

Soil Boron (B) Deficiency & Treatment

The element Boron (B) is an essential plant micro-nutrient that becomes a plant toxin at high concentrations, or when carelessly applied. Soil Boron is deficient in many areas of Alaska. Boron is the only plant nutrient with a neutral charge (neither negative or positive), meaning it doesn't stick around--readily leaching away where soils or seasonally saturated.

In 2021, the Chilkat Valley Orchard Project collected and analyzed twenty Chilkat Valley soil samples ranging from tidewater to near the US-CAN border. **Only three of the twenty showed Boron in the "good" (0.5ppm – 1ppm). Seven of these samples were at or below 0.2ppm (very deficient).** The average Boron value for the 20 CV samples was 0.36ppm, well below recommended levels.

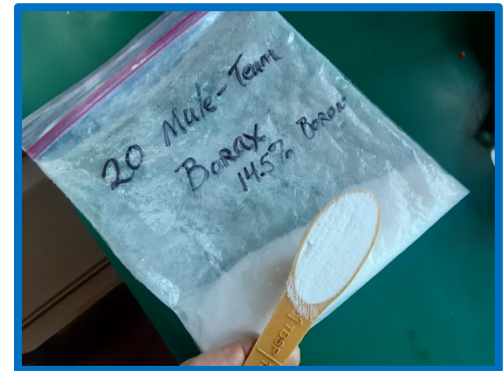
Why Boron? Boron is critical in the pollen tube structures of all flowering plants. For crops that require fruitful flowers, such as raspberries, apples, plums or cherries, deficiency reduces the fruit yield, or means incomplete, or no, fertilization. Boron also plays a role in plant protein synthesis and the uptake/transport of calcium, potassium, phosphorus, etc. **Some references saying all the Brassica crops have a "high response" to Boron, another indicated broccoli, beets and turnips, as being particularly needy.**

Toxicity depends on the species, too. But around 2ppm (4lb/acre) (or less) it becomes a problem. Careful measuring and application is crucial. A general agricultural level for Boron, recommended by Michigan State University agronomists, is two-pounds per acre¹ (1ppm) which is the high end of the above-noted "good" range. This concentration is over twice the level of most Haines soils we tested. *The uptake of Boron, and all plant nutrients, is optimized by keeping soil acidity in the range of pH 6.0 - 6.5. Most local soils test below pH 6.*

Applying Boron to an Orchard/Garden Space

The cheap and simple way to acquire Boron is by purchasing 20 Mule Team Borax powder, which is 14.5% Boron by weight.

Boron Deficiency Problem: The soil test says the Boron level is 0.2ppm. I want to increase my Boron by 0.5ppm to achieve a final total soil Boron of 0.7ppm. *How much 20-Mule Team Borax do I need to apply to each 100ft²?*



Answer²: For each 100ft², add 7.3grams of 20 Mule Team Borax. That will nudge the soil Boron upwards 0.5ppm to achieve 0.7ppm. Using the *Nerd-Day Kitchen Conversions* shown at the right, two level teaspoons that are just *slightly* light will give you the 7-grams of 20 Mule Team Borax--just right for our 100ft² example.

Nerd-Day Kitchen Conversion

One level culinary teaspoon = 4-grams Borax
One level culinary Tablespoon = 12-grams Borax

We spared you the math. The goal of 0.7ppm is safe, w/ no plant toxin issues, far from it. For a 12'x 4' raised bed (48 ft²) that would be one light, level teaspoon (4-grams), etc. and so forth. If you wanted to raise the level by 0.25ppm, instead of 0.5ppm, you would use ½ this amount (for each 100ft²).

Application—dissolve and water

Dissolve the measured 20 Mule Team Borax in 3-5 gallons of water. Apply the liquid evenly over the measured area, ideally with a watering can, if you have one. For 200ft², double the amount, 300ft², triple, and so forth. As Boron is readily leached, you can imagine making this a ritual every few years.

Completing a periodic Soil Audit and Inventory Report (soil test) is another useful ritual. Contact the CV Orchard Project if you need help with that (info@cvorchardproject.org). The Orchard Project uses Brookside Lab (blinc.com) process S001AN, which requires about 1-cup of material. Cost: \$20 cheap, plus priority shipping.

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1. Michigan State University (https://www.canr.msu.edu/news/boron_in_vegetables_not_too_little_not_too_much)
 2. If you want to do the math, have at it: 1lb = 454 grams; 1 acre=44,356 ft²; because one "acre-foot" (1-acre to depth of 1ft) weighs 2,000,000 pounds, 1lb/acre equals 0.5ppm; 20 Mule Team Borax is 14.5% Boron.