BROCHURE

# Boron in alfalfa

20 MULE TEAM BORAX™
RioTinto

## Alfalfa, a common pasture crop, responds especially well to boron fertilizers

### Boron supply

Providing alfalfa with adequate boron is necessary for:

- Greener, leafier plants with high protein
- Faster regrowth after each cutting
- Longer stand life
- Improved winter hardiness
- Enhanced root growth
- Better water use, efficiency, and drought tolerance
- Increased root nodule development for fixing nitrogen
- Thicker stands to suppress weed and grass growth

### Boron deficiency symptoms

The main symptoms of boron deficiency in alfalfa are yellowing and reddening of the upper leaves. As the deficiency develops, the internodes of the top growth become progressively shorter and the short side branches give the plant a “rosetted” appearance. Boron deficiency is closely associated with moisture stress and drought. Alfalfa yellowing caused by boron deficiency is frequently mistaken for drought damage.

Alfalfa needs a relatively high rate of boron constantly over the entire growing season. Annual boron applications should be applied when other nutrients are topdressed, after cuttings.

### Recommended pounds of boron per acre per year

* Foliar sprays should not exceed 0.5 lbs/acre boron per application.

| Potential yield (tons/acre) | Application method | Boron soil test | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| 1-3 | Prior to seeding | 1 | 0 | 0 |
| | Topdress | 1 | 1 | 0 |
| 3-6 | Prior to seeding | 2 | 1.5 | 0 |
| | Topdress | 2.5 | 2 | 1 |
| Plus 6 | Prior to seeding | 3* | 2.5 | 1 |
| | Topdress | 4* | 3* | 1.5 |

## The difference between borate sources

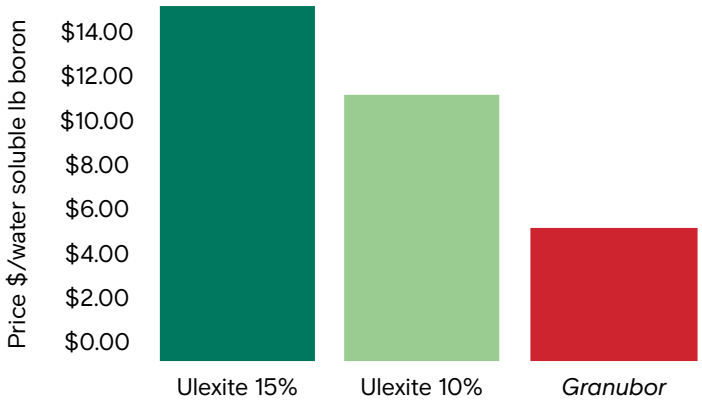
### Unrefined borates (ulexites)

- Potentially high levels of impurities and arsenic, a heavy metal
- Generally irregular granulometry
- Incomplete dissolution in water
- High hygroscopicity
- Inconsistent release of boron over time
- High content of dust creating segregation and poor distribution of the product in the field
- Limited field tests and certifications

### Refined borates (*Granubor*®)

- No impurities, dust, fillers, coatings, or added ingredients
- Average particle size 2.8 mm—perfect for blending with NPK fertilizers
- 100% water soluble
- Very low hygroscopicity for even blending in NPK fertilizers
- Gradual release of boron for consistent, long-lasting benefits
- Crush resistant, limited dust during transport, hauling, and spreading
- OMRI-listed and USDA-certified for use in organic food production, processing, and handling
- Mined and refined in the USA

## *Granubor* delivers more water soluble boron to plants at a more affordable price




**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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agriculture.borax.com