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Boron (B)

Boron is essential for plants, playing a major role in the carbohydrate metabolism including the production and storage of sugars. It is also believed to be important in protein production and general cellular activities (division, growth, respiration, maturation and differentiation e.g. the formation of fruit cells).

Boron deficiency is the most common trace element problem for *Pinus radiata* trees. Other crop examples include brown heart in swede and turnip, heart rot in beets, hollow stem in cauliflower and bitter pit in apples.

Plants with a latex system (e.g. chicory and lettuce) have a higher requirement for boron than other plants. Good boron levels also benefit carrots, potatoes, brassicas, legumes, celery, grapes and fruit trees.

Boron availability is related to soil pH, being most available in acid soils. Boron is very mobile and thus easily leached, so deficiency can be a problem in sandy, low organic matter soils but it can also be a problem in high organic matter soils. Excessive liming (raising pH to 7 or above), dry soils and soils receiving recent heavy rain are three further conditions under which deficiencies can arise.

True deficiencies are uncommon in NZ pastures but pastures with low boron levels will benefit from applications through increased calcium and sodium availability, increased palatability and improved clover growth (with better nodule formation).

Boron is generally thought to be not essential for animals and humans. However, there is growing evidence that boron is an essential element for animal bone formation and that it is important for the metabolism of calcium, magnesium and phosphorus (as it is in plants).

Most boron in the soil is present in organic matter or old micro-organism residues. As a result, both the amount of organic matter present and the rate of nutrient cycling/decomposition is important for good boron availability. Good soil biological activity and soil structure are the key to reducing boron leaching losses.

Boron can be added in fertiliser with excellent results but care needs to be taken not to cause toxicity (some of the plants that most benefit from boron application e.g. potatoes, carrots and many fruit crops/trees are also among the most affected by toxic levels). Toxic levels can be achieved by irregular/uneven distribution of fertiliser boron. This can be a special concern at sowing time for high levels of boron can upset seed germination. Because the desirable range for boron in the soil is rather narrow and problems of toxicity can be as serious as problems of deficiency, it is a good idea to test for boron before adding boron into fertiliser mixes.