss of chlorophyll.
8.	Manganese	A deficiency of manganese leads to chlorosis in the interveinal tissue of net-veined leaves and plants.
9.	Zinc	Shortening of internodes. Interveinal chlorosis of the foliage, particularly in lower leaves, with the size reduction in young leaves.
10.	Copper	Copper deficiency is evident as chlorosis, withering and often distortion of the terminal leaves.
11.	Molybdenum	The deficiency of molybdenum reduces the activity of the symbiotic and non-symbiotic nitrogen fixing organism.
12.	Boron	Plant growth is retarded and the leaves turn yellow (or) red. Boron deficiency is generally associated with sterility and malformation of reproductive organs.

Fertilizers

of essential elements required for

- ❖ Fertilizers are those substances which must be added to the soil in order to remove the deficiency

plant growth.

Natural fertilizers

Manure

- ❖ Manure is an organic substance and is prepared by the decomposition of plant and animal wastes.

Farm yard manure

- ❖ This is the decomposed mixture of excreta (dung) and urine of farm animals like cow, horse, goat and sheep along with left over manures and contain nitrogen, phosphorus and potassium.
1. Nitrogen- 0.5%
 2. Potassium oxide – 0.5%
 3. Phosphorus penta oxide – 0.2%

Compost

- ❖ Compost prepared by using earth worms to speed up the process of decomposition of plant and animal wastes is called vermi compost.

Green manures

- ❖ Leguminous plants like sun-hemp (or) cluster bean are grown and then mulched by ploughing them back into the soil. This helps in enriching the soil with nitrogen and phosphorus

Artificial Fertilizers

- ❖ Artificial Fertilizers are chemicals commercially produced in factories and used as plant nutrients.

Properties of good fertilizers

- ❖ The element present in the compound must be easily available to the plant.
- ❖ The substance must be soluble in water.
- ❖ It should be stable, so that it may be made available to the plant for a long time.
- ❖ It should not be very costly.
- ❖ It should maintain the PH of the soil in the vicinity of 7 to 8.
- ❖ It should not be a poison for plant

TYPES OF ARTIFICIAL FERTILIZERS

Nitrogen fertilizers

- ❖ Soil takes up the nitrogen in the form of ammonium (or) nitrate ions and forms amino acids with carbon compounds in the complex chemical system in the plant.
- ❖ These amino acids are then converted into proteins and enzymes. Proteins thus formed

make part of the protoplasm, while enzymes act as catalysts for various reactions taking place in the plants.

- ❖ Nitrogen is also a special constituent of the chlorophyll, without which photosynthesis is not possible.

Ammonium Sulphate

- ❖ It contains 24-25% of nitrogen.

Calcium Ammonium Nitrate (CAN)

- ❖ It contains 20% of nitrogen

Urea

1. It contains 46.6% of nitrogen.
2. Product cost is low
3. It maintain pH Value.

Importance of nitrogen

1. Production of DNA, RNA
2. Production of amino acids
3. Formation of protoplasam

Production of nitrogen fertilizers in Tamil Nadu

- ❖ Ammonium sulphate, Urea, Ammonium Chloride, Calcium ammonium nitrate

Importance of phosphorus

1. Production of ATP energy molecule.
2. Support of DNA, RNA production

Phosphorous fertilizers

1. It stimulate to crop growth
2. It help growth seed, flower and root growth
3. It helps to increase the number of N_2 fixing bacteria in roots.

Calcium super phosphate

- ❖ It contains 16-20% P_2O_5

Older Phosphorus fertilizers

- ❖ Dicalcium phosphate
- ❖ Triple superphosphate

Potassium fertilizers

- ❖ It helps to plant growth
- ❖ It helps to resistance from insects, disease resistance protection from drought
- ❖ Ex. Potassium nitrate, Potassium chloride, Potassium sulphate.

Bio fertilizers

- ❖ Fertilizers which are derived from living organism are called bio fertilizers.
- ❖ The main source of bio-fertilizers are bacteria, cyanobacteria and fungi. Bio fertilizers are renewable and non- polluting sources of plant nutrients. They also improve the soil condition. Rhizobium and Cyanobacteria

such as Anabena and Nostoc are common bio fertilizers.

Pests

- ❖ Pests are organisms of plants (or) animal origin which damage cultivated crops (or) plant products in storage.

Insecticides

- ❖ The chemical substances which are used to kill the insects are called insecticides.
- ❖ Ex. DDT (Dichloro diphenyl trichloro ethane)
- ❖ Malathion, Endosulphone, Gammexane (or) Lindane (or) BHC (Benzene hexa chloride)

Fungicides

- ❖ The chemicals used to kill fungi are called fungicides.
- ❖ Ex. Bordeaux mixture ($\text{CuSO}_4 + \text{Ca(OH)}_2$), Copper oxy chloride

Rodenticides

- ❖ The chemicals used to kill rodents like rats, mice and squirrel are called rodenticides.
- ❖ Ex. Zinc phosphate, Arsenic, Thallium sulphate, white phosphorous

Weedicides

- ❖ The chemicals substances which are used to kill the weeds are called weedicides.
- ❖ Ex. 2,4 -D (2,4 dichlorophenoxy acetic acid)

Insect pests

I. Chewing Insects

- ❖ They cut and chew the root, stem and leaves of the plants. eg. grasshoppers, caterpillars etc.

II. Sucking Insects

- ❖ They suck the cell sap from different parts of the plants. eg. leaf hoppers, aphids etc.

III. Borer insects

- ❖ They bore and enter different parts and feed on the plant tissues. eg. Sugarcane borer.

Methods of insect pest control

- ❖ Root cutting insects are controlled by mixing insecticides in soil. eg. chlorophyriphos
- ❖ Stem and leaf cutting and boring insects are controlled by dusting (or) spraying contact insecticides. eg. Malathion, Lindane and Thiodan
- ❖ The sap sucking insects can be controlled by spraying insecticides. eg. Dimethoate and Metasystox.