

ANNUAL REPORT

PROJECT NO: BJKX61, BJKT07

TITLE: Efficacy Trials of Biostimulant Products

PERSONNEL: Dr. Juliet Marshall, Ext. Crop Mgmt. Specialist (SC and E Idaho)
 Dr. Kurtis Schroeder, Ext. Cropping Systems Agronomist (Moscow)
Staff: Program staff
Collaborator: Ross Nielson, Business Development, AgriGrow

ADDRESS: Dr. Juliet Marshall, 1776 Science Center Dr, Suite 205, Idaho Falls, ID, 83402;
 208-529-8376; jmarshall@uidaho.edu

ACCOMPLISHMENTS: A second year of research trials to test the benefits of biostimulants on winter wheat were completed at Aberdeen and Genesee. The trials were situated in the same physical space as the previous year to determine whether multiple applications to the same site will provide a cumulative benefit from the biostimulants. At planting, each trial consisted of six treatments that include the biostimulant IgniteS² with and without chemical seed treatment. The chemical seed treatment consisted of Cruiser Maxx in Aberdeen and Vibrance Extreme + Cruiser in Genesee. A second biostimulant product (FoliarBlend) was applied to selected plots in the spring. A control treatment consisting of a micronutrient solution that was similar in composition to the micronutrients in FoliarBlend was applied at tillering and flag leaf emergence. This treatment consisted of Bioburst Concentrate (J.R. Simplot Company) which is comprised of 0.02% boron, 0.0005% cobalt, 0.05% copper, 0.10% iron, 0.05% manganese, 0.0005% molybdenum and 0.05% zinc. The quantity of macronutrients in the IgniteS² and FoliarBlend were very low, so additional nutrients were not added with the fungicide + Micro treatment. FoliarBlend was applied twice in the spring, once at tillering with a second application at flag leaf emergence. At each location, individual plots were 5 feet wide by 30 feet long, with six replicate plots for each treatment. A 30 foot buffer of winter wheat without biostimulant products was seeded between each plot.

Treatment Code	Seed treatment		Foliar blend protocol	
	Fungicide/ Insecticide	Ignite ^x	Tillering	Flag Leaf Emergence
1	Yes	No	-	-
2	Yes	Yes	-	-
3	Yes	No	FoliarBlend ^y	FoliarBlend
4	Yes	Yes	FoliarBlend	FoliarBlend
5	No	Yes	FoliarBlend	FoliarBlend
6	Yes	No	Micro ^z	Micro

^xIgniteS² applied at 16 oz/cwt.

^yFoliarBlend applied at a rate of 24 oz/A at tillering and flag leaf emergence.

^zBioburst Concentrate micronutrient blend from Simplot.

At Aberdeen, measurements included root length and root mass recorded on May 27, a Fusarium crown rot rating, heading date, mature plant height, yield, test weight and protein. In Genesee, a plant assessment for agronomic traits and disease was recorded on June 9. Measurements included number of tillers per plant; plant height; disease ratings for Fusarium crown rot, Rhizoctonia root rot and take-all; plant fresh weight; and plant dry weight. At the end of the growing season, the

plots were harvested to determine yield, test weight and protein. Due to inconsistent results from the samples sent to EarthFort (Corvallis, OR) in 2014 for microbial composition, this process was not repeated in 2015. Yields at both locations were very similar with an average of 117 and 118 bu/A for Genesee and Aberdeen, respectively. There was no statistical difference among treatments, although numerically the chemical + FoliarBlend had the highest yield at both locations (123 and 128 bu/A). However, a similar increase in yield was not observed with the chemical + Ignite + FoliarBlend. Test weights were not significantly different, although mature plant height was significantly different for the chemical + FoliarBlend at Genesee only.

Yield, test weight and mature plant height.

Treatment ^y	Genesee			Aberdeen		
	Yield (bu/A) ^z	Test Weight (lb/bu)	Height (in)	Yield (bu/A)	Test Weight (lb/bu)	Height (in)
Chemical	118.6	58.7	36.5 b	117.1	58.3	35.0
Chemical + Ignite	116.4	58.4	36.5 b	115.4	57.8	35.0
Chemical + Foliar	122.8	58.4	38.0 a	128.3	58.3	35.0
Chemical + Ignite + Foliar	117.5	58.4	36.7 b	121.0	58.5	35.0
Ignite + Foliar	109.6	58.2	35.5 b	120.8	58.0	35.0
Chemical + N-P-K	118.2	58.4	36.5 b	108.0	58.2	35.0
Average	117.2	58.4	36.6	118.4	58.2	35.0
LSD (0.05)	ns	ns	1.2	ns	ns	ns
P-value	0.4090	0.9547	0.0117	0.4911	0.6317	--
CV (%)	8.8	1.4	2.8	14.7	1.2	--

^yChemical treatment was VibranceExtreme + Cruiser at Genesee and CruiserMaxx at Aberdeen.

