Effects of timing and rate of foliar biostimulant application on dry matter accumulation and yield in rice.

Trial ID - 2017-005-MO – University of Missouri

Quick Details: Fertileader products were applied at 1, 1.5, and 2 pint/ac at either internode elongation or boot stage to evaluate effects on growth and yield. Variety, seeding rates, and N-P-K fertilizers were applied equally across all treatments.

Design: Replicated plots, 4 per treatment. Plots were 13 ft x 20 ft

Researcher(s): Data compiled and submitted by David Dunn, PhD, University of Missouri. Final write-up by John D. Bailey, PhD, Timac Agro USA.

OBJECTIVE

The Fertileader range of products are liquid formulas that contain humic and fulvic acids, glycine betaine, isopentenyl adenosine (IPA), and amino-acid complexed nutrients. These patented formulas have been shown to improve crop response to water and heat stress, improve growth, chlorophyll content, photosynthetic rate, and enhance nutrient uptake. The following study was designed to evaluate the rate, timing, and formula effects on growth and yield in rice. The two products tested were 1) Fertileader Elite (9-0-6-4.6 Ca + traces of B) and Fertileader Vital (9-5-4 + traces of Zn, Mg, B, Mo).

MATERIALS AND METHODS

This study tested the impact of different rates and timings of foliar biostimulants from the Fertileader range of products. The location of this study was on a Crowley silt loam soil located at the Missouri Rice Research Farm near Qulin, MO. A soil test indicated that pH was above 6.8 and soil nutrients were classified as either good or very good. University of Missouri fertilizer application rates and timings were followed for all treatments. The experimental design was a randomized complete block with four replications. Plots were 20 ft long by 13 ft wide. **At either 30 d after planting (25 May – internode elongation) or 60 d after planting (25 June – Boot stage) the following foliar treatments were applied to rice plots:**

1. Control – no foliar biostimulants
2. Fertileader Elite – 1 pint/ac
3. Fertileader Vital – 1 pint/ac
4. Fertileader Elite – 1.5 pint/ac
5. Fertileader Elite – 2 pt/ac
6. Fertileader Vital – 2 pt/ac

To ascertain dry matter accumulation, representative samples from each replicate within each treatment x rate x timing combination were collected at 10% heading. The samples were then weighed, oven-dried, and weighed again to determine dry matter weight.
Plots were then harvested, and total weight of grain was used to calculate yield and test weight.

RESULTS

There were significant differences in dry matter accumulation ($P < 0.05$) and rice yield ($P < 0.10$) when Fertileader biostimulants were foliar applied at stem elongation (Figure 1 and Figure 2). While Controls also tended had numerically lower yields to have lower yields, an effect that was most pronounced with biostimulants were applied during stem elongation. While both dry matter accumulation and yields were numerically lower in the Controls compared to rice treated with biostimulants at boot stage, the effects were not as pronounced compared to rice treated at stem elongation.

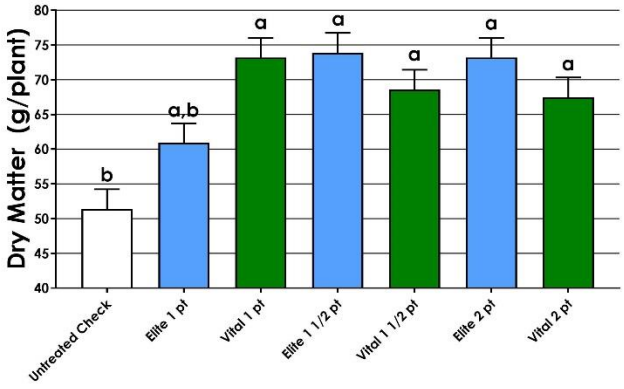
CONCLUSIONS

Overall, the use of Fertileader biostimulants improved dry matter accumulation and yield in rice but these effects seemed to depend upon application timing. Based upon these findings, 1-2 pts/ac of either Fertileader Elite or Fertileader Vital provided enhanced growth characteristics when applied at internode elongation, which may have led to economically important increases in yield (see Table 1).

