

Other Vegetables



- Fertilizer Effects on Green Bean Yields (2004)
- Fertilization of Production Carrots (2003-04)
- Carrots (2007)
- Sweet corn foliar fertility comparison for impact on crop yields and maturity (2009)

Experiment: Fertilizer Effects on Green Bean Yields
Year: 2004 (04-46)
Date of Planting/Harvest: 5-19-03; 6-3-04 / 7-26-03; 8-2-04
Plot Size: 5' x 5'

Soil Test Levels (ppm)

pH ~ 6.4 P1 ~ 52
 CEC ~ 5 K ~ 121
 OM ~ 1.5% (6.2% K)

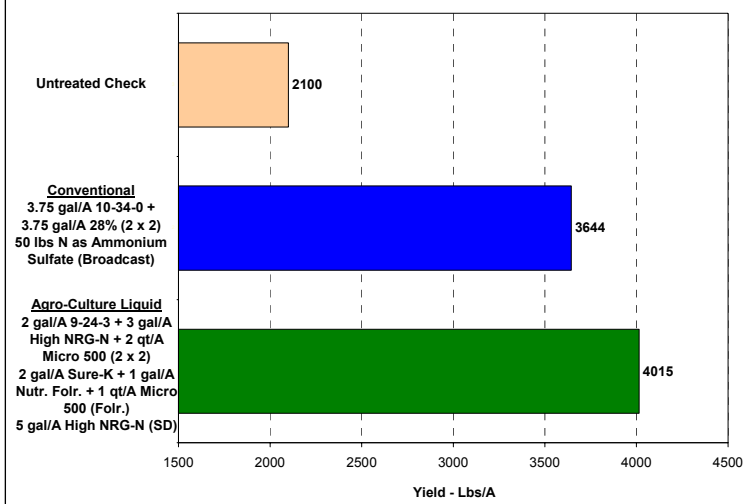
Table 1. Green Bean Fertility Program Yields By Year

North Central Research Station - 2003 and 2004

Fertility Program	2003 Yields* lbs/A	2004 Yields lbs/A
Agro-Culture Liquid	5059	2971
Conventional	4551	2738
Check	2333	1867
<i>LSD</i>	<i>1760.3</i>	<i>1217.9</i>

* 2003 plots were hand harvested 3 times

Chart 1. 2 Year Average of Green Bean Fertility
North Central Research Station - 2003-04



**Agro-Culture
 Liquid Fertilizers:**

2 gal/A 9-24-3 + 3 gal/A High NRG-N + 2 qt/A Micro 500 (*planting*); 2 gal/A Sure-K + 1 gal/A Nutritional Foliar + 2 qt/A Micro 500 (*2 foliar applications*); 5 gal/A High NRG-N (*sidedress*)

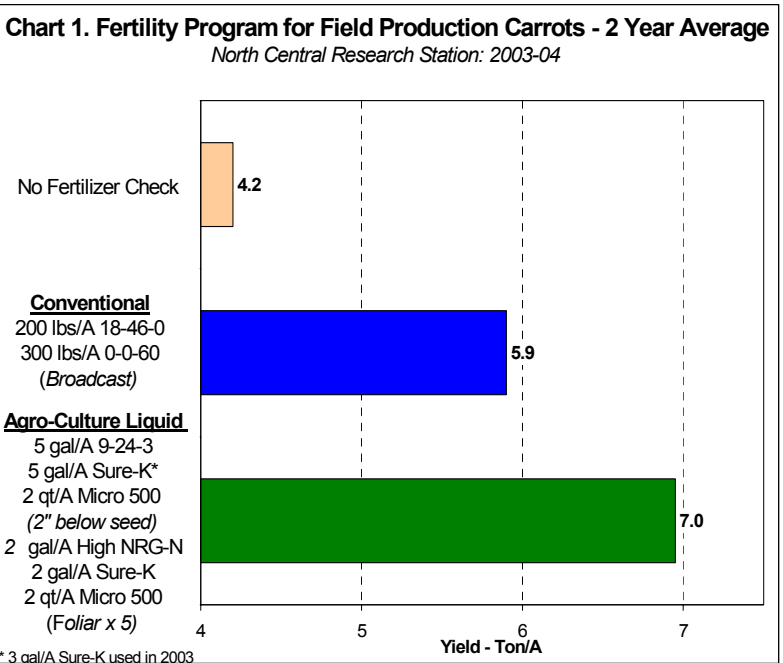
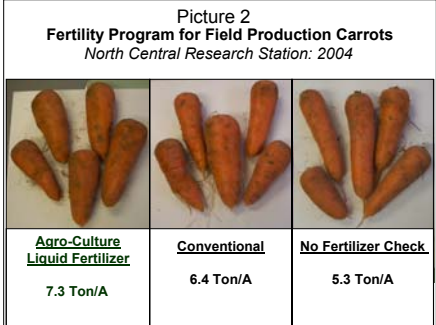
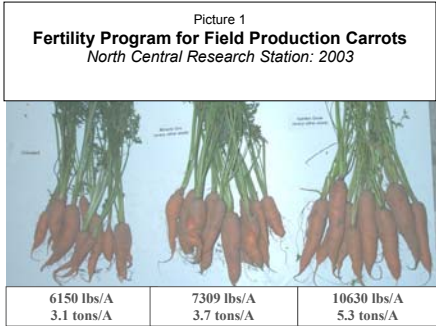
Conventional:

