

“Corn Best Management Practices Fertility Trials for North Florida”

FDACS Contract No. 23492

Deliverable Report #3: Corn Fertility Trials Report

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**FDACS Deliverables Report #3:
Corn Fertility Trials Report**

Deliverable 3: Computation of Nutrient Use Efficiency (NUE) Curves Graphical representation of NUE curves for interpretation. Calculate efficiency ratings for each of 4 locations.	December 1, 2016	\$8,096
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OVERVIEW:

Four farms (3 on-farm and 1 at the SVAEC) grew grain corn under Best Management Practices noted in FDAC’s Vegetable and Agronomic Crops Manual during the spring/summer of 2016. To complete this deliverable #3, yield measurements, fertilizer input data and computations of Nitrogen Use Efficiency (NUE) were made to document our progress.

DATA SUMMARY

For each of the on-farm fertility trials, both hand harvest yields and combine harvest yields were documented for each of the grower and reduced nitrogen (IFAS) treatments.

**Table 1. Corn Yield Data for Fertility Demonstration Trial 2016
hand harvested**

County	Farmer	Grower Yield	IFAS Yield	Difference
Hamilton	Murphy	177	168	5.1%
Suwannee	Gwinn	293	266	9.2%
Madison	Garland	247	206	16.6%
Average Yield		239	213	10.3%

**Table 2. Corn Yield Data for Fertility Demonstration Trial 2016
combine harvested**

County	Farmer	Grower Yield	IFAS Yield	difference
Hamilton	Murphy	n/a	n/a	
Suwannee	Gwinn	232	231	0.4%
Madison	Garland	218	178	18.3%
Average Yield		225	205	9.4%

Using the information collected throughout the season for fertility inputs, each farmer tracked their N,P, and K additions to quantify additions. As reduced Nitrogen was the factor we considered the treatment (and the grower side control), we calculated a nitrogen use efficiency (NUE) or nitrogen conversion ratio to compare each farm’s effectiveness in converting each pound of N into grain yield. Table 3 below shows the efficiency ranging from 71-99%. Average N applications were 323 lbs/ac and grain harvest was 239 bushels per acre or 86.5% for the grower treatment and 95% NUE for the reduced side with slightly reduced yield averages of 213 bpa..

Table 3. Corn NUE/ Conversion Ratio for SVAEC Fertility Demonstration

	Grower Treatment			Reduced Treatment		
County	N applied (#)	Yield (bpa)	NUE ratio	N applied (#)	Yield (bpa)	NUE ratio
Hamilton	N/A	177		N/A	168	
Suwannee	297	293	98.7%	270	266	98.5%
Madison	350	247	70.6%	234	206	88.0%
SVAEC				246	220	89.4%
Average	323.5	239	84.6%	252	213	93.3%

Yield					
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Extrapolating these data to show economics of each treatment, we took the average price of liquid UAN nitrogen at \$265/ton (or \$.047/pound of N) to calculate each farmer’s specific return to N inputs. For every bushel of corn harvested, 1.1 pounds of nitrogen was used on average (ranging from -1.01-1.42 for all treatments). Reduced treatments nitrogen return ratio per bushel was 1.22 while less nitrogen was needed to give the same yield in the reduced treatment (only 1.05). Average cost per acre for nitrogen inputs was \$132/ac. When divided by treatment, the cost of each bushel of grain averaged \$.58 for nitrogen inputs /bu for the grower and \$0.50/bu for the reduced treatment. This represents a savings of 8 cents for each bushel produced when using the reduced nitrogen budget or \$19.12 saved per acre.

Return to Nitrogen
Ratio

Treatment	N/bu
grower	1.22
reduced	1.05

Return on Investment (fertilizer expense)

Treatment	Cost per bushel of corn
grower	\$0.58
reduced	\$0.50

From the environmental side, the economy of nitrogen savings shows a similar benefit of efficiency. If average inputs of N were 318 for the grower treatment and 247 for the reduced treatment, then 72 pounds less of N was applied per acre, representing a 23% savings. Considering the actual timing and placement of these nutrients across the season, such reduced inputs could have a significant effect on the amount of nitrates flowing below the root zone. Early in the season, we experienced at least 3 leaching rains which may have flushed out much of the early nitrogen additions.

