

Role of Sulphur in Plant Nutrition

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INTRODUCTION:

After N, P, and K, sulphur is the fourth necessary macronutrient. It's made up of cysteine, cystine, and methionine amino acids, as well as vitamins like thiamine, biotin, lipoic acid, and coenzyme A. It is a secondary macronutrient for plants. Because sulphur is a component of amino acids, it is essential for good protein content in plants. It also aids in the mineralization of nitrogen from proteins in plants. Chlorophyll is produced with the help of sulphur. It also aids legumes in nitrogen fixation. Sulphur-containing chemicals in mustard, onion, and garlic, for example, contribute to the flavour and aroma.

This refers to the reduction in fitness in a cultivar due to deleterious genes introduced along with the beneficial gene during backcrossing. Linkage drag refers to the (usually undesirable) effects of genes linked to the genes or QTL we are trying to introgress.

Characteristics of sulphur nutrient:

- The percentage of sulphur in the earth crust is 0.10 %.
- Plants absorb the ionic forms of sulphur is SO_4^{2-} , SO_2 , SO_3^{2-}

Forms and importance of sulphur nutrient:

- Sulphur is present in the soil in the both forms organic and inorganic.
- Sulphur can be classified into five different types: organic, inorganic, soluble, insoluble, and adsorbed.
- The organic form of Sulphur, which accounts for 5 to 98 % of accessible S in Indian soils, is the most important of them.
- S-deficiencies are identified in over 40% of the farmed land in India.
- S-containing substances, such as non-volatile S-glycosides.
- Brassica seeds contain 1.19 % sulphur, brassica straw has 0.19 %, and legumes contain 0.25 %.

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- Varied crop types require different amounts of S.
- S-containing substances, such as non-volatile S-glycosides.

Role of Sulphur in Plant Growth and Development:

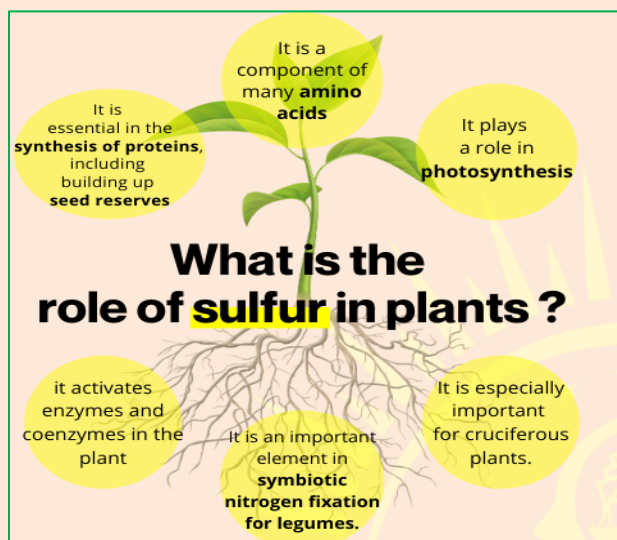


Fig. 1: Role of Sulphur in Plant Nutrition

Sulphur key functions in plants:

- In plants, sulphur is required for the formation of proteins, enzymes, vitamins, and chlorophyll.
- It also aids legume plant nodule formation and development. Sulphur is one of the 17 important plant nutrients, and it is required for the development and growth of all crops.
- Sulphur is a significant ingredient in evaluating the nutritional content of foods because it is a constituent of various amino acids and vitamins found in both plants and animals.
- Sulphur is required in high amounts for protein synthesis, particularly in the creation of oils within the seed.

- Sulphur also helps crops to survive the winter.
- A sufficient supply of sulphur is critical not just for crops with high sulphur requirements, but also for crops with high nitrogen requirements, which cannot optimise their nitrogen consumption without Sulphur.
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Symptoms of Sulphur Deficiency in plants:

- Sulphur is involved in the production of proteins and chlorophyll, and its deficient symptoms are similar to those of nitrogen insufficiency.
- Because sulphur is moderately mobile within the plant, deficient symptoms normally begin on the younger leaves and proceed to the older leaves over time, resulting in uniformly chlorotic plants.
- Sulphur-deficient plants have pale green leaves, which appear first on the younger leaves. The entire plant can eventually turn a light yellow-green colour.

- Instead of being blotchy or limited to interveinal zones, chlorosis is uniform over the leaf.



(A)



(B)

Fig. 2: Sulphur deficiency symptoms in Wheat (A) and Maize (B)

- Affected leaves may be smaller than healthy leaves in some situations, and the entire plant will usually be stunted.
- While the symptoms of sulphur shortage on a single leaf resemble those of nitrogen deficiency, nitrogen insufficiency occurs in the oldest leaves, not the youngest.
- Plant maturation may also be delayed.

Management strategies of Sulphur deficiency:

- When plants show signs of sulphur deficiency, the first actions should be to evaluate the pH of the soil and increase the amount of organic matter in it. Plants can absorb the most sulphur when the soil pH is 6 or higher, while most plants should be able to acquire enough if the pH is 5.5 or higher.
- When the pH of the soil must be less than 5, further sulphur may be required.
- The soil should be well-drained. If it doesn't, organic matter will help, albeit it will take some time for the additional organic matter to work.
- If your plant's drainage is poor, we'll need to move it or build a raised bed for it. It's also a good idea to water plants only when they're thirsty.
- Cloches can be used to warm the soil if symptoms emerge early in the season.
- If the soil nitrogen levels are moderate to low, an ammonium-based fertiliser can be used to help the soil absorb sulphur. The usage of gypsum as a source of extra sulphur is preferred. Other sulphur-containing fertilisers are available, but if sulphur is the only

missing nutrient, they may upset the balance of other elements.

- If soil tests suggest nitrogen, potassium, or phosphorus deficits, you can use ammonium sulphate, potassium sulphate, or super phosphate, accordingly.
- If you want to do so, make sure to carefully follow the guidelines on the package and keep the dose small. It's preferable to have to offer many tiny amounts of fertiliser than to add a large amount and discover that you've over-fertilized.

Conclusion:

- Plants require sulphur as a secondary macronutrient. Sulphur is also crucial in photosynthesis and helps crops survive the cold.
- Organic Sulphur, which accounts for 5 to 98 % of accessible S in Indian soils, is the most important.
- The most common symptom of sulphur deficiency is chlorosis.
- Sulphur is a key component in assessing the nutritional value of foods.
- Sulphur is found in both plants and

animals and is a component of various amino acids and vitamins.

- Organic Sulphur is the most important of these types, accounting for 5 to 98 % of accessible S in Indian soils.

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