OHIO STATE UNIVERSITY EXTENSION





2017 Fulton County On Farm Research Results





THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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CFAES provides research and related educational programs to clientele on a nondiscriminatory basis. For more information: go.osu.edu/cfaesdiversity

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Conducting On Farm Research

Why on Farm Research?

At the county level, on-farm research offers opportunities for educators to build relationships with county stakeholders and develop research responding to local concerns. Since the research is conducted using farmer equipment and normal production practices; it is directly applicable to local production.

OSU Extension's Agronomic Crops Team has published 517 peer-reviewed on-farm research reports written by 48 different lead authors since 1997. The on-farm research effort allows the team to address issues relevant to county needs as identified by local stakeholders, while contributing to statewide research efforts. (Martin et al, December 2016). Please visit www.agcrops.osu.edu/onfarmresearch for a complete list of technical reports by category and year.

Research in Fulton County is a product of an On Farm Research Team of interested farmers who have given trial suggestions for the coming year.

Additional Resources Available

The Ohio Corn Performance Test (OCPT) evaluates corn hybrids for grain yield and other important agronomic characteristics. http://go.osu.edu/corntrials

The Ohio State Precision Ag Program conducts studies related to all aspects of the corn production cycle. http://go.osu.edu/PrecisionAg

Resources, fact sheets, and articles on corn research studies can be found here on the Agronomic Crops Team website: http://go.osu.edu/CropsTeamCorn

Statistics 101

While the data contained in the On Farm Research booklet is believed to be true and accurate, the discussion of results is considered preliminary (draft) that has not yet been peer reviewed and accepted.

Replication: In statistics, replication is repetition of a treatment or observation in the same or similar conditions. Replication is important because it adds information about the reliability of the conclusions or estimates to be drawn from the data. The statistical methods that assess that reliability rely on replication. Multi-year data is considered some of the most important replications for a particular trial and is considered more valuable than one year data.

Randomization: Using random sampling as a method of selecting a sample from a population in which all the items in the population have an equal chance of being chosen in the sample. Randomization reduces the introduction of bias into the analysis. In on farm research, this same randomization helps account for spatial and soil variation.

What is the P-value, LSD or CV? The P-Value reported for each trial is the calculated probability that the differences found in the study are due to chance. As the P-Value number gets smaller, the probability increases that there are real differences. This helps differentiate between random variation and real treatment effects. For these studies we use a P-Value of 0.05 as the cutoff to determine whether the treatment differences are greater than random variation (sometimes called experimental error). When the differences are thought to be real we call them significant. Most used research P values are .01, .05, .1 or .2. As P values go to .2, there is less confidence in the treatments that cause significant difference, and as P values go to .01, there is more confidence in the treatments that caused the significant difference. Least Significant Difference (LSD) is the amount of difference that is required within a particular data point to be called significant or due to the treatment. In this book the treatment data that is not different (P-Values are greater than 0.05 or within the LSD listed) are followed by the same letter. Finally, Coefficient of Variation (CV) is the amount of variation in the data that is analyzed in ANOVA. The higher the CV, the more variance there is in the data. The lower the CV (closer to 0.0), the "cleaner" the data.

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Rain Fall & Soil Data

Rainfall data was acquired from the nearest CoCoRaHS / National Weather Service stations for key growing season months of May through August. Generally, the goal is to acquire rainfall data at field level or within at least 3 miles of the nearest CoCoRaHS station. If you are interested in being a CoCoRaHS weather reporter, visit www.cocorahs.org and let your county Extension Educator know.

Field level soil types were determined by visiting the National Resource Conservation Service (NRCS)-Web Soil Survey site and identifying the two most prevalent soil types for each trial. These are identified in each technical report under the background information. Randomization of treatment replications helps account for spatial and soil variations in on farm research.

Profit Calculation

Many of our studies include a net return calculation. It is difficult to make this figure applicable to every producer. In order to calculate revenue for our research trials we used standardized input costs from The Ohio State University Extension's *2017 Corn, Soybean, and Wheat Budgets*. Where applicable custom farming rates from the *Ohio Farm Custom Rates 2016* fact sheet were used. Commodity Prices were approximated for the 2017 market year.

Average market commodity prices for the 2017 report are:

Corn: $3.50 / bu

Soybeans: $9.00 / bu

Wheat: $4.00 / bu

Forage: $50 / ton

In order to make this information relevant to your operation, you may need to refigure return per acre with costs that you expect.

Water Quality

There were 24 end-of-tile outlet monitors throughout Fulton County; this monitoring program began in the fall of 2015 and came to a close in the spring of 2017. In the first sampling cycle (fall 2015) statewide concentrations (n=245 sites) have ranged from no discharge to .05 ppm DRP, with a statewide average of .006-.01 ppm DRP for the first 3-month cycle. The full report on these four 3-month monitoring periods will not be available until later this year.

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Fulton County

Farms (2012 Census)	Number
Number of Farms	825
Land (2012 Census)	**Acres**
Land Area	259,483
Land in Farms	195,356
Cropland	179,634
Harvested Cropland	173,769
Pastureland	2,873
Woodland	6,895
Capacity (2012 Census)	**Bushels**
On-farm Grain Storage Capacity	10,083,173

Livestock (Jan. 1, 2017)	Number	Rank
All cattle and calves	35,000	5
Milk cows	2,700	30

Crop (2016)	Acres Harvested	Yield Per Acre	Production	Rank
Corn ... Bu.	76,000	177.6	13,500,000	9
Soybeans ... Bu.	85,300	58.4	4,984,000	25
Wheat ... Bu.	15,600	90.4	1,410,000	10
Alfalfa Hay ... Ton	1,600	5.25	8,400	21

Commodity (2012 Census)	Cash Receipts	Commodity (2012 Census)	Cash Receipts
Corn	61,113,000	Cattle & Calves	33,815,000
Soybeans	47,842,000	Milk	11,148,000
Wheat	6,929,000	Hogs & Pigs	8,448,000
Vegetables	2,214,000	Sheep & Goats	181,000
Fruit & Berries	111,000	Total Livestock	53,767,000
Nursery & Greenhouse	2,499,000	Total Crop & Livestock	175,744,000
Total Crop	121,977,000		
Poultry & Eggs	12,000		

Source: United States Department of Agriculture, National Agricultural Statistics Service

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2017 On Farm Research Reports

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1. Corn Yield Response to Seeding Rate

OBJECTIVE

To determine the effects of seeding rate on corn yield and profitability.

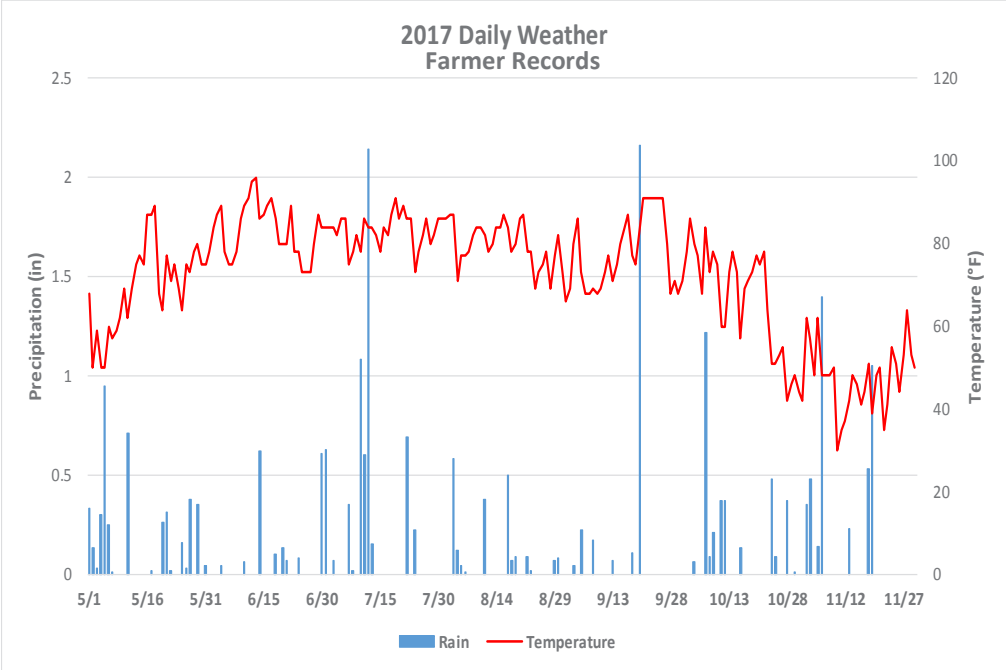
OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

Planting Date	5/24/2017
Harvest Date	11/10/2017
Variety	Pioneer 0843
Population	Varies
Acres	19.2
Treatments	5
Reps	4
Treatment Width	30 ft
Tillage	No Till
Herbicide	Cinch ATZ, Instigate
Pesticide	Tombstone in furrow
Previous Crop	Soybeans
Row Width	30”
Soil Type	Colwood loam & Dixboro FSL



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

STUDY DESIGN

This trial was designed with five seeding rate treatments replicated four times in a randomized complete block design. Plots were 12 rows wide (30 ft) by 2250 feet long. All treatments received the same starter fertilizer, herbicide and sidedress nitrogen. The trial was planted, sprayed, sidedressed and harvested with commercial farm equipment. This study has been conducted in Fulton County since 2014 with seeding rates in increments of 5,000 seeds per acre at the rates reported. The tillage system for all years of this study has been no-tillage with cover crops.

Aerial photo of plot in July.

OBSERVATIONS

Throughout the year, plant growth was monitored for any potential treatment differences. No yield limiting factors were observed.

Stand Counts

Seeding rates were evaluated in season by taking stand ear counts based on 17 ft 5 inches of row (1/1000 of an acre). Emergence was evaluated by taking an average of eight stand counts at the time of sidedress application in June. Ear counts-plants with harvestable double ears and plants with aborted ears– were taken on the date of harvest. See Table 1

Yield Data

Yields and moistures were measured by using an Ag Leader yield monitor. Corn yield was shrunk to 15% moisture. See Table 2.