3.75 gal/A 10-34-0 + 3.75 gal/A 28% UAN (*planting*); 50 lbs/A nitrogen as ammonium sulfate (*broadcast prior to flowering and irrigated in*)

- Fertilizer applications made at planting were placed two inches to the side and 2 inches below the seed. Sidedress was done at prior to flowering; nitrogen was placed in a band along the irrigation line and watered in. Ammonium sulfate was broadcast and watered in. Foliar applications began after flowering in mid to late June and were applied with a pressurized backpack sprayer.
- Harvest was done by hand and green beans were sorted and weighed to calculate yield. Both fertilizer programs in both years, increased green bean yields over the no fertilizer check.
- The complete Agro-Culture Liquid Fertilizers Program out yielded the conventional program in both 2003 and 2004.
- Two-year averages show that the Agro-Culture Liquid Fertilizer Program yielded over 370 lbs/A higher than the conventionally used program.

Experiment: Fertilization of Production Carrots (04-37)
Year: 2004 (04-37)
Date of Planting/Harvest: 5-12-04 / 8-19-04
Plot Size: 5' x 5'

Soil Test Levels (ppm)	
pH ~ 6.4	P1 ~ 52
CEC ~ 5	K ~ 121
OM ~ 1.5%	(6.2% K)



- **Agro-Culture Liquid Fertilizers:** 5 gal/A 9-24-3 + 5 gal/A Sure-K + 2 qt/A Micro 500 (placed 2" below the seed at planting); 2 gal/A High NRG-N + 2 gal/A Sure-K + 2 qt/A Micro 500 (weekly foliar applications made 5 times from July 13th thru August 12th)
- **Conventional:** 200 lbs/A 18-46-0 + 300 lbs/A 0-0-60 (per plant broadcast)
- Harvest was done by hand, carrots were washed, sorted, and weighed to calculate yield. All fertilizer applications in both years, increased yields over the no fertilizer check.
- Highest yields were achieved with the Agro-Culture Liquid Fertilizer Program. Two year average yield was 7.0 Ton/A compared to 5.9 Ton/A produced with the conventional fertilizer program. An increase of almost 1 Ton/A. (See Chart 1)
- More uniformed sized carrots were seen in both 2003 and 2004 with the Agro-Culture Liquid Fertilizer program. (See Pictures 1 and 2)
- Making frequent applications of small amounts of fertilizers with post emergent pesticide applications provides nutrients to the plant during the active growing season.

Experiment: Carrots

Year (Experiment Number): 2007 (07-102)

Date of Planting/Harvest: Apr 19 / Sept 10

Hybrid: Millennium

Plot Size (replications): 30' x 2.5', 3 reps

Soil Test Levels (ppm)

pH ~ 7.3 P1 ~ 61

CEC ~ 6.3 K ~ 87

OM ~ 1.8% (3.5% K)

Carrots are a crop which is grown from seeds and the early season development is very important to the yield and quality of the carrots produced. Inputs of phosphorus and potassium are commonly made prior to planting and nitrogen is very often applied as split applications during the growing season. This trial followed that idea and utilized various Agro-Culture Liquid Fertilizer programs to enhance carrot size and yields. Foliar applications of Sure-K with other foliar materials as well as the use of eNhance® to stabilize 28% UAN were some of the treatments. Comparisons with conventional dry fertilizer products were also made.



