2014 Executive Summary

The AgroSpray Research Farm (ARF), located in Oxford County, Ontario, has over 100 acres of field-sized research trials. Our research focuses on combining environmentally-responsible nutrient application and modern technology to maximize agricultural yields. As demonstrated in our climate summary, the cool, wet spring delayed planting, and the cool weather in August also slowed the 2014 growing season. Despite the challenges of the season, we have some interesting and informative results from both corn and soybean trials, detailed on the pages which follow.

Overall, the trials highlight the importance of matching fertilizer programs to the nutrient needs of the specific fields and farms, as dictated by soil test results. For example, the field used for our Liquid Starter Fertilizer Comparison in Corn was low in calcium and potassium. Treatment 5 in this trial included LiberateCa and Sure-K, meeting these deficiencies and achieving the strongest yield. AgroSpray's liquid fertilizer products allow for the creation of speciality mixes; notably, even calcium and phosphorus can be combined, unlike in traditional fertilizer programs.

Our soybean trials demonstrate the benefits of a foliar feed application of Ferti-Rain. This fertilizer has a balanced mix of N-P-K and micronutrients, thus allowing the plants to optimize yields.

Finally, a new trial this year allowed for the direct comparison of liquid and dry fertilizers. The results demonstrate the strong performance of AgroSpray's liquid fertilizer products, especially when looking at yield, moisture, and test weight together.

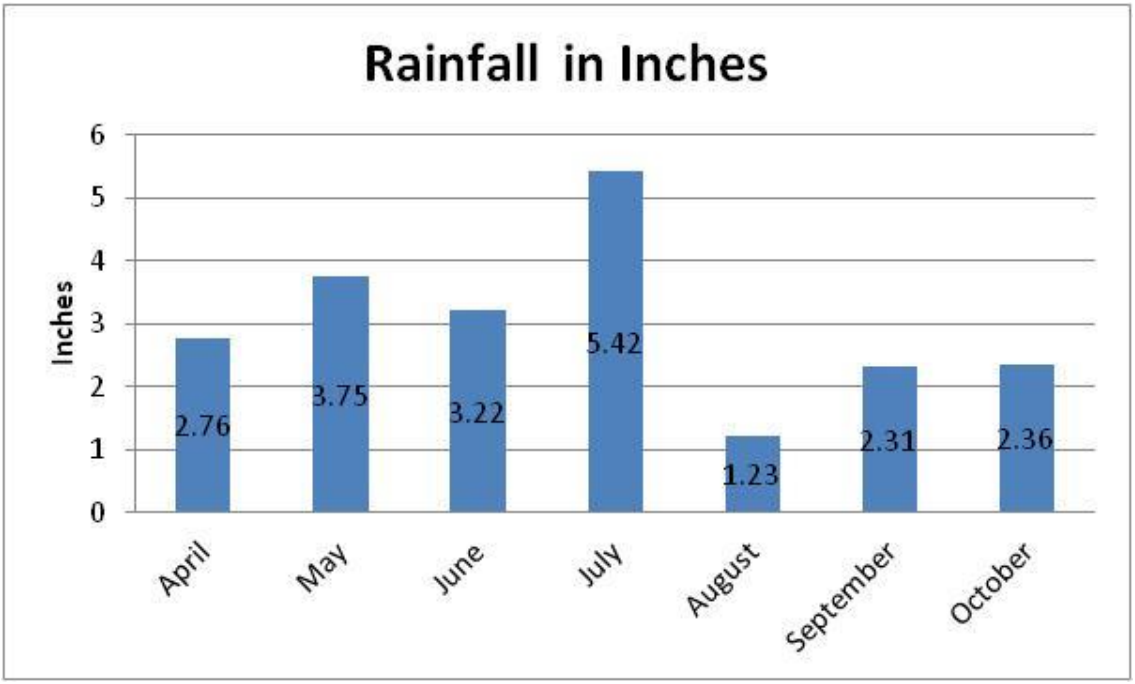
Our Area Sales Managers are eager to work with you to build on the knowledge presented in this report, and to help you develop custom fertilizer mixes to meet your specific soil needs.