Table 1. Stand and ear counts

Seeding Rate (seeds/ac)	Stand Count (plants/ac)	Ear Count (ears/ac)	Doubles (plants/ac)	Aborts (plants/ac)
5-24-2017	*6-10-2017*	*11-10-2017*		
23,000	23,900	23,100	2,000	500
28,000	26,000	27,100	700	0
33,000	32,600	31,200	0	600
38,000	38,300	36,000	0	1,000
43,000	38,600	38,600	0	900

SUMMARY

- There was no statistical difference in yield for seeding rates 33,000 to 43,000.
- The greatest Return on Investment was achieved at a seeding rate of 33,000.
- The 2017 data suggests that a harvest ear count of at least 31,200 is necessary to achieve top yield.
- Harvest Ear count data suggests that as seeding rate decreases, the incidence of double ears increases. As seeding rate increases, the incidence of aborted ears increases.

SPONSORS

OSU Extension-Fulton County would like to thank on farm collaborators Les & Jerry Seiler for planting and harvesting the plot. And thanks to OSUE interns Ross Andre and Kaitlin Ruetz for assistance with data collection.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

Table 2. Yield Data	*2017 Data*		*2016 Data*	*2015 Data*	*2014 Data*
Seeding Rate (seeds/ac)	Yield (bu/ac)	ROI ($/ac)	Yield (bu/ac)	Yield (bu/ac)	Yield (bu/ac)
23,000	191.5 c	-	191.3 ab	152.1 b	-
28,000	202.8 b	$22.50	193.4 ab	159.8 ab	166.7 a
33,000	213.8 a	$43.05	191.6 ab	171.3 a	159.9 ab
38,000	208.9 ab	$8.40	195.5 a	158.5 ab	158.1 b
43,000	210.6 a	-$3.15	186.0 b	-	155.6 b

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05. ROI based on a seed cost of $3.50 per 1,000 seeds.

2. Starter Phosphorus Rate

OBJECTIVE

To determine the effects of phosphorous on corn yield and profitability.

OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

	Trial A	Trial B	Trial C
Planting Date	5/17/2017	5/17/2017	5/16/2017
Harvest Date	11/4/2017	11/4/2017	10/18/2017
Variety	DeKalb 57-50	Pioneer 0506	Rupp AO391
Population	33,000 sds/ac	33,000 sds/ac	33,000 sds/ac
Acres	10.3	10.3	5
Treatments	2	2	3
Reps	6	6	4
Treatment Width	20 ft	20 ft	15 ft
Soil Test P (Bray-1)	21 ppm	21 ppm	15 ppm
Tillage	Conventional	Conventional	Fall-Chisel Spring-Cultivate
Herbicide	Cinch ATZ, Abundant Edge	Cinch ATZ, Abundant Edge	Cinch ATZ, Instigate
Sidedress N	180 lbs/ac	180 lbs/ac	150 lbs/ac
Previous Crop	Soybeans	Soybeans	Soybeans
Row Width	30”	30”	30”
Soil Type	Hoytville Clay Loam	Hoytville Clay Loam	Latty Clay, Fulton Clay Loam

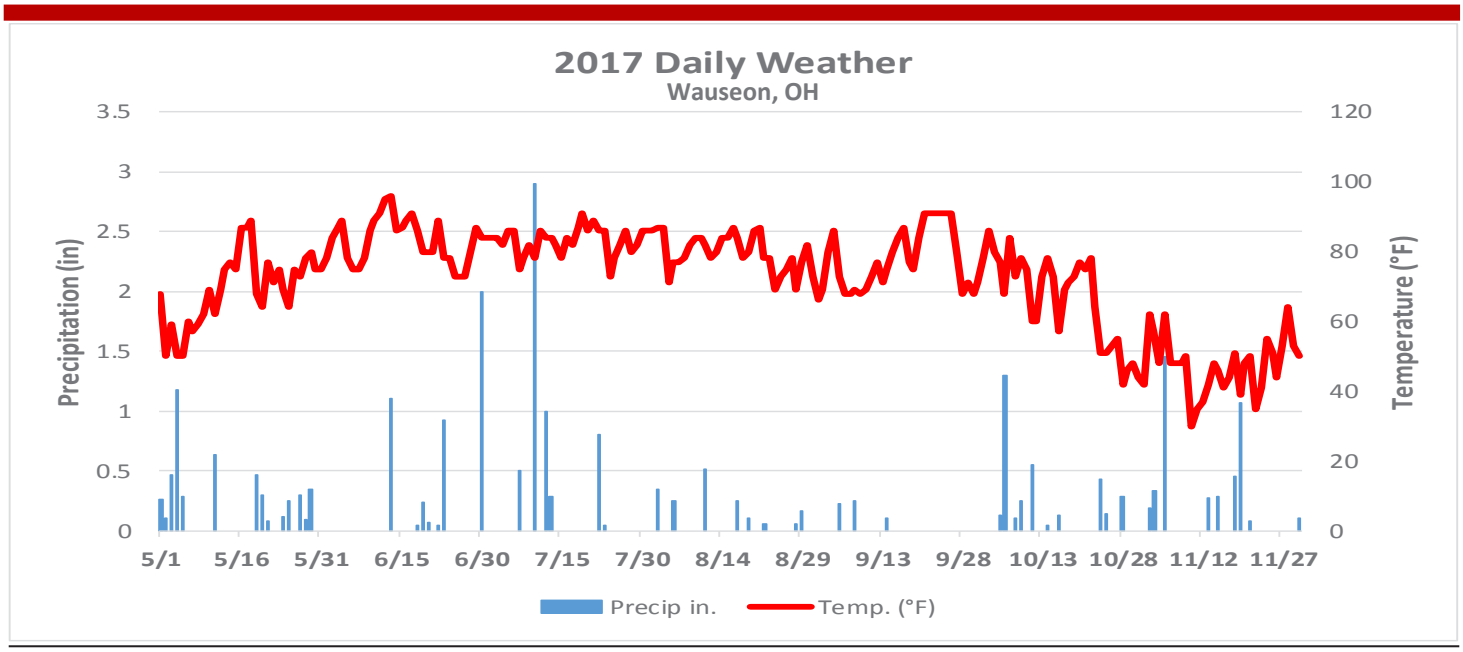
STUDY DESIGN

Two multi year phosphorus starter rate studies are represented in this report.

For Trial A and B (Study 1), two phosphorus starter rates were replicated six times in a randomized complete block design. In this study, the planter was split to include two varieties, plots were 8 rows wide and 2,500 feet long. Starter phosphorus (as P_2O_5)treatments used in this study were 0 lbs/ac and 28 lbs/ac.

For Trial C (Study 2), three phosphorus starter rates were replicated four times in a randomized complete block design. Plots were 6 rows wide by 1,250 feet long. Starter phosphorus (as P_2O_5) treatments used in this study were 0 lbs/ac, 20 lbs/ac and 40 lbs/ac.

All treatments were nitrogen-balanced at planting. Sidedress nitrogen treatments were the same across each studies. All studies were planted, sprayed, sidedressed and harvested with commercial farm equipment.



OBSERVATIONS

Throughout the year, plant growth was monitored for any potential treatment differences. No yield limiting factors were observed.

Aerial photos were taken in July to see if any noticeable color differences could be observed. No inconsistent color patterns were observed.

Additionally, ear leaf samples were pulled at green silk and tested for phosphorus concentration. All P tissue samples were at sufficient levels according to the *Ohio Agronomy Guide*.

Yield and moisture observations were taken with a calibrated yield monitor and shrunk to 15% moisture (See Table 1).

SUMMARY

- Trial A and Trial B: Showed no statistical yield difference between phosphorus rate treatments.

All Starter Phosphorus was liquid and applied to 2in x 2in next to the row

- In Trial C there was no statistical yield difference between 0 and 20lbs rate; there was no statistical yield difference between the 20 and 40lbs rate. However, a statistical yield difference was observed between the 0 and 40lbs rate.

SPONSORS

These studies were supported by the Ohio Corn Check-off Board and the OARDC Soil Fertility Lab. OSU Extension-Fulton County would like to thank on farm collaborators Lawrence Onweller and Josiah Hoops for planting and harvesting these studies. And thanks to OSUE interns Ross Andre and Kaitlin Ruetz for assistance with data collection.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

Table 1. **2017 Data** | **2016 Data**

Trial	Treatments	Rate (lbs/ac)	Moisture (%)	Yield (bu/ac)	Yield Diff (bu/ac)	ROI ($/ac)	Yield (bu/ac)
A	No P	0	21.9	142.9 a	-	-	181.2 a
	Starter P	28	21.8	142.9 a	-	- $12.04	179.1 a
B	No P	0	21.2	158.2 a	-	-	192.1 a
	Starter P	28	21.3	148.4 a	-10	-$46.34	199.8 a
C	No P	0	19.5	121.5 b	-	-	143.9 a
	Starter P	20	19.1	129.9 ab	+8	$20.80	140.5 a
	Starter P	40	19.0	135.2 a	+13	$30.75	140.5 a

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05. ROI based on a P_2O_5 cost of $.43 per lb.

3. Liquid Dairy Manure at Sidedress

OBJECTIVE

To compare the yields of corn side-dressed with liquid dairy manure versus commercial nitrogen.