Materials and Methods:

- The entire plot area was soybeans in the season prior to this trial. The stubble was lightly worked in the spring with a field cultivator to prepare for establishment of the plots. A yield goal of 12 tons/acre along with Michigan State University's Vegetable Fertility Guide (E2934) was used as the basis for fertility levels.

Table C1. Fertility programs evaluated in 2007 for enhancement of carrot yields.

Treatment	(Yield goal = 12 tons/Acre)	Rate/A (gal/A)	Method of Application
1	Untreated Control	0	na
2	18-46-0, 0-0-60, 46-0-0, Mn 46-0-0	218#, 333#, 22#, 2# 50	Band/ PPI 2 x Side dress
3	0-0-60+10-34-0+28% UAN + Mn 28% UAN x 2	333#, 25.7, 7, 2#, 8.3	PPI / Band 2 x Side dress
4	HN + PG + SK + Micro 500+ Mn HN x 2	8.5+7.7+15.4+2qt+1pt 5	Below seed 2 x Side dress
5	28%w/ eNhance + PG + SK + Micro 500+Mn 28% w/ eNhance	11.3+7.7+15.4+2qt+1pt 6.7	PPI-below seed 2 x Side dress
6	HN + PG + SK + Micro 500+ Mn HN x 2 Sure K + Nutritional Foliar	8.5+7.7+11.4+2qt+1pt 5 2+1	Below seed 2 x Side dress 2x Foliar
7	HN + PG + SK + Micro 500+ Mn HN x 2 Sure-K + G07	8.5+7.7+11.4+2qt+1pt 5 2 + 2 qt	Below seed 2 x Side dress 2x Foliar
8	HN + PG + SK + Micro 500+ Mn HN x 2 Sure-K + GGWP	8.5+7.7+11.4+2qt+1pt 5 2 + 2 qt	Below seed 2 x Side dress 2x Foliar

SK = Sure-K, PG=Pro-Germinator, HN = High HRG-N, NR = High HRG-NR, Mn = Manganese Flavanol

- On April 24th, 2007 the entire plot area was formed into beds (4" tall x 24" wide x 30' long). The dry fertilizers were broadcast then lightly incorporated on the top of selected beds, various liquid fertilizer materials were banded 2" below the soil surface as two separate bands placed 4-6" off-center for the remaining plot areas. Two rows of pelletized "Indiana" variety carrot seeds were

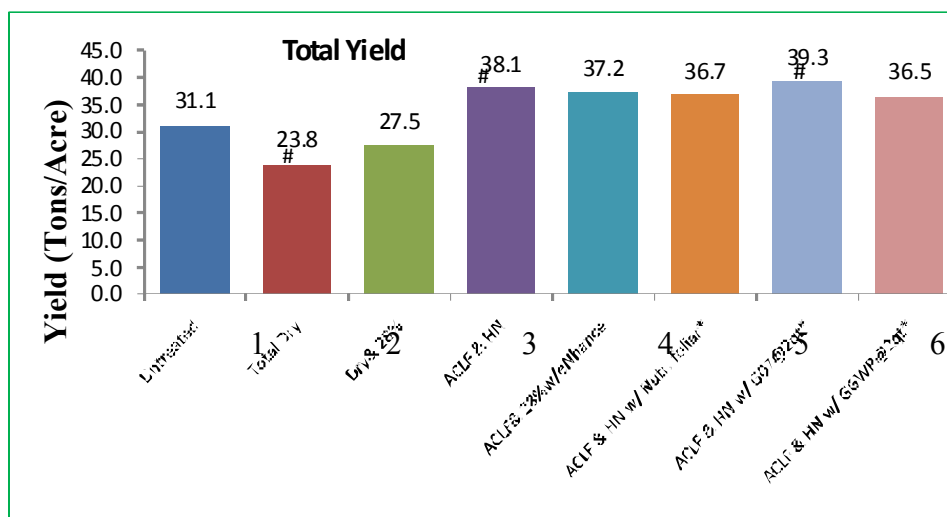
planted eight to twelve inches apart, almost directly over the banded fertilizer applications with 0.75 to 0.8 inch spacing between seeds the desired spacing. However, the pelletized seeds didn't flow evenly out of the Earthway® garden planter utilized to establish the plots. Therefore, plots were over-planted and thinned back to the desired plant spacing. Still, some gaps and/or skips remained producing an uneven stand in some plots.