2014 Soil Test Data

Trial	pH	OM	CEC	P (ppm)*	K (ppm)
Liquid Fertilizer Comparison in Corn	7.1	2.7	9.9	41	106
Side-Dressed Fertilizer on Corn	6.9	2.1	7.3	35	90
Micronutrients in Starter Fertilizer on Corn	6.7	1.6	6.6	54	90
Foliar Feed on Soybeans (Early)	6.9	2.3	8	70	114
Foliar Feed on Soybeans (Late)	6.9	2.0	8.6	68	110
Late Foliar Feed Nitrogen on Soybeans	6.7	1.3	4.8	101	81
Dry Starter vs. Liquid Starter Fertilizer Comparison	6.9	1.8	6.6	63	102
Foliar Micronutrients on Soybeans	7.0	1.4	5.3	59	64

***Bicarb phosphorous test**

ARF 2014 Climate



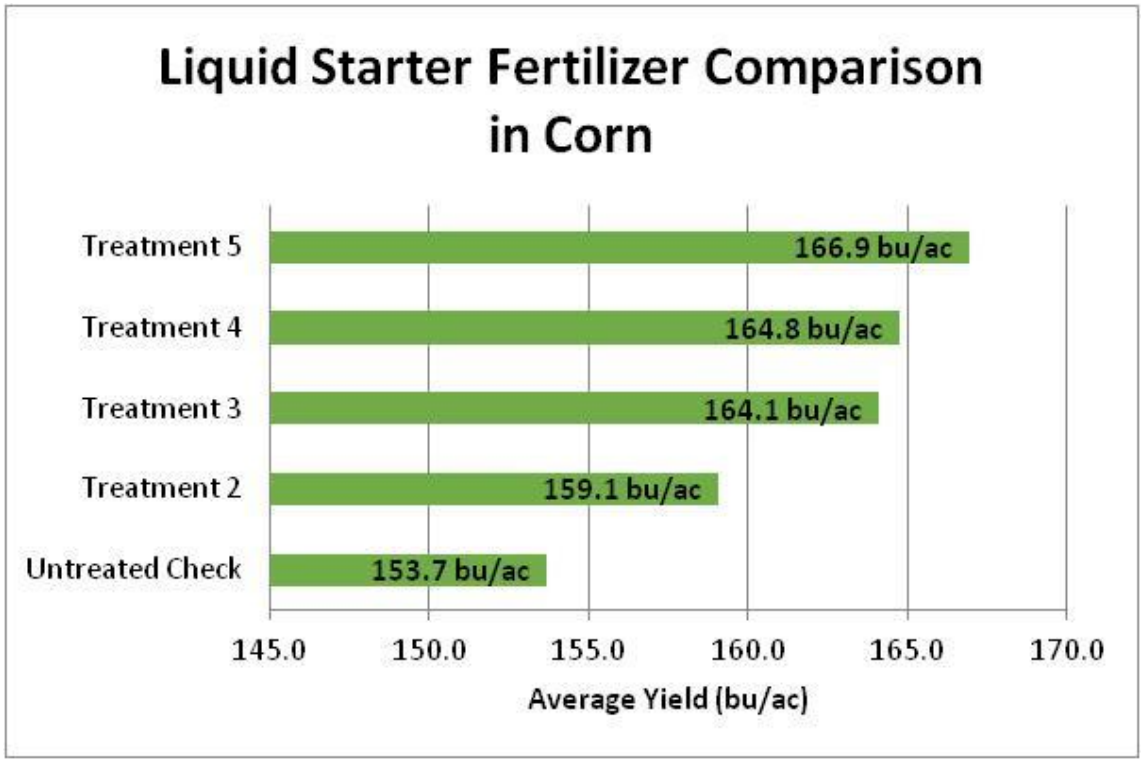
Temperature (Fahrenheit)

Month	Mean Max	Mean Min	Mean	High (Date)	Low (Date)
April	53.5	33.6	43.4	74.0 (21st)	16.6 (16th)
May	67.2	46.2	56.8	85.0 (13th)	35.2 (17th)
June	78.7	56.4	67.7	88.2 (16th)	44.4 (7th)
July	76.2	55.3	66.0	84.9 (22nd)	45.4 (5th)
August	77.1	54.3	65.7	85.6 (26th)	45.9 (19th)
September	70.6	48.3	59.4	84.8 (5th)	35.3 (19th)
October	58.8	41.2	49.6	72.5 (3rd)	27.5 (27th)

Liquid Starter Fertilizer Comparison in Corn

Cropping Year: 2014
Date of Planting/Harvest: June 7/December 8
Hybrid: A6010G2 (2750 CHU)
Population: 32,000 seeds/acre
Plot Size (replications): 12 - 30" rows x 2250ft (3)
Additional Information: Side-dressed with 40 GPA 28% + 2.5 L/acre eNhance July 15.

