

# Factors Affecting the Occurrence of Boron Deficiency in Plants

Boron is an essential mineral nutrient that is absolutely necessary for the growth of plants and optimum crop yield. Boron deficiency in plants is usually observed in soils with very low and high pH. The fact that the boron element is easily washed away from the soil profile in soils with low pH under high precipitation and its adsorption to clay minerals in soils with high pH are the most important reasons for the low amount of boron available to plants in the soil. Typical factors causing boron deficiency in plants are listed below:



- **pH of soil:** High soil pH causes boron adsorption (immobilization) in soils and low soil pH (especially in regions with high precipitation) causes leaching from soil, and this negatively affects the boron nutrition of plants.
- **Soil Liming:** Liming of acidic soils is a common agronomic practice considered to reduce acidity and the common problem of aluminum toxicity in these soils. However, aluminum hydroxide-like precipitates formed after liming reduce the amount of boron that can be taken by the roots through adsorbing or binding useful boron in the soil and increases the risk of boron deficiency in plants.
- **Boron leaching:** In regions with high rainfall and frequent irrigation, there is an important boron leaching problem from soils (especially from soils with low organic matter and high sand content), and this problem increases the issue of boron deficiency in plants. For this reason, it is recommended to use colemanite-based boron fertilizers with slow solubility in such soils.
- **Organic matter:** Organic matter is an important reservoir for boron. Soils with low organic matter are potentially boron deficient soils.

- **Intensive vegetal production:** Removing large amounts of boron from the soil through harvested crops leads to depletion of boron in soils over time. For example, dicotyledonous plants have the potential to remove up to 500 grams of pure boron from one hectare of land each year.
- **High light intensity and extreme temperatures:** Plants become very sensitive to high light intensity and very low and very high air temperatures when grown under low boron nutrition conditions. Under these conditions, growth problems due to boron deficiency occur more rapidly and severely.



- **Transpiration:** In conditions where transpiration is very low, there will be a decrease in both the uptake of boron from the soil and its transport to the plant as well as lesser boron will be transported to the organs to which already small amount of boron is transported (such as the youngest leaves, flowers, fruits, etc.) because the transpiration is low, which will further accelerate the occurrence of issue of boron deficiency in plants. In general, since transpiration is low in greenhouses with very high humidity, the risk of boron deficiency in greenhouse plants is high.
- **Mobility of boron in plants:** Although there is high amount of boron according to leaf and soil analysis, boron deficiency is still found in generative organs in many plant species. The problem is that the boron in the leaves cannot be transported to the generative organs, which causes significant disruptions in flowering, pollen viability, fertilization and seed formation. For this reason, although there is no visible boron nutrition problem in the green part of the plant, serious decreases may occur in the yield of plants due to boron deficiency.

**"For more information: <https://tarim.etimaden.gov.tr/en>"**