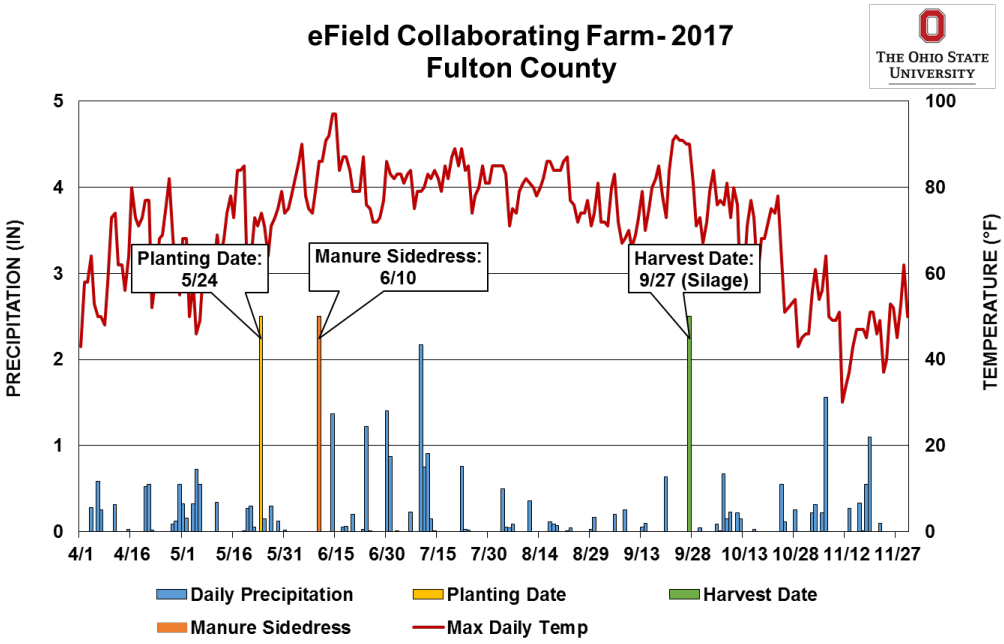
OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

Planting Date	5/24/2017
Harvest Date	9/27/2017 (Silage)
Variety	Mycogen TMF2A637
Population	34,000 sds/ac
Acres	7
Treatments	2
Reps	4
Treatment Width	30 ft (12 Rows)
Tillage	No Till
Pre-Side Dressed Nitrogen Test	16.7 ppm
Herbicide	BiCep II Magnum, glyphosate
Pesticide	N/A
Previous Crop	Corn
Row Width	30”
Soil Type	Colonie FS Gilford FSL



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

STUDY DESIGN

Historically, the manure application window closes once corn has been planted. OSU Extension has conducted tanker liquid manure trials in standing corn since the 2000’s but recently began doing demonstrations and research trials with commercial liquid manure application in standing corn at sidedress. A 40-acre dragline trial was conducted in Fulton County using approximately 10,000 gallons/ac of dairy lagoon manure. A manure analysis showed nutrient of the manure to be:

15 lbs Ammonia-N
4 lbs $P_2 0_5$
9 lbs $K_2 0$ per 1,000 gallons

} per 1,000 gallons

Use of the manure at sidedress allowed for the capture of ammonia-N that may otherwise be lost.

Liquid dairy manure being injected with a commercial dragline in standing corn.

METHODS and OBSERVATIONS

Preliminary research at OARDC-Northwest has shown that a dragline can be used up to V4 corn with no significant stand loss. Sidedress manure was applied on June 12th and four 12–row check strips were left where commercial nitrogen was applied in anhydrous form on the same day. Observations were made on a weekly basis after manure application to evaluate plant recovery. Additionally, corn stalk nitrate tests (CSNT) data were collected at 10 days post-black layer to evaluate if sufficient nitrate nitrogen was available to the plant. Corn was harvested for silage in late September. Silage yields were weighed and shrunk to 100% dry matter for comparison.

Pictures of corn at treatment on June 12th (left) and one week after treatment on June 19th (right).

Corn has shown to tolerate two passes with a draghose up to the four-leaf stage (V4).

Tools of the Trade

Manure injection toolbars, like this one from Bazooka Farmstar, allow for liquid manure injection at corn sidedress, capturing valuable ammonia N for the corn plant. Commercial manure application—efficient & effective.

SUMMARY

- Nitrate levels for both treatments were in Optimal ranges (250-2,000 ppm, Purdue).
- Nutrient consistency in dairy manure varies, thus having a possible impact on yield results.
- A significant difference (less) in dry matter silage yield was observed when only dairy manure was used as the nitrogen source.

SPONSORS

The author expresses appreciation to on-farm collaborators Emmons Dairy for the planting and harvesting of this plot. Special thanks to those providing support to for this study: Bazooka Farmstar, Conservation Action Project, Cooper Farms, Hord Livestock, and the Columbus Foundation, Frey Brothers Tim Stutzman , OSUE Manure Nutrient Specialist Glen Arnold, Ross Andre and Kaitlin Ruetz. This field is included in the OSU Digital Ag eFields Report, to view more eField reports visit Facebook @OhioStatePA.

PROJECT CONTACT

Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

Treatments	Application Rate	N Rate (lbs/ac)	Wet Yield (T/ac)	Dry Yield (T/ac)	Moisture (%)	Stand Count	CSNT (ppm)	Grain Yield * (bu/ac)
82% Anhydrous	159 lbs/ac	130	21.3	8.92 a	58.1	31250	1991	183.2
Dairy Manure	10,000 gal/ac	150	20.1	8.02 a	60.0	32125	618	169.0

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

*Based on *Calculating Grain Yield Utilizing a Corn Silage Forage Test,* University of Wisconsin-Extension.

4. Nitrogen Rate

OBJECTIVE

To determine the effects of the rate of nitrogen on corn yield and profitability.

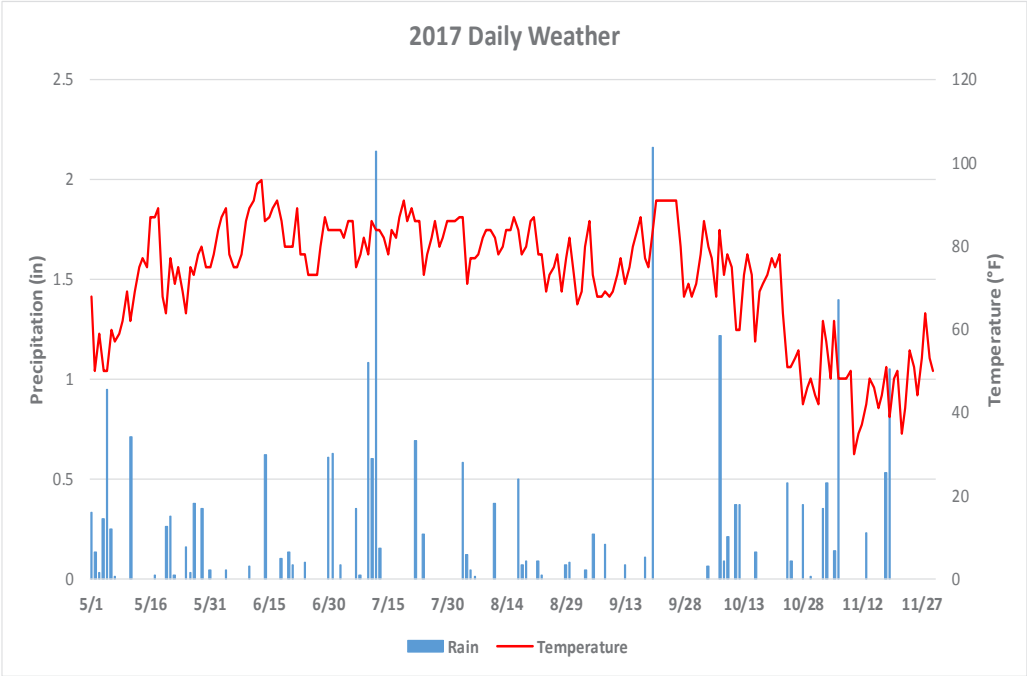
OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

Planting Date	5/30/2017
Harvest Date	11/10/2017
Variety	Shur Grow 69555
Population	23,000
Acres	15
Treatments	4
Reps	4
Treatment Width	40 ft
Tillage	Conventional
Herbicide	Tripleflex Atrazine, f6 Round up powermax
Pesticide	Tripleflex, Atrazine, Round up
Previous Crop	Corn
Row Width	30”
Soil Type	Pewamo CL, Lamson FSL



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

STUDY DESIGN

Nitrogen rate trials in corn have been conducted in Fulton County since 2014 across 14 sites. Generally, a collaborating farmer selects four to five incremental rates and replicates them a minimum of four times across a field. The most common rates are 100, 150, 200, 250lbs of total N per acre. Each grower is asked to plant a 0/low rate to determine how much organic N is provided by the soil. In some cases the upper limits of the Nitrogen curve are tested (i.e. 300lbs per acre). Nitrogen source is based on farmer preference

Aerial observations in July showed limited color variation except for the zero rate (Left).

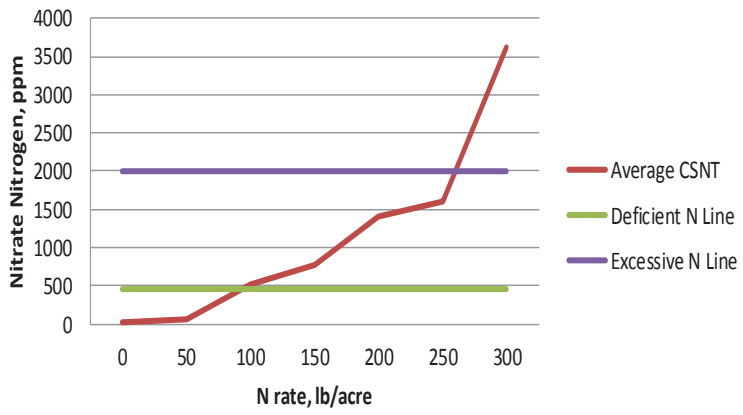
SUMMARY

- No statistical yield difference in nitrogen rates 200-300lbs.
- The economic data suggest that the greatest Return on Investment occurs between total nitrogen rates of 150-200lbs.
- Based on corn stalk nitrate tests (CSNT), optimal nitrate nitrogen levels were achieved at total N rates of 150-250lbs. The 300lbs rate exhibited excess nitrogen (Purdue Rating) (See Graph 1).

Use of a calibrated yield monitor makes harvesting on farm research trials very efficient.

Graph 1. End of Season Corn Stalk Nitrate Test

n=114 samples



Excess nitrate-nitrogen levels were observed in CSNTs at all N rates greater than 250 lbs/ac.

