2022 Crop, Livestock, & Youth Demonstrations & Programs

Greene County Cooperative Extension Service

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MASTER GARDENER

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MASTER GARDENER

2022 Potassium Management Project

Investigator: Dr. Trent Roberts/Dr. Michael Popp ***Extension Agent:*** Dave Freeze

Producers: Blackburn Farm (Britt, Justin), Boyd Farm (Jason, Robin), Distretti Farm (Johnny, Nathan, Ryan), Eason Farm (Carlos, Shane), Finch Farm (Braden, Shaun), Gray Farm (Brad, Randy), Terry Gray, King Farm (Gary, Greg, Larry, Shannon), Brandon Martin, Newsom Farm (Justin, Roy), Pigue Farm (Ashton, David, Clint, Ron), Rice Farm (Blaine, Danny, Nick, Stacey), Roberts Farm (Dallas, Rob, Ronnie, Ryan)

Consultants: Dwight Brannon, Sterling Clifton, Jack Cox, Chris Murray, Lance Taylor, Lance Ramthun, Mike Simmons, Charles Wood, Luke Zitzelburger

Location: Greene County, AR

Background:

In row crop production in Northeast Arkansas, potassium (K) is the primary nutrient needed for soybean production. For other crops (corn, cotton, rice, etc.), it comes in a close second behind nitrogen (N). A vast amount of research in the public and private sector has shown when soil test K levels become deficient, crops yields will be reduced accordingly.

Potassium fertilizer makes up a large part of a row crop farmer's budget. Checking University of Arkansas, Division of Agriculture (UADA) planning budgets for 2023, K fertilizer expense was listed at $41,$41 , and $72/acre , for soybeans, rice, and corn, respectively. These figures pencil out to 7, 4, and 8 % of the total budget for soybeans, rice, and corn, respectively.

It is noteworthy that in 2022, primary fertilizer sources, including potash (K fertilizer), were up significantly due to supply chain disruptions and other economic and political influences seen in the global community we operate today. Potash was in the $900 per ton ballpark in 2022, running 2-3 times what it had been in recent years.

The good news is that UADA scientists and economists have worked together to develop tools to help farmers, and others in the row crop industry, fine tune K nutrient management. Along with routine soil sampling regularly used to determine crop nutrient needs, University officials have recently developed the Potash Rate Calculator (PRC) computer program to help refine the units of potassium (K2O) fertilizer needed at planting, based upon a profitable response.

Researchers have also further developed the procedures for collecting and analyzing plant tissue samples (corn, cotton, rice, soybeans) later in the season for K deficiency. They continue to refine computer models which help predict whether tissue sample K levels are adequate to meet the crops needs, or if corrective late season potash is needed.

Objectives:

Evaluate the use of UADA K management tools to help farmers and consultants adjust early season K fertilizer rates to a profitable level.

Monitor the need for late season K fertilizer based on plant tissue sampling and UADA predictive computer models.

Determine if logistics and timing to collect plant tissues samples, submit them to the diagnostic lab, and receive results and recommendations, will work for farmers and their crop advisors.

Project Setup:

Farmers and their crop advisors were enrolled in the K management project the winter/spring of 2022. A total of 10 soybean, 8 rice, and 3 corn fields were included. Local project partners included 13 farms and 9 consultants. Key UADA K management tool developers (Dr. Michael Popp, Dr. Trent Roberts) were also involved in the planning, implementation, and evaluation of the project.

Step 1 was to get soil sample results for each field in the program. Local consultants graciously provided results for several of the fields they had recently sampled. The County Extension Agent collected soil samples on the rest of the project fields.

Step 2 was to generate PRC printouts for each field to provide the producer with a K fertilizer rate expected to be profitable. Soil test K levels were keyed into the PRC program along with other input data provided by the farmer (expected yield level, expected crop price, current K fertilizer price), to fine tune the units of K2O (k fertilizer) needed at planting.

Step 3 was to collect plant (new leaf) tissue samples later in the season, soon after the crops shifted from vegetative to reproductive growth, and submit them to the UADA diagnostic lab for analysis. The date was recorded the crop on each field reached the beginning of reproductive development (R1 or first flower for soybeans, PI or green ring for rice, and V10 was used for corn).

The first tissue sample for each field was taken 7-14 days after the project field reached reproductive development. A second leaf sample followed 14 days after the first sample was collected, to help monitor plant K levels, and to confirm whether late season corrective K fertilizer was needed or not.

Step 4 was to record the yield for each project field. Yields were then studied and compared to early season soil test K levels, K fertilizer application at planting and late in the season, plant tissue results, and field notes.

SOYBEANS (Results in Tables 1 & 1a)

Soil Test Results:

Based on soil test results, all 10 fields in the program would have required a K fertilizer application at planting using current UADA standard recommendations. The average soil test K level for all project fields was 95 parts per million (ppm), which falls into the UADA medium category, with a recommendation for 75 units (K2O) of K fertilizer.

Checking individual fields, only one had soil test K levels in the optimum (131-175 ppm) category, while three fields fell in medium range (90-130 ppm), and 6 tested in the low range (60-90 ppm). The UADA lab recommendation for fields testing optimum and low in soil test K, is 50 and 120 units K2O, respectively.

Potash Rate Calculator (PRC) Results:

When the PRC program was used (based on a profitable K fertilizer recommendation) only 7 of 10 fields in the project called for K fertilizer at planting. Furthermore, the average K fertilizer suggested for all project fields was 100 units K2O using the UADA standard recommendation, and only 59 units using the PRC program.

The range for PRC recommendations of project fields was from 0 to 96 units K2O. While the farmer estimated yield plugged into the PRC for each farm was quite variable, the estimated price for potash ($900/ton) and crop price ($14.80/bu) were consistent for each field.

Plant Tissue Results & K Monitoring Tool:

Averaged across all project fields, the first tissue sample was collected 10 days after the soybeans reached first flower (R1). The average leaf tissue K level (1.81 % K) was just above the UADA model trigger to recommend corrective late season potash.

The range of K tissue levels for the first samples was from 1.06 to 2.49% K. In addition, 5 of the 10 project fields had low enough K tissue levels that late season K fertilizer was recommended. Fields receiving a recommendation were all suggested 60 units K2O (100 # potash).

Checking results of the second tissue samples taken on project fields (average 24 days after R1), 1.68% K was the average K level. The range of K levels was from 1.15 to 2.22% K. In addition, by this time, one additional project field (6 of 10) was now calling for late season corrective K fertilizer.

UADA officials developed a computer program (Soybean Tissue K Monitoring Tool) we were able to use to key in first flower date, and leaf tissue sample dates and results. The program then generated predictive yield curves (75, 85, and 95%).

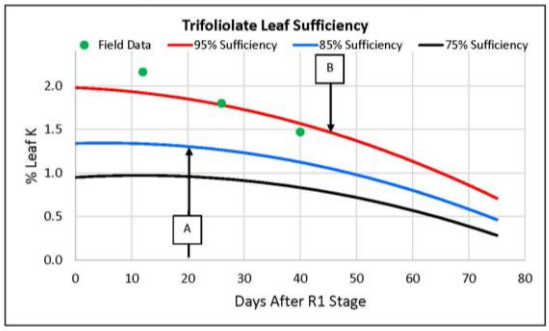
A line graph was also shown giving the relative yield potential of a field plotted by the K tissue levels. The monitoring tool suggested late season corrective K fertilizer any time plotted tissue levels (dynamic critical K levels) fell under the predicted 95% yield curve (researchers note that below this level, K is deficient and yield limiting).

Looking at 1st tissue samples for our project fields, the average dynamic critical K level was 92%, with a range for the 10 fields from 77-100%. Checking results for 2nd tissue samples for our project fields, the average dynamic critical K level was still at 92%, and ranged from 82 to 100%.

Soybean Tissue K Monitoring Tool

Grower Name	Nick Fox	Field Name	Mangrum North
Variety Name	Extend Flex	Maturity Group	IV
County	Greene	State	AR
Planting Date	10-May	R1 (Flowering) Date	10-Jun

Sample	Sample Date (Enter data)	Leaf % K (Enter data)
1	22-Jun	2.16
2	6-Jul	1.8
3	20-Jul	1.47
4		
5		
6		
7		
8		
9		
10		



Yield Results:

Yields for the project fields ranged from 30 to 74 bushels per acre (bpa), with an overall 53 average. It is noteworthy that yields fell some 10% short of the farmer estimated yield potential for their fields.

One reason for this may be the delays seen in planting this season due to excessive early rains, along with waterlogging of some of the fields, especially those on zero grade ground. Other reasons for lower-than-expected yields could be the auxin herbicide injury seen on field S9, along with poor quality litter used on one field, delayed irrigation on another field, and a 6 week heat wave/drought.

Discussion & Summary:

At planting time 7 of 10 of the project soybean fields called for K fertilizer according to the PRC, while 8 fields ended up receiving K fertilizer at this time. An average of 68 units K20 was applied per acre, with a range from 0-120 units. In addition, 3 of the fields used poultry litter as part of their K fertilizer at planting.

Checking plant tissue results, four of the project fields did not need late season K fertilizer, and did not receive a K fertilizer application.

Six of the project soybean fields observed tissue results that called for a late corrective potash application. Three of these fields did receive a potash application. Two of the fields getting late season potash only made in the 40 bushel yield range. One was 0 grade and had yield limitations due to drainage. The other had a wide range of soil test K levels and most likely could have benefited from a K fertilizer application at planting. The third field receiving late K fertilizer also received 80 units of K fertilizer at planting which may be why it recorded a 64 bpa yield.

Two of the six fields that the K monitoring tool called for a K fertilizer application, just barely triggered the need for an application, so we opted not to make a late season application on these fields. Also, one of them had a soil test K level that was optimum, while the other was in the upper medium range.

The field (S9) in the project with the lowest tissue readings and lowest yield, received a good level of auxin herbicide injury. This resulted in delayed crop development, and also made it a challenge to collect tissue samples.

Leaf tissue sampling soybeans is a somewhat simple procedure. A consultant can collect 15-25 newly developed, fully expanded, trifoliate leaves (without the petiole) to represent the field, as he is making his pest scouting circle in a field. Trifoliate leaves are small and can easily be put in a pocket when scouting the field. They also dry out fairly quickly on the truck dash in a paper bag, and are not too bulky to package up and mail to the diagnostic lab. From sample submission until receiving UADA lab results was generally 7 days, sometimes up to 10-14 days. Use of a private lab may speed up a client/consultant getting sample results.

RICE (Results in Tables 2 & 2a)

Soil Test Results:

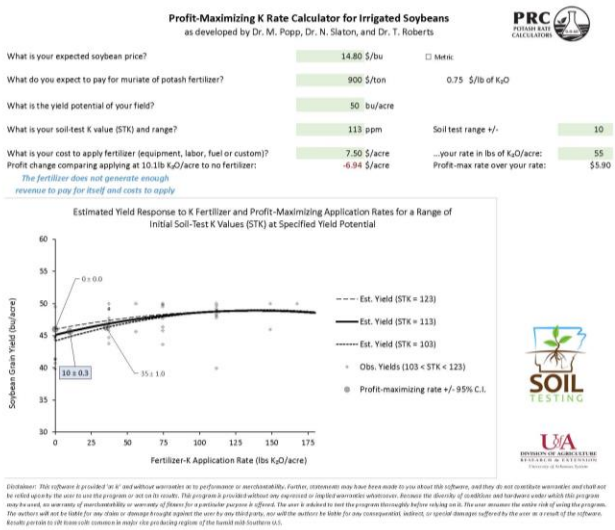
Based on soil test results, 6 out of 8 fields in the program would have required a K fertilizer application at planting using current UADA standard recommendations. The average soil test K level for all project fields was 112 parts per million (ppm), which falls into the UADA medium category, with a recommendation for 60 units (K2O) of K fertilizer.

Checking individual fields, one had soil a soil test K level above optimum (> 175 ppm), one was in the optimum (131-175 ppm) category, while five fields fell in medium range (90-130 ppm), and 1 tested in the very low range (<60 ppm). The UADA lab recommendation for fields testing above optimum, optimum, and very low in soil test K, is 0, 0, and 120 units K2O, respectively.

Potash Rate Calculator (PRC) Results:

When the PRC program was used (based on a profitable K fertilizer recommendation) only 1 of 8 fields in the project called for K fertilizer at planting. Furthermore, the average K fertilizer suggested for all project fields was 53 units K2O using the UADA standard recommendation, and only 13 units using the PRC program.

The range for PRC recommendations of project fields was from 0 to 105 units K2O. While the farmer estimated yield plugged into the PRC for each farm was quite variable, the estimated price for potash ($900/ton) and crop price ($16.00/cwt) were consistent for each field.



Plant Tissue Results & K Monitoring Tool:

Averaged across all project fields, the first tissue sample was collected 5 days after the rice reached green ring (PI). The average leaf tissue K level (2.19 % K) was well above the UADA model trigger (1.6% K) to recommend corrective late season potash.

The range of K tissue levels for the first samples was from 1.44 to 2.94% K. In addition, only 1 of the 8 project fields had low enough K tissue levels that late season K fertilizer was recommended. The field receiving a recommendation was suggested 60 units K2O (100 # potash).

Checking results of the second tissue samples taken on project fields (average 19 days after PI), 1.88% was the average tissue K level. The range of K levels was from 1.68 to 2.18% K. In addition, by this time, none of the project fields were calling for late season corrective K fertilizer.

Yield Results:

Yields for the project fields ranged from 160 to 249 bushels per acre (bpa), with an overall 200 average. The average yield was comparable to the farmer estimated yield potential (205 bu) for their fields.

Checking field notes, the lowest yielding field had a cultivar planted that is not in the high yield range but used for weedy rice situations. Another couple of the fields had also just been leveled, contributing to their lower yields reported. Finally, two of fields were planted late, and one received litter with low K values.

Discussion & Summary:

At planting time, even though only 1 of 8 of the project rice fields called for K fertilizer according to the PRC, all 8 fields received K fertilizer at this time. An average of 65 units K20 was applied per acre, with a range from 28-90 units. Three of the fields received poultry litter at planting (one was recently leveled), contributing some to this elevated use of K fertilizer on these fields.

With the standard UADA soil test recommendation calling for K fertilizer on 6 of the 8 project fields, the producers were making applications as they had been accustomed too. Rice project results show that producers and consultants will need to gain confidence in pulling back on use of K fertilizer at planting when it is recommended with support of soil test data and PRC profit rate predictions.