^zBruneau was seeded at Genesee and WB456 was seeded at Aberdeen.

At Genesee, plant roots were assessed for Rhizoctonia root rot, Fusarium crown rot and take-all as well as indirectly gauging root health by measuring above ground plant vigor (number of tillers, plant height, shoot weight). There was no Fusarium crown rot observed in Genesee, low to moderate Rhizoctonia root rot and low take-all. There were no differences between treatments with the exception of a significant increase in take-all severity with the chemical + micronutrient treatment. Considering the low disease incidence for take-all, the difference is minor. There were small differences in plant height and shoot weight with the chemical control and the Ignite + FoliarBlend being shorter. All seed treatments containing FoliarBlend also had lower shoot weights compared to the other treatments.

At the Aberdeen location, plants were assessed for Fusarium crown rot and plant roots were directly assessed by recording root length and fresh root weight. There was no Fusarium crown rot observed in the trial and no significant difference among treatments for root length or mass.

From the data collected in Aberdeen and Genesee to examine various combinations of Ignite² and FoliarBlend, there was not a consistent measureable impact on seedling health, changes in plant pathogen severity or yield.

Mid-season plant measurements, disease rating, heading and grain protein data from Genesee.

Treatment	Tiller (no/plant)	Plant Height (cm)	Rhizoctonia Rating (0-8)	Take-all Rating (0-8)	Shoot Fresh Weight (g)
VibranceCruiser	2.2	80.3 b	1.8	0.5 b	1.5 a
VibranceCruiser + Ignite	2.3	83.4 a	2	0.5 b	1.5 a
VibranceCruiser + Foliar	2.3	83.4 a	2.1	0.4 b	1.4 ab
VibranceCruiser + Ignite + Foliar	2.0	82.6 a	1.7	0.5 b	1.1 b
Ignite + Foliar	2.4	80.4 b	1.9	0.6 b	1.3 ab
VibranceCruiser + N-P-K	2.2	82.9 a	1.9	1.1 a	1.6 a
Average	2.2	82.2	1.9	0.6	1.4
LSD (0.05)	ns	2.1	ns	0.4	0.3
P-value	0.3467	0.0039	0.6275	0.0046	0.0148
CV (%)	44.7	6.9	60.5	176.5	51.6

Mid-season plant measurements, disease rating, heading and grain protein data from Aberdeen.

Treatment	Root Length (cm)	Root Mass (g)	Fusarium Rating (1-3)	Days to Heading	Protein (%)
CruiserMaxx	11.5	6.6	1	146	11.5
CruiserMaxx + Ignite	11.3	7.3	1	145	12.5
CruiserMaxx + Foliar	11.9	6.3	1	145	13.3
CruiserMaxx + Ignite + Foliar	10.2	6.8	1	146	12.7
Ignite + Foliar	12.3	7.5	1	146	12.3
CruiserMaxx + N-P-K	11.0	6.8	1	145	12.7
Average	11.4	6.9	1	146	12.5
LSD (0.05)	ns	ns	--	ns	ns
P-value	0.5602	0.7651	--	0.1967	0.1527
CV (%)	17.4	22.9	--	0.6	8.8

PROJECTIONS: In the fall of 2015, the trials were replanted, seeding the same treatments back into plots where those treatments were placed in the previous two growing season which will provide sites with three cumulative applications of the biostimulants products. The rate of IgniteS² was maintained at 16 oz/cwt (8 oz/cwt was used in the fall of 2013). Multiple applications should have a cumulative effect and if benefits are going to be observed, they are most likely to occur in the 2015/2016 crop seasons. The research plots at both Aberdeen and Genesee will be assessed for plant vigor, disease and yield during the spring and summer of 2016 as described for the 2014/2015 season. It is expected that the results of this study will provide information on the feasibility of using biostimulants in wheat production and will allow growers to make educated decisions about which products to use and how best to apply them.

PUBLICATIONS: None.