SPONSORS

OSU Extension-Fulton County would like to thank on farm collaborators Joe and Jason Howard/Mull Bros for planting and harvesting the plot. And thanks to OSUE interns Ross Andre and Kaitlin Ruetz for assistance with data collection.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

Table 1.	*2017 Data*					*2016*	*2015*	*2014*
Treatments	**CSNT (ppm)**	**Yield (bu/ac)**	**Yield Diff (bu/ac)**	**ROI ($/ac)**	**NUE (lbs N/bu)**	**Yield (bu/ac)**	**Yield (bu/ac)**	**Yield (bu/ac)**
0#N*	23	179.3 c	-	-	-	-	76.9	-
75#N	667	215.7 b	+36.4	$77.15	.35	-	-	-
100#N	-	-	-	-	-	169.8	84.7	171.2
150#N	1305	222.1 a	+42.8	$82.80	.68	184.9	183.2	183.2
200#N	-	-	-	-	-	184.1	181.4	196.5
225#N	1792	217.5 ab	+38.2	$49.95	1.03	-	-	-
250#N	-	-	-	-	-	184.5	192.4	189.9
300#N	2250	218.1 ab	+38.8	$35.30	1.38	192.4	-	-

*Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05. *Treatment not replicated. ROI based on a nitrogen cost of $.335 per lb.*

Multi Year Data: Nitrogen Rate

OSU Extension

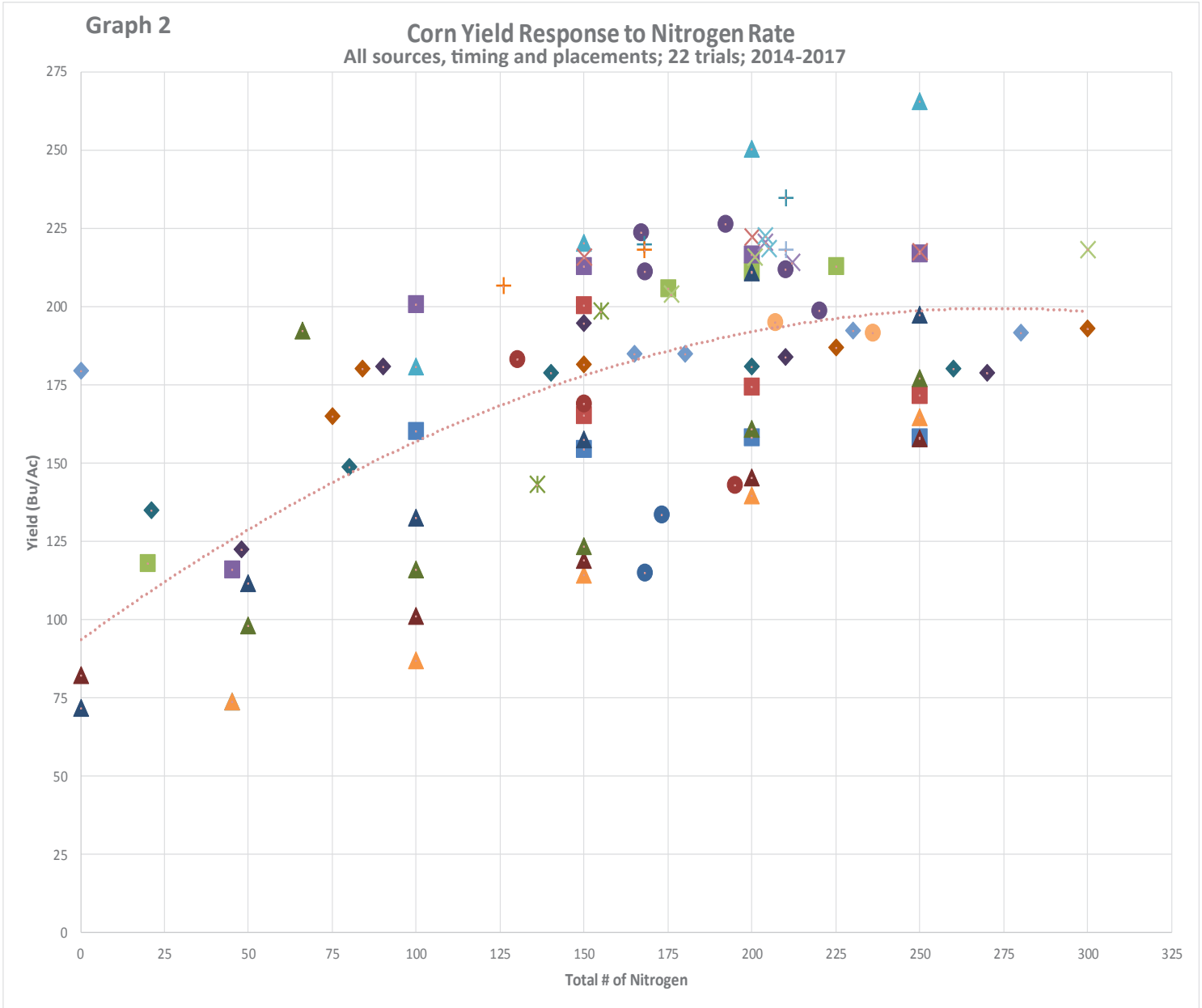
Wauseon, OH

Fulton County

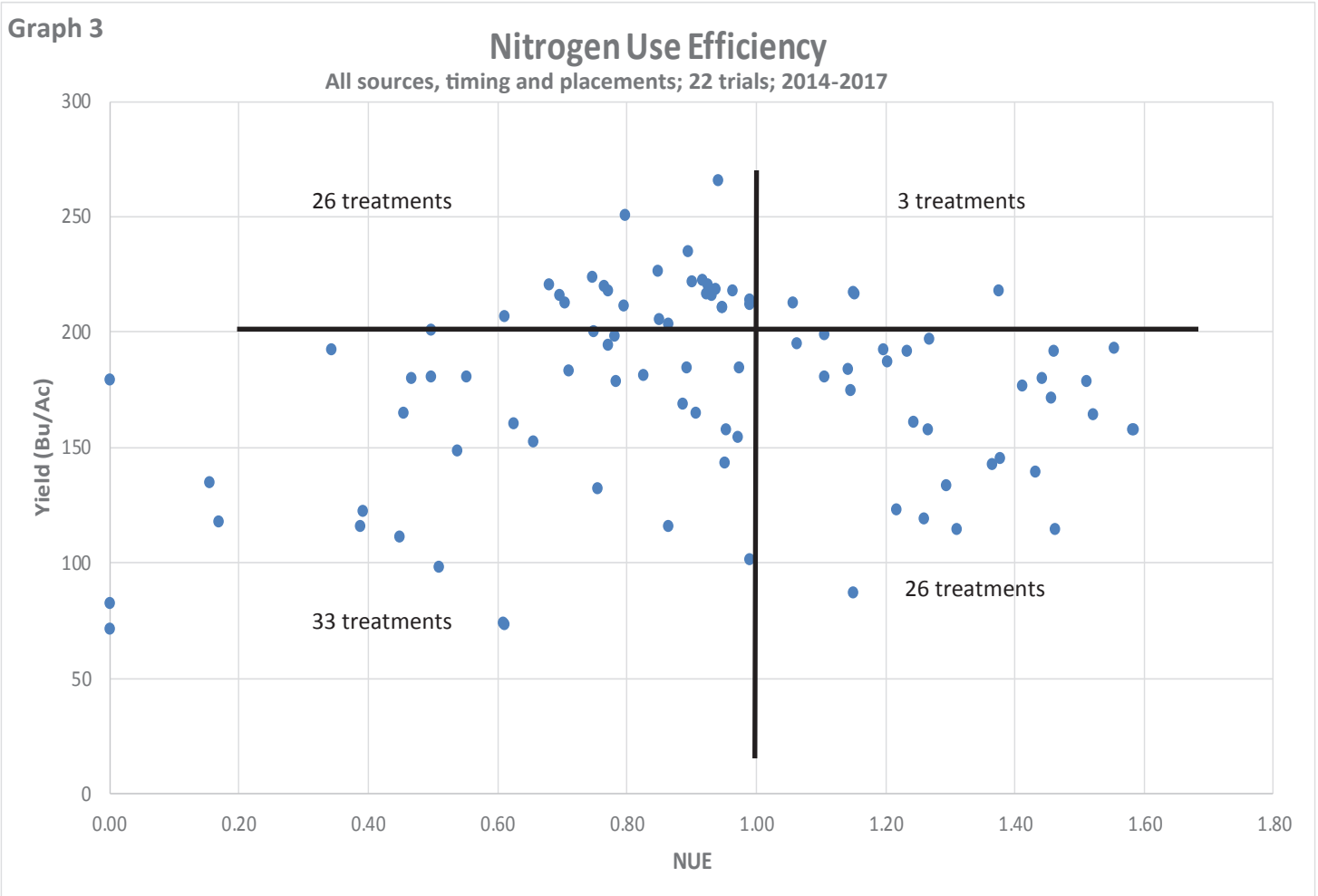
Since 2014, 22 Nitrogen trials (including rate, placement, timing and source) have been conducted (See Graph 2).

Nitrogen Use Efficiency (NUE) is a measure of the units of commercial nitrogen used to produce 1 bushel of corn. All NUE's were plotted on a graph to determine which NUE occurred the most often (See Graph 3). The results were quite mixed, However, 67% of the points plotted were at a NUE less than 1.0 #N per bushel. In treatments that yielded above 200 bu/ac, 90% of the points (26 out of 29) had a NUE less than 1.0. NUE should be evaluated by each farmer, on a field by field and a variety by variety basis.

Graph 2



Graph 3


Nitrogen Use Efficiency
All sources, timing and placements; 22 trials; 2014-2017
26 treatments
3 treatments
33 treatments
26 treatments
Yield (Bu/Ac)
NUE
300
250
200
150
100
50
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80

5. Nitrogen Source

OBJECTIVE

To determine the effects of nitrogen source on corn yield and profitability.