Placing small to moderate amounts of plant nutrients in a band in close proximity to the seed at planting increases early-season growth and yield of grain crops (Bates, 1971; Walker et al., 1984; Reeves et al., 1986; Osborne 2005). Yield response to starter fertilizer has been observed even when soil test values are high (Touchton, 1988; Gordon and Whitney, 1995; Osborne 2005). Limited uptake of P early in the growing season can reduce yield because of the importance of adequate P nutrition in crop development (Tisdale et al. 1993; Osborne 2005). Starter fertilizer is known to increase corn yield, regardless of hybrid or planting date, by increasing early-season plant height and reducing grain moisture and days to silking (Mascagni and Boquet 1996; Osborne 2005).



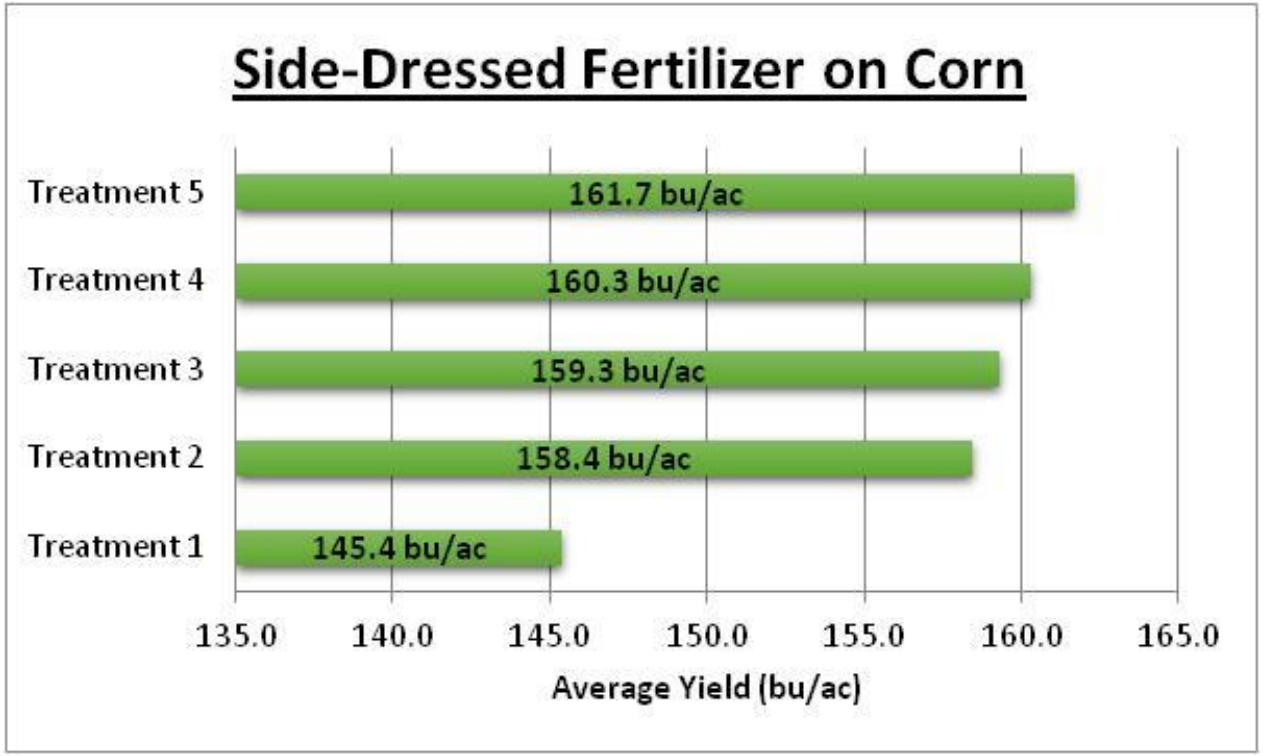
Treatment	Product	Rate
Untreated Check		
2	6-24-6	5 GPA
3	Pro-Germ	2.5 GPA
	Water	2.5 GPA
4	Pro-Germ	2.5 GPA
	Sure-K	2.5 GPA
5	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac

This trial highlights the yield advantage to tailoring your liquid starter program to soil test data; AgroSpray's liquid fertilizer products have this capability.