When tissue level results are considered, only 2 farmers applied late season K fertilizer. One did not get a K fertilizer recommendation based on tissue results, but routinely mixes some potash in with urea to apply at boot stage to hybrid rice.

The farmer who did have a low K tissue reading, did make a late season potash application (60 units K2O) and ended up with a good yield for the cultivar being grown.

Leaf tissue sampling in rice is a fairly easy process. A consultant can collect 20-30 Y-leaves (only leaf blades, from the newest leaves extending from the whorl, with leaf collar showing) to represent the field as he is making his weekly circle in the field to scout for pests. The leave blades are small and can easily be put in a pocket when scouting the field. They also dry out very quickly on the truck dash and are very compact to package up and send to the diagnostic lab.

CORN (Results in Table 3)

Soil Test Results:

Based on soil test results, all 3 fields in the program would have required a K fertilizer application at planting using current UADA standard recommendations. The average soil test K level for all project fields was 67 parts per million (ppm), which falls into the UADA low category, with a recommendation for 120 units (K2O) of K fertilizer with yield goal of >200 bpa.

Checking individual fields, one had a soil test K level in the medium (91-130 ppm) category, while the other two fields fell in the very low range (<60 ppm). The UADA lab recommendation for fields testing medium and very low in soil test K, is 70 and 160 units K2O, respectively.

Potash Rate Calculator (PRC) Results:

When the PRC program was used (based on a profitable K fertilizer recommendation) only 2 of 3 fields in the project called for K fertilizer at planting. Furthermore, the average K fertilizer suggested for all project fields was 130 units K2O using the UADA standard recommendation, and only 80 units using the PRC program.

The range for PRC recommendations of project fields was from 0 to 121 units K2O. While the farmer estimated yield plugged into the PRC for each farm was variable, the estimated price for potash ($900/ton) and crop price ($7.30) were consistent for each field.

Plant Tissue Results & K Monitoring Tool:

Averaged across all project fields, the first tissue sample was collected 8 days after the corn reached V10. The average leaf tissue K level (2.00 % K) was a little above the UADA model trigger (1.75% K) to recommend corrective late season potash.

The range of K tissue levels for the first samples was from 1.62 to 2.2% K. In addition, 1 of the 3 project fields had low enough K tissue levels that late season K fertilizer was recommended. The field receiving a recommendation was suggested 60 units K2O (100 # potash).

Checking results of the second tissue samples taken on project fields (average 28 days after V10), 1.68 % was the average K level. The range of K levels was from 1.46 to 2.34% K. By this time, only field C2 was still calling for late season corrective K fertilizer. This field received 100 # potash after seeing low K tissue levels from our first sample.

Yield Results:

Yields for the project fields ranged from 168 to 190 bushels per acre (bpa), with an overall 176 average. It is noteworthy that yields fell some 15% short of the farmer estimated yield potential for their fields.

One reason for this may be the delays seen in planting this season due to excessive early rains, along with waterlogging on one of the fields. One field also had cover crop and seemed to get a slow start, plus we had a 6-week heat wave/drought.

Discussion & Summary:

Reviewing farmer K fertilizer applications, the 2 fields testing very low in soil test K, received K fertilizer (one used 120 units commercial K and the other 57 units) near planting.

The PRC did not call for any K fertilizer for the field with the medium soil test report, but the Extension Agent recommended 60 units K2O since the soil test report fell on the low end of the medium range and the farmer was managing for very high yields (litter was used – 120 units K2O).

Late season K fertilizer was only needed for one of the corn project fields based on leaf tissue samples. The producer made a corrective potash (60 units K2O) application and ended up with a nice yield on this field which had soil tested very low for K.

The UADA K management program has merit for corn growers but note the following as you get ready to sample.

1. When tissue samples are collected, it is sometimes challenging to know when a field reaches V10, since the plants first 2-3 leaves often deteriorate and cannot easily be seen.
2. Collect 4-5 leaves for your sample. Submit only leaf blades collected from the uppermost fully collared leaf or from the leaf subtending the ear.
3. With corn being so tall when tissue samples are taken, it makes it harder to get composite samples that represent the whole field.
4. Leaves are much larger to sample (compared to rice & soybeans), so fewer leaves can be collected and prepared to ship per tissue sample. Drying also takes longer.
5. When collecting leaf samples, corn is often shedding pollen, so face (eye, mouth) and body protection are needed to avoid health issues and irritation.

University of Arkansas System, Division of Agriculture

Greene County K2O Management Soybean Program 2022

Table 1: Soil Test, Potash Rate Calculator (PRC), & Plant Tissue Sample, Information & Results

Entry Number	S1	S2	S3	S4	S5	**Average**
Crop	Soybean	Soybean	Soybean	Soybeans	Soybean	10 fields
Est. Yield - Bu./Acre	50	75	60	75	65	59
Est Grain Nutrient Removal - #K2O/A	60	90	72	90	78	65
Crop Price - $/Bu.	$14.80	$13.50	$14.80	$14.80	$14.80	
Potash Price - $/ton	$900	$820	$900	$900	$900	
Soil Test Report Date	April 7th 2022	2021	2021	2020	March 31st 2022	
Soil Test K Level - VL,L,M,O,AO	Optimum	Low	Low	Low	Low	
Soil Test K Level Ave - PPM	132	85	85	85	76	95
Soil Test K Level Range - PPM	28	10	26	38	10	21
Soil Test Rec K Rate - #K20/A	50	120	120	120	120	100
PRC refined Rec K Rate - #K20/A	24	100	100	100	115	84
PRC Profit Max Rec K Rate - #K20/A	0	95	81	95	96	57
Ext Agent Adjust Rec K Rate - #K20/A	0	95	81	95	96	60
Potash applied at planting - #K20/A	0	35	80	0	72	47
Poultry litter at planting - #K20/A		71		120		21
Total Preplant - #K2O/A	0	106	80	120	72	68
Soybean R1 (First Flower) Date	July 17th	August 1st	July 30th	June 22nd	June 10th	
Tissue Sample #1 Date	July 29th R2-12	August 9th R2-11	August 9th R2-9	June 29th R2-7	June 21st R2-8	
Tissue Sample days past R1	12	8	10	7	11	10
Tissue Sample #1 - % K	1.76	2.14	1.46	2.08	2.16	1.81
Est % Yield - Dynamic Critital K Level	92	99	87	97	99	92
Recommended - #K2O/A	60	0	60	0	0	30
Late Season K Applied - #K2O/A	0	0	0	0	0	6
Tissue Sample #2 Date	Aug 10th R3-15	August 23rd R4-15	August 23rd	July 14th R2-10	July 6th R3-12	
Tissue Sample days past R1	24	22	24	20	26	24
Tissue Sample #2 - %K	1.71	1.97	1.57	2.19	1.8	1.68
Est % Yield - Dynamic Critital K Level	93	97	90	100	95	92
Recommended - #K2O/A	60	0	60	0	0	36
Late Season K Applied - #K2O/A	0	0	60 Aug 26th	0	0	7
Crop Yield - Bu/A	45	59	64	49	74	53
Field Notes:	38" rows-irrigation delayed	Late Doublecrop-1 ton litter	K demo field-Late replant	Wet-yield loss to drainage	Good IR, drainage & soil	

University of Arkansas System, Division of Agriculture

Greene County K2O Management Soybean Program 2022

Table 1a: Soil Test, Potash Rate Calculator (PRC), & Plant Tissue Sample, Information & Results

Entry Number	S6	S7	S8	S9	S10
Crop	Soybeans	Soybeans	Soybeans	Soybeans	Soybeans
Est. Yield - Bu./Acre	50	50	60	40	65
Est Grain Nutrient Removal - #K2O/A	60	60	72	48	17
Crop Price - $/Bu.	$14.80	$14.80	$14.80	$14.80	$14.80
Potash Price - $/ton	$900	$900	$900	$900	$900
Soil Test Report Date	Dec 13th 2021			May 6th 2022	April 13th 2021
Soil Test K Level - VL,L,M,O,AO	Low	Medium	Medium	Low	Medium
Soil Test K Level Ave - PPM	77	113	104	68	128
Soil Test K Level Range - PPM	10	62		8	17
Soil Test Rec K Rate - #K20/A	120	75	75	120	75
PRC refined Rec K Rate - #K20/A	113	55	70	128	31
PRC Profit Max Rec K Rate - #K20/A	78	0	51	72	0
Ext Agent Adjust Rec K Rate - #K20/A	78	30	51	72	0
Potash applied at planting - #K20/A	90	0	75	60	60
Poultry litter at planting - #K20/A	14				
Total Preplant - #K2O/A	104	0	75	60	60
Soybean R1 (First Flower) Date	July 19th	June 21st	June 10th	June 21st	July 5th
Tissue Sample #1 Date	July 29th R2-12	June 29th R2-8	June 22nd R2-8	July 6th R2-8	July 13 R2-9
Tissue Sample days past R1	10	8	12	15	8
Tissue Sample #1 - % K	1.6	1.06	2.49	1.13	2.26
Est % Yield - Dynamic Critital K Level	89	77	100	80	100
Recommended - #K2O/A	60	60	0	60	0
Late Season K Applied - #K2O/A	60	0	0	0	0
Tissue Sample #2 Date	August 10th R2	July 14th R2-13	July 7th R2-13	July 20th R2	July 29th R2-14
Tissue Sample days past R1	22	23	27	29	24
Tissue Sample #2 - %K	1.15	1.17	2.22	1.29	1.7
Est % Yield - Dynamic Critital K Level	82	82	100	86	93
Recommended - #K2O/A	60	60	0	60	60
Late Season K Applied - #K2O/A	0	72	0	0	0
Crop Yield - Bu/A	38	40	68	30	64
Field Notes:	Poor litter & poor drainage	Visibal K deficiency	Good IR, drainage, & soil	Auxin herbicide injury	Good beds & drilled

University of Arkansas System, Division of Agriculture
Greene County K2O Management Rice Program 2022
Table 2: Soil Test, Potash Rate Calculator (PRC), & Plant Tissue Sample, Information & Results

Entry Number	R1	R2	R3	R4	R5	**Average**
Crop	Rice-PVL03	Rice-Diamond	Rice-RiceTec 753	Rice-DGL263	Rice-DGL263	8 fields
Est. Yield - Bu./Acre	190	215	180	220	210	205
Est Grain Nutrient Removal - #K2O/A	30	34	29	35	34	33
Crop Price - $/cwt	$16.00	$16.00	$16.00	$16.00	$16.00	
Potash Price - $/ton	$900	$900	$900	$900	$900	
Soil Test Report Date	May 9th 2022	2022	May 6th 2022	April 7th 2022	March 19th 2021	
Soil Test K Level - VL,L,M,O,AO	Above Optimum	Medium	Medium	Optimum	Medium	
Soil Test K Level Ave - PPM	162	110	94	146	116	112
Soil Test K Level Range - PPM	21	37	10	30	14	21
Soil Test Rec K Rate - #K20/A	0	60	60	0	60	53
PRC refined Rec K Rate - #K20/A	0	22	51	0	11	34
PRC Profit Max Rec K Rate - #K20/A	0	0	0	0	0	13
Ext Agent Adjust Rec K Rate - #K20/A	0	0	50	0	0	19
Potash applied at planting - #K20/A	72	72	60	60	90	44
Poultry litter at planting - #K20/A						21
Total Preplant - #K2O/A	72	72	60	60	90	65
Rice PI (greenring) Date	June 27th	July 8th	July 5th	June 21st	June 14th	
Tissue Sample #1 Date	June 29th 1/4" IE	July 13th 1/4"IE	July 7th 1/4"IE	June 29th 1"IE	June 21st 3/4"IE	
Tissue Sample days past PI	2	5	2	8	7	5
Tissue Sample #1 - % K	1.44	1.94	1.99	1.98	2.89	2.19
Tissue Goal - Adequate Level % K	1.6	1.6	1.6	1.6	1.6	1.60
Recommended - #K2O/A	60	0	0	0	0	8
Late Season K Applied - #K2O/A	60	0	0	18	0	10
Tissue Sample #2 Date	July 13th 4"IE	July 28th 5"IE	July 20th 3"IE	July 14th Early boot	July 6th 4"IE	
Tissue Sample days past PI	16	20	15	23	22	19
Tissue Sample #2 - %K	1.75	1.92	1.68	1.85	2.18	1.88
Tissue Goal - Adequate Level % K	1.6	1.6	1.6	1.6	1.6	1.60
Recommended - #K2O/A	0	0	0	0	0	0
Late Season K Applied - #K2O/A	0	0	0	0	0	0
Crop Yield - Bu/A	160	200	192	195	211	200
Notes	Good yield for cultivar	A bit late - Cache R bottoms	Just leveled-0 grade, thin spots	0 grade - good stand & crop	good stand & crop	

University of Arkansas System, Division of Agriculture
Greene County K2O Management Rice Program 2022
Table 2a: Soil Test, Potash Rate Calculator (PRC), & Plant Tissue Sample, Information & Results

Entry Number	R6	R7	R8
Crop	Rice-DGL263	Rice-RiceTec 753	Rice-RiceTec 753
Est Yield - Bu./Acre	225	180	220
Est Grain Nutrient Removal - #K2O/A	36	29	35
Crop Price - $/cwt	$16.00	$16.00	$16.00
Potash Price - $/ton	$900	$900	$900
Soil Test Report Date	2020	Dec 13th 2021	March 31st 2022
Soil Test K Level - VL,L,M,O,AO	Medium	Medium	Very Low
Soil Test K Level Ave - PPM	108	101	55
Soil Test K Level Range - PPM	31	12	10
Soil Test Rec K Rate - #K20/A	60	60	120
PRC refined Rec K Rate - #K20/A	26	37	123
PRC Profit Max Rec K Rate - #K20/A	0	0	105
Ext Agent Adjust Rec K Rate - #K20/A	0	0	105
Potash applied at planting - #K20/A	0	0	0
Poultry litter at planting - #K20/A	60	28	76
Total Preplant - #K2O/A	60	28	76
Rice PI (greenring) Date	June 17th	July 9th	July 1st
Tissue Sample #1 Date	June 22nd 1/2"IE	July 14th 3/4"IE	July 6th 1/4"IE
Tissue Sample days past PI	5	5	5
Tissue Sample #1 - % K	2.94	2.36	1.97
Tissue Goal - Adequate Level % K	1.6	1.6	1.6
Recommended - #K2O/A	0	0	0
Late Season K Applied - #K2O/A	0	0	0
Tissue Sample #2 Date	July 7th 6"IE	August 4th Early boot	July 20th 4"IE
Tissue Sample days past PI	20	20	14
Tissue Sample #2 - %K	2.11	1.79	1.76
Tissue Goal - Adequate Level % K	1.6	1.6	1.6
Recommended - #K2O/A	0	0	0
Late Season K Applied - #K2O/A	0	0	0
Crop Yield - Bu/A	249	185	207
Notes:	0 grade, early, good crop	poor litter, 0 grade, late	0 grade-just leveled, good litter

