On-Farm Corn Nitrogen Enhancer Foliar Treatment Demonstration Trials

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Introduction

Nitrogen use efficiency is a major factor causing yield variation in corn. Many bacteria or biostimulant products are available that promote increased nitrogen availability and use efficiency in plants. Envita™ is a naturally occurring, food grade bacteria – *Gluconacetobacter diazotrophicus* – marketed by Azotic, originally discovered in sugarcane. It is promoted to form a beneficial relationship with the host plant and provides nitrogen to every cell in the plant, foliage and root system, throughout the growing season. The purpose of these trials was to investigate what effect Envita™ applied foliar has on corn and soybean yields.

Materials and Methods

In 2020, seven trials examined yield levels with the use of Envita™ nitrogen use enhancing bacteria on corn and one trial on soybean (Table 1). In all corn trials, Envita™ was applied at a rate of 5.12 oz/acre. This was applied foliar to corn between the dates of May 20 and June 9, 2020, across Iowa. Trial 200203 applied Envita™ foliar to soybeans at a rate of 32 oz/acre July 12, 2020. Trial 200805 looked at multiple parameters of hybrid, planting population, and Envita™ foliar treatment (Table 3). All trials had Envita™ applied in addition to regular nitrogen use practices with no rate reductions applied. All of these trials were conducted on ISU research farms. Treatments were applied using standard farm equipment based on farms. Treatments were applied with the sprayer and were arranged in a randomized complete block design with at least three replications per treatment. Plot size varied from field-to-field depending on equipment size and the size of the field. All plots were machine harvested for grain yield.

Results and Discussion

Envita™ had no effect ($P \leq 0.10$) on corn yield in trials 200506, 200507, 200708, 200803, and 200804. Soybean trial 200202 also displayed no significant yield changes. Trial 200610 had a significant yield advantage of 6 bushels/acre of the Envita™ treatment over the control. Trial 200805 (Table 3) had significant yield difference based on the individual hybrids and the overall data set of Envita™ compared with a non-treated control and reduced yield by 10 bushels/acre. However, there was not a significant yield difference ($P \leq 0.10$) in the comparisons of populations alone, population by hybrid, populations by Envita™ treatment, or hybrids by Envita™ treatment. It is unknown why the Envita™ foliar treatment may have reduced corn yield in trial 200805.

Acknowledgments

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NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.

Table 1. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2020 Envita trials on corn and soybean.

Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
Corn							
200506	Boone	Pioneer P1197	30	4/25/20	34,000	Soybean	Spring cultivation
200507	Boone	Pioneer P1197	30	4/25/20	34,000	Soybean	Spring cultivation
200610	Adair	Dekalb DK5835 RIB	30	4/22/20	35,000	Soybean	No-till
200708	Washington	Stine 9734-32	30	4/28/20	36,000	Soybean	Fall chisel spring soil finisher
200803	Floyd	Pioneer P0574AM	30	4/22/20	35,000	Soybean	Spring cultivation
200804	Floyd	Dekalb DK5553 SS RIB	30	4/22/20	35,000	Soybean	Spring cultivation
200805	Floyd	Pioneer Multiple	30	4/23/20	28,977 35,077 40,772	Soybean	Spring cultivation
Soybean							
200202	Buena Vista	Golden Harvest GH2027LG	30	5/15/20 Planted in green CC	150,000	Corn fall winter wheat CC	No-till

Table 2. Yields for on-farm Envita trials in corn and soybean in 2020.

Trial	Treatment	Application date	Application rate	Yield (bu/ac)[a]	P-value[b]
Corn					
200506	Envita Control	6/3/20	5.12 oz/ac	159 a 164 a	0.42
200507	Envita Control	6/3/20	5.12 oz/ac	164 a 165 a	0.84
200610	Envita Control	5/20/20	5.12 oz/ac	211 a 205 a	0.05
200708	Envita Control	6/9/20	5.12 oz/ac	171 a 171 a	0.90
200803	Envita Control	5/31/20	5.12 oz/ac	195 a 196 a	0.90
200804	Envita Control	5/31/20	5.12 oz/ac	196 a 202 a	0.56
Soybean					
200202	Envita Control	7/12/20	32 oz/ac	52 a 50 a	0.31

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.10.
[b]P-value = the calculated probability that the difference in yields can be attributed to the treatments and no other factors. For example, if a trial has a P-value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. This is consistent with demonstration trials.

Table 3. Yields for on-farm Envita trial 200805 in corn in 2020.[a]

		Hybrid								Plant Population			Treatment	
		P0075Q	P0220Q	P0446Q	P0595A	P0622Q	P1082A	P1185Q	P1366A	28,977	35,077	40,772	Envita	Control
Hybrid	P0075Q	192.1												
	P0220Q		206.0											
	P0446Q			194.9										
	P0595A				188.9									
	P0622Q					197.9								
	P1082A						194.3							
	P1185Q							185.7						
	P1366A								201.3					
		p<0.0001												
Plant Population	28,977	200.1	202.4	191.2	190.3	201.1	192.7	186.2	197.8	195.2				
	35,077	188.0	207.4	199.4	188.4	200.6	198.6	188.6	206.9		197.2			
	40,772	188.2	208.1	194.0	188.1	191.9	191.5	182.2	199.3			192.9		
					p=0.7512						p=0.1981			
Treatment	Envita	188.5	202.1	193.2	185.4	191.9	187.7	177.1	193.6	191.6	191.5	186.8	189.9	
	Control	195.7	209.8	196.5	192.4	203.9	200.9	194.2	209.0	198.8	203.0	199.1		200.3
					p=0.6202						p=0.5197		**p<0.0001**	

[a]Values denoted in same square within a trial are statistically different if at the significance level of 0.10 based on P-value notated.

P-value = the calculated probability that the difference in yields can be attributed to the treatments and no other factors. For example, if a trial has a P-value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. This is consistent with demonstration trials.