Side-Dressed Fertilizer on Corn

Cropping Year: 2014
Date of Planting/Harvest: June 7/December 3
Application Date (Stage): July 14 (V7-V8)
Hybrid: A6010G2 (2750 CHU)
Population: 32,000 seeds/acre
Plot Size (replications): 12 - 30" rows x 2250ft (3)
Starter fertilizer: Pro-Germ 3 GPA + Kalibrate 4 GPA + Micro 500 1 L/ac

Increases in energy costs have not only resulted in higher fuel costs for farmers, but also higher nitrogen (N) fertilizer prices (Williams et al. 2010). Environmental concerns stemming from N levels in groundwater, lakes and rivers over past decades continue to stimulate interest in improved agricultural management of N (Williams et al. 2010). Historically, producers have applied more N fertilizer on corn than is used by the crop in a given season (Williams et al. 2010). This is because of the previously low cost of applying ample N fertilizer to ensure that it would not be limited, regardless of environmental and climatic conditions (Williams et al. 2010). Here at ARF we aim to fertilize crops in an environmentally responsible manner while still meeting the needs of the crop, using side-dressed applications of fertilizer.



Treatment	Product	Rate
1	28% UAN	50 GPA
2	28% UAN	40 GPA
	eNhance	5 L/ac
3	28% UAN	40 GPA
	eNhance	5 L/ac
	Sure-K	5 GPA
4	28% UAN	40 GPA
	S-Calate	4.5 GPA
5	High NRG-N	30 GPA

If your operation utilizes the traditional 28% nitrogen application, eNhance provides a good final yield increase; switching to High N allows farmers to apply less product and achieve strong results.

ARF's 300 bu/ac Liquid Fertilizer Yield Challenge

Cropping Year: 2014
Date of Planting/Harvest: May 28/December 20
Hybrid: A6757G8 (2925 CHU)
Population: 32,000 seeds/acre
Plot Size: 5.88 ac (total harvested)
Additional Information:

- **Pre-plant Nitrogen:** 28% 50 GPA + eNhance 2 L/acre applied with herbicide
- **Starter Fertilizer:** Pro-Germ 5 GPA + Sure-K 3 GPA + eNhance 2 L/acre + Micro 500 1 L/acre + Boron 1 L/acre
- **Starter Fertilizer 2x2:** 28% 10 GPA + 0.5 L/acre eNhance
- **Late Nitrogen Application:** 28% 40 GPA applied at V12 with Y-drops

Summary:

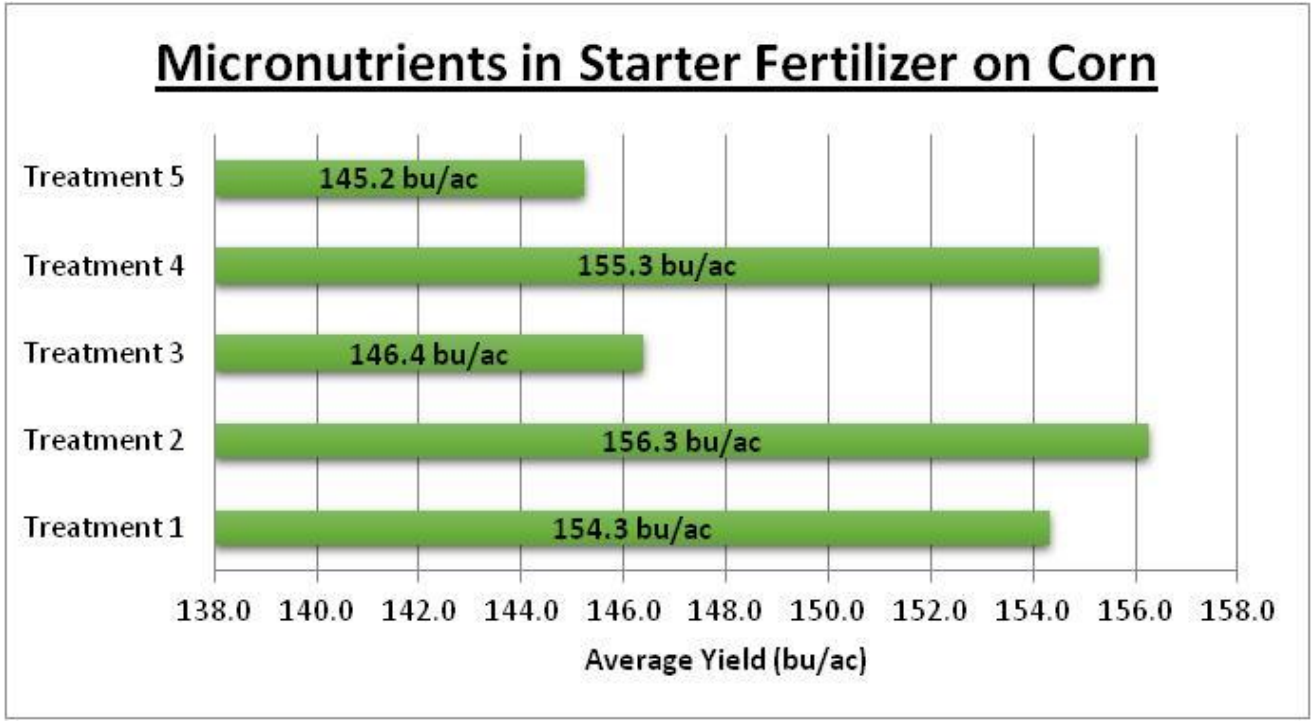
This year's corn yield challenge was held at a satellite location, in Tavistock, Ontario, approximately 30 km north from the home ARF site, on a 5.88 acre plot. Prior to planting, 28% was applied at a rate of 50 GPA, with Primextra II Magnum and 2 L/ac of eNhance. Due to the cold, wet spring, the plot was planted with A6757G8 (2925 CHU) on **May 28th, 2014**, at a population of 32,000 seeds/ac. The starter fertilizer in this program was: Pro-Germ 5 GPA + Sure-K 3 GPA + eNhance 2 L/acre + Micro 500 1 L/acre + Boron 1 L/acre. Also applied at the starter stage was a 2x2 application of 28% 10 GPA + 0.5 L/acre eNhance. At the twelve leaf stage, 28% was again applied, at a rate of 40 GPA, with Y-drops. The trial was harvested on December 20th, 2014. The average yield was **180.9 bu/ac**, at a moisture of **29.6%**, and a test weight of **48.1 lbs/bu**.