University of Arkansas System, Division of Agriculture
Greene County K2O Management Corn Program 2022
Table 3: Soil Test, Potash Rate Calculator (PRC), & Plant Tissue Sample, Information & Results

Entry Number	C1	C2	C3	**Average**
Crop	Corn	Corn	Corn	3 fields
Est Yield - Bu./Acre	200	200	245	215
Est Grain Nutrient Removal - #K2O/A	50	50	61	54
Crop Price - $/Bu.	$7.30	$7.30	$7.30	
Potash Price - $/ton	$900	$900	$900	
Soil Test Report Date				
Soil Test K Level - VL,L,M,O,AO	Very Low	Very Low	Medium	
Soil Test K Level Ave - PPM	55	39	108	67
Soil Test K Level Range - PPM		4	26	10
Soil Test Rec K Rate - #K20/A	160	160	70	130
PRC refined Rec K Rate - #K20/A	127	123	83	111
PRC Profit Max Rec K Rate - #K20/A	121	118	0	80
Ext Agent Adjust Rec K Rate - #K20/A	121	118	60	100
Potash applied at planting - #K20/A	120	57	0	59
Poultry litter at planting - #K20/A			120	40
Total Preplant - #K2O/A	120	57	120	99
Corn V10 Date	June 10th	June 15th	June 15th	
Tissue Sample #1 Date	June 21st V11	June 22nd V13	June 22nd V13	
Tissue Sample days past V10	11	7	7	8
Tissue Sample #1 - % K	2.2	1.62	2.19	2.00
Tissue Goal - Adequate Level % K	1.75	1.75	1.75	1.75
Recommended - #K2O/A	0	60	0	20
Late Season K Applied - #K2O/A	0	60	0	20
Tissue Sample #2 Date	July 6th R2	July 20th R3	July 7th R2	
Tissue Sample days past V10	26	35	22	28
Tissue Sample #2 - %K	2.34	1.46	2.21	2.00
Tissue Goal - Adequate Level % K	1.75	1.75	1.75	1.75
Recommended - #K2O/A	0	60	0	20
Late Season K Applied - #K2O/A	0	0	0	0
Crop Yield - Bu/A	168	190	170	176
Notes:	Cover crop, no-till	Soil & tissue K low	0 grade, excess rain-water	

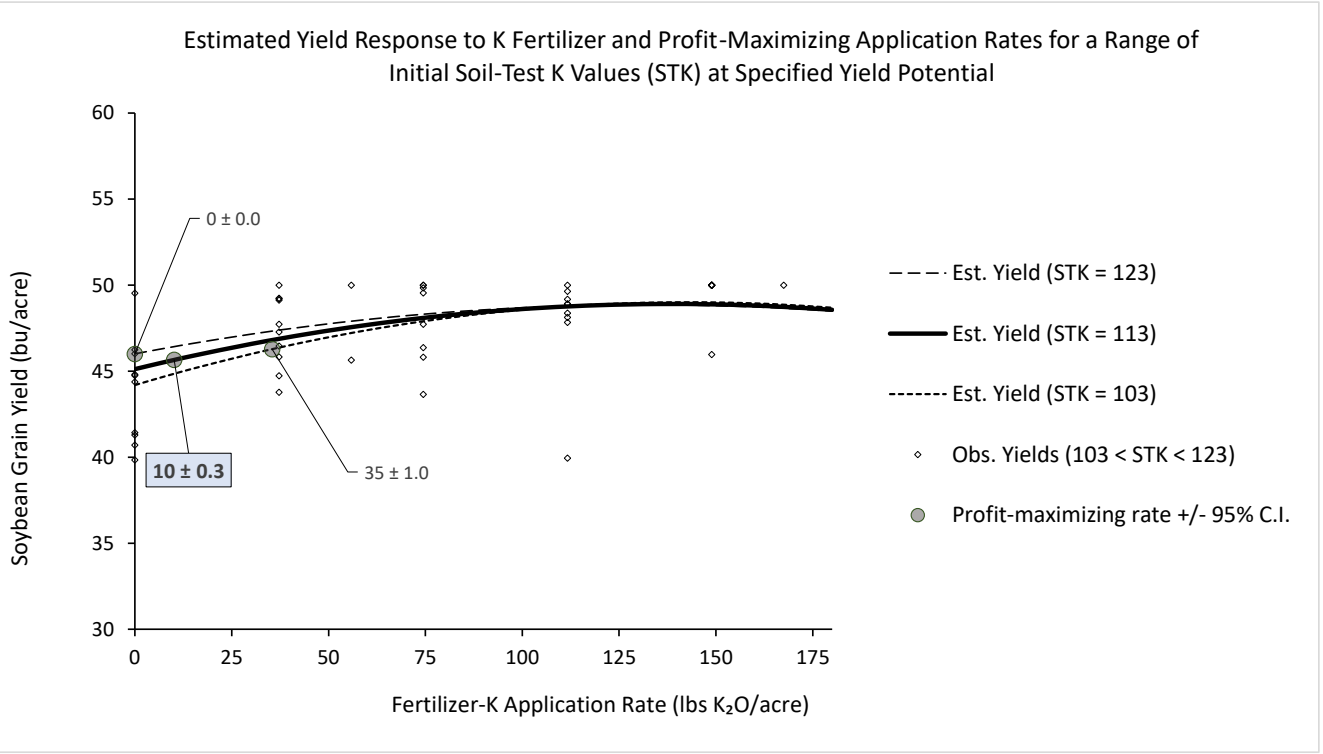
Profit-Maximizing K Rate Calculator for Irrigated Soybeans

as developed by Dr. M. Popp, Dr. N. Slaton, and Dr. T. Roberts

PRC POTASH RATE CALCULATORS 0-0-60

What is your expected soybean price?	14.80	$/bu	☐ Metric	
What do you expect to pay for muriate of potash fertilizer?	900	$/ton	0.75 $/lb of K_2O	
What is the yield potential of your field?	50	bu/acre		
What is your soil-test K value (STK) and range?	113	ppm	Soil test range +/-	10
What is your cost to apply fertilizer (equipment, labor, fuel or custom)?	7.50	$/acre	...your rate in lbs of K_2O/acre:	55
Profit change comparing applying at 10.1lb K_2O/acre to no fertilizer:	-6.94	$/acre	Profit-max rate over your rate:	$5.90

The fertilizer does not generate enough revenue to pay for itself and costs to apply



SOIL TESTING

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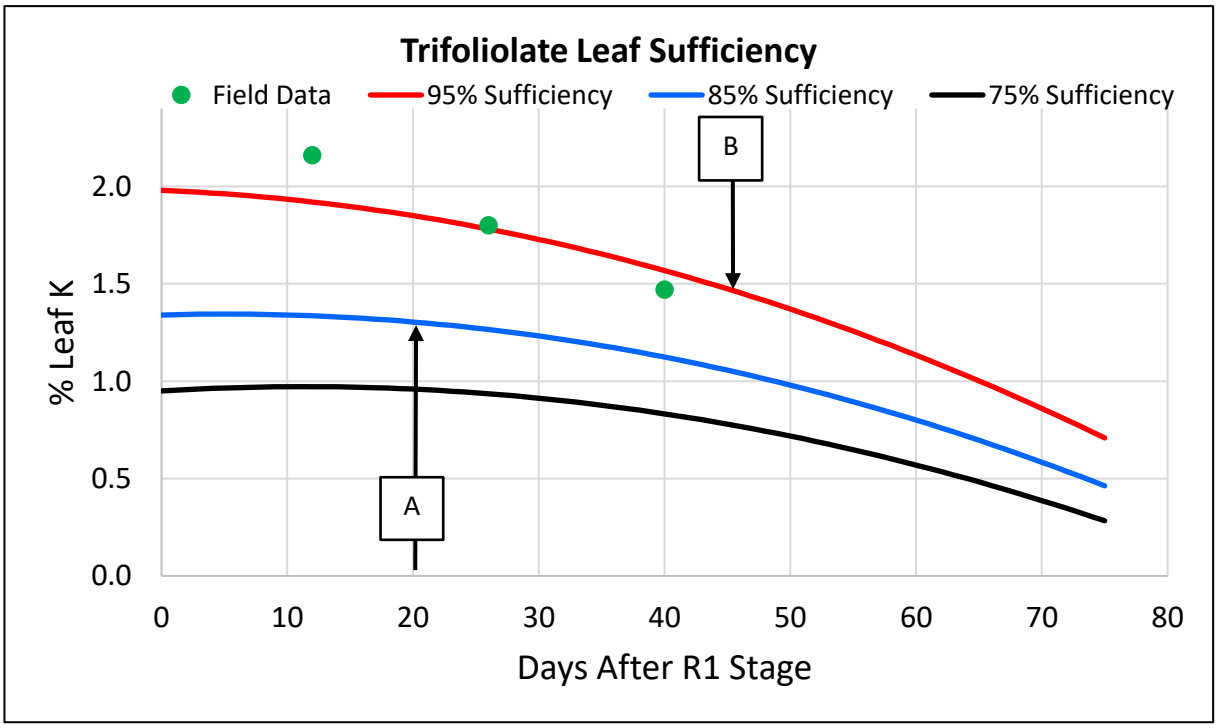
Soybean Tissue K Monitoring Tool

Grower Name	Nick Fox	**Field Name**	Mangrum North
Variety Name	Extend Flex	**Maturity Group**	IV
County	Greene	**State**	AR
Planting Date	10-May	**R1 (Flowering) Date**	10-Jun

Sample	Sample Date (Enter data)	Leaf % K (Enter data)
1	22-Jun	2.16
2	6-Jul	1.8
3	20-Jul	1.47
4		
5		
6		
7		
8		
9		
10		



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This soybean tissue K monitoring tool was designed to help easily diagnose in-season K deficiencies with trifoliolate leaf lab results. Only trifolioliate leaf (not including petioles) from the uppermost fully expanded leaf should be compared to the critical concentrations shown.

Instructions:

1. Enter planting date (required)
2. Enter date of R1 or first flower (required)
   Use SoyStage to estimate R1 date if unknown: **SoyStage** (click here)
3. Enter date each sample was taken (required)
4. Enter leaflet K concentration from lab analysis (required)
5. Green dot will appear on the figure
6. Symbols below the red line are K deficient

Understanding Your Results:

The graph shows the dynamic critical potassium (K) concentration thresholds for reproductive soybean. Critical concentrations determine the nutrient status at which below is considered deficient and yield limiting, and above which is considered sufficient. The three lines indicate the critical concentration for relative grain yield goals of 95% (red), 85% (blue), and 75% (black). **Any point below the red 95% relative grain yield goal critical concentration is deficient and yield limiting.** The 85% and 75% grain yield lines are shown to help the user understand the potential yield loss if left unmanaged. If a field is deficient, an in-season corrective application of granular K fertilizer can correct the deficiency and prevent yield loss when applied correctly.

Fertilizer Timing:
The granular K fertilizer must be applied and incorporated with irrigation or rainfall within 20 days after R1 (A) in severely deficient situations and within 44 days after R1 (B) for hidden hunger to prevent yield loss. After this point, yield loss is anticipated and a corrective application can only minimize the loss, not prevent it.

Fertilizer Rate:
60-120 lbs K_2O per acre depending on the severity of the situation. Ongoing research intends to improve this rate and calibrate it to the leaf K concentration.

2022 Corn Hybrid Demonstration

Partnering: Derek & Royce Boling ***Ext. Agent:*** Lance Blythe / Dave Freeze

Investigator: Dr. Jason Kelley

Location: Paragould ***Soil Series:*** Calhoun Silt Loam

Objective: Accumulate yield, agronomic, and disease tolerance support data of corn hybrids entered in the UA System, Division of Agriculture, county performance trials. Determine local yield potential and adaptability of commercially available hybrids.

Previous Crop: Soybeans

Tillage, Planting, & Demo Setup:

Conventional seedbed prepared and planted on 30-inch beds on April 30th. Included 12 hybrids - 8 rows of each hybrid were planted.

Crop Development, Irrigation, & Weather:

A wet spring delayed planting again this year. The drought was a struggle and seemed to have affected corn yields county-wide. Furrow irrigation was used in this field.

Fertility & Pest Control:

At planting, a 60-23-80-12 fertilizer was applied. A sidedress fertilizer (161-0-39-12) followed at the 5-leaf growth stage. At pretassel, 46-0-0 was applied. The total units of fertilizer for the season were 267-23-119-24.

Warrant & Atrazine were applied preplant. Acuron, Atrazine, Besiege and Trivapro were used during the growing season as needed.

Discussion & Results:

The plots were harvested on September 16th. Yield data was collected using a weigh wagon and a moisture/test weight meter provided by Adam Rawls with AgriGold.

Yields were adjusted to 15.5% moisture (Table 1). Yields ranged from 237 to 274 bushels per acre. The average yield was 258 bushels.

Table 1: 2022 Corn Hybrid Demonstration
Greene County Cooperative Extension Service

Grower:	Derek Boling, Royce Boling	**Investigator:**	Dr. Jason Kelley
Location:	Paragould/Greene County	**County Agent:**	Lance Blythe & Dave Freeze
Farm Manager:	Justin Threlkeld	**Consultant:**	Shane Frost
Planting Date:	April 30, 2022	**Soil Type:**	Calhoun silt loam
Harvest Date:	Sept. 16, 2022	**Previous Crop:**	Soybeans
Number Rows:	8	**Row Length x Width:**	1200 ft. x 30 in.

