

SUGAR CANE

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Sugar cane is one of the major field crops in tropical regions. Sugar cane is grown in more than 105 countries around the world [especially in Australia, Brazil, the USA, China, and India] for use in the production of sugar and sugar-added products. The role of boron [B] in the growth and development of the sugar cane is very important. Boron has significant functions in the sugar cane such as metabolism of carbohydrates, sugar transport through membranes, synthesis of nucleic acids and phytohormone, formation of cell walls, and cell division. Although it is required by the plant in small amounts, B is essential for the plant to complete its physiological and morphological functions. In case of deficiency in B, the amount of chlorophyll in plant leaves will decrease and many of the plant's physiological activities will be negatively affected. In addition, boron plays an important role in the absorption and transport of essential plant nutrients such as N, P and K.

There are many studies on how uptake of nutrients by roots is affected by boron nutrition. In case of lack of boron, it was found that there was a significant increase in the electrical potential difference of the membranes within 3 minutes after the plant roots were transferred to a growth medium rich in boron, as a result, the plants absorbed more potassium ions. The literature reports that boron element has positive effects on the activity of H-ATPase enzyme, which has a decisive role in the uptake of potassium and some other nutrients on the cell membranes, and that plants take in more potassium from the environment with sufficient boron nutrition.

Soil Application:

0,3-1,5 k g B ha⁻¹ of can be applied before or during sowing.

Foliar Application:

30 g of B dissolved in 100 liters of water can be applied at tillering, and during cane thickening. In ratoon crops, at early tillering, and after mid-tillering.



Sugar canes can quickly deplete the nutrients in soil, especially potassium. Potassium [K] is the most abundant cation found in the cellular juice of sugar canes. K has important functions as an enzyme activator in metabolisms such as photosynthesis, protein synthesis and starch formation in the plant. Sugar canes grown in boron deficiency cannot benefit sufficiently from K in the environment, therefore, it is of great importance to provide sufficient amounts of B to the sugar canes under the necessary conditions.

Signs of deficiency in B in sugar canes are similar to those in cereals. Due to the low mobility of B in the plant, the signs of deficiency in B first manifest in the newly growing, developing parts [curled, deformed, wrinkled and rough young leaves that tend to break], and at a later phase, result in the death of the entire plant.

There are many studies in the literature that demonstrate the effects of B on the growth, yield and sugar amount of sugar cane. A study conducted by Eti Mine Works General Directorate with sugar canes in Brazil reported that the application of B improved the yield of sugar canes by up to 20%.

The critical concentration of boron at which sugar yield of sugar cane is expected to start decreasing due to deficiency in boron is reported to be 4 mg kg^{-1} for leaf blades. For leaves, $15\text{-}20 \text{ mg kg}^{-1}$ of boron is considered sufficient. In case of application of boron fertilization in soil, the recommended safe boron dose is mostly $300\text{-}1500 \text{ g B ha}^{-1}$. In foliar fertilization of boron, a solution containing 300 mg of B per liter can be considered. Soil analysis must be done before boron fertilization to determine the boron needs of the soil.

