

Boron applications for increased soybean yields

Overview

- Soybeans require an adequate supply of available boron, especially during flowering and seed development. Multiple foliar sprays of *Solubor*® will ensure an adequate supply of boron during this stage of growth.
- Foliar sprays of *Solubor* can be combined with other field treatments, such as insecticides, to reduce costs.
- Preplant soil application of *Granubor*® plus foliar sprays of *Solubor* during the season are recommended for soils testing low in available boron.

Soybeans require a high fertility soil for optimum production. Well-drained soils with a good supply of organic matter which have been well fertilized and limed over several years will generally produce the highest soybean yields.

Cell wall strength, cell division, fruit and seed development, and sugar transport are plant functions related to boron (B). While boron requirements for optimum plant nutrition are low compared with those of the primary nutrients, the need for boron is especially significant in flowering and seed development.

Deficiency symptoms

Because boron is vital to flower formation and seed production, a decrease in boron supply during this critical stage can result in decreased yields. Boron deficiency results in interveinal chlorosis of the plant foliage with brittle leaves in the youngest growth. Stunted roots with few or no flowers also may be evident. Floral buds may wither before opening.

Soil tests and plant analyses

Boron deficiencies may be suspected on coarse-textured soils where organic matter content is low, on soils with a pH above 6.0, and on recently limed soils. Soil testing and plant analyses are both helpful in assessing the potential boron supplying capacity of the soil and the current boron status of the growing plant.

The critical level of hot-water-soluble boron for soybeans in most soils ranges from 0.2 to 0.5 ppm, depending on the soil pH, organic matter content, and texture. Soybeans which are grown on soils that are less than the critical level generally will respond to applied boron.

The critical level of boron in the top mature soybean leaves is about 20 ppm, but the ideal level is about 30 ppm. Soybean plants with leaf boron contents below the critical level should be sprayed one or more times with *Solubor* after flower initiation and during seed development.

Recommendations for soybeans

Yield responses to applied boron may be inconsistent and seasonal, probably due to environmental effects on soybean growth. However, both yield and quality of soybeans may be improved with boron fertilization because available boron levels are low in some soils.

Boron should be applied for soybeans especially on sandy soils in high rainfall regions or with over-irrigation because soluble boron can be easily leached from the root zone. Soybean response to applied boron generally is greatest when there are adequate supplies of the other nutrients.

AGRONOMY NOTE: SOYBEAN PRODUCTION

Boron recommendations for soybeans

Marginal soil test boron and/or leaf analyses, or dry weather during critical stages



Multiple foliar sprays at rates of 0.5 lbs (0.1 lbs of B/acre) weekly for 3 – 5 times before flower initiation and development. *Solubor* can be applied to vines alone or with insecticides.

Low soil test boron and a prior history of boron response



A soil application of 7 lbs of *Granubor*/acre (1 lb of B/acre) surface broadcast and incorporated prior to planting. If boron is banded with fertilizer at planting, 0.5 lbs of B/acre is suggested.

Data below show increased soybean yields with foliar applications of boron, nitrogen (N), and/or magnesium (Mg) which were made during the R3 to R5 stages of growth in Georgia. Four foliar applications of various combinations of *Solubor*, urea, or UAN solution; and MgSO_4 resulted in 5-20% increases in yields. Highest yield increases were with B+N or B+Mg foliar sprays applied at 25 gal/acre. Other studies have reported soybean yield increases with one or two foliar sprays of 1.25 lbs of *Solubor*/acre applied alone or in combination with the insecticide, Dimilin®.

Response of soybeans to late-season foliar sprays of one or more nutrients

Nutrient applied, lbs / acre			Yield, bu/acre	
B	N	Mg	Bonifay sand	Greenville sandy loam
—	—	—	37.8	38.3
—	40	—	44.3	40.7
0.4	—	—	38.9	43.6
0.4	40	—	46.0	42.2
—	—	0.25	40.2	40.9
—	40	0.25	39.4	43.5
0.4	40	0.25	47.2	41.3
0.4	40	0.25	42.0	42.5

About U.S. Borax

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates—naturally-occurring minerals containing boron and other elements. We are 1,000 people serving 650 customers with more than 1,800 delivery locations globally. We supply around 30% of the world's need for refined borates from our worldclass mine in Boron, California, about 100 miles northeast of Los Angeles.

Our local agriculture experts understand the uses and benefits of boron on crops. In addition to a global sales team, we have a number of agronomists on staff to help fertilizer distributors maximize the benefits of borates in agriculture applications. Our ag team can answer individual growers' questions and concerns about their particular crop.

High quality, high reliability, high performance borate products. It's what we're known for.



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