

Boron and Calcium Together in Plant Nutrition

Boron in Plant Nutrition

The role of boron in plant nutrition is among the least understood of all the mineral nutrients. What is known of boron requirement arises mainly from studies of what happens when boron is withheld or re-supplied after deficiency. This is unusual given the fact that on a molar basis plants require more boron than any other micronutrient. Boron has a long list of postulated roles:

- (a) sugar transport
- (b) cell wall synthesis
- (c) lignification
- (d) building cell-wall structure
- (e) carbohydrate metabolism
- (f) RNA metabolism
- (g) respiration
- (h) indole acetic acid (IAA) metabolism
- (j) building membranes

Boron plays a very critical key role in cell-wall synthesis. In boron-deficient plants the cell walls are dramatically altered compared to cell walls of boron-sufficient plants. Disorders such as *cracked stem*; *stem corkiness*; and *hollow stem disorder* are all caused by low-boron levels. Boron complexes strongly with cell wall constituents as well as helping to maintain structural integrity by forming weak borate-ester cross-links. These borate-ester cross-links are critical to the plant's ability to elongate cell walls without

destroying them. Since the cross-links are weak, they can break and then reform during cell wall elongation; furthermore, they provide negative charges for ionic interactions, with Ca⁺⁺ for example. Boron is bound less strongly to the cell wall than is calcium. This same role of boron just described is also evident in pollen tube growth.

Are boron and calcium codependent to be effective in plant nutrition?

Calcium in Plant Nutrition

Calcium is a divalent cation that is extremely important in maintaining the strength of stems and stalks of plants. This mineral also regulates the absorption of nutrients across plasma cell membranes. Calcium functions in plant cell elongation and division, structure and permeability of cell membranes, nitrogen metabolism, and carbohydrate translocation. Since calcium is part of the cell wall and acts as the cement that binds the cell walls together, it is one of the most significant factors of firmness and storage life of fruit and vegetables.

Boron and Calcium Together

We are all familiar with the symbiotic relationship that flowering

plants and honeybees have in common. Each benefits from the other and without the other, the success of both is extremely limited. In order for plants to effectively utilize calcium, boron must also be present. Essentially, what this means is that if you have a nutritional situation in which the crop does not have sufficient levels of boron in the tissue, calcium applications will not be nearly as effective as they could be if there was sufficient boron present. It is wise to know the nutritional status of your crops when making applications of fertilizers.

Historically, we have seen that the benefit of combining boron with calcium applications is tremendous. This is true when crops have historically had low boron levels in the tissue. In many farming practices, boron and calcium are applied at the same time. If you are not currently recommending this to your customers, or are not currently doing this in your farming operation, it is something very simple and should be seriously considered.

For more information on boron and calcium nutrition, or plant nutrition in general, please contact your local Albion Advanced Nutrition[®] representative. ☞