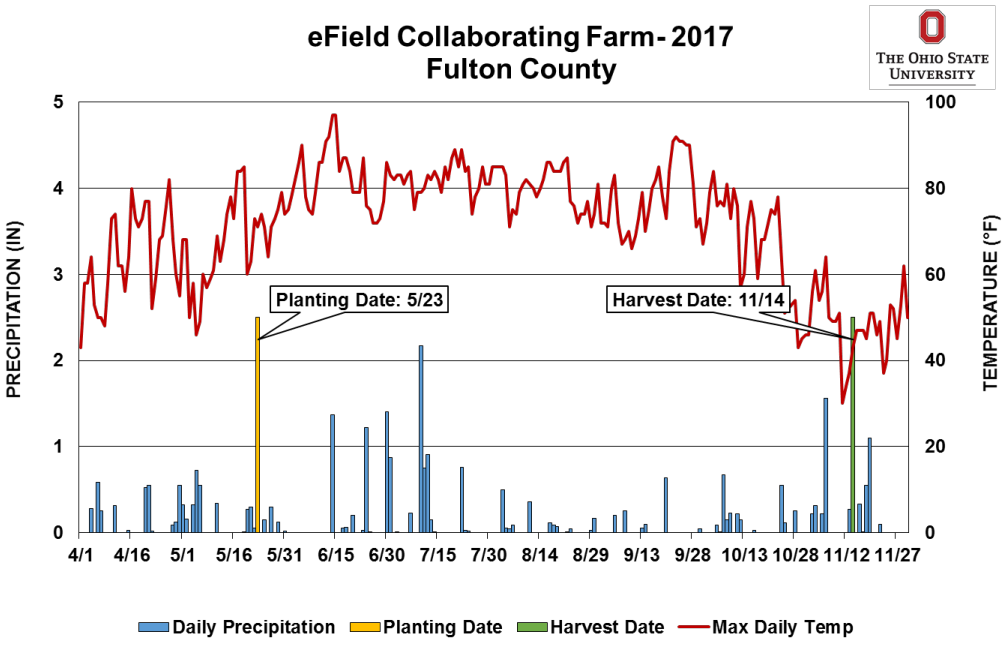
OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

Planting Date	5/23/2017
Harvest Date	11/14/2017
Variety	Pioneer 0843 AM
Population	33,000 sds/ac
Acres	19.1
Treatments	4
Reps	4
Treatment Width	30 ft (12 Rows)
Tillage	No Till
Herbicide	Cinch ATZ, Instigate
Pesticide	Tombstone
Previous Crop	Soybeans
Row Width	30”
Soil Type	Colwood Loam Bixler LFS



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

STUDY DESIGN

High speed, low disturbance nutrient application systems have been recently adopted which allow for a variety of nitrogen products to be injected below the soil surface at sidedress. This study evaluated four nitrogen sidedress source systems after 80 lbs of nitrogen was applied at planting.

Treatments	Application Rate	Equipment System
28% UAN	43 gal/ac	Spray King
82% Anhydrous	159 lb/ac	Countryside Implements
46% Urea	283 lb/ac	John Deere 2510H
45% ESN–slow release	289 lb/ac	John Deere 2510H

Anhydrous, urea and 28% UAN being applied on 5-leaf (V5) corn.

OBSERVATIONS

Throughout the year, plant growth was monitored for any potential treatment differences. No yield limiting factors were observed.

All sidedress applications of nitrogen were made on June 19th. Approximately .3" of rain was observed in 24 hours immediately after sidedress.

Cornstalk nitrate tests were evaluated at 10 days post black layer to evaluate nitrate-nitrogen levels at maturity. Yields were determined by weigh wagon and commercial moisture checks.

Sidedress application of dry products

SUMMARY

- No significant difference found among anhydrous, urea and ESN sources (systems). The 28% check showed a significantly lower yield than the other 3 treatments.
- Nitrogen use efficiency (NUE) was maximized in the anhydrous and urea systems.
- Additional replications and year-over-year data will add to the validity of these results. This study will be conducted for two more years

Tools of the Trade

High Speed, Low Disturbance (HSLD)

Several agricultural equipment manufacturers now offer a high speed, low disturbance system for placing nutrients below the surface. John Deere's 2510H is one such toolbar that allows for dry, liquid or gas nutrient placement in an efficient and environmentally friendly way.

SPONSORS

OSU Extension-Fulton County would like to thank on farm collaborators Les & Jerry Seiler for planting and harvesting the plot. Additionally this study could not have been possible without Kenn-Feld Group John Deere, Countryside Implements, Crop Production Services, Neu-Brook Pioneer Seeds, the Dr. Culman fertility lab and OSUE interns Ross Andre and Kaitlin Ruetz. This field is included in the OSU Digital Ag eFields Report, to view more eField reports visit Facebook @OhioStatePA.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

Treatments	Total N (lbs/ac)	CSNT (ppm NO3-N)	Moisture (%)	Yield (bu/ac)	Yield Diff (bu/ac)	NUE (lbsN/bu)	LSD
28% UAN	210	162	22.4	214.6	-	.98	b
82% AA	210	645	23.1	230.5	+16	.91	a
46% Urea	210	78	22.8	229.3	+14	.92	a
45% ESN	210	424	23.3	224.7	+10	.93	a

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

6. Nitrogen Timing

OBJECTIVE

To determine the effects of nitrogen timing on corn yield and profitability.

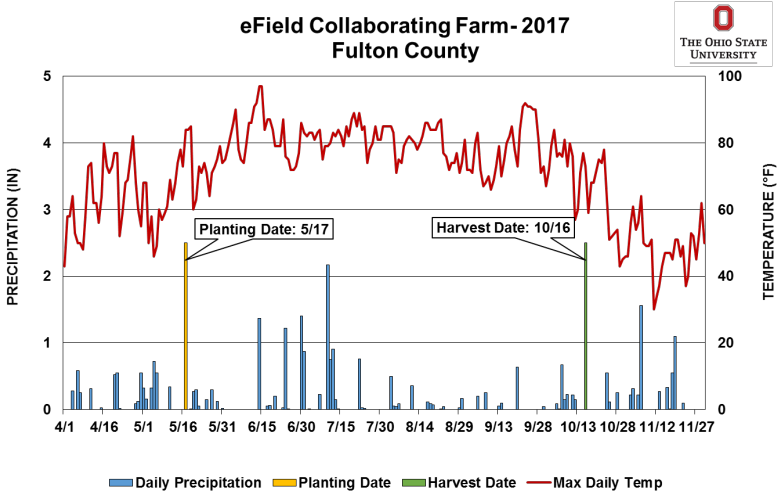
OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

	Fulton Co 1	Fulton Co 2	Fulton Co 3
Planting Date	5/17/2017	5/16/2017	5/18/2017
Harvest Date	10/16/2017	10/19/2017	10/16/2017
Variety	DK 5520	Pio 0843 AM	Pio 0825 AM
Population	34,000	33,000	33,000
Acres	13	55	40
Treatments	4	4	4
Reps	3	4	3
Treatment Width	30-60 ft	60 ft	60 ft
Tillage	Fall Chisel	Stale Seed Bed	Spring cultivate
Herbicide	Triple Flex, Atrazine, Roundup	Triple Flex, Atrazine, Sharpen	Bicep II Magnum, Roundup
Nitrogen at Plant	90 lbs	70 lbs	70 lbs
Previous Crop	Soybeans	Soybeans	Soybeans
Row Width	30”	30”	30”
Soil Type	Lenawee SCL, Fulton SCL	Mermill Loam, Haskins Loam	Hoytville Loam Mermill Loam



Weather Summary

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	145.0	420.0	1020.0	1714.0	2292.0	2292.0

Liquid nitrogen placed near the stalk.

STUDY DESIGN

High-clearance equipment has allowed producers to stretch the nitrogen application window in corn. Since 2016, three on-farm collaborators have committed to multi-year late season nitrogen trials in Fulton County. All sites had a pre-season yield goal of 210 bushels per acre. In each trial, the check treatment is the farmer’s normal practice of applying all remaining nitrogen at sidedress or approximately 5-leaf (V5) corn. As fewer source and equipment options are available for late season applications, the check treatments in these studies may have different source or placement characteristics than the late season treatments. Finally, in 2017, several ‘reduced rate’ treatments were tried as corn is generally more efficient with nitrogen applied later in season.

Late season N application on ten-leaf (V10) corn.

Results—Fulton #1				2017 Data				2016 Data
Treatments	Placement	Rate (total N/ac)	Source	CSNT (ppm)	Yield (bu/ac)	Yield Diff (bu/ac)	NUE (lbs N/bu)	Yield (bu/ac)
Check @ V5	Coulter/Knife	210	28% UAN	58	232.7 a	-	.90	219.0 a
Late N @ V12	Y-Drops ®	210	28% UAN	449	234.7 a	+2	.89	218.8 a
Split @ V5 & V12	Both	210	28% UAN	1,375	239.0 a	+6	.88	222.0 a
Late N @ V12 (reduced)	Y-Drops ®	168	28% UAN	173	219.7 b	-13	.76	N/A

Treatments with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

SUMMARY #1

Two-year yield data suggests in season application equipment allows for a longer nitrogen application window with no impact on yield when comparing similar nitrogen rates. Split in-season applications have not shown significant yield gains in this study.

Results—Fulton #2				2017 Data				2016 Data
Treatments	Placement	Rate (total N/ac)	Source	CSNT (ppm)	Yield (bu/ac)	Yield Diff (bu/ac)	NUE (lbs N/bu)	Yield (bu/ac)
Check @ V5	Y-Drops ®	210	28% UAN	831	223.2 a	-	.94	173.9 a
Late N @ V10	Y-Drops ®	210	28% UAN	1,048	218.0 a	-5	.96	176.2 a
Late N @ V10 (reduced)	Y-Drops ®	168	28% UAN	57	218.0 a	-5	.77	175.6 a
Late N @ V10 (reduced)	Y-Drops ®	126	28% UAN	20	206.5 b	-16	.61	N/A

SUMMARY #2

Two-year data suggests that late season nitrogen application at reduced rates can produce statistically similar yields at reduced input cost. Additional study is needed to better refine reduced rates and environmental conditions that drive late N rates.

Results—Fulton #3				2017 Data				2016 Data
Treatments	Placement	Rate (total N/ac)	Source	CSNT (ppm)	Yield (bu/ac)	Yield Diff (bu/ac)	NUE (lbs N/bu)	Yield (bu/ac)
Check @ V5	Gas Injection	210	Anhydrous	458	209.2 a	-	1.0	212.8 a
Late N @ V12	Y-Drops ®	210	28% UAN	972	211.9 a	+4	.99	211.2 a
Split @ V5 & V12	Both	210	Both	1,633	214.4 a	+6	.98	214.4 a
Late N @ V12 (reduced)	Y-Drops ®	168	28% UAN	148	211.2 a	+3	.80	N/A

SUMMARY #3

Two-year data suggests corn yields showed no difference when comparing late season application of 28% UAN and sidedress anhydrous when applied at similar N rates . No significant yield loss was realized at a reduced rate of 168 lbs total N per acre in this study.

Toolbar used for check treatments in Fulton #2.

SPONSORS

The project contact expresses appreciation to on-farm collaborators J & J Ag, Von Seggern Farms and Larry Richer. Thanks to the Ohio Corn Checkoff Board and OARDC Fertility Lab for supporting this research. Thanks also to Ross Andre, Ben Eggers and Kaitlin Ruetz, OSUE interns for data collection and processing. This field is included in the Digital Ag eFields Report, to view more eField reports visit Facebook @OhioStatePA.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, Extension Educator, Agriculture and Natural Resources, Ohio State University Extension– Fulton County (richer.5@osu.edu).