Table 4. Fertilizer return on investment in terms of grain yield

County	Farmer	bu/a	N#/a	#N/bu	Price UAN/#N	Tot Fert \$/a	Fert \$/bu
Hamilton	grower	177		0	0.47		
	reduced	168		0.00	0.47	0	\$-
Suwannee	grower	293	297	1.01	0.47	\$140.54	\$0.48
	reduced	266	270	1.02	0.47	\$127.77	\$0.48
Madison	grower	247	350	1.42	0.47	\$165.63	\$0.67
	reduced	206	234	1.14	0.47	\$110.73	\$0.54
SVAEC	grower				0.47		
	reduced	246	246	1.00	0.47	\$116.41	\$0.47
Ave Yield		252	279	1.11	0.47	\$132.22	\$0.53

GRAPHS:

Figure 1. Comparing Grower Yield

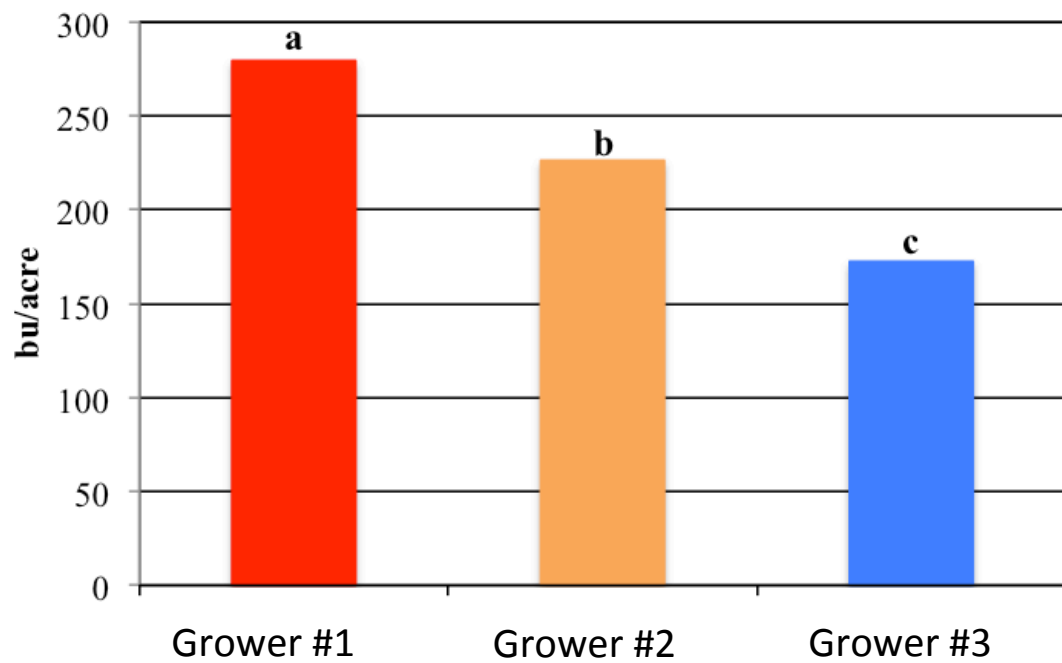