Fertility: (lb/ac)	**N**	**P**	**K**	**S**	**Zn**
--- Preplant	60	23	80	12	0
--- Sidedress	161	0	39	12	0
--- Pretassel	46	0	0	0	0
Total Fertility:	267	23	119	24	0

Boron 32 oz/A

Herbicides:
Warrant
Atrazine
Acuron
Atrazine
Besiege

Fungicide:
Trivapro

Irrigation Type: Furrow **Number of Times:** Multiple

Hybrid	Adj. Yield[1] Bu/Acre	Acres	Weight	Yield	% Moisture	Test Weight	Plant Stand[2]	Lodging Score[3]
DynaGro 55VC80	268.2	*0.550*	8,492	275.7	17.8	62.0	34,500	1
Pioneer 1718	268.0	*0.550*	8,622	279.9	19.1	61.5	35,500	2
Dekalb 67-94	264.7	*0.550*	8,422	273.4	18.2	62.0	33,500	1
AgriGold 645-16	263.5	*0.550*	8,334	270.6	17.7	63.0	35,500	1
Progeny 2118	263.0	*0.550*	8,356	271.3	18.1	64.1	36,000	1
Revere 1307	261.0	*0.550*	8,244	267.7	17.6	60.4	35,500	1
Dekalb 62-70	260.4	*0.550*	8,194	266.0	17.3	63.1	33,500	1
AgriGold 66-59	257.7	*0.550*	8,200	266.2	18.2	61.9	34,500	1
Pioneer 1222	257.3	*0.550*	8,098	262.9	17.3	61.8	35,500	1
DynaGro 57VC53	251.1	*0.550*	8,078	262.3	19.1	63.8	30,500	1
Revere 1898 [4]	*244.7*	*0.550*	*7,682*	*249.4*	*17.1*	*63.6*	34,000	1
Progeny 2015	242.2	*0.550*	7,782	252.7	19.0	60.2	34,000	1
Average	**258**							

[1] Yield is adjusted to 15.5% moisture.
[2] Plant Stand is given as thousands of plants per acre.
[3] Lodging score - 1 is no lodging, 10 is completely lodged.
[4] *This variety had ~800 feet of one row that was not planted. Yield data should not be compared to other varieties.*

Special thanks to Andy Vangilder & Chris Elkins assisting with planting.
Special thanks to Adam Rawls for harvest help & weigh wagon.

2022 Arkansas Rice Performance Trials (ARPT)

Partnering:	Pigue Farm (Ron, Clint & crew)	***Investigator:***	Dr. Jarrod Hardke
Crop Advisor:	Charles Wood	***Program Associates:***	Lauren Amos/Donna Frizzell
Location:	Paragould	***Soil Series:***	Jackport silty clay loam

Objective: Evaluate rice hybrids/varieties entered in the UADA Performance Trials, under farm level management. Determine local yield potential and pest (disease & insect) reaction of commercially available hybrids/varieties.

Tillage and Planting:

Soybeans were planted on the trial field in 2021. It was precision leveled and flood irrigation was used. Conventional tillage (field cultivator, Kelley tool) was used to prepare the field for planting. The ARPT small plots were planted May 11th.

Demo Setup & Weather:

The test included 30 cultivars (8 drill rows of each), replicated 4 times. A nice shower after planting resulted in the plots coming up to a good DD50 stand by May 18th. The test was harvested using a small plot combine on September 21st. The farmer's field was planted to RiceTec 7401, and cut in the 180-bushel range.

A small plot drill was used to plant the demonstration small plots on the Ron Pigue farm in Greene County.

Fertility & Pest Control:

A custom application of preplant fertilizer (0-0-60) went out May 2nd. On June 4th, 100# of 21-0-0-24 was applied. On June 16th, preflood N included 260 # of urea (120 units N). A final boot application included 70 # of urea (32 units) and 30 # of potash. A total of 173 units of N and 78 units of K was applied to the field & small plots.

For weed control, Command (16 oz) was applied at planting. On May 31st, 1 gallon of RiceBeaux, plus 1 qt. Propanil, plus ¾ oz. of Permit was applied as an overlapping residual. Overall, weed control was good. We did see some small escape patches of weedy rice and barnyardgrass.

No significant insect or disease problems were seen. No fungicide or insecticide applications were made.

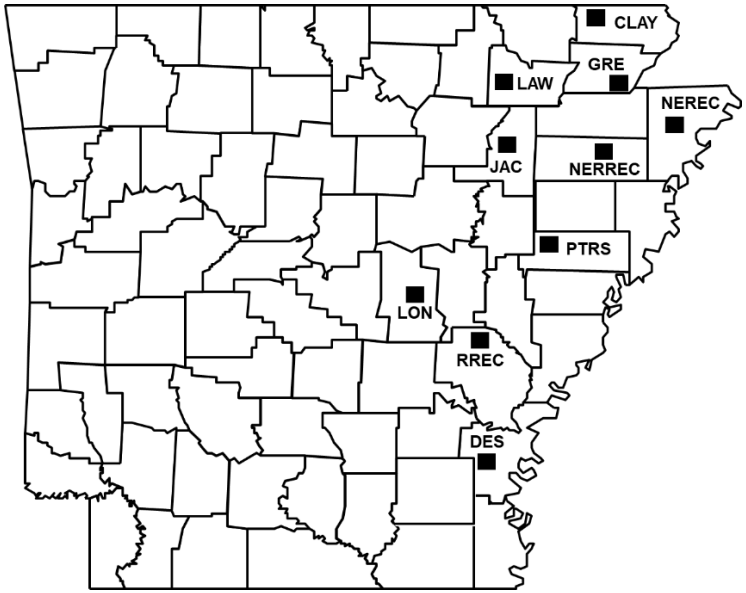
Results:

At this ARPT site, the average yield of all entries was 168 bushels per acre (bpa). A couple of the highest yielding hybrids, RiceTec 7401 (204 bpa) , and RiceTec 753 (203 bpa), were followed not too far behind by the top performing pure line entries, DGL037 (195 bpa), and Ozark (a 2022 UADA release – 190 bpa). Looking at the medium grain entries, Taurus (a 2022 UADA release – 168 bpa) performed very well compared to Titan (149 bpa). Review the tables that follow for more planting, yield & milling results, for all entries in this trial and at other locations.***

Summary of Arkansas Rice Performance Trial Locations, 2022

University of Arkansas System Division of Agriculture

Site	Planting Date	Emergence Date	Harvest Date	Soil Type	Location Type
RREC, Arkansas Co., Stuttgart, Ark.	March 29	April 15	September 7	Dewitt silt loam	Research Station
PTRS, St. Francis Co., Colt, Ark.	May 9	May 15	September 27	Calhoun-Henry silt loam	Research Station
NEREC, Mississippi Co., Keiser, Ark.	May 18	May 25	October 13	Sharkey silty clay	Research Station
NERREC, Poinsett Co., Harrisburg, Ark.	April 28	May 6	September 23	Henry-Calloway silt loam	Research Station
CLAY, Clay Co., McDougal, Ark.	April 28	May 11	September 14	Crowley silt loam	On-Farm
DESHA, Desha Co., McGehee, Ark.	May 20	May 28	September 28	Rilla silt, Portland clay	On-Farm
LAW, Lawrence Co., Walnut Ridge, Ark.	May 10	May 18	September 21	Foley-Calhoun silt loam	On-Farm
JAC, Jackson, Co., Newport, Ark.	May 11	May 28	September 29	Amagon/Forestdale silt loam	On-Farm
GRE, Greene Co., Paragould, Ark.	May 11	May 17	September 21	Jackport silty clay loam	On-Farm
LON, Lonoke Co., England, Ark.	May 11	May 18	September 12	Portland silty clay	On-Farm



2022 Grain Yield Summary – All Locations

University of Arkansas System Division of Agriculture

Cultivar	Grain	CLAY*	DESHA	NEREC	PTRS*	RREC	NERREC	LAW*	JAC	GRE	LON	Mean
	Length[1]	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
Diamond	L	170	179	186	150	180	179	167	159	163	183	**172**
Ozark	L	190	186	196	177	207	196	185	181	190	188	**190**
Leland	L	155	153	164	147	180	170	155	168	156	173	**162**
DG263L	L	211	166	162	194	191	184	188	155	181	222	**185**
DGL2065	L	162	173	173	158	190	164	151	154	163	181	**167**
DGL037	L	192	176	173	178	206	174	173	181	195	186	**183**
Avant	L	171	185	184	173	173	167	163	147	168	185	**172**
Addi Jo	L	162	163	107	129	157	157	127	154	144	149	**145**
ProGold1	L	171	177	184	151	174	180	156	158	171	182	**170**
ProGold2	L	154	180	166	142	190	167	156	159	161	168	**164**
CLHA02	L	186	175	186	153	172	161	136	143	164	183	**166**
CLL16	L	168	169	181	160	181	178	167	167	168	193	**173**
CLL17	L	171	164	148	161	172	154	137	126	136	179	**155**
CLL18	L	180	185	188	157	189	186	179	166	168	192	**179**
CLL19	L	197	199	181	154	193	183	176	154	167	185	**179**
PVL03	L	171	173	165	135	177	163	147	150	164	182	**163**
RTv7231MA	L	211	180	168	137	202	187	186	174	152	195	**179**
RT 7331 MA	L	205	184	190	138	220	225	201	169	189	186	**191**
RT 7321 FP	L	203	160	193	125	210	196	159	179	171	178	**177**
RT 7421 FP	L	194	211	137	147	211	218	181	198	164	167	**183**
RT 7521 FP	L	226	221	132	187	211	228	181	223	161	187	**196**
RT 7401	L	214	200	174	158	211	234	200	203	204	173	**197**
RT XP753	L	194	197	210	168	219	220	207	192	203	191	**200**
RT 7302	L	225	197	181	149	222	216	210	205	184	165	**196**
RT XP780	L	217	203	224	180	221	225	209	214	187	196	**208**
Jupiter	M	163	135	152	131	168	165	147	142	147	157	**151**
Titan	M	182	150	160	132	166	173	159	136	149	153	**156**
Taurus	M	182	184	164	154	193	203	189	170	168	200	**181**
CLM04	M	172	169	136	146	172	166	146	155	150	165	**158**
DGM004	M	161	142	172	151	155	158	149	162	165	149	**156**
MEAN	--	**185**	**178**	**171**	**154**	**191**	**186**	**170**	**168**	**168**	**180**	**175**

[1] Grain Length: L=long grain, M=medium grain. *PTRS harvested at low moisture, CLAY and LAW weedy locations.

2022 Milling Yield Summary – All Locations

University of Arkansas System Division of Agriculture

Cultivar	Grain	CLAY*	DESHA	NEREC	PTRS*	RREC	NERREC	LAW*	JAC	GRE	LON	Mean
	Length[1]	HR-TR[2]	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR	HR-TR
Diamond	L	61-70	60-72	63-72	45-69	62-70	65-72	57-69	63-72	59-70	43-70	**58-71**
Ozark	L	65-71	59-72	67-72	48-69	62-70	66-72	60-69	65-73	60-70	52-71	**60-71**
Leland	L	65-71	68-73	62-73	47-70	66-72	66-73	62-70	63-72	63-71	58-71	**62-72**
DG263L	L	59-69	60-70	38-69	32-67	58-68	60-70	55-68	60-70	50-68	37-69	**51-69**
DGL2065	L	65-71	67-73	63-73	50-70	65-71	65-72	60-69	64-72	62-71	58-72	**62-71**
DGL037	L	62-69	61-70	59-70	38-66	59-69	59-69	58-68	62-70	55-69	44-69	**56-69**
Avant	L	64-70	63-72	59-72	46-69	63-70	66-72	58-69	61-71	62-70	53-71	**59-71**
Addi Jo	L	61-69	66-72	62-72	57-68	64-70	66-71	58-69	65-72	64-70	62-71	**62-70**
ProGold1	L	64-70	60-72	66-72	31-68	60-69	66-71	56-69	58-71	54-70	50-71	**56-70**
ProGold2	L	64-71	54-72	61-73	26-69	64-71	66-72	56-70	50-72	48-71	45-71	**53-71**
CLHA02	L	61-70	63-72	63-72	36-68	62-70	64-71	49-63	59-71	56-70	50-70	**56-70**
CLL16	L	57-68	60-72	56-72	40-68	61-69	63-71	57-69	62-72	55-70	47-70	**56-70**
CLL17	L	64-70	63-71	61-71	47-68	61-69	64-71	59-68	61-70	57-69	57-70	**59-70**
CLL18	L	60-68	61-71	63-72	43-67	59-68	64-70	58-68	63-71	59-69	48-69	**58-69**
CLL19	L	63-70	63-72	63-72	45-68	61-69	65-71	58-68	64-71	61-70	52-70	**59-70**
PVL03	L	64-71	64-73	58-72	42-69	64-71	66-72	54-68	62-72	56-70	56-75	**58-71**
RTv7231MA	L	62-70	53-71	47-71	14-69	56-68	63-71	53-70	49-71	46-70	38-70	**48-70**
RT 7331 MA	L	64-71	58-73	49-73	21-59	63-71	67-73	52-70	54-73	42-71	39-72	**51-71**
RT 7321 FP	L	62-71	50-72	35-72	19-69	58-70	63-73	47-70	57-72	41-71	33-71	**47-71**
RT 7421 FP	L	61-70	61-72	46-72	25-69	61-71	67-73	55-70	60-73	42-71	36-71	**51-71**
RT 7521 FP	L	62-70	62-72	58-71	43-67	61-70	66-72	53-69	63-72	48-70	49-70	**57-70**
RT 7401	L	64-71	61-73	41-71	29-69	62-71	66-72	60-72	58-72	45-70	32-71	**52-71**
RT XP753	L	63-71	57-73	41-72	23-69	61-71	68-73	50-71	52-73	46-71	30-71	**49-72**
RT 7302	L	65-71	60-74	40-72	22-69	63-71	68-73	57-70	61-73	49-71	33-71	**52-72**
RT XP780	L	59-69	60-72	55-71	33-68	61-69	67-72	54-69	62-71	46-70	49-69	**55-70**
Jupiter	M	63-68	68-71	64-70	46-66	65-69	67-70	61-68	65-70	55-68	67-71	**62-69**
Titan	M	67-70	54-71	54-70	18-68	62-69	65-71	50-68	47-71	45-69	49-68	**51-70**
Taurus	M	65-70	58-72	55-70	27-69	61-69	67-72	59-69	60-71	60-70	52-72	**56-70**
CLM04	M	66-70	63-72	65-71	39-68	65-70	68-71	60-69	65-71	58-69	66-71	**62-70**
DGM004	M	65-70	56-71	62-71	29-68	63-69	67-72	50-68	63-72	54-69	55-69	**57-70**
MEAN	--	**63-70**	**61-72**	**56-71**	**35-68**	**62-70**	**65-72**	**56-69**	**60-72**	**53-70**	**48-71**	**56-70**

[1] Grain Length: L=long grain, M=medium grain; [2] HR-TR = % Head Rice (whole kernel) and % Total Rice (total milled rice). *PTRS harvested at low moisture, CLAY and LAW weedy locations.

