

18th JAN 2022

Q. What are trace elements or Micro nutrients? Describe the role of different trace elements and also mention their deficiency symptoms.

Ans. The green plants are photoautotrophic. They are independent of our side sources for their organic substances. But need inorganic matter from our side. The chemical analysis of plant system has clearly indicated the presence of 92 elements. Some elements are required in larger quantities for growth and development. They are named as Macro nutrients. But there are elements which are required in smaller amounts these are named as Micro-nutrient or Trace elements. These include Boron, Magnesium, zinc, copper, Molybdenum, cobalt and others.

Definition → These are nutrient elements required by the plants for their growth and metabolic activities in a very minute amount.

Important Micro nutrients or Trace elements for plant system →

1. Boron

sources - It is abundant in rocks and marine sediments. It exists in ~~for~~ three forms namely, Boric acid, Calcium or Magnesium Borate and as a constituent of silicates. Boron is absorbed by plants as Borate or tetraborate ions.

Physiological role -

1. It regulates carbohydrate metabolism.
2. It also regulates regeneration, fruiting and cell division.

3. It helps in translocation of sugar in plants.
4. Boron also regulates water relation, active salt absorption, nodulation in plants and fat metabolism.

Deficiencies Symptoms —

1. Deformation, discoloration and disorganization of meristematic tissue.
2. Death of growing points.
3. It causes abscission of flowers.
4. It increases fruit drought.
5. Curling and twisting of leaves.
6. Boron deficiency causes several diseases in plants such as Heart of sugarbeet, Internal cork formation in Apples.

Magnesium —

Sources - Soil contents Magnesium as tetra-valent and tri-valent oxides. Acidic soil favours the availability of Magnesium to plants.

Physiological role —

1. It functions as activator of enzymes like Magnesium dehydrogenase.
2. It is also an activator of Carboxylase and nitrate reductase.
3. It plays a role in the stabilization of Hydrogen atom splits from H_2O in photosynthesis.
4. It takes part in formation of chlorophyll.

Deficiency symptom —

1. Its deficiency causes chlorosis and Necrosis in the leaves.
2. Chloroplast gets devoid of chlorophyll.
3. There is reduction starch grain in chloroplast.

4. Cells are vacuolated and finally disintegrate.

Copper

Sources - ^{Major} ~~Measure~~ portion of Copper occurs as natural arsenite of Copper sulphide.

Physiological role -

1. It is a component of Plastocyanin, taking part in electron transport chain in photosynthesis.
2. It is an activator of enzymes like Polyphenol oxidase.
3. It is components of enzyme involved in the synthesis of Ascorbic acid.

Deficiency Symptoms -

1. Distortion and chlorosis in leaves.
2. Necrosis of the tips of young leaves.
3. Plants appears wilted.
4. Leaves are lost.

Zinc

Sources - It occurs in nature in the form of Ferro magnesium minerals, Magnitite, Biotite. The weathering of these minerals releases divalent form of Zinc which are absorbed by the plants.

Physiological role -

1. It plays active role in the synthesis of tryptophan.
2. It is an activator of several enzymes such as carbonic anhydrase and alcohol dehydrogenase.

Deficiency Symptoms -

1. Storing of internodes.
2. Plants become stunted.

3. Reduction in size of leaves.
4. Interveinal chlorosis.
5. Interveinal Necrosis.
6. Separation of seed formation.

Molybdenum.

Sources - It widely occurs in nature in soil as Molybdate ions and soil minerals.

Physiological role -

1. It is required for nodulation of legumes.
2. It is also needed for the synthesis of Tannins.
3. It takes part in reduction of nitrate to nitrite.
4. It also regulates amino acid concentration in plant system.
5. It is also required for the protection of chloroplast.

Deficiency Symptoms -

1. Deficiency of Molybdenum results in chlorosis of leaves.
2. Poor leaf growth.
3. Nitrogen fixation is reduced in symbiotic plants.
4. Flower formation is also inhibited.

Cobalt

Sources - In nature it is present in the bivalent form with Iron and Molybdenum. It is also present as heavy metal.

Physiological role -

1. It is required by Nitrogen fixation system.
2. It is the part of ^{vitamin} B₁₂.
3. It also act as activator of some enzymes.

Physiological Deficiency Symptoms —

1. Poor growth of the plants.
2. It results in reduction in protein synthesis.
3. Leaf stalks becomes short and slender.
4. Flowering is delayed or ~~suppressed~~ ^{repressed}.

Chlorine

Sources — It occurs in nature as chlorine gas.

Physiological role —

1. It plays an important role in photosystem II in photosynthesis.
2. It is essential in the transfer of electron from water to photooxidised chlorophyll.
3. It also plays a role in transpiration.

Deficiency symptoms —

1. Wilting of leaves.
2. Chlorosis and Necrosis of leaves.
3. Roots become short and thick.
4. Root tip becomes club shaped.