- Two side dress nitrogen applications were made during the growing season. The initial treatment was on June 15th and second on June 29th, both were knifed into the center of the plot area. Within one day of each side dress application, water was applied with drip irrigation tape placed directly over the nitrogen band to incorporate the fertilizer further.
- Foliar fertilizer applications were made to selected plots on July 2nd and July 24th. All foliar applications were made with a backpack sprayer and hand boom equipped with flat fan nozzles. These fertilizer mixtures were diluted with water and applied at a total volume of 15 gallons per acre. Fungicides and insecticides were applied separately with an air-blast backpack sprayer as needed throughout the season.
- The carrots were harvested, topped, sorted by hand and then weighed by use category on October 20th and 21st, 2007.

RESULTS:

- Carrot yields for the conventional fertilizers were the lowest of all treatments in the trial, including the untreated control. It appeared that the dry fertilizers were not sufficiently incorporated and seedling establishment was reduced due to salt injury from the dry fertilizers. The “total dry” program showing the lowest plant stand and statistically lower total yields. This was likely due to the greatest volume of dry fertilizer applied prior to planting. Treatment #3 had better plant stands. Because only potash was applied as a dry material in these plots, the total salt load was less and establishment was better.
- Total yield for all the Agro Culture Liquid Fertilizer fertility program combinations were statistically similar to each other. However, two treatment programs significantly increased total yields compared to the untreated control, treatment #4 & #7.
- Despite variability in the yields, the best fertility program (Trt. #7) increased the observed carrot yields by 26.4% over the untreated control.

Chart C1. Impact of various fertility programs on the total yield of fresh market carrots.



#Treatments are statistically different from the Untreated Control according to Duncan's Multiple Range Test (P<0.10)



Experiment 09-104: Sweet corn foliar fertility comparisons for impact on crop yields and maturity, 2009.

Planted: 5/22 & 6/3	Variety: GSS-0966	Population: 32,000
Plot Size: 5' x 20' (2 rows)	Replications: 2 reps x 2 dates=4 reps	Harvested: 8/12 & 8/27
Sidedress: 6/23	Foliar: 7/3, 7/17	

Soil Test Values (ppm):													
pH	CEC	% OM	P1	K	S	% K	% Mg	% Ca	% H	% Na	Zn	Mn	B
7.2	4.3	1.2	56	54	8	3.2	22.1	73.1	-	1.6	0.9	9	0.5

Objectives: Determine if early season foliar fertility treatments can influence sweet corn maturity and/or yield potential positively. Evaluate if there an interaction of foliar fertilizers and planting date due to warmer conditions and more rapid growth later in the growing season.

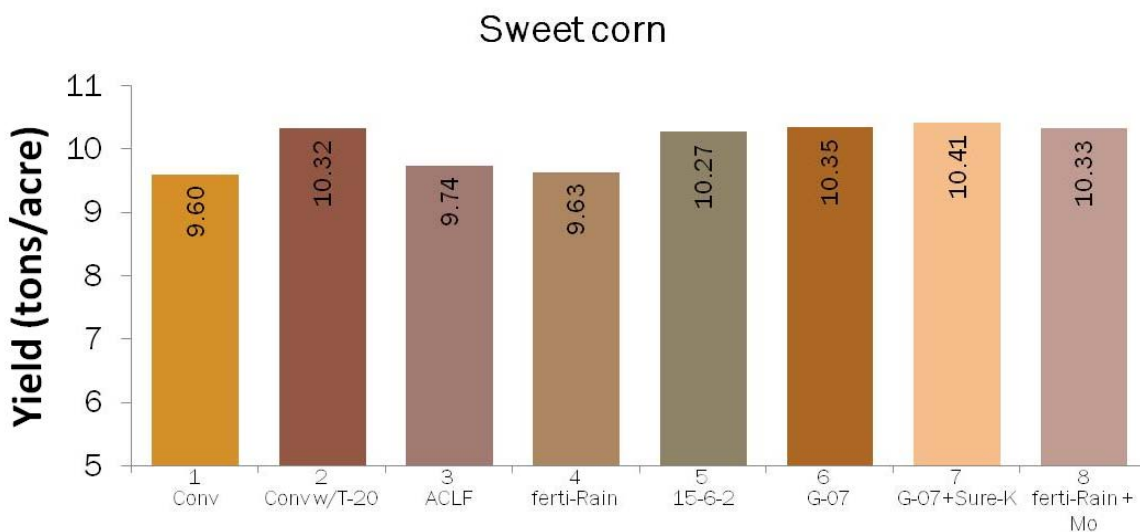


Figure SC1. Sweet corn yields as influenced by various soil and foliar fertility programs. Data presented are the average of two planting / harvest dates.