7. Asiatic Garden Beetle: Monitoring and Early Evaluation of Management Tactics

OBJECTIVE

Evaluate sampling methods and effects of foliar-insecticide application, tillage, and Bt-crops on Asiatic garden beetle (AGB) in a soybean-corn rotation.

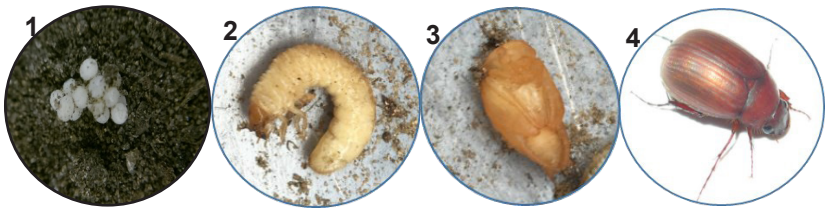
OARDC

Wooster, OH

Hosted in Fulton County

STUDY INFORMATION

	2016	2017
Location	**Wauseon, OH**	**Wauseon, OH**
Planting Date	5/23/2016	5/18/2017
Harvest Date	10/12/2016	10/18/2017
Variety	Pio 32T83 Liberty	Pioneer 0157
Population	180,000 sds/ac	32,000 sds/ac
Acres	38	4
Treatments	5	5
Reps	2	1
Treatment Width	120 ft	N/A
Tillage	No till	Till and No till
Herbicide	Liberty soybeans	BiCep II, Glyphosate
Pesticide	Asana, Prevathon,	N/A
Previous Crop	Corn	Soybeans
Row Width	15”	30”
Soil Type	Ottokee, Tedrow Sand	Ottokee, Tedrow Sand



Life stages of AGB; 1) eggs, 2) grub, 3) pupa, and 4) adult

Weather Summary—2016

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	2.58	2.95	3.32	2.72	4.72	16.29
Cumulative GDDs	224	574	1220	1965	2749	2749

Weather Summary—2017

Total	APR	MAY	JUN	JUL	AUG	Total
Precip (in)	3.30	3.63	4.34	5.91	1.56	18.74
Cumulative GDDs	357	689	1322	2028	2609	2609

Extensive plant stand loss caused by AGB grubs in early-season corn. The grubs hatch from eggs in the soil from mid to late summer and emerge in spring to feed on roots.

STUDY DESIGN

The grubs of Asiatic garden beetle can be devastating pests of early-season field corn in Northwest Ohio. Management practices for this pest are either largely ineffective, or have not yet been evaluated for efficacy. In 2016, four foliar insecticide treatments were applied to soybean on July 15 for management of AGB populations. AGB grubs and adults were monitored for in 2017 in rotated corn to identify whether there were any effects from the insecticides. Alongside this study, cultural control practices like tilling and Bt-corn were evaluated for AGB management in parallel with sampling methods used for other annual white grub species (e.g. Japanese beetle, Oriental chaffer, etc.); grubs were sampled using the compact and golf hole cup cutter soil methods , while adults were sampled using pitfall traps and sticky cards placed at canopy height. Identifying successful trapping methods for AGB will allow for standardized evaluations of management tactics in the future.

Sampling methods evaluated weekly for AGB grubs; 1) compact soil method, 2) cup cutter soil method, and adults; 3) sticky traps and 4) pitfall traps.

Results
Foliar insecticides

Product name	Active ingredient	Rate (fl oz/A)	Plant stand count per acre (2017 Data)	Mean grubs per plot (2017 Data)	Mean adults per plot (2017 Data)	Yield (bu/A) (2016 Data*)
Check	N/A	-	33,765a	9.1a	51.3	49.0
Asana® XL	*esfenvalerate*	9.6	33,108a	8.8a	82.9	45.6
Prevathon®	*chlorantraniliprole*	20	32,439a	1.4b	17.5	49.0
Steward® EC	*indoxacarb*	11	32,459a	5.4ab	16.6	49.7
Warrior®	*lambda-cyhalothrin*	1.9	32,239a	2.7b	5.3	43.8

Treatments with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

SUMMARY #1: Foliar Insecticides

Corn planted following soybean treated with foliar-applications of Prevathon® and Warrior® had significantly fewer grubs and adults per plot. Steward® had fewer adults than check plots. Areas treated with Asana® had grub and adult populations similar to the Check. **DISCLAIMER:** This data is based on 2 replicates. Further studies are needed to verify the performance of these products for management of AGB.

***NOTE:** AGB populations were not adequately monitored in 2016; pretreatment population size is unknown.

Results
Cultural Control

Treatment	Mean grubs per plot (2017 Data)
No-till	8.6
Till	5.4
Pioneer 0157G (non-Bt)	7.4
Pioneer 0157AM (Bt)	6.7

SUMMARY #2: Cultural Control

Tilled plots had significantly fewer grubs than those without tillage. Pioneer 0157G corn plots had similar numbers of grubs as Pioneer 0157AM corn plots; Bt-varieties did not influence grub population size.

Purpling corn due to the primary root being clipped by AGB larva.

Results
Sampling Methods

Sampling method	Mean grubs per soil volume (2017 Data)	Mean adults per trap (2017 Data)
Compact method	0.3	—
Cup cutter	0.5	—
Sticky trap	—	0.0
Pitfall trap	—	8.7

SUMMARY #3: Grub Sampling

The cup cutter method (75in^3) sampled more grubs per volume than the compact method (256in^3) when adjusted for volume. A smaller soil sampling method can be used to adequately estimate the number of grubs per unit volume. This information will help to evaluate management tactics systematically and develop economic threshold levels for AGB.

SUMMARY #4: Adult Sampling

Pitfall traps consisting of a deli container (5.5" tall with 4" diameter) that was filled 1/3 full with water had a significantly greater adult AGB capture rate than yellow sticky traps (3" x 5") placed above the corn canopy. When using pitfall traps, any size container placed in the ground flush with the surface should work; killing agents like antifreeze can be used in place of water.

AGB adults caught in a simple "pitfall" trap in July.

SPONSORS

The project contact expresses appreciation to on-farm collaborator Ken Clark. Thanks also to Dr. Kelley Tilmon, Dr. Andy Michel, Amy Raudenbush, Ross Andre, Amberleigh Ray, Kat Suggs, and Megan Zerrer.

PROJECT CONTACT

For inquiries about this project, contact Adrian Pekarcik, Entomology PhD Student, Ohio State University—Ohio Agricultural Research and Development Center (pekarcik.4@osu.edu).

8a. Economics of Wheat Plus a Second Crop

OBJECTIVE

To evaluate the yield and profitability of wheat followed by a second crop.

OARDC

Northwest Branch

Custar, OH

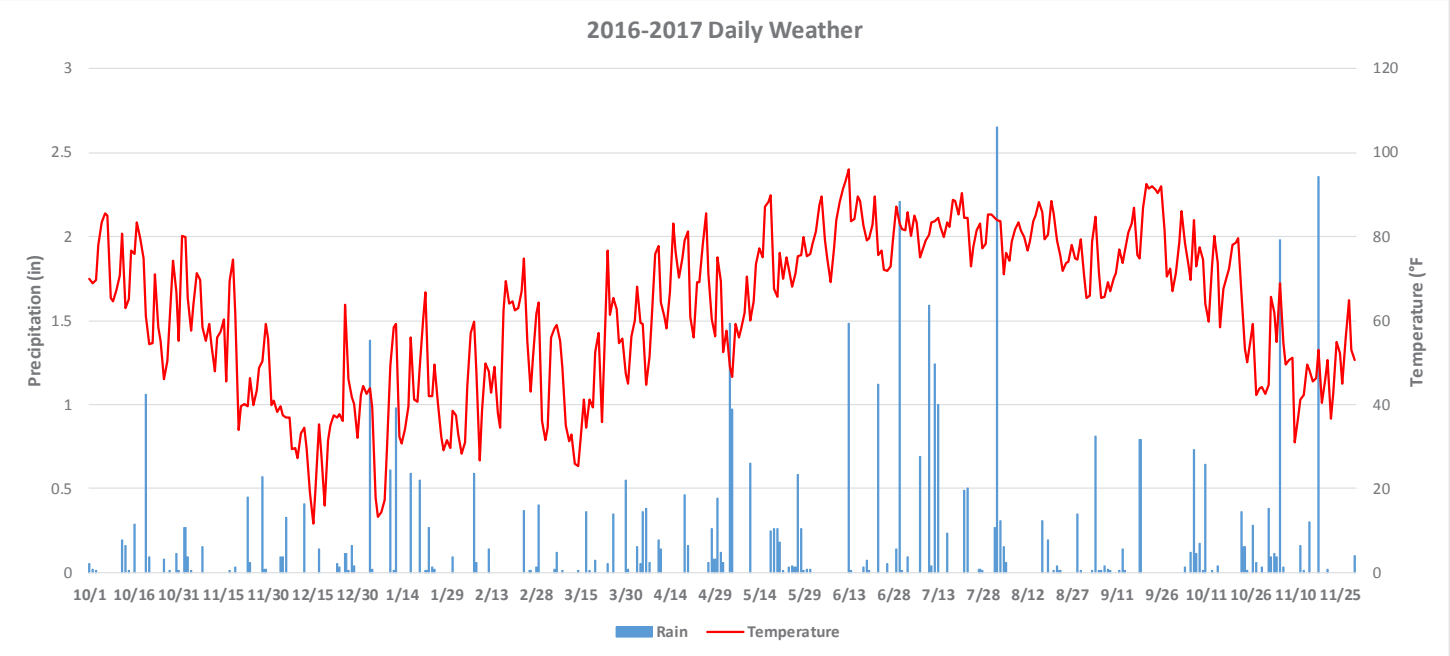
STUDY INFORMATION

Wheat Planting Date	10/12/2016
Wheat Harvest Date	7/3/2017
Wheat Variety	Rupp 902
Soybean Variety	Pioneer 31T11
Red Clover Variety	Cisco Gallant
Oat Variety	Everleaf Forage
Population	1.8 M sds/ac
Acre	1/10
Treatments	9
Reps	4
Treatment Dimensions	10 ft x75 ft
Previous Crop	Soybeans
Tillage	Conventional
Row Width	Varies
Soil Type	Hoytville Clay Loam

STUDY DESIGN

This small plot study was designed with nine treatments replicated four times in a randomized complete block design. Treatments included All treatments received the same starter fertilizer, herbicide and topdress nitrogen. The study was planted, sprayed and harvested with small test plot equipment. Treatments included:

- Soybeans planted June 6, 2017
- Red clover frost seeded March 9, 2017
- Wheat (7.5" & 15" rows) planted October 12, 2016
- Wheat followed by double crop (DC) soybeans July 6, 2017
- Wheat followed by modified relay intercropped (MRI) soybeans June 6, 2017
- Wheat followed frost seeded red clover March 9, 2017
- Wheat followed double crop (DC) forage oats planted August 10, 2017



OBSERVATIONS

Throughout the year, plant growth was monitored by OARDC – Northwest Research Staff. For 2017 no major crop damage or stress was observed

Yield Data

Wheat and soybean yields and moistures were measured by using a calibrated weigh wagon and commercial moisture tester. Forage Yields (red clover and oats) were estimated by taking eight randomized 1-square-foot cuttings, drying to 0% moisture and converting to dry matter (DM) tons per acre. Straw yield was not taken in this study.