Crop heat unit (CHU) accumulation from May 1st to July 31st was approximately 50-150 CHU ahead of normal. If temperatures would have kept on this track, we were well on our way to making up for the planting delay. However, as our weather data demonstrates, August was cooler than average; approximately **8 nights fell below 10°C/50°F**, and this made for several unproductive days following these cool nights. These temperatures greatly affected the plant's ability to mobilize dry matter into the ear, ultimately affecting final yields. The later planting and short growing season exacerbated the impact of many leaf and stalk diseases (e.g. Northern Corn Leaf Blight), which compromised stalk quality and yields.

Micronutrients in Starter Fertilizer on Corn

Cropping Year: 2014
Date of Planting/ Harvest: May 19/November 15
Hybrid: A6757G8 (2925 CHU)
Population: 32,000 seeds/acre
Plot Size (replications): 12 - 30" rows x 900ft (3)
Additional Information: Side-dressed with 40 GPA 28% + 2.5 L/acre eNhance June 20 (V6).

Proper fertilizer management in corn production is important, both from economic and environmental standpoints (Osborne 2005). Starter fertilizer containing N and P has been shown to increase grain yield, reduce the number of thermal units needed from emergence to maturity, decrease grain-moisture content at harvest, and increase total P uptake (grain plus stover at maturity) (Gordon and Pierzynski 2006). Most starter-fertilizer studies have evaluated crop response to various combinations of only the three major elements: N, P, and K (Gordon and Pierzynski 2006). However, few studies have investigated the yield response to a more complete complement of fertilizer nutrients (Gordon and Pierzynski 2006). Here at ARF we aim to close this knowledge gap.



Treatment	Product	Rate
1 (Basic)	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac
2 (Basic + Zn)	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac
	Zinc	1 L/ac
3 (Basic + eNhance)	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac
	eNhance	1 L/ac
4 (Basic + Boron)	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac
	Boron	1 L/ac
5 (All combined)	Pro-Germ	3 GPA
	Sure-K	5 GPA
	LiberateCa	1 L/ac
	Micro 500	1 L/ac
	Zinc	1 L/ac
	eNhance	1 L/ac
	Boron	1 L/ac

Executive Summary

The AgroSpray Research Farm (ARF), located in Oxford County, Ontario, has over 100 acres of field-sized research trials. Our research focuses on combining environmentally-responsible nutrient application and modern technology to maximize agricultural yields. This report provides some of the cumulative results from trials carried out in both the 2013 and 2014 growing seasons.