Conclusions:

- No significant affect of planting date / harvest date on sweet corn yield was found so data from both harvest dates were combined for analysis.
- While not statistically significant, most foliar fertilizer treatments increased the observed sweet corn yields by nearly three-quarters of a ton per acre. The number of marketable sized ears harvested from these plots was nearly identical for all treatments on both harvest dates. Therefore, the observed yield enhancements were a result of slightly larger ears at harvest (data not provided). As all harvested ears appeared ready for picking, the larger ears could be a result of changes in corn maturity.
- The positive trends for the foliar treatments (Trt. 2, 5-8) were seen for both planting/harvest dates. Only a small difference separated these foliar programs. Therefore, despite difference in the nutrients and rates of application, all performed similarly.

*See *Product Descriptions* in the introduction for more information on ACLF products used.

Table SC1. Sweet corn fertility programs and foliar fertilizer applications for yield enhancement in 2009.

	Treatment	Rate/#A (gal/A)	Method of Application	Nutr. App.	NUE[#]
1	46-0-0, 18-46-0, 0-0-60 6-24-6 (Conventional) HN	176#, 108#, 145# 10 17	PPI planter 2x2 Side dress	325.8	5.9
2	46-0-0, 18-46-0, 0-0-60 6-24-6 HN Plant Products 20-20-20 (Conv w/ T-20)	176#, 108#, 145# 10 17 3#	PPI planter 2x2 Side dress foliar	327.6	7.2
3	HN+PG + SK + Micro 500+ Mn HN (ACLF Base)	10, 3, 7, 4 qt 17	planter 2x2 Side dress	95.9	20.3
4	HN+PG + SK + Micro 500+ Mn HN + PG ferti-Rain (F-07)	10, 3, 7, 4 qt 17 3	planter 2x2 Side dress foliar	97.9	19.0
5	HN+PG + SK + Micro 500+ Mn HN 15-6-2 (ACLF Blend)	10, 3, 7, 4 qt 17 2 qt	planter 2x2 Side dress foliar	97.6	21.2
6	HN+PG + SK + Micro 500+ Mn HN G-07	10, 3, 7, 4 qt 17 2 qt	planter 2x2 Side dress foliar	95.9	21.1
7	HN+PG + SK + Micro 500+ Mn HN G-07+ Sure-K	10, 3, 7, 4 qt 17 2 qt, 2	planter 2x2 Side dress foliar	97.9	21.3
8	HN+PG + SK + Micro 500+ Mn HN ferti-Rain (F-07) + Mo Flav.	10, 3, 7, 4 qt 17 3 + 1 qt	planter 2x2 Side dress foliar	101.3	20.4

[#]Nutrient Use Efficiency – (Lb. Yield /Total Lb. Nutrient from Fertilizer Applied)

All plots were planted utilizing 6 row Monosem planter. The first half (two replications) of this trial was planted on May 22nd and the second half on June 3rd. The two planting dates were utilized to compare differences in maturity as well as accommodate harvesting. Despite nearly two weeks separation in planting dates, little or no difference was observed in the crops response to the foliar applications. Therefore, all data were combined for analysis and reporting.

For the ease and accuracy of application, all plots were side dressed on the same day with High NRG-N at 17 gallons per acre placed in the center of each row. Corn from the first planting date was approximately V-8 and corn that from the second planting was stage V-5. A special note, even the “conventional” fertility treatments utilized High NRG-N as the side dress form of nitrogen in this trial.

Only marketable sized ears were hand harvested and removed from each plot. All plots were only harvested once for this trial. Any small ears and/or immature ears were left in the plots at the time of harvest. The weight and counts from both rows of the plot were combined for data analysis.



#See Appendix “V” for additional equipment, irrigation application description and other information.

*See *Product Descriptions* in the introduction for more information on ALCF products used.

BCL 015210 NRG