Yield Response of Canola with Foliar Boron Applied at Early Bolting Stage

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Abstract

Foliar boron was applied at 20% bloom stage of irrigated canola and increased yield at two of three sites. The treated area showed up in NDVI images at two of three sites located on sandy soils. With the frequent rainfall in recent years, foliar boron applied to irrigated canola at 20% bloom especially on sandy soils during wet years has shown increased yields by 4-5 bu/ac. The response that has been observed in recent years during high rainfall summers may disappear if canola relies more on subsoil moisture uptake and irrigation water. Plant tissue levels below 20 ppm boron are indicated as a potential threshold for application of foliar boron at early flowering with the first fungicide application to irrigated canola. Earlier work showed that the soil test was not effective for predicting the potential for a yield response with foliar application.

Project Objective

This project demonstrated the impact on canola yield by the application of foliar boron fertilizer at early bolting stage tankmixed with the first fungicide application to an irrigated field.

Demonstration Site

The project was conducted at three locations for 2016. One was located at the southern portion of Riverhurst Irrigation District on NW14-22-7-W3 on Fox Valley loam developed on calcareous silty glaciolacustrine parent material. A second was located at the northern portion of the Riverhurst Irrigation District on WH6-24-6-W3 on Hatton sandy loam developed on coarse textured, moderately calcareous sandy glaciofluvial parent material. The third was located on SW9-23-4-W3 on Hatton sandy loam developed on coarse textured moderately calcareous sandy glaciolacustrine deposits. The plant tissue analysis for two of the replications is reported in Table 1. The project is relying on plant tissue analysis to guide selection of potential responsive sites because the effectiveness of a soil test has been inconsistent for predicting yield response to boron of canola.

Project Methods and Observations

This project evaluated the yield response of foliar boron applied at 20% bloom stage as a piggy back application tank mixed with fungicide to control sclerotinia in irrigated canola. The product applied to the Oram and Hiebert sites was Omex 10% boron. At 0.5 litre/ac, 1.43 lb B was applied to the canola foliage. At 1.0 litre/ac, 2.86 lb B was sprayed on the canola foliage. The product applied to the South Riverhurst site was manufactured by ATP Nutrition and applied at 1 liter per ac with the fungicide.

Plant tissue samples were collected from the Oram and Hiebert sites at the rosette stage are reported in Table 1. Both samples contained just under 20 ppm boron. No visual differences were noticed at the sites at any time during the growing season. NDVI imagery was obtained from Farmer's Edge in Outlook for the Grainland and South Riverhurst sites. Figure 1 and figure 2 are NVDI aerial images depicting the visual effect of the boron treatments.

Table 1: Tissue Test Information For Boron Trial

Treatment (Fertilizer/ac)	N (%)	P (%)	K (%)	S (%)	Ca (%)	Mg (%)	Cu ug/g	Fe ug/g	Mn ug/g	Zn ug/g	B ug/g
South Riverhurst	-	-	-	-	-	-	-	-	-	-	-
North Riversurst	5.5	0.42	4.3	0.66	2.5	0.52	6.0	131	89	39	18
Grainland	6.0	0.50	3.8	0.77	2.2	0.46	5.0	89	102	9	19
Target	4.0	0.25	2.0	0.30	0.5	0.20	4.5	40	20	15	30

Figure 1: North Riverhurst site - boron strips are evident as two narrow light green strips north of the pivot point. The color difference disappears toward the east side of the pivot

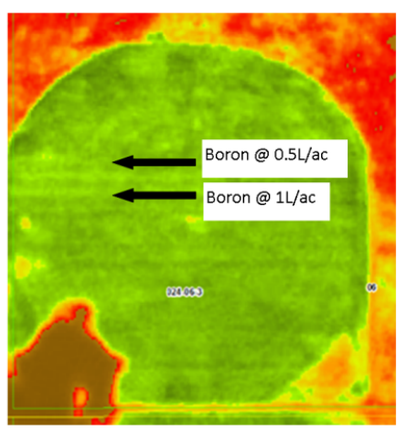
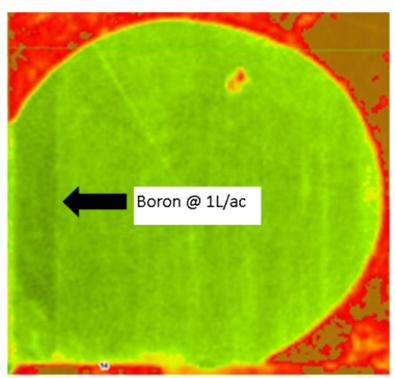


Figure 2: South Riverhurst site - boron strip is the darker green area along the west side of the pivot circle.



Results

The canola yield for the three sites is summarized in Table 2. Yields were strong in 2016. Yield response to the boron application at the South Riverhurst and Grainland sites was around 5-6 bu/ac. The increase in seed yield appears to come from larger seed size at the South Riverhurst site. Oil content of the seed may also be increased by the practice. The response is linked to the above average rainfall patterns Saskatchewan is experiencing. The higher rainfall reduces the need for irrigation water. Previous water analysis showed that each acre-inch of Lake Diefenbaker water contains 0.005 lb boron. If weather patterns dry up leading to higher application of irrigation water, greater uptake of boron from soil reserves and an increase in boron from applied irrigation water may correct the deficiency leading to a decline in the yield response. Higher rainfall is also associated with an increase in soil pH which reduces the availability of boron. The lower yield for the North Riverhurst site is partly because the seeding date was near the end of May.

Table 2: Results from the 2016 Boron Canola Trial

Treatment	Canola Yield (bu/ac)	Oil Content (%)	TKW (g)
South Riverhurst			
Control (average of 3 reps)	65.9	45.7	3.83
Boron foliar	71.7	45.9	3.97
Grainland			
Control	69.3	ND	ND
0.5 l/ac	71.3	ND	ND
1.0 l/ac	74.6	ND	ND
North Riverhurst			
Control	47.9	43.8	2.70
0.5 l/ac	43.7	45.1	2.66
1.0 l/ac	44.5	42.7	2.49

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