In 2013, there was a cool, wet season in Oxford County. In 2014, there was another slow start to the year. Temperatures did reach seasonal highs until August, when temperatures began to dip below seasonal norms. There were also excessive rainfall levels in 2014. The trials highlight the strengths of Agro-Culture Liquid Fertilizer (ACLF) products, even in challenging growing conditions.

Overall, the trials emphasize the importance of matching fertilizer programs to the nutrient needs of the specific fields and farms, as dictated by soil test results. For example, the field used for our Foliar Feed on Soybeans (Early) trial in 2013 had a potassium deficiency, and the soybeans with the Sure-K application had a strong yield. ACLF products allow for the creation of speciality mixes; notably, even calcium and phosphorus can be combined, unlike in traditional liquid fertilizer programs.

Our soybean trials demonstrate the benefits of a foliar feed application of Ferti-Rain. This fertilizer has a balanced mix of N-P-K and micronutrients, thus allowing the plants to optimize yields. The Ferti-Rain in these trials was applied as early as the R2 stage (or full bloom stage) in one foliar feed trial, and as late as the R4 stage (or full pod stage) in another trial, suggesting that the timing of the foliar application is not of key significance.

Our Side-Dressed Fertilizer on Corn trial highlights the strengths of ACLF nitrogen products. An application of High NRG-N increases yields over the standard 28% UAN application; notably, less volume of High NRG-N is necessary than of the standard 28% UAN, which allows growers to cover more ground with fewer fill-ups. High NRG-N is also a slow release and stabilized form of nitrogen, which is important in years with high amounts of rainfall.

The Side-Dressed Fertilizer trial also demonstrates a second option for those growers interested in continuing the use of their traditional 28% UAN program. The addition of eNhance to the fertilizer mix reduces the necessary amount of 28% UAN, as it helps to stabilize nitrogen. Please speak with your Area Sales Manager to explore the best nitrogen program to fit your needs.

Our Area Sales Managers are eager to work with you to build on the knowledge presented in this report, and to help you develop a custom fertilizer program to meet your specific soil needs.

Side-Dressed Fertilizer on Corn

Cropping Years: 2013 & 2014
Application Stage: V7-V8
Replications: 3 replications for each treatment in each trial
Additional Information: Starter fertilizer applied, as per soil test

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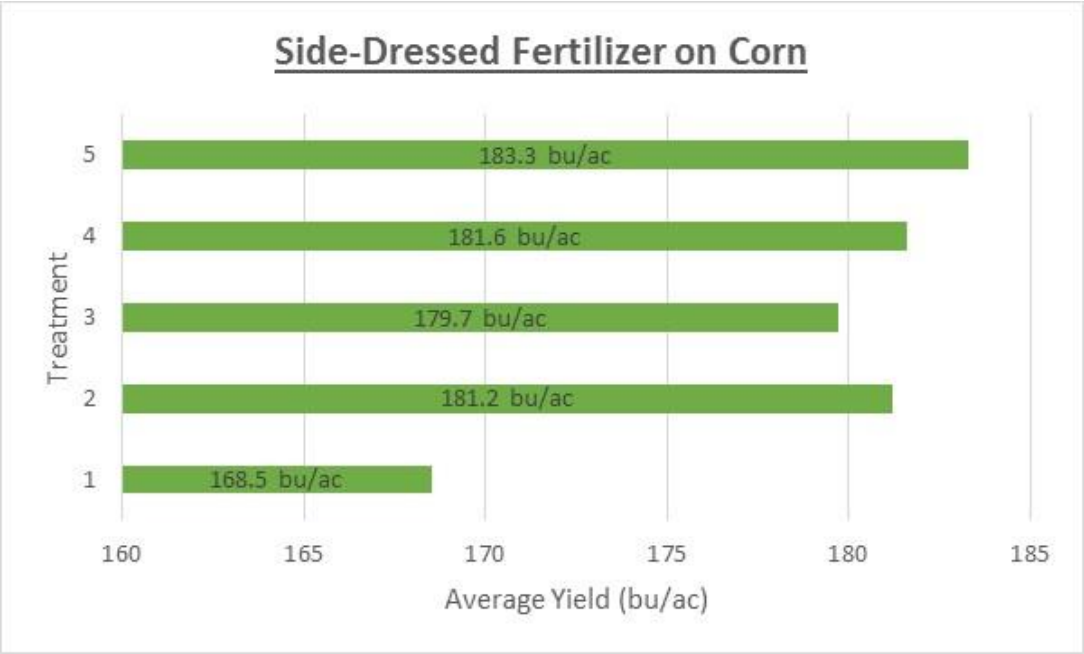

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