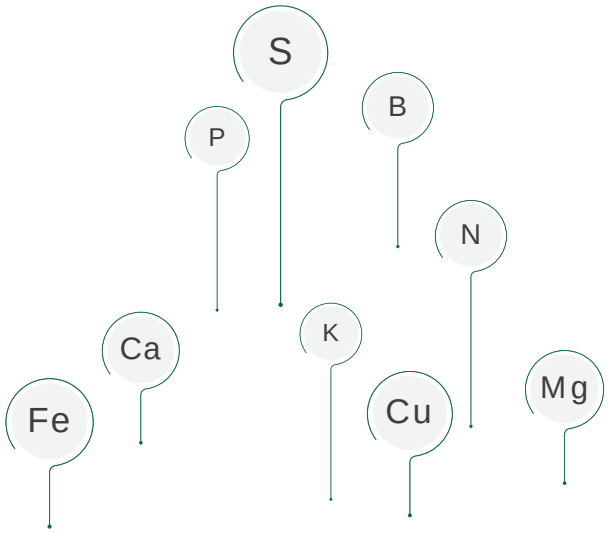
Boron utrition, Pollination and Fertilization



Perhaps the most well-known and widely accepted most important physiological function of boron is its role in pollination and fertilization. Fertilization, naturally, is a process that directly affects plant yield. Boron plays a decisive role in pollen viability, pollen germination and pollen tube formation. Pollen tubes are known as the fastest growing organs in biological systems and this growth process is directly affected by boron nutrition. Boron requirement of pollen tubes is very high. Therefore, the continuity of pollen tube development and elongation is highly dependent on the continued presence of boron. Thus, pollen germination is also very affected by boron nutrition. For example, in one study, while the pollen germination rate was found to be approximately 22% in an environment with boron deficiency, it was reported that the pollen germination rate increased above 60% with the improvement of boron nutrition.

The occurrence of reduced flowering and the subsequent loss or shedding of developed flowers is a common problem in boron-deficient plants. Here, it is reported that boron-bound rhamnogalacturonan-II (RG-II) pectin complex has a decisive role in both pollen tube elongation and pollen germination and function. It has been reported that approximately 90% of the RG-II pectin complex is a boron-bound complex.

Due to this important role of boron in fertilization, while a visible effect or symptom presence on vegetative growth and leaves is not observed in boron deficiency, surprising decreases can be seen in the yield of plants. This is why the critical boron deficiency concentration in plants is much higher for generative tissues than leaves. For example, the recommended critical boron deficiency concentrations for male reproductive tissue anthers are 16 mg kg-1 in wheat and 38 mg kg-1 in rapeseed, while these values are 1 and 17 mg kg-1 for leaves, respectively.

It is known that male flower organs are very sensitive to boron deficiency. Since the boron requirement of cereals is very low, boron deficiency in field conditions shows itself more during the flowering period. When there is a boron deficiency in this period, it is observed that pollen and anthers do not develop properly. The shape and functional disorders that occur with boron deficiency in the anthers of the male organ also strongly prevent seed formation. Male sterility, which occurs with boron deficiency, is thought to be the main cause of yield losses observed under boron deficiency conditions.

These findings and observations indicate that the boron nutrition level in the generative growth phase of plants is very important. Leaf boron fertilization is important since it is very difficult for boron to be transported within the plant in a large part of the plants, that is, boron cannot be transported from the leaves to the generative organs. However, application of boron from the leaf needs to be repeated several times just before and during the generative period due to the same reason for not being able to be transported.

"For more information; tarim.etimaden.gov.tr"

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