2022 Late Season Soybean Potassium Demonstration

Investigator:	Dr. Trent Roberts	***Extension Agent:***	Dave Freeze
Producers:	Eason Farm (Carlos, Shane)	***Consultant:***	Mike Simmons
Location:	Walcott, AR	***Soil Series:***	Forestdale silty clay loam

Background:

Research shows when soil test K (potassium) becomes deficient, soybean yields will decline. In addition, potassium fertilizer currently makes up a good percentage (5-10%) of a soybean farmer's budget.

UADA (University of Arkansas System, Division of Agriculture) faculty have recently developed tools which help fine tune K nutrient management for soybean production. Along with routine soil sampling regularly used to determine soybean nutrient needs, University officials have recently released the Potash Rate Calculator (PRC) computer program to help a farmer/consultant adjust potassium (K2O) fertilizer needed at planting, based upon being the most profitable rate.

Procedures for collecting and analyzing soybean plant tissue samples late in the growing season to check for K deficiency have also been established by UADA researchers. They have also developed a computer program which helps predict whether tissue sample K levels are adequate to meet the crop's needs, or if corrective late season potash is needed. The program is called the Soybean Tissue K Monitoring Tool.

Objectives:

Evaluate the use of the UADA PRC to help the soybean farmer/consultant adjust his early season K fertilizer rate to a profitable level.

Document yield response to the application of late season K fertilizer based upon the UADA dynamic critical K threshold provided by the Soybean Tissue K Monitoring Tool and plant leaf tissue sampling.

Determine if collecting plant tissue samples, submitting them to the diagnostic lab, and receiving results and recommendations, can work as a routine practice for the farmer and his consultant.

An aerial application of potassium fertilizer was applied in late August to test plots.

Project Setup:

The demonstration field was selected from one of the fields in the 2022 K Management Project (10 fields total) in Greene County. The farmer and consultant were interested in serving as cooperators for the demonstration to learn more about the program and its potential benefit to their operation.

Mike Simmons, the farmer's consultant, had recently taken soil samples on the demonstration field. The PRC was then used to determine an early season K fertilizer rate expected to be profitable. An average soil test K level was keyed into the PRC program along with other input data provided by the farmer (expected yield level, expected crop price, current K fertilizer price). A PRC report was then generated to help refine the units of K2O (K fertilizer) needed at planting to maximize producer profit.

The next step was to collect plant leaf tissue samples later in the season, soon after the soybeans reached flowering (R1). The tissue samples where then submitted to the UADA diagnostic lab (Fayetteville, AR) for analysis.

Soybean leaves are collected to submit for nutrient analysis.

The first tissue sample was targeted for a week or so after the field reached R1, and a second sample was collected 14 days later. The second sample was collected to help monitor plant K levels, and to confirm whether late season corrective K fertilizer was recommended. A late 3rd sample was collected 2 weeks after the application of late season potash was applied, to check for differences in tissue K concentrations for the different fertilizer treatments.

Soon after the field reached R1, the consultant and Extension Agent used bicycle flags to mark off three different late season K fertilizer treatments for the field. They included 0, 100 (60 units K2O), and 200 (120 units K2O) pounds of potash.

On August 26th the treatments were applied by air. The plane was flying a 100 pound rate of potash per acre. The center plot did not receive an airplane pass. The plots on each side of the center plot (adjacent to), each received a single pass (60 units K2O) of fertilizer. The plots outside of those, to the far east and west sides of field, each received 2 airplane passes (120 units K2O).

The farmers combine yield monitor was used to determine yield for the different treatments at harvest. The yield monitor had recently been calibrated. Yield was determined for one single combine pass down the center of each treatment plot.

Soil Test Results:

Soil test results show the average soil test K level for the demo field at 85 parts per million (ppm). This falls into the UADA low category, with a recommendation for 120 units (K2O) of K fertilizer per acre.

Potash Rate Calculator (PRC) Results:

According to our printout from the PRC program (used to get a profitable K fertilizer), 81 units of K20 were recommended at planting. This was almost 40 fewer units of K2O than was called for by the UADA standard recommendation.

Information provided by the farmer for the PFC program included an estimated yield of 60 bushels per acre, price for potash of $900/ton, and crop price of $14.80/bushel.

Plant Tissue Results & K Monitoring Tool:

The field reached first flower (R1) on July 30th. The leaf tissue K level for the first sample collected for the project field on August 9th (soybeans at full bloom with 9 nodes) was 1.46% K. According to the Soybean Tissue K Monitoring Tool, plant tissue level was below the 95% dynamic critical K concentration threshold, and corrective late season potash was recommended to avoid yield loss.

Tissue sample 1 landed at 87% on the chart line for critical K concentration. Based on the farmers expectation of 60 bushel per acre yield, about 8 bushels of yield might be saved if late season K fertilizer was applied before 44 days after R1. The fertilizer should help alleviate hidden hunger and recover lost yield potential.

The leaf tissue samples are carefully bagged and labelled before being sent to the UADA lab for nutrient analysis.

The second tissue sample (soybeans at beginning seed) was taken on August 23rd, just before late season demo treatments were applied. Leaf K concentration was still low at this point, at 1.57% K. A bit of improvement was seen for this sample (90% critical K concentration) according to the Tissue K Monitoring Tool. However, as with the first tissue sample, corrective late season potash was recommended.

A third set of leaf tissues samples (one from each treatment section of the field) was taken 2 weeks after our potash fertilizer treatments were applied. The plot not receiving late season potash had a tissue K level of 1.36% K. Tissue results for the sections of the field receiving 60 and 120 units of late season K2O, each had a plant tissue level of 1.49% K.

From these results it is evident that the plots receiving late season potash were able to take it up and move it to the developing leaves and pods. The plots receiving the late season potash showed almost 10% more tissue K than the plot not receiving the late season potash application.

Yield Results:

The field was harvested on October 21st with the farmer's John Deere combine. Averaged across the three treatments, the demonstration field made 68 bushels per acre.

The plot on the far west side of the field was not included, due to a thin stand and more drainage problems in this part of the field. Also, the yield reported for the 60 units of K2O treatment is the average for the plots on each side of the center plot (no fertilizer).

A combine harvests the late season potassium demonstration soybeans.

Yield results for the different treatments.

Units of K2O	*Bu/A*
0	68.2
60	68.4
120	67.3

Discussion & Summary:

At planting time, the farmer applied 80 units K2O as suggested by his PRC report. The field was planted on June 10th. It required a replant on June 21st due to heavy rainfall and waterlogged soil soon after the first planting.

Reviewing plant tissue results, with both the first and second sample testing below the dynamic critical K concentration level, the farmer used good judgement in making a late season corrective potash application to preserve yield loss from K deficiency. In addition, the tissue samples taken from each plot 2 weeks after late season K had been applied, showed higher levels of plant K available on the plots that received late potash.

It was surprising that all three treatments in the test made similar yields in the 67-68 bushel per acre range, which was a great yield for such a late planting. One thought is that the 80 unit K2O application made on the field at planting may have supplied enough K to meet the needs for the soybeans for the rest of season.

According to Dr. Trent Roberts, UADA Soil Scientist, if soybeans experience drought between emergence and R1, then leaf tissue samples can come back with artificially low K levels since good soil moisture is needed for K uptake. If any delays in irrigation occurred at this site during the hot/dry period seen from late June to early August, it might have resulted in lower leaf tissue K levels.

With all plant tissue samples coming in low, one may also speculate that available soil K was still extremely low and production of future crops will be reduced unless attention is given to following a K fertilizer management program to help build soil test K levels from a low to a medium range.

Leaf tissue sampling soybeans was not too taxing or confusing. A consultant should be able to collect 15-25 newly developed, fully expanded, trifoliate leaves (without the petiole) to represent the field, as he makes his pest scouting circle in a field. The leaves are small and can readily be put in a pocket while scouting. They also dry out quickly on the truck dash in a paper bag.

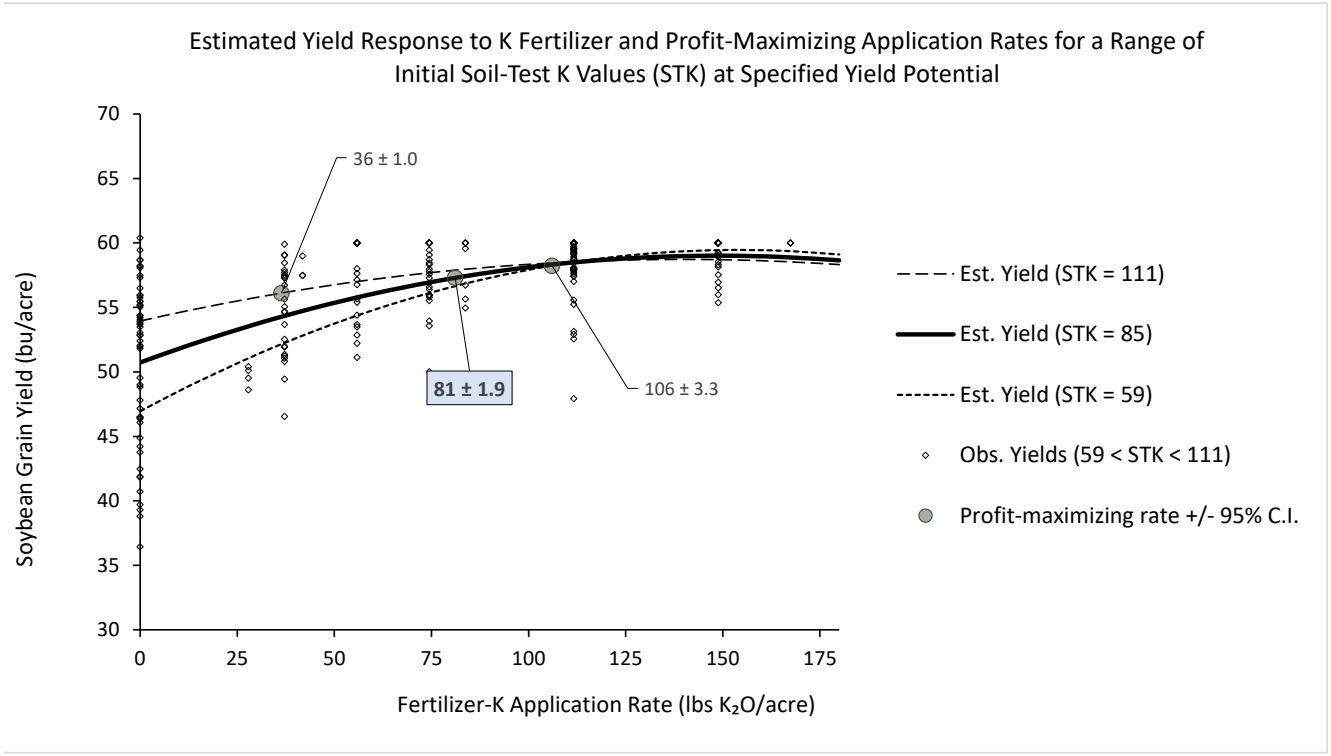
They are also not too bulky to package and mail to the diagnostic lab. The time frame from sample submission until receiving UADA lab results generally was 7 - 10 days. A private lab may be an option to speed up a client/consultant getting sample results.***

Profit-Maximizing K Rate Calculator for Irrigated Soybeans

as developed by Dr. M. Popp, Dr. N. Slaton, and Dr. T. Roberts

PRC POTASH RATE CALCULATORS 0-0-60

What is your expected soybean price?	14.80	$/bu	☐ Metric	
What do you expect to pay for muriate of potash fertilizer?	900	$/ton	0.75	$/lb of K_2O
What is the yield potential of your field?	60	bu/acre		
What is your soil-test K value (STK) and range?	85	ppm	Soil test range +/-	26
What is your cost to apply fertilizer (equipment, labor, fuel or custom)?	7.50	$/acre	...your rate in lbs of K_2O/acre:	100
Profit change comparing applying at 81.1lb K_2O/acre to no fertilizer:	29.27	$/acre	Profit-max rate over your rate:	$2.01



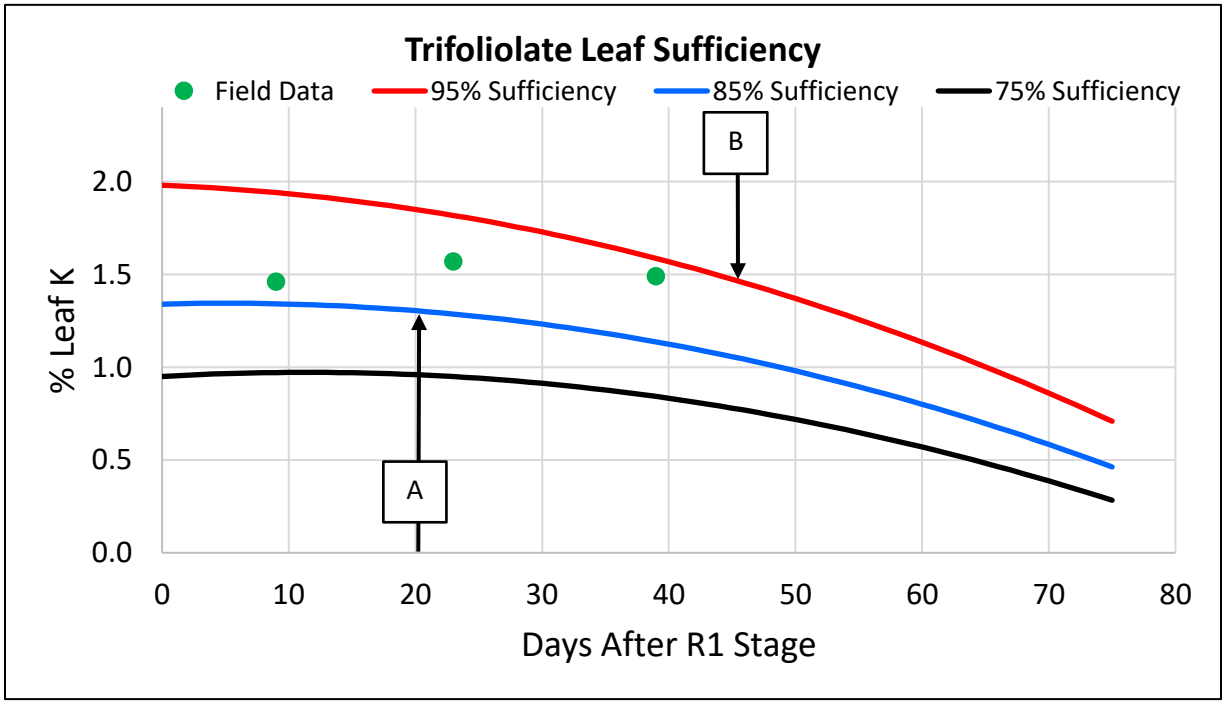
SOIL TESTING

UofA DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

Soybean Tissue K Monitoring Tool

Grower Name	Caslos Eason	**Field Name**	Cupp 3-Late K yes
Variety Name	Extend Flex	**Maturity Group**	IV
County	Greene	**State**	AR
Planting Date	17-Jun	**R1 (Flowering) Date**	30-Jul