Statistics

For the purposes of this report statistical difference (LSD) was calculated for wheat yield only.

SUMMARY

- 2017 data suggest there was no difference in yield for 7.5" wheat, 15" wheat fb red clover or 7.5" wheat fb soybeans, red clover, or oats. The wheat with interseeded soybeans likely had reduced yield due to mechanical damage.
- Wheat in 7.5" rows out yielded that in 15" rows.
- Standard economic calculations suggest 2017 wheat with interseeded or doublecropped soybeans grossed the greatest returns per acre. In 2016, wheat with doublecropped soybeans or forage oats grossed the greatest returns.
- Mulit-year, multi-site replications will add to the validity of these results.

SPONSORS

This study is supported by Ohio Small Grains Marketing Program. Thanks to Matt Davis at OARDC Northwest for conducting field work and OSUE interns Ross Andre and Kaitlin Ruetz for assistance with data collection and processing.

PROJECT CONTACT

For inquiries about this project, contact Eric Richer, richer.5@osu.edu; Bruce Clevenger, Clevenger.10@osu.edu or Laura Lindsey, lindsey.233@osu.edu.

	2017 Data				*2016 Data*
Treatment	**Crop**	**Yield**	**LSD**	**Gross Revenue**	**Yield**
1 Soybeans in 15" rows (160,000 sds/ac)	Soybeans	60.6 (bu/ac)		$545	49.5 (bu/ac)
2 Frost seed red clover in March (10#/ac)	Clover	1.8 (T/ac)		$90	1.5 (T/ac)
3 Wheat in 7.5" rows (1.8 M sds/ac)	Wheat	113.4 (bu/ac)	a	$454	88.9 (bu/ac)
4 Wheat in 15" rows (900K sds/ac)	Wheat	107.2 (bu/ac)	b	$429	65.8 (bu/ac)
5 Wheat in 7.5" rows fb DC soybeans	Wheat Soybeans	114.0 (bu/ac) 29.7 (bu/ac)	a	$723	86.8 (bu/ac) 12.8 (bu/ac)
6 Wheat in 7.5" rows w/ frost seed clover	Wheat Clover	110.4 (bu/ac) 2.9 (T/ac)	ab	$587	78.9 (bu/ac) 1.4 (T/ac)
7 Wheat in 15" rows w/ MRI soybeans	Wheat Soybeans	92.8 (bu/ac) 42.9 (bu/ac)	c	$757	51.6 (bu/ac) 17.4 (bu/ac)
8 Wheat in 15" rows w/ frost seed clover	Wheat Clover	108.8 (bu/ac) 3.1 (T/ac)	ab	$590	70.4 (bu/ac) 1.1 (T/ac)
9 Wheat in 7.5" rows fb DC forage oats	Wheat Oats	112.9 (bu/ac) 1.1 (T/ac)	ab	$507	92.6 (bu/ac) 1.8 (T/ac)

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

8b. Corn Yield Response to Wheat Plus a Second Crop

OBJECTIVE

To determine the corn yield impact from the previous years crop.

STUDY INFORMATION

Planting Date	4/26/2017
Harvest Date	10/31/2017
Variety	Pioneer 0506AM
Population	34,000 sds/ac
Area	750 ft^2
Treatments	9
Reps	4
Treatment Width	2 Rows
Tillage	Minimal
Herbicide	Cinch ATZ, Instigate
Pesticide	Mad Dog Gly, Choice
Previous Crop	Varies
Row Width	30”
Soil Type	Hoytville Clay Loam

STUDY DESIGN

This 2017 study is designed to be the follow up of the 2016 “Economics of Wheat Plus a Second Crop” study. It will be replicated again in 2018 and 2019 after the before mentioned Wheat study.

OBSERVATIONS & SUMMARY

Treatments 2-8 had significant water damage and/ or grass pressure and yields were effected. In summary, statistical difference should not be used until 3 year data is compiled.

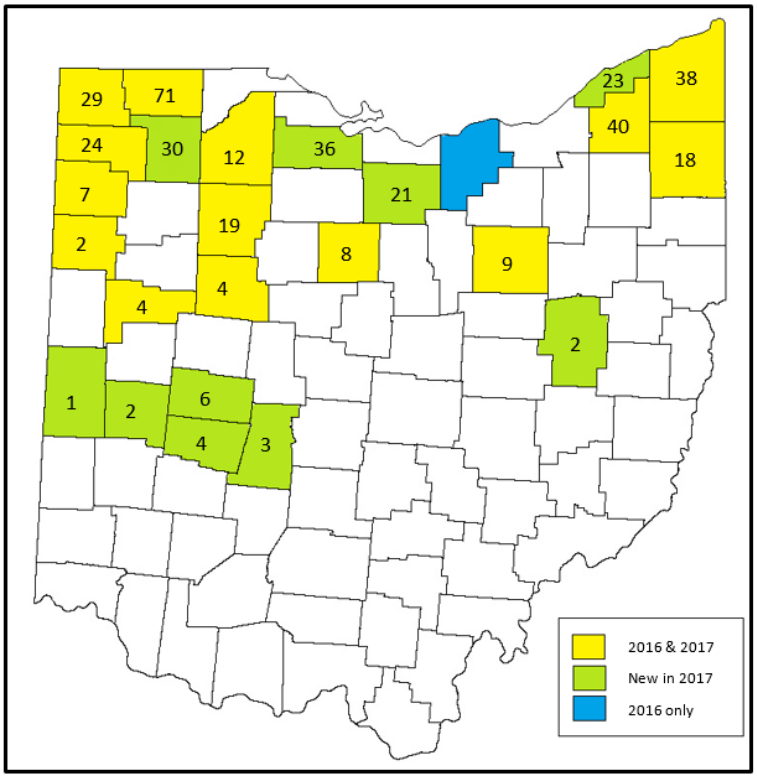
Previous year’s Treatment	Moisture (%)	Yield (bu/ac)	LSD
1 Soybeans in 15” rows	16.4	185.6	a
2 Frost seed red clover	17.1	146.6	ab
3 Wheat in7.5” rows	18.5	139.3	ab
4 Wheat in 15” rows (900K sds/ac)	18.3	120.0	b
5 Wheat in 7.5” rows fb d.c. soybeans	18.0	132.8	b
6 Wheat in 7.5” rows w/ frost seed clover	18.3	102.4	b
7 Wheat in 15” rows w/ MRI soybeans	17.7	116.4	b
8 Wheat in 15” rows w/ frost seed clover	17.4	158.1	ab
9 Wheat in 7.5” rows fb forage oats	18.1	145.4	ab

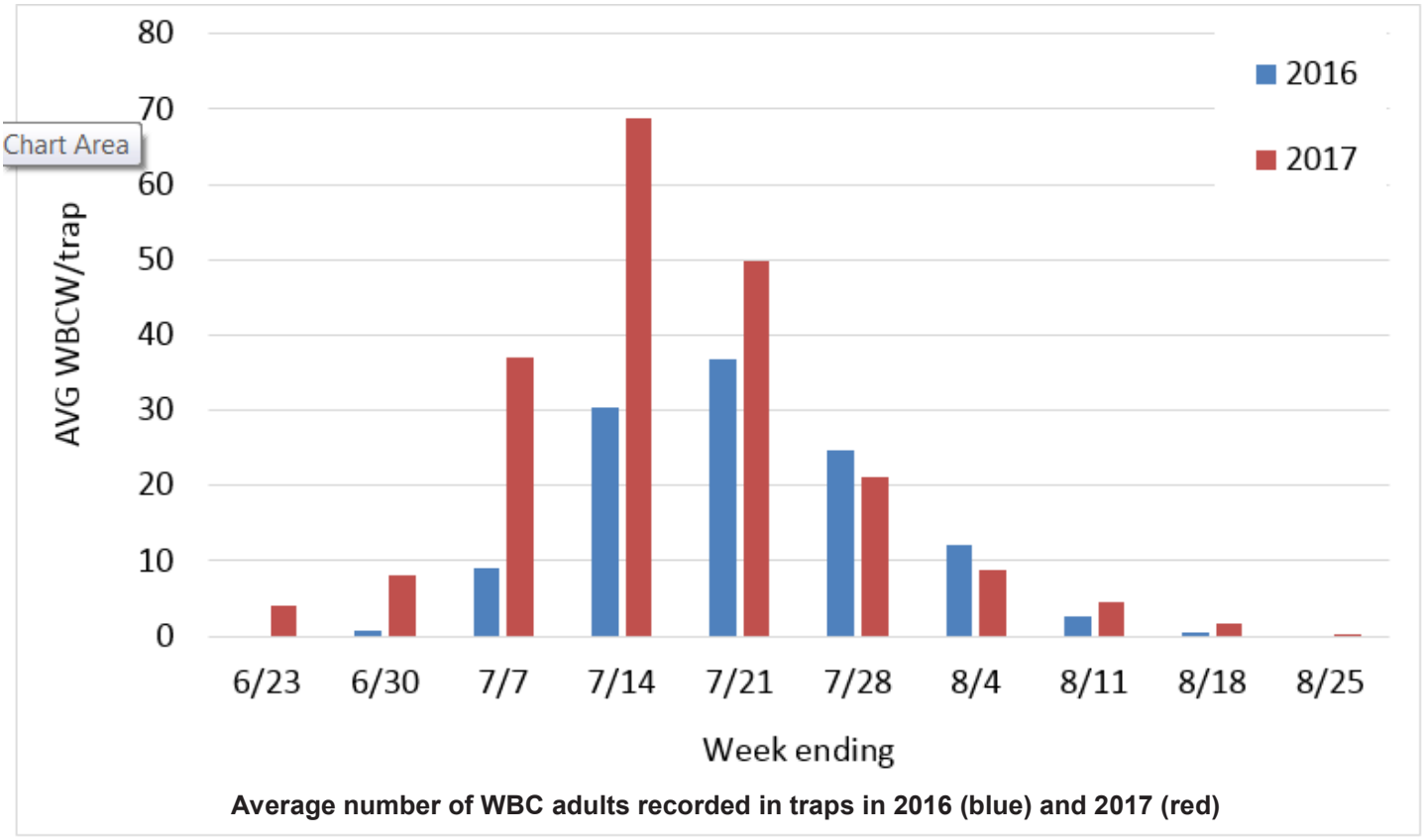
Treatment Means with the same letter are not significantly different according to Fisher’s Protected Least Significant Differences (LSD) test at alpha = 0.05.

