TECHNICAL BROCHURE

Research into boron sources and rates

The micronutrient boron (B) has been used in agriculture for many years. Several options for boron fertilizers exist on the market, which could create some confusion for farmers and agronomists. Depending on the boron source, its solubility may vary, having an effect on the recommended rate and boron management in the field.

In order to aid in understanding the response of soy and corn to some sources available on the market, Schaich (2020) conducted fieldwork comparing boron sources and rates. Among the sources of boron tested were *Granubor*® (15% B), granulated ulexite (10% B), and a technology based on potassium chloride (KCl) + two sources of boron in the same granule (58% K_2O and 0.5% B). *Granubor* is a sodium tetraborate pentahydrate-based fertilizer and the sources of boron in the KCl + B product are based on anhydrous sodium tetraborate (50%) and colemanite (50%).

The experiments were carried out in the city of Cruz Alta, RS, Brazil, with Red Latosol of medium texture (Table 1). The experimental design used randomized blocks with four repetitions. For each crop, all of the treatments received the same quantity of NPK nutrients. In the soy experiment, the rate of potassium (K_2O) used was 151 kg/ha, while for corn it was 116 kg/ha.

Table 1
Chemical and physical characteristics of the soil in the areas used for experiments before the implementation of the experiments

Exp	Prof	pH	Ca	Mg	Al	Al+H	P	K	S
	cm	H_2O	$cmol_c/dm^{-3}$				mg/dm^{-3}		
Corn	0-20 cm	5.9	8.3	1.7	0	2.2	18	160	8.9
Soy	0-20 cm	5.6	3.9	1.9	0	3.2	5.6	79	6.9
Exp	**Prof**	**Argila**	**MO**	**V**	**CTC**	**Zn**	**Cu**	**B**	**Mn**
	cm	%	g/dm^3	%	$cmol_c/dm^{-3}$	mg/dm^{-3}			
Corn	0-20 cm	42	3.2	82.6	12.6	3.3	6.1	0.5	4.3
Soy	0-20 cm	38	2.3	65.2	9.2	2.3	5.4	0.2	6

Cruz Alta, RS (Safra 2019-2020)
UNISC Analytical Center; Santa Cruz do Sul - RS. Extractors: P, K, Cu, Fe, Mn, and Zn (Mehlich-1); S (ammonium acetate); Ca, Mg, and Al (KCl 1N); MO (sodium dichromate); B (hot water); Clay (densimeter method)

Aerial photo of the experiment



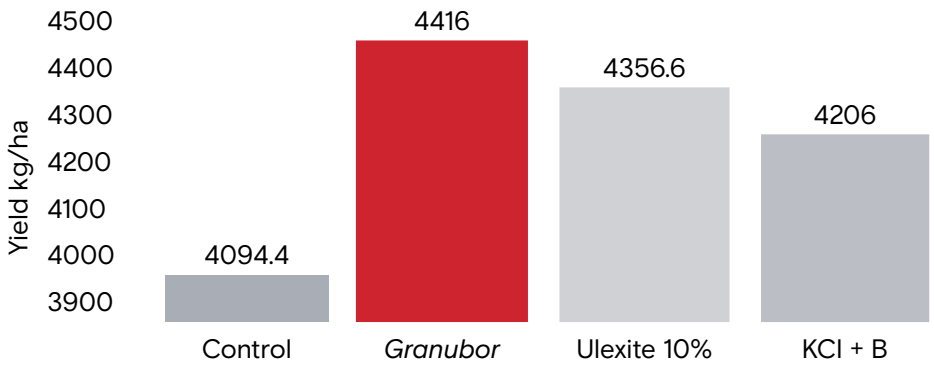
Physioatac, 2020

Results

For soy, *Granubor* increased the yield by 321.6 kg/ha as compared to the control at a rate of 1.3 kg B/ha (Figure 1). Even though the differences in yield were not statistically different, the numerical increase in yield from *Granubor* was the greatest among the compared sources.

Figure 1

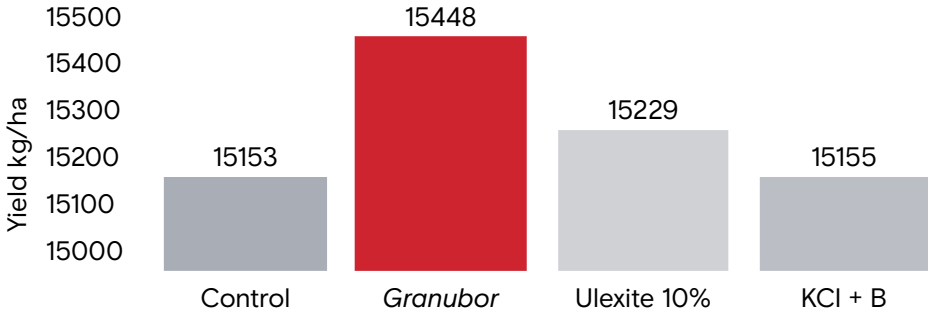
Response of soy to the application of B at a rate of 1.3 kg/ha using different sources available in the market



In the corn, *Granubor* increased yield by 295 kg/ha when compared to the control at a rate of 1 kg/ha B (Figure 2). Even though the differences in yield were not statistically different, the numerical increase in yield from *Granubor* was the greatest among the compared sources.

Figure 2

Response of corn to the application of B at a rate of 1 kg/ha using different sources available in the market



These preliminary results prove the consistency of the fertilizer *Granubor* in providing positive results for farmers.

Gabriel Schaich, 2020. Physioatac

About U.S. Borax

U.S. Borax 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 our customers with more than 1,200 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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