Sample	Sample Date (Enter data)	Leaf % K (Enter data)
1	9-Aug	1.46
2	23-Aug	1.57
3	9-Sep	1.49
4		
5		
6		
7		
8		
9		
10		



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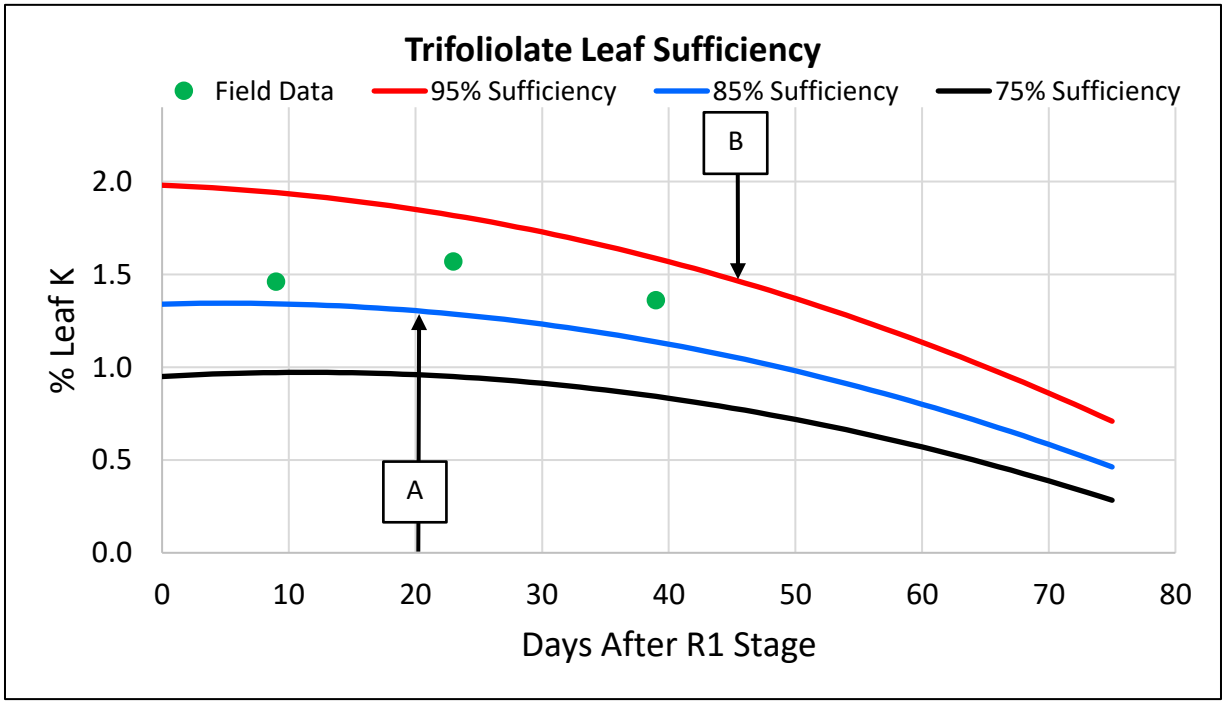
4		
5		
6		
7		
8		
9		
10		



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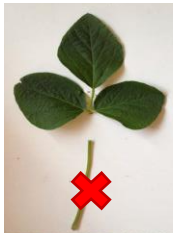
University of Arkansas System

This soybean tissue K monitoring tool was designed to help easily diagnose in-season K deficiencies with trifoliolate leaf lab results. Only trifolioliate leaf (not including petioles) from the uppermost fully expanded leaf should be compared to the critical concentrations shown.



Instructions:

1. Enter planting date (required)
2. Enter date of R1 or first flower (required)
   Use SoyStage to estimate R1 date if unknown: **SoyStage** (click here)
3. Enter date each sample was taken (required)
4. Enter leaflet K concentration from lab analysis (required)
5. Green dot will appear on the figure
6. Symbols below the red line are K deficient

Understanding Your Results:

The graph shows the dynamic critical potassium (K) concentration thresholds for reproductive soybean. Critical concentrations determine the nutrient status at which below is considered deficient and yield limiting, and above which is considered sufficient. The three lines indicate the critical concentration for relative grain yield goals of 95% (red), 85% (blue), and 75% (black). **Any point below the red 95% relative grain yield goal critical concentration is deficient and yield limiting.** The 85% and 75% grain yield lines are shown to help the user understand the potential yield loss if left unmanaged. If a field is deficient, an in-season corrective application of granular K fertilizer can correct the deficiency and prevent yield loss when applied correctly.

Fertilizer Timing:
The granular K fertilizer must be applied and incorporated with irrigation or rainfall within 20 days after R1 (A) in severely deficient situations and within 44 days after R1 (B) for hidden hunger to prevent yield loss. After this point, yield loss is anticipated and a corrective application can only minimize the loss, not prevent it.

Fertilizer Rate:
60-120 lbs K_2O per acre depending on the severity of the situation. Ongoing research intends to improve this rate and calibrate it to the leaf K concentration.

2022 Poultry Litter Study – Greene County – Year 2

Investigator: Dr. Mike Daniels, Jace Clark, Clint Mangrum, Eric Simon, Lance Blythe

Producer: Distretti Farm (Johnny, Nathan, Ryan) ***Consultant:*** Mike Simmons

Location: Walcott, AR ***Soil Series:*** *See Table 1*

Background:

In the last decade the poultry industry has quickly expanded into Northeast Arkansas (NEA). Several farmers in this region contract to grow broilers for Peco and Ozark Mountain Poultry each year. Expansion in poultry production in NEA continues to grow each year.

Poultry litter (PL), one of the main byproducts in broiler production, has quickly become popular for row crop producers and ranchers in this region. They commonly use it on their crop and hay fields, and pastures.

A key reason for strong PL demand is due to the nutrient value cost. At the current prices for PL in NEA, the cost per unit of NPK is comparable to, and sometimes even better than, what farmers are paying for an equivalent amount of nutrients from commercial fertilizer.

We know from studying poultry litter use trends in other regions of the country, like Northwest Arkansas (NWA), that nutrient runoff from using poultry litter as a soil amendment must be monitored to avoid detrimental environmental impacts. Protection of ground and surface waters from excess nutrient (nitrates & phosphates) runoff is paramount to maintain a safe water supply for agricultural, industrial, municipal, and domestic use.

Terrain and agriculture are also a lot different in NEA (flat, row crops) compared to NWA (rolling hills, hay & livestock). The average acre in NEA will need higher levels of N, P, K to achieve top row crop yields compared to nutrient levels needed for haying and grazing in NWA.

In addition, many of the nutrients taken up by row crops in NEA leave the field with the grain, whereas much of the hay and pasture consumed by livestock in NWA is cycled back into the soil.

In NWA, with a terrain that has lots of slope compared to the generally flat terrain of NEA, it is easier for excess nutrients from poultry litter and commercial fertilizer to run off into the streams and reservoirs.

Objective:

To study environmental & production impacts of using poultry litter as a soil amendment to supply nutrients for row crop production in Northeast Arkansas. Evaluate yield impact, and change to net returns, when poultry litter is substituted for commercial fertilizer.

Demo Setup:

The project will be conducted for three years (2021-2023). Nearby fields with similar soil type, crop rotation, and management, will receive different rates of poultry litter annually. Litter rates studied will be 1.0, 1.5, 2.0, and 2.5 tons per acre (TPA).

Over the course of the study, each field will be monitored for changes in organic matter (OM), nutrient levels, and crop yields.

Grid soil samples (1 per acre) will be taken each spring with an automated sampling machine, to determine OM and nutrient levels. The samples will be analyzed at the UADA diagnostic lab.

Samples of each lot of poultry litter used on project fields will be collected each year. They will be sent to the UADA diagnostic lab for nutrient analysis.

Crop yields for each field will be determined using farmer records for each year of the study. Combine yield monitor data, or grain elevator scale weights, may be used to determine bushels per acre (BPA).

Planting & Production Practices:

The four fields at the Distretti Farm study site are near each other and generally follow a corn-soybean crop rotation. Cover crops (mostly wheat & crimson clover) have been used on the project fields in the last few years, including 2022. The main soil series varies by field, but they all have a silt loam soil texture.

In 2022, the Brown32 and Potter fields were planted no-till to XF soybeans in mid-June, following harvest of the wheat cover crops. The West and Massey fields were planted notill to RR2YLL corn in mid-April. This was the second year for the project fields to receive litter applications.

Soil Test Results:

Grid soil samples were taken in March/April. Lab results (median levels) for OM were similar (1.7-2.4 %) for all four fields.

Soil test P levels were optimum-above optimum for all 4 fields (range from 40-72 PPM (parts per million per acre)). Phosphorus fertilizer was not recommended for any of the project fields (corn or soybeans) at this site.

Soil test K levels were low-medium for all 4 fields (range from 83-115 PPM). For the corn fields, 80 units of K fertilizer was recommended for the Potter field, and 115 units for the Brown32 field. For the soybean fields, 75 units of K fertilizer was recommended for the West and Massey fields.

Poultry Litter Results:

Composite litter samples were collected in late March/April from litter piles being stored for each of the project fields. The litter was custom broadcasted in early April. It did not get incorporated since the producer was using a no-till system.

The Brown32 and Potter soybean fields received 1.0, and 2.0 tons of litter per acre (TPA), respectively. Litter analysis for these two fields came back at 49-59-71 (N-P2O5-K20), and 37-52-73 per ton, respectively.

The West and Massey corn fields received 1.5, and 2.5 TPA litter, respectively. Litter analysis for these two fields came back at 30-60-48, and 48-58-67 per ton, respectively.

The litter samples for the West and Potter fields had low lab results for N (30-37#/ton). Meanwhile, analysis results for N for the other two fields fell in the 50#/ton range. These N levels were a little lower than what we see for most samples that are sent to the lab from the Greene County Extension office (55-55-60 average for N-P2O5-K2O from 2019-21).

P2O5 levels for litter samples this year were all in the 58-60 #/ton range, except for the Potter field (52 #/ton). K20 litter levels were above average (67-73 #/ton) for all fields expect the West field (48 #/ton) which fell a bit lower than average.

Commercial Fertilizer Used:

Variable rate application was used to put out commercial K fertilizer on two of the four project fields before planting.

None of the fields receive commercial P fertilizer. Looking at K fertilizer applied, only two fields received potash (35 units K2O for Potter, and 30 units for West).

Split applications (at planting, side-dress, and pre-tassel) were used to supply corn with N fertilizer. Both the West and Massey fields received a season total of 250 units of N from commercial fertilizer.

Yield Results & Nutrient Removal:

Yields were determined using yield monitor data for each field.

Checking corn yields, surprisingly, the West field which received a 1.5 TPA litter rate made 190 bushels per acre (BPA), while the Potter field with 2.5 TPA litter cut 160.

A similar yield difference was seen on the 2 soybean fields this year. The Brown32 field which received a 1.0 TPA litter rate made 59 bushels per acre (BPA), while the Potter field with 2.0 TPA litter cut 52.

Nutrient removal from the field in the form of the grain harvested, was calculated using grain content estimates in UADA Fact Sheet (FSA2176), Estimating Nutrient Removal for Row Crops Grown in Arkansas.

Grain in a 180 BPA corn crop removes an estimated 121, 63, and 45 pounds of N-P2O5-K2O per acre. Oilseed in a 55 BPA soybean crop removes an estimated 182, 40, and 66 pounds of N-P2O5-K2O per acre.

Nutrient Balance Chart

In Table 1. Nutrient Balance Chart (NBC), we have attempted to show the amount of nutrients put into the soil bank each year (litter & fertilizer), the amount of nutrients leaving the soil bank with grain harvest, and the net balance at the end of the year. This should help us determine whether we are raising or lowering the soil test level for a nutrient, depending on whether there was a net positive or negative balance for that nutrient for the year.

At the Distretti Farm site, the NBC shows for P2O5, we ended up with a net gain (range of 16-89 #/A) for all 4 fields at the end of year. Enough P was supplied to meet the needs to grow the crop, and extra was available to help build the soil P level.

University Soil Scientists estimate (note there can be a wide range) it takes 15 pounds of net P2O5 at the end of the crop season to build up 1 PPM soil test P. The extra P2O5 on the Distretti fields should help slightly build the soil test P (a range of 1-6 PPM for the 4 fields).

Looking at K2O, the NBC shows we also had a net increase for this nutrient (ranging from 35-128 #/A) at the end of year. We would expect soil K levels to see some building. University Soil Scientists estimate (note there can be a wide range) it takes eight pounds of net K2O at the end of the crop season to build up 1 PPM soil test K. Soil test K building for the four fields ranged from 4-16 PPM.

Discussion:

The Distretti Farm test site saw good corn yields and soybean yields for the second year of our study. Adequate nutrient (N-P-K) levels are a key factor for these top yields.

The farmer was able to meet the P and K nutrient needs of his corn and soybean crops, and potentially build soil test P and K levels by applying poultry litter on all 4 project fields, and commercial K2O fertilizer on just two fields. None of the four project fields received commercial P2O5 fertilizer this year.

From an environmental standpoint, one should pay close attention when using higher rates of P & K (litter plus commercial fertilizer). The higher rates could be beneficial to build soil test nutrient levels, but they could also lead to excess nutrient runoff from the field.

Soil sample results showed all four fields testing optimum-above optimum (high) for P205 and low-medium for K2O. Therefore, P2O5 fertilizer was not recommended at this test site. No yield response would be expected from P fertilizer, so we would want to eliminate this production expense and potential environmental risk. On the other hand, applying K2O fertilizer was recommended for the project fields (Brown32, West) receiving the lowest litter rates, to help build the soil K from a low-medium level toward our goal of an optimum level.