9. Western Bean Cutworm Trapping in Ohio

INSECT

Map of Ohio counties participating in WBC trapping. Counties highlighted in yellow participated in WBC trapping and monitoring in 2016 and 2017. Counties highlighted in green began monitoring in 2017. Counties in blue monitored in 2016 only. Number within the county represents the average WBC trapped throughout the duration of the season





Average number of WBC adults recorded in traps in 2016 (blue) and 2017 (red)

Source: OSU Entomology, Raudenbush, Tilmon, Michel

9. Traits for Western Bean Cutworm

OBJECTIVE

To determine the effects of corn insect traits on WBC damage and corn yield.

OSU Extension

Wauseon, OH

Fulton County

STUDY INFORMATION

Fulton Co 1		Fulton Co 2
5/19/2017	Planting Date	4/26/2017
11/10/2017	Harvest Date	10/19/2017
Golden Harvest 07B39	Variety	Golden Harvest 07B39
36,000 sds/ac	Population	35,000 sds/ac
5.7	Acres	13.5
3	Treatments	3
4	Reps	4
20 ft (8 Rows)	Treatment Width	20 ft (8 Rows)
Conventional	Tillage	Spring Finisher
Cinch ATZ	Herbicide	Cinch ATZ, Abundant Edge
Force 3g	Pesticide	N/A
Soybeans	Previous Crop	Soybeans
30”	Row Width	30”
Colwood Loam, Bixler LFS	Soil Type	Gilford FSL

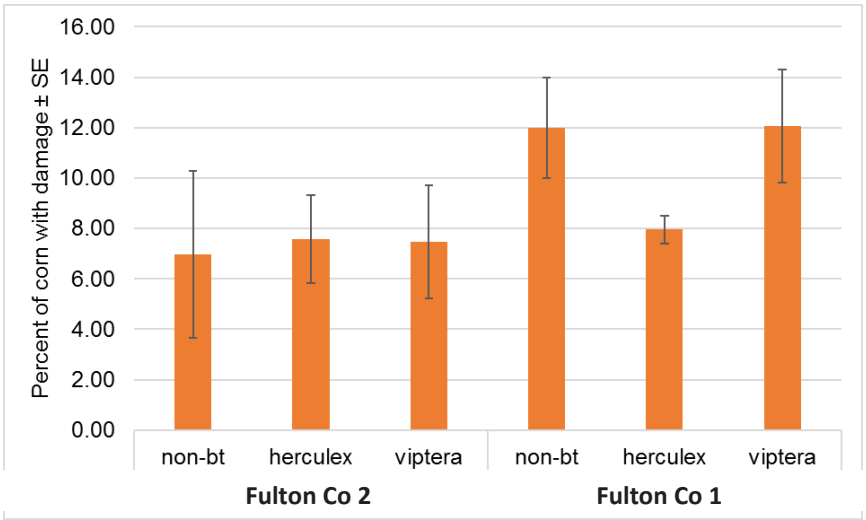
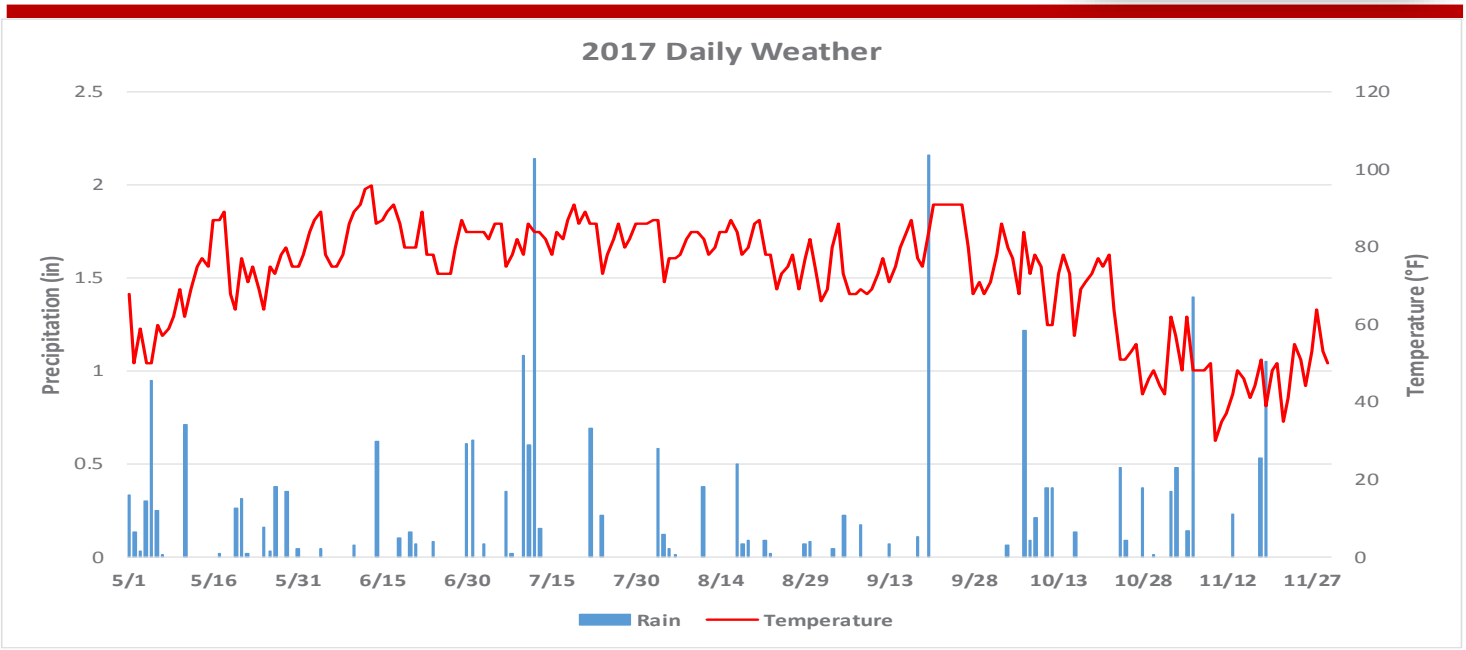


Figure 1. *Percent of corn ears with feeding damage ± standard error (SE) in the western bean cutworm trait trial for Fulton Co 1 & 2.*

Western Bean Cutworm Eggs on a corn leaf.



OBSERVATIONS

Damage Control

Each ear of corn was evaluated for western bean cutworm feeding damage. Damage was quantified by the percentage of kernels damaged and classified as the following:

0 – no damage to the kernels

1 – slight damage to the kernels (<2 kernels)

2 – moderate damage to the kernels (3-10 kernels)

3 – severe damage to the kernels (>10 kernels)

Data was then sorted into two categories, corn with no damage and corn with damage. Percent of corn ears with damage was then calculated. Results are shown in Figure 1.

SUMMARY

Ear Damage: Overall, Fulton 2 had little differences between treatments with percent damage ranging from 6.97 to 7.58 for the non-bt treatment and the Agrisure 3122 (Herculex) treatment, respectively. Whereas Fulton Co 1 both non-bt and Agrisure Viptera 3111 (Viptera) treatments had approximately 12% of corn ears with damage and the Herculex treatment had less damage (approximately 8%). Results from the damage ratings were analyzed using a randomized complete block design with ANOVA. Results indicated no significant differences among treatments at Fulton Co 2 (P=0.9817) and Fulton Co 1 (P=0.1665).

Bucket Trap Monitoring

Green bucket traps are used to monitor for Western Bean Cutworm throughout the state. Each bucket has a WBC pheromone lure and insecticide strip. Adult moths are counted each week from June to August to monitor peek adult flight. Peek adult flight is an indicator of egg laying and subsequent hatch of the 2nd generation which can cause damage to mature corn kernels.

Yield Data: No significant difference in yield was observed between the Non-bt check and Viptera for both locations. The Agrisure 3122/Herculex treatment showed a significantly lower yield than the other two treatments at both locations

SPONSORS

OSU Extension-Fulton County would like to thank on farm collaborators Richard Snyder and Lawrence Onweller for planting and harvesting these plots. Thanks to Dr. Kelley Tilmon and Amy Raudenbush and OSUE interns Ross Andre and Kaitlin Ruetz for assistance with data collection.

PROJECT CONTACT

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Fulton Co 1

Treatments (Traits)	Dry Yield (bu/ac)	Moisture (%)	Stand Count	% Plants with WBC eggs/larva July 19
Non-bt	242 a	22.6 a	33500 ab	7.5%
Agrisure 3122/Herculex (Cry1Ab, Cry1F, mCry3A, Cry34/35Ab1)	231 b	22.5 a	31250 b	5%
Agrisure Viptera 3111 (Cry1Ab, Vip3A, mCry3A)	240 a	23.0 a	34625 a	6.25%

Fulton Co 2

Non-bt	193 a	18.3 b	33000 a	1.3%
Agrisure 3122/Herculex (Cry1Ab, Cry1F, mCry3A, Cry34/35Ab1)	182 b	19.1 a	33125 a	5%
Agrisure Viptera 3111 (Cry1Ab, Vip3A, mCry3A)	195 a	19.4 a	33375 a	12.5%

Treatment Means with the same letter are not significantly different according to Fisher's Protected Least Significant Differences (LSD) test at alpha = 0.05.

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Resources

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Android

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