Figure 2. Effect of N-rate on yield for 3 locations

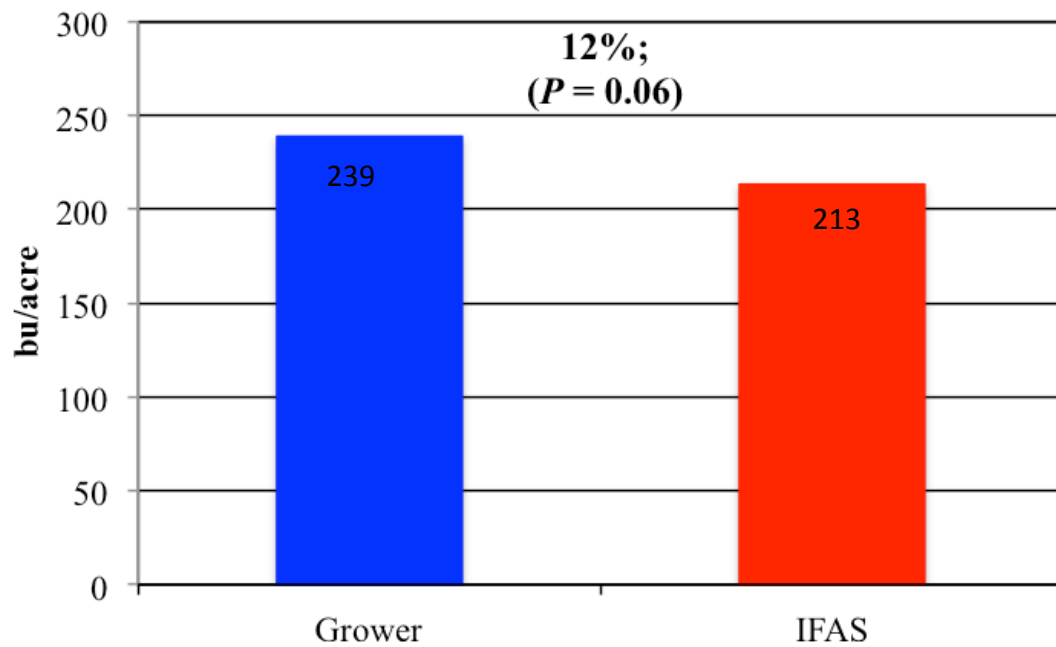
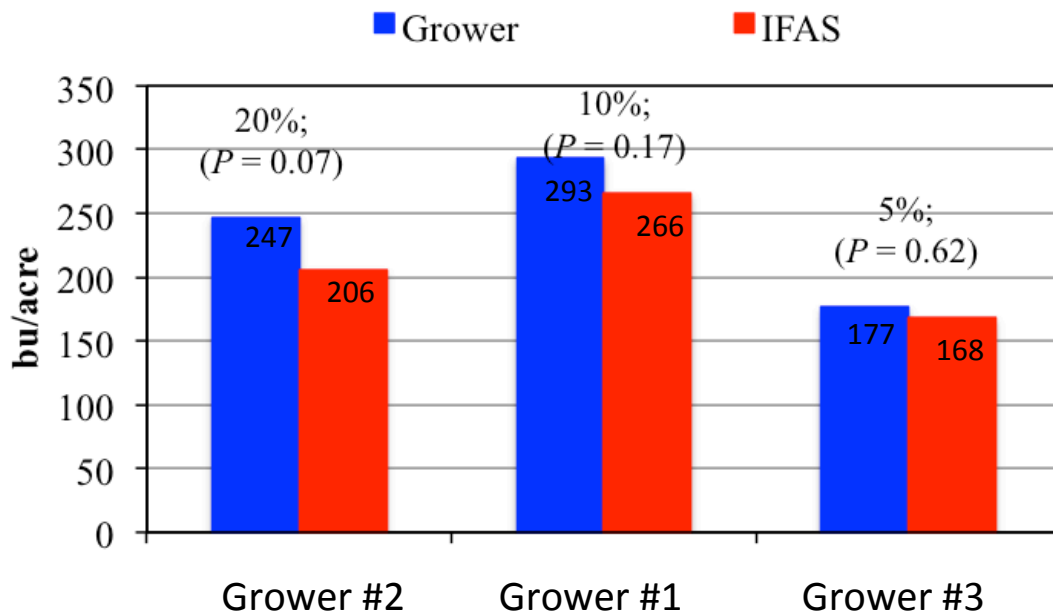


Figure 3. Yield effect of 2 nitrogen rates for 3 growers

*(hand harvested 6' rows from 6 sample sites per N treatment)



BUDGET:

Following the line item categories in the approved project agreement (page 19), expenses were made for the following items during this period:

1. Salary- OPS staff for field visits, planting, and farmer support
2. Equipment- none
3. Travel – fuel for farmer visits
4. Miscellaneous- plant tissue samples, printed materials, field day flyers