Considering the use of poultry litter, from an economic standpoint, using litter to supply some of the crop's P and K needs is likely a good move compared to using all commercial fertilizer. Both litter and commercial fertilizer work fine to provide a crops P and K needs, so using the source that costs the least (per combined nutrient value) makes good sense.

Checking with local retailers in April 2022, the cost per unit of N, P2O5, and K2O for commercial fertilizer (includes custom application) was estimated to be $1.08, $1.06, and $0.72, respectively. At that same time, an estimated average (factoring in a wide range) cost of poultry litter (including delivery to the farm and custom application) was in the $55 per ton ballpark.

Using the above figures, and considering the litter used at the Distretti test site had a ballpark 41-57-65/ton analysis, we can pencil out that the nutrient value (just P & K) of this litter was worth around $107 per ton.

University soil scientists suggest we can estimate 30-50% of the N in poultry litter to be available for a corn crop. The rest of the N can be lost via natural processes (leaching, volatilization, de-nitrification). If we use this estimate, to put a value on the N in this litter to our corn crop, it comes out to $17 per ton. The combined N-P-K nutrient value in this litter was in the $124 per ton range for corn production. Once again this was just an estimate for 2022.

Do note that most poultry litter samples that go to the lab for analysis through the Greene County Extension office come back in the 55-55-60 ballpark (there is a wide range). At these nutrient levels, the litter nutrient value ($125/ton) for corn was well above the $55 litter ballpark cost the spring of 2022.

Another positive attribute to using poultry litter is its organic nature lending to slow release and the potential to add some organic matter and tilth to the soil. It has for many years been recommended to help build back precision leveled fields.

Summary:

This project has helped show it is very important to get an analysis of the poultry litter you plan to use on your farm to know what level of nutrients it may supply. This will allow you to estimate the current economic value of your litter source compared to commercial fertilizer.

Poultry litter can be used to substitute for some of the commercial fertilizer (P and K sources) used to grow row crops in Northeast Arkansas. In addition, one needs to be cautious on the amount of N they will get from using litter. With natural loss mechanisms for N, when using poultry litter in the spring, expect only 25-30% of the N to be available for a rice crop, and 30-50% to be available for upland crops (corn, cotton).

A Nutrient Balance Chart may be a good way to gauge if you are putting out way too much or too little of a particular nutrient. The chart could help a farmer make a better economic decision on how much combined fertilizer and litter to use for the season. The chart could also provide insight if way too much of a particular nutrient (N or P) is being applied for the season and potentially at risk for runoff which could lead to environmental concerns years down the road.

The project fields at this sight have high enough levels of soil test P that P2O5 fertilizer is not needed. However, for K, soil test levels are low-medium, and additional K2O fertilizer could help build soil K back up to an optimum level. One should also be careful not to use too much potash which might lead to salt problems in rice rotation or chloride toxicity for soybean production.

Evaluating crop (corn & soybeans) yields, it is uncertain why production was some 15% lower on the fields receiving the higher litter rates. We need to watch this more closely in year #3 of the project.

U of A System, Division of AG, Cooperative Extension Service
2022 Poultry Litter Study - Greene County - Distretti Farm
Table 1: Nutrient Balance Chart

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University of Arkansas System

	"----------Field & Poultry Litter Rate - Tons/Acre----------"			
Soil Sample Results (SSR) - Field Median	**Brown32-1.0 ton/A** 32 acres	**West-1.5 ton/A** 28 acres	**Potter-2.0 ton/A** 18 acres	**Massey-2.5 ton/A** 37 acres
Primary soil series	Calloway SL	Calhoun SL	Hilleman SL	Oaklimeter SL
N #/A (Nitrate)				
P PPM	46	52	54	32
K PPM	59	92	112	92
OM %	2.0	1.7	2.4	1.7
CEC	9	8	8	7
pH	7.3	7.0	6.1	6.2
UADA Fertilizer Recommendation				
Corn 200 bpa+ - N #/A		220		220
Corn 200 bpa+ -P2O5 #/A		0		70
Corn 200 bpa+ - K2O #/A		70		70
Soybean - P205 #/A	0		0	
Soybean - K2O #/A	160		75	
Poultry Litter (PL) Applied (tons/acre)	1	1.5	2	2.5
Litter analysis - UADA lab - N-P2O5-K2O/ton	49-59-71	30-60-48	37-52-73	48-58-67
N # applied/A	49	45	74	120
P2O5 # applied/A	59	90	104	145
K2O # applied/A	71	72	146	168
Commercial Fertilizer (CF) Applied				
N # applied/A	0	250	0	250
P2O5 # applied/A - Field Ave variable rate	0	0	0	0
K2O # applied/A - Field Ave variable rate	35	30	0	0
Total Nutrients Applied (PL + CF)				
*N Total #s	49	295	74	370
P2O5 Total #s/A	59	90	104	145
K2O Total #s/A	106	102	146	168
****Yield & Grain Nutrient Removal**				
Crop & herbicide trait group	Soybeans - XF	Corn - RR2Y-LL	Soybeans - XF	Corn - RR2Y-LL
Yield Bu./A	59	190	52	160
N # Grain removal	195	127	172	107
P2O5 # Grain removal	43	67	38	56
K2O # Grain removal	71	48	62	40
*****Net Nutriet Gain/Loss for Season**				
P2O5 # Net gain or loss	16	24	66	89
K2O # Net gain or loss	35	55	84	128
******Soil Test P & K Build or Loss Estimate**				
P PPM	1	2	4	6
K PPM	4	7	10	16

***Seasonal loss of N from leaching, denitrification, and volatilization, is highly variable, depending on crop, soil, weather, etc.**

**** Nutriet removal detemined using values listed in UADA Fact Sheet (FSA2176)**

*****Net gain/loss from soil amentments is much less than one expects due to nutrient dynamics (buffering, tie up) in the soil**

******UADA soil test guide suggests estimating 15#s of P2O5 fertilizer to build one PPM soil test P, and 8#s K2O fertilizer to build one PPM soil test K. These estimates come after subtracting grain nutrient removal first.**

2022 Soil Health Project – Greene County – Year 3

Producer: Smith Farm (Clay, Terry, & friends) ***Investigators:*** Dr. Steve Green

Project Team:
Greene County NRCS – Adam Eades, Katie Womack & colleagues
Arkansas State University – Dr. Steve Green & colleagues
USDA-Agricultural Research Service - Dr. Joe Massey & colleagues
Greene County Conservation District – Will Young & board
Greene County Extension Office – Dave Freeze & colleagues
Crop Consultant – Austin Miller
Several others – ASU, USDA-ARS & UA Scientists

Location: Walcott ***Soil Series:*** Calhoun silt loam

Objective: Evaluate the impact of including cover crops & notill – minimum till, in cash crop production (row rice-soybean rotation) to improve yields, economic returns, irrigation efficiency, water quality, and soil health.

Demo Setup: The project was conducted for 3 years (2020-2022). Side by side fields (row rice or soybeans) with similar soil types, crop rotation, and management (a field can also be split in half) were compared. One field (or half field) received conventional management (no cover crop) for the three-year period. The other field (half field) was managed to produce both a yearly cover crop and cash crop using a no-till or minimum till approach.

Cover Crop –Planting & Development:

The 2021 soybean crop was harvested October 19th from the project field. The 2022 cover crop was planted on the western half of the field in early November. Cover crop seed was drilled. The fall cover crop mix included wheat & crimson clover. An excellent cover crop stand emerged soon after planting. Cover crop stand counts were taken on February 11th. The project field averaged 8 plants per square foot for wheat, and 1 for clover. In addition, clover was thin on much of the field, but some spots had a decent stand. Wheat provided a solid cover for the whole field.



The eastern half of the project field was not planted to a cover crop and served as our conventional check.

The cover crop was terminated in late March with a burndown application of glyphosate. Cover crop biomass was small at this time resulting in good control. We did not see any cover crop pests of concern, but a few patches of ryegrass (likely glyphosate resistant) were seen following the burndown application.

Cash Crop – Planting & Development:

RiceTec 7321 rice (22 # seed/acre) was drilled notill in April on both the cover and no cover sides of the project field. Both sides came up to a nice uniform stand. Stand counts on June 15th showed the no cover side of the field (3.4 plants per square foot) with a little better stand (cover side average was 2.9 plants/ft2).

Regarding fertilizer, the farmer used 65 units of K (112 # potash) and 148 units N (321 # urea) for the season. The urea was split, with all applied before the first flush except 100 pounds put out near boot stage. No phosphorus fertilizer was used on the field

Cash Crop - Pest Management:

Weed control in the rice cash crop was good. It is expected that overlapping residual herbicide applications were used, most likely starting out with Command and following later with Preface.

Regarding insects and diseases, only a light level of stinkbugs was found, but never developed to treatment level. Neither the cover nor check sides of the field received an insecticide application. The producer did put out a fungicide application (Quilt XL at 17 oz/Acre).

Cash Crop – Yield

The rice was harvested in September. The check side of the field made a little better yield compared to the cover side. Based upon information provided by the farmer, the check side cut a little over 4 bushels more per acre compared to the side which had the cover crop.

Water Use & Dynamics - Pending

Furrow irrigation was applied with polypipe. Each irrigation set used a mechanical flowmeter to measure the quantity of water applied. Computerized Hole Selection (pipe planner) was run to design the two sets (one set per treatment).

The moisture sensor was installed and checked regularly but that they didn't give us reliable data to present or compare treatments.

We tracked total rainfall during the cover crop growing period and the cash crop growing period.

We utilized local precipitation data for the cover crop growing period and an infield rain gauge with weekly readings during the cash crop growing season.

Total Cash Crop Period Rainfall: April 1 – September 30 = 23.45 in.

Note: effective rainfall is less than we've represented since we used the time interval of planting to harvest.

For future comparisons it may be best to document rainfall between significant crop growth stages; especially R6.5 when irrigation in Soybeans is to be terminated.

Soil Health Dynamics- Pending

Soil health encompasses soil physical, chemical, and biological properties. To improve soil health, 4 main practices are needed:

- Minimize soil disturbance (no-till)
- Keep living roots in the ground for as long as possible (cover crops)
- Keep the soil covered (cover crops and preserving residue)
- Plant diversity (crop rotation and cover crop diversity)

Many measurements and soil samples were taken in year 1 and will be again in year 3 that will be used to try to measure change in soil health from the implementation of the 4 soil health practices above.
The soil measurements and samples taken to track changes in soil properties over the life of the demonstration include:

- bulk density (the weight of soil in a known volume)
- aggregate stability (how well the soil holds together and resists erosion)
- infiltration rates (how fast water soaks into the ground)
- routine soil testing at the University of Arkansas Soil Lab (chemical properties)
- Haney soil health test (biological indicators)
- N-star soil test (biological and chemical indicators) which can possibly be used as an Arkansas soil health test.
- Nematode soil samples (biological indicators) in spring and fall

Differences in soil measurements and samples are not expected to be seen until soil health practices have been implemented over a number of years. For example, Arkansas research has shown that on some delta soils, it takes implementing soil health practices for 5 years or more to see significant changes in aggregate stability, while bulk density and water infiltration rates can see improvements in less time. Final soil samples and measurements were collected this fall. Samples are being analyzed in the lab now. When the final results come in, we will share results comparing the two sample times.

With exception to the routine soil testing for fertilizer management decisions and the nematode samples, the samples and measurements we are taking aren't necessarily for immediate management decisions. We are just tracking the on-farm benefits that can be had from soil health practices like bed integrity, greater rainwater utilization and irrigation efficiency, reduced weed pressure and others. The benefits from soil health should make the farm more profitable through increased efficiency.

Additional Analysis - Pending

ASU and ARS are partnering on this project to do additional analysis on irrigation efficiency and water quality. They are documenting irrigation water applied and monitoring quantity and quality of water leaving the fields. Their data can be viewed in a separate report when available.

At the time of this report USDA-ARS Researcher, Dr. Joseph Massey, reported the following for the 2022 Irrigation Season:

- Irrigation applied to the side with a Cover Crop: 21.2 inches
- Irrigation applied to the side without a Cover Crop: 19.5 inches

Summary - Pending

Yield did turn out a little better on the no cover side of the field. The stand was a little better on this side.

We did not have any trouble with insects moving from the terminated cover crop to the newly established cash crop. No insect or disease problems developed, making this a cheap crop to grow, pest management wise.

Economic Results - Pending

Using U of A Extension Interactive budgets, economic reports will soon be generated for both the Cover project field and No Cover field. These reports will be available soon.

Soil Health for Grazing Lands

Partnering: Larry & Linda Morris

Project Team: Dr. Mike Daniels, Dr. John Jennings, Kenny Simon, Adam Eades, Lance Blythe

Partners/Sponsors: Natural Resources Conservation Service (NRCS)

Objective: Implement a multi-year on-farm research-based program to demonstrate production practices that would help the producer meet production goals and to collect soil data.

Producer Goals: To improve forage diversity, quantity, and quality; increase rotational grazing capability and grazing efficiency; improve soil fertility and health; reduce winter hay feeding, and any other information available to help improve the operation.

Farm Background:

The soils are a Calhoun Silt Loam from 0-3 percent slope. Soil was poorly to somewhat-poorly drained. Approximately half of the farm's acreage was previously used for row crops. The other portion had been used for grazing and haying for many years.

Project Timeline & Practices (Year 1):

Beginning in January of 2020, a questionnaire was sent to producers followed by several meetings with Extension and NRCS staff to gauge current production practices, to discuss producers short and long-term goals, and to gauge their willingness to cooperate on a multi-year project with the proposed project timeline.

Producers & project team members meet to discuss project plans.

February 2020: A farm survey was taken to note current production practices, to view current facilities and equipment available, to test hay and soil quality, to note available pasture forages and hay stores, and to survey forage pest pressure. Recommendations were made to control pests and locations were determined for annual forages to be planted.

March 2020: We looked at potential paddock design, electric fencing, water tanks, heavy-use areas, and other potential management practices to be implemented. Fertilizer, lime, and herbicide recommendations were made as well.

Water tank & electric fence design established.

April 2020: The following data was gathered on cow/calf herd: cattle weights, hip height, body condition score, foot score, docility score, and hair shedding score.

May 2020: The no-till planter was calibrated. Herbicide was applied and bermudagrass was no-till drilled in a 25-acre field to establish an improved summer perennial forage.

June 2020: Excellent stand of Cheyenne II bermudagrass was established in the 25-acre field. Forage pest surveyed and recommendations made.

Established seedling bermudagrass stand.

July 2020: PTO sprayer was calibrated and broadleaf herbicide was applied to the 25-acre field to suppress broadleaf weeds.

