# Functions of Boron in Plant Nutrition

- Boron is a micronutrient required for all plant nutrition.
- The main functions of boron relate to cell wall strength and development, cell division, fruit and seed development, sugar transport, and hormone development.
- Some functions of boron interrelate with those of nitrogen, phosphorus, potassium and calcium in plants. Balanced nutrition is essential for optimum crop growth.
- Soil application of *Granubor*® or foliar sprays of *Solubor*® or *Solubor*® DF can be used to ensure an adequate B supply for optimum growth.

Boron (B) is required for all plant growth. Adequate B nutrition is critical for high yields and quality of crops. Deficiencies of B result in many anatomical, biochemical and physiological changes in plants. Plant needs for boron can be applied as *Granubor* preplant to the soil or as *Solubor* or *Solubor* DF foliar sprays during the growing season.

Determination of the functions of B in plant nutrition has been the objective of much research for many years. Knowledge of those functions attributed to B still is limited because many of the functions of B apparently have secondary effects in plant nutrition.

The most important physiological effects of B in plants now are thought to be a structural role for B in cell walls; a role for B in membrane function; and, a stimulation or inhibition of specific metabolic pathways.

## Cell Wall Structure

Boron is involved along with calcium (Ca) in cell wall structure. Boron is involved in the movement of Ca into the plant and in normal Ca nutrition in plants and animals. There is a similarity between bone development in animals and cell wall development in plants. For example, "hollow-heart" in peanuts can occur when a shortage of B limits Ca movement, normal cell wall development and cell division.

## Cell Division

Boron is essential in the actively growing regions of plants, such as root tips, and in new leaf and bud development. This involves the meristematic (growing) tissues in plants or the cells which are rapidly multiplying, allowing plant growth to occur.

A shortage of B is most often noted by a change in plant structure in these actively growing regions. Boron ensures healthy plant storage tissues and conductive tissues for the transport of water, nutrients, and organic compounds to the actively growing portions in plants.

For example, rosetting (stunting) of plants is a common B-deficiency symptom, due to a decrease in cell numbers in the apical (upper) growing regions of alfalfa, clovers and other legumes.

## Sugar Transport

Photosynthesis transforms sunlight energy into plant energy compounds such as sugars. For this process to continue in plants, the sugars must be moved away from the site of their development, and stored or used to make other compounds.

Boron increases the rate of transport of sugars (which are produced by photosynthesis in mature plant leaves) to actively growing regions and also in developing fruits.

Boron is essential for providing sugars which are needed for root growth in all plants and also for normal development of root nodules in legumes such as alfalfa, soybeans and peanuts.

## Flowering and Fruiting

The B requirement is much higher for reproductive growth than for vegetative growth in most plant species. Boron increases flower production and retention, pollen tube elongation and germination, and seed and fruit development.

A deficiency of B can cause incomplete pollination of corn or prevent maximum pod-set in soybeans, for example.

## Plant Hormone Regulation

Plant hormones, like animal hormones, regulate many growth and reproduction functions. Flower initiation, fruit development, cell wall and tissue formation, and root elongation are all influenced by hormones. Boron plays an important role in regulating hormone levels in plants.

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