

# On-Farm Plant Growth Regulator Demonstration Trials in Corn and Soybean

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### Introduction

Farmers continue to search for ways to increase corn and soybean yields, including the use of plant growth regulators. Plant growth regulators, such as gibberellic acid, are organic compounds that modify plant growth processes at very low concentrations. Gibberellic acids control cell elongation and division in plant shoots. Cytokinins affect cell division, cell enlargement, senescence, and transport of amino acids in plants. Plant growth regulators are more commonly used on fruit and vegetable crops than on grain crops. The purpose of these trials was to investigate the effect of foliar applications of the plant growth regulators on corn and soybean grain yield.

### Materials and Methods

In 2017, there were eight on-farm trials in Iowa that evaluated the effect of plant growth regulators on corn yield (Table 1), and three trials investigated the effect of plant growth regulators on soybean yield (Table 2). In corn Trial 1, Calcium-25<sup>®</sup> at 3.2 oz/acre was applied to corn at the V4 crop growth stage (Table 3). Calcium-25<sup>®</sup> is marketed by OMRT as a crop yield enhancer. RyzUp<sup>®</sup> at 0.5 oz/acre and Radiate<sup>®</sup> at 2 oz/acre were applied to corn at the V4 to V6 crop growth stages in Trials 2, 3, 5, 6, 7, and 8. RyzUp<sup>®</sup> contains a gibberellic acid and is marketed by Valent. It is promoted to increase yields and overcome the effects of heat and drought. Radiate<sup>®</sup>

contains a cytokinin and indole butyric acid. It is marketed by Loveland and is promoted to improve nutrient uptake and plant health. In Trial 4, Tryptophan<sup>®</sup> was applied at eight gallon/acre to corn at the V8 crop growth stage. Tryptophan<sup>®</sup> is marketed by Ajinomoto as a biostimulant. In soybean Trials 1, 2, and 3, Tryptophan<sup>®</sup> was applied at five gallon/acre to soybeans at the V8 crop growth stage (Table 4).

All trials were conducted on-farm by farmer cooperators. Strips were arranged in a randomized complete block design with at least three replications per treatment. Strip length and width varied from field-to-field depending on field and equipment size. All strips were machine harvested for grain yield. Strips treated with a crop growth regulator were compared with untreated strips in all trials.

### Results and Discussion

The foliar application of Calcium-25<sup>®</sup> resulted in a yield decrease of nine bushels/acre in corn Trial 1 (Table 3). It is unknown why the product may have reduced the corn grain yield. Foliar applications of RyzUp<sup>®</sup> and Radiate<sup>®</sup> had no effect on corn grain yield in any of the trials. Foliar applications of Tryptophan<sup>®</sup> had no effect on corn grain yield in Trial 4 (Table 3), or soybean grain yield in soybean Trials 1 and 3 (Table 4). There was a one bushel/acre increase in soybean grain yield with the Tryptophan<sup>®</sup> application in Trial 2 ( $P = 0.09$ ). This agrees with most past research showing that although plant growth regulators can affect crop growth, effects on corn and soybean grain yield are less common.

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. Hybrid, row spacing, planting date, planting population, previous crop, and tillage practices in the 2017 growth regulator trials on corn.**

Exp. no.	Trial	County	Hybrid	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
170204	1	Crawford	Curry 830-39	30	4/21/17	35,000	Corn	Fall disk, spring field cultivate, harrow
170304	2	Monona	LG 56435TX	30	5/12/17	32,500	Corn	Disked
170305	3	Monona	Dekalb DK60-67 RIB	30	5/17/17	35,000	Corn	Turbo tilled
170307	4	Monona	LG 5565 VT2	30	5/26/17	32,000	Soybean	No-till
170605	5	Cass	Channel 21319	30	4/25/17	34,000	Corn	No-till
170608	6	Cass	Nutech 5N410	30	4/25/17	34,000	Soybean	No-till
170637	7	Audubon	Pioneer P0506AM	30	4/22/17	34,000	Soybean	No-till
170638	8	Montgomery	Stein 9536	30	4/16/17	39,000	Corn	Disk, field cultivate

**Table 2. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2017 growth regulator trials on soybean.**

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
170214	1	Buena Vista	Golden Harvest 20T6	30	6/1/17	142,400	Corn	Disk, field cultivate
170215	2	Buena Vista	Golden Harvest 20T6	30	5/31/17	142,400	Corn	Disk, field cultivate
170216	3	Buena Vista	Golden Harvest 20T6	30	5/31/17	142,400	Corn	Disk, field cultivate

**Table 3. Yields for on-farm plant growth regulator trials in corn in 2017.**

Exp. no.	Trial	Treatment	Yield (bu/ac) <sup>a</sup>	P-value <sup>b</sup>
170204	1	Calcium-25 at 3.2 oz/ac at V4	216 a	0.02
		Control	225 b	
170304	2	Ryzup at 0.5 oz/ac at V6	237 a	0.40
		Radiate at 2 oz/ac at V6	241 a	
		Control	241 a	
170305	3	Ryzup at 0.5 oz/ac at V6	218 a	0.16
		Radiate at 2 oz/ac at V6	215 a	
		Control	212 a	
170307	4	Tryptophan at 8 gal/ac at V8	183 a	0.72
		Control	186 a	
170605	5	Ryzup at 0.5 oz/ac at V4	231 a	0.22
		Radiate at 2 oz/ac at V4	227 a	
		Control	224 a	
170608	6	Ryzup at 0.5 oz/ac at V6	183 a	0.36
		Radiate at 2 oz/ac at V6	186 a	
		Control	180 a	
170637	7	Ryzup at 0.5 oz/ac at V6	251 a	0.72
		Radiate at 2 oz/ac at V6	250 a	
		Control	250 a	
170638	8	Ryzup at 0.5 oz/ac at V6	224 a	0.62
		Radiate at 2 oz/ac at V6	227 a	
		Control	234 a	

<sup>a</sup>Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.

<sup>b</sup>P-value = the calculated probability that the difference in yields can be attributed to the treatments and not 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. For P = 0.05, we would be 95 percent confident.

**Table 4. Yields for on-farm plant growth regulator trials in soybean in 2017.**

Exp. no.	Trial	Treatment	Yield (bu/ac) <sup>a</sup>	P-value <sup>b</sup>
170214	1	Tryptophan at 5 gal/ac at V8	63 a	0.51
		Untreated	63 a	
170215	2	Tryptophan at 5 gal/ac at V8	64 a	0.09
		Untreated	63 a	
170216	3	Tryptophan at 5 gal/ac at V8	68 a	0.48
		Untreated	68 a	

<sup>a</sup>Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.

<sup>b</sup>P-value = the calculated probability that the difference in yields can be attributed to the treatments and not 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. For P = 0.05, we would be 95 percent confident.