Key Findings:

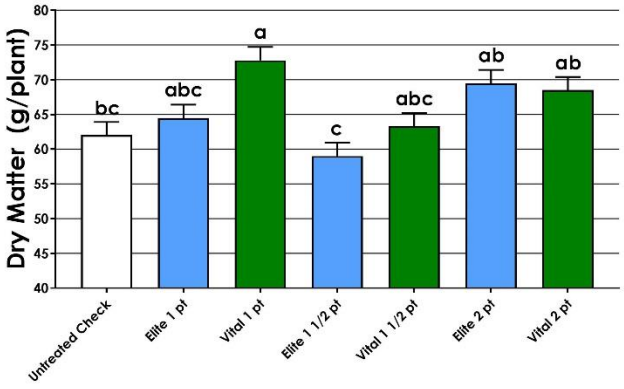
+18 bu/ac Fertileader Elite @ 2 pt/ac applied at internode elongation

Figure 1. Effects of biostimulant application at internode elongation on dry matter accumulation in rice.



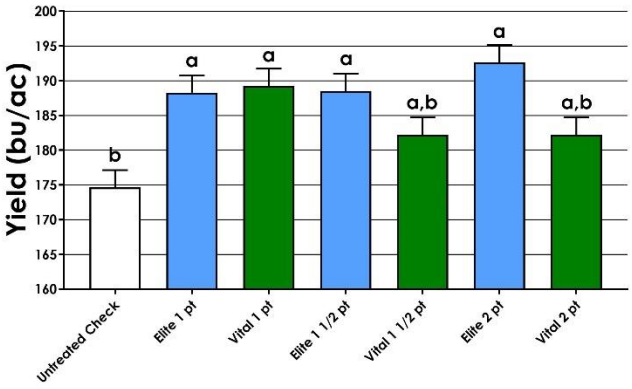
*Means with different letters differ at $P < 0.05$.

Figure 2. Effect of biostimulant application at boot stage on dry matter accumulation in rice.



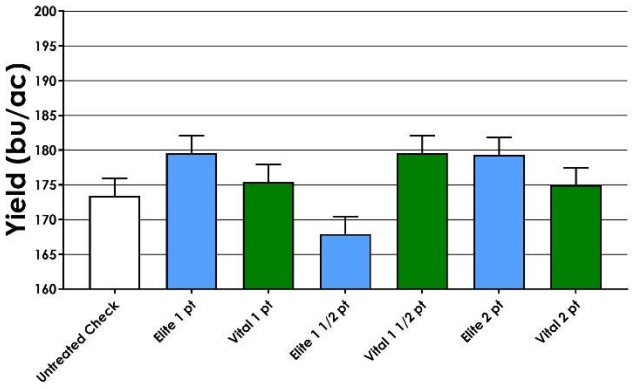
*Means with different letter differ at $P < 0.05$.

Figure 3. Effect of biostimulant formulas applied at internode elongation on rice yield.



*Means with different letters differ at $P < 0.10$.

Figure 4. Effect of biostimulant formulas applied at boot stage on rice yield.



*Yields were not significantly different ($P > 0.10$).

Table 1. Return on investment associated with application of foliar biostimulants in rice.

Timing	Treatment	Yield (cwt/ac)	Gross Revenue @ $11.52/cwt	Revenue Change from Control	Rate (pt/ac)	Add-on Cost	Net Return
Internode Elongation	Untreated Check	78.6	$905.33	-	-	-	-
	Elite 1 pt	84.7	$976.02	$70.69	1	$6.69	$64.00
	Vital 1 pt	85.2	$981.04	$75.71	1	$6.69	$69.02
	Elite 1 1/2 pt	84.8	$977.28	$71.95	1.5	$10.03	$61.92
	Vital 1 1/2 pt	82.0	$944.66	$39.33	1.5	$10.03	$29.30
	Elite 2 pt	**86.7**	**$998.60**	**$93.27**	**2**	**$13.37**	**$79.90**
	Vital 2 pt	82.0	$944.66	$39.33	2	$13.37	$25.96
Boot Stage							
	Untreated Check	78.1	$899.19	-	0	0	0
	Elite 1 pt	80.8	$930.86	$31.67	1	$6.69	$24.98
	Vital 1 pt	79.0	$909.53	$10.34	1	$6.69	$3.65
	Elite 1 1/2 pt	80.8	$930.86	$31.67	1.5	$10.03	$21.64
	Vital 1 1/2 pt	80.7	$929.61	$30.41	1.5	$10.03	$20.38
	Elite 2 pt	78.7	$907.02	$7.83	2	$13.37	-$5.54
	Vital 2 pt	76.6	$881.93	-$17.26	2	$13.37	-$30.63

Timac Agro USA Plots - Missouri Rice Research Farm near Qulin, MO, 2017.