August 2020: Poultry litter was applied to 25 acres in preparation for stockpiling. Burndown herbicide was applied to a 15-acre paddock to control weeds in preparation to plant a summer annual (pearl millet) to improve available forage quality. Paddock was to be utilized in combination with 25-acre field of stockpiled bermudagrass to improve forage quality and extend grazing into Fall.

Forage height was measured.

September 2020: A mixer of left-over summer annual, annual ryegrass, and brassicas were planted into an 8-acre paddock. Annual ryegrass was planted into another 10-acre paddock. One ton of poultry litter per acre was applied to approximately 75 acres of the farm.

October 2020: Forage samples of the pearl millet were taken to assess forage quality. Results were 18.4% crude protein (CP) and 62.9% total digestible nutrients (TDN). Recommendations were made to limit grazing of the pearl millet to two days per week in combination with the stockpiled bermudagrass to improve and extend fall grazing. Balansa Clover was planted into five acres of the bermudagrass field at 16 pounds per acre (double rate) and skipping every other row.

Winter 2020/2021: Hay feeding was reduced from 166 days to 106 days. Hay was normally fed Nov. 1 through mid-April. Stockpiled forages extended grazing through December 1. Fall planted winter annuals and legumes allowed the producer to stop feeding hay 30 days earlier in the spring of 2021.

Additional savings were established with the use of hay rings. Prior to the use of hay rings, bale grazing was normal practice- which resulted in a good amount of hay being wasted. The utilization of hay rings reduced overall hay usage by approximately 50%. The hay rings cost $300 each and paid for themselves within the first week of use. Previous feeding rates were two bales per day and now feeds one bale per day due to lower waste and higher animal consumption.

Estimated savings in hay feeding over a 106-day feeding season vs. 166 days were $5300. Additional savings from using annual forages and stockpiled forages to extend the grazing season by 60 days were $3000 for a net savings of $6550 by using improved forage management practices. In addition, he has been growing forage for more of the year to improve overall forage productivity and soil health.

Bale grazing cattle in the field resulted in hay being wasted.

Project Timeline & Practices (Year 2):

March/April 2021: Hay feeding ceased in March. Cool season annuals and legumes were grazed. An additional hay field was acquired on an adjoining farm and soil samples were taken. This field would be fenced for grazing and utilized for hay production, as needed. A burndown herbicide application was made to this field. Forage and grazing management plans were made for each paddock for 2021.

Soil samples were taken on the whole farm. Soil testing results were compared with previous year samples and by hay feeding locations. Across the whole farm, soil test phosphorus decreased slightly while potassium levels increased slightly. Field 5 had the highest increase in p & k levels likely due to the release of nutrients from the hay fed (bale grazing) in that location the previous winter. Additional samples were pulled in hay feeding areas (Field 2) which revealed almost twice the level of p & k.

		April 2021				May 2020				Difference			
Field	Acres	pH	P (lbs/a)	K (lbs/a)	% organic matter	pH	P (lbs/a)	K (lbs/a)	% organic matter	pH	P (lbs/a)	K (lbs/a)	% organic matter
1	25	6	28	116	2.2	6	30	111	2.1	0	-2	5	0.1
2	15	5.6	32	136	2.5	5.4	26	82	2.3	0.2	6	54	0.2
3	10	5.5	16	82	2.1	5.5	22	84	2.2	0	-6	-2	-0.1
4	18	5.4	22	96	1.9	5.2	24	114	2	0.2	-2	18	-0.1
5	10	6	62	204	2.5	6.1	40	120	N/A	-0.1	22	84	N/A
6	3	6.1	42	156	4.5	6	42	130	N/A	0.1	0	26	N/A
7	13	6.1	40	208	3.7	5.9	80	236	3.4	0.2	-40	-28	0.3
8	10	6	56	168	2.2	6	58	190	3.2	0	-2	-22	-1
9	4	6.2	26	116	3.6	6.4	32	112	3.2	-0.2	-6	4	0.4
10	10	6.1	24	114	3.3	6	18	94	2.6	0.1	6	20	0.7
11	20	5.6	36	106	2.7	6	46	118	2.7	-0.4	-10	-12	0
12	20	6.5	14	100	3.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Average		**6.0**	**30**	**149**	**3.1**	**5.9**	**38**	**126**	**2.6**	**0.1**	**-8**	**22**	**0.5**
Hay rings		*6.5*	*64*	*248*	*2.7*								

May 2021: Winter kill was noted in a newly established bermudagrass field. Fertilizer applications were made to warm season pastures.

Burndown herbicide applications were made to a field in preparation for summer annual planting. One of the pastures, containing endophyte infected fescue and a high rate of winter broadleaf weeds, was treated with metsulfuron to control weeds and suppress fescue. Every other pass was skipped to help identify how well the product worked as a growth suppressant on the fescue.

July 2021: Current hay stores and hay needs for winter were assessed. Forage pests were being monitored closely. Bermudagrass field was harvested for hay. Field will be grazed in preparation for stockpiling.

Fescue suppression observed between treated (left) & untreated (right) areas.

August/September 2021: Fertilizer was applied to warm-season perennial pastures to be stockpiled. Plans were made on winter hay feeding locations to help improve soil fertility. Pastures to be planted were grazed through, then burndown herbicide applied in late August. These pastures were all planted around early to mid-September with one or a combination of spring oats, winter oats, ryegrass, and brassicas. Plans were made for a field day in late October.

October 2021: Field Day plans were finalized. Pastures stockpiled and planted were surveyed. Fall/winter grazing plan was made for cow herd and growing calves. Great turnout for field day.

Audience gathered to learn from UADA Forage Specialist, Dr. John Jennings, during the October 2021 Livestock & Forage Field Day

November/December 2021: Stockpiled forages were utilized. Winter-annual pasture rotation plan made.

Partnership with USDA- Natural Resources Conservation Service (NRCS):

Larry and Linda were working with the local NRCS office during the same time they were planning with Extension. Planning was done jointly with the Morris's to set up an Environmental Quality Incentives Program (EQIP) contract to accomplish many of the practices needed to establish the structural components (fence, water system, heavy use areas for erosion, tree planting for shade, and a stream crossing) and the needed forages (Fescue/Clover, Bermudagrass, Switchgrass plantings). Extension works closely with NRCS; however, this was truly a great partnering opportunity to combine Extension's grazing technical expertise along with NRCS's technical and financial resources. EQIP contracts are multi-year contracts that provide cost-share to do approved conservation practices. It is a competitive program that is based off an environmental ranking.

Demonstration Results & Summary:

The University of Arkansas Cooperative Extension Service and Natural Resource Conservation Service were able to help the cooperator meet their goals of improving forage diversity, quantity, and quality; increasing rotational grazing capability and grazing efficiency; improving soil fertility (slightly), drainage, and health; and reducing winter hay feeding by implementing research-based practices.

Demonstration Results & Summary (continued):

View of 25-acre field at the beginning of the project.

View of 25-acre field at the end of the project.

The producers continue to implement recommended forage management practices to improve productivity and to extend the grazing season. Practices included soil sampling, proper fertilization, use of poultry litter, planter calibration, planting improved forage varieties, improved grazing management practices and pasture design, pasture drainage improvement, improved footing in high-use areas (reducing potential foot problems), forage pest control, sprayer calibration, and increased access to water to better utilize available forage. They used a combination of stockpiled bermudagrass, winter annuals, and legumes along with controlled grazing to extend the grazing season. The producer continues to strategically feed hay in a manner to improve soil fertility. The producer continues to grow more forage for more of the year which continues to improve overall forage productivity and soil health. Larry and Linda Morris were a pleasure to work with and we hope they have found this program to be of value to them and others.

Illustrated Timeline:

2/2020- Producer pulled hay core samples for hay quality testing.

7/2020- Producer applied herbicide.

Illustrated Timeline (continued):

10/2020- Samples are taken for soil retention curve.

11/2020- Project team & producers work to build tire water tanks.

3/2021 Balansa Clover stand.

6/2021- Balansa Clover allowed to go to seed.

6/2021- Cattle allowed to graze the clover.

4/22- The Balansa clover came back the second year from seed & spread.

2022 Hay Show & Contest

Cooperators: Greene County Hay Producers

Investigators: Dr. Shane Gadberry, Lance Blythe

Partners/Sponsors: Greene County Fair Board, GreenPoint Ag, Legacy Equipment, UADA Agriculture Diagnostic Lab

Objective: Provide an opportunity for producers to learn the quality of their hay, understand what factors influence that quality, and to set hay quality production goals based on animal nutrient requirements.

Hay sampler in round hay bale to take core sample for hay quality testing.

Testing Method: Hay samples were taken during the first week of August using a Star Quality brand push-type forage sampler. Twenty-five to thirty sample cores were pulled from each lot of hay entered. Samples were bagged, labeled, then sent to the Agriculture Diagnostic Lab in Fayetteville. Only warm season grass hay was accepted for the contest.

Ranking Method & Results: Samples results were ranked using a composite calculation utilizing crude protein (CP) percent and total digestible nutrients (TDN) percent. The total composite score was weighted at 30% for CP and 70% for TDN. See table below for results.

#	CP%	ADF%	NDF%	TDN%
21003	16	32.9	66.1	61.5
21011	11.6	30.4	61.3	61
21009	12.3	31.5	62.2	60.7
21006	13.6	33.7	62.2	59.9
21004	12.8	33.6	62.5	59.6
21012	9.6	30.3	60.1	60.1
21008	12.7	34.2	62.6	59.2
21005	11	32.6	64	59.4
21007	8.3	29.9	57.2	59.8
21001	10.2	33	64.6	58.8
21000	9.1	32.9	61.8	58.3
20999	10.1	36.4	63.7	56.7
21014	8.9	33.9	60.4	57.7
21002	7.7	32	58.5	58.2
21010	9	36.3	60.5	56.3
21013	7.8	34.8	65.3	56.6

Results & Discussion: There was a relatively wide variation in test results. Crude Protein ranged from 7.8% - 16% and TDN from 56.6% – 61.5%. The variation in nutrient content of these samples was influenced by several factors such as drought, conditions at harvest, forage pests, etc. However, no factor influences the nutrient quality of hay more than stage of plant maturity at harvest.

All samples submitted were above the 5-year state average for percent TDN and twelve of the sixteen were above for percent CP. All samples with TDN over 60% would meet the TDN requirements for an 1,100-pound cow with 18-pound peak milk production at any stage of production throughout the year. With this hay, no supplemental energy should be needed to maintain cow body condition. All samples over 11.5% CP would meet crude protein requirements as well. Simply put, most of the hay entered in this contest would require little to no supplemental feeding for cattle!

If you would like to see how your hay would meet cattle, sheep/goats, or horse requirements, check out this link: https://forageadvisor.uada.edu

To learn more about how your hay would meet the nutritional needs of cattle in other production stages, check out this publication: https://www.uaex.uada.edu/publications/pdf/MP391.pdf

Educational Component: During the Greene County Fair, the top three contest winners were announced, and test results were posted at an educational display. Attendees of the Greene County Fair could try to visually pick the best quality bale of hay.

We were pleased to see that the contest stimulated much conversation about hay production and hay quality. Most producers seemed pleased with their results considering all the production challenges they faced this year.

Congratulations to this year's winners and a special thanks to the sponsors! The sponsors made this contest possible at no cost to producers and some nice prizes were awarded as well!

Systemic Insecticide Demonstration- Carpenterworm Control

Cooperators: Danny Dodd

Investigators: Dr. Gus Lorenz, Dr. Glenn Studebaker, Andy Vangilder, Lance Blythe

Objective: To assist homeowners with identification and control of pest in Ash trees.

Pests: Carpenterworm, *Prionoxystus robiniae*

Demonstration Background:

In the May of 2021, the Greene County Extension Office received a call about some young Ash trees that appeared sick and the owner had noticed holes in the bark. Upon further investigation, we found the holes to look similar to the Emerald Ash Borer (EAB). We shared some pictures and communicated with a couple of forestry specialists, and due to the diameter of the holes, they didn't think it was EAB. Arkansas Forestry Commission technicians met with the cooperative extension agent and homeowner for further investigation. While cutting a limb to take to their lab, a boring insect was found in one of the limbs. The insect turned out to be a carpenterworm. Extensive damage and tunneling was noted within the limb. Varying size larvae and shed exoskeletons were found as well. The holes observed in the bark turned out to be exit holes.

Upon identification, we determined that there were systemic products available that should help control these pests and possibly keep the damages to the trees from getting any worse. We proposed a demonstration that would treat one tree and leave the other one untreated as a control. The homeowner, Mr. Dodd, was interested in the proposed demonstration. We contacted Mr. Andy Vangilder and Dr. Gus Lorenz to find products available to conduct the demonstration. Dr. Lorenz provided the needed product, which contained the active ingedient imidacloprid.

Method:

The Ash tree located south of the house was used as the untreated control. The Ash tree north of the house was treated. The imidacloprid was mixed with water at the labeled rate and applied around the base of the tree in May of 2021. The same treatment protocol was used and another treatment was applied, March 29, 2022, during spring greenup.

Summary:

The Ash tree treated with imidacloprid survived another season due to the systemic insecticide treatment as opposed to the untreated tree. The untreated tree did not. The treated tree will likely not have future new growth from the limbs that were so severely damaged from the pests, but will likely overall put on new growth with proper management.

This demonstration helped the homeowner see that early detection of the pest is important and that the use of systemic products can help control boring pests if they are present.

To learn more about Carpenterworms, please visit: https://hortnews.extension.iastate.edu/2021/04/be-aware-carpenterworm

Demonstration Results:

Treated:

5/21/21

5/2/22

7/15/22

Untreated:

5/21/21

5/2/22

7/15/22

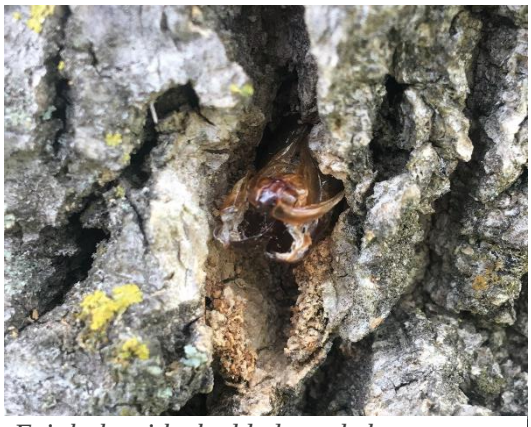
Initial On-Site Pest Signs:

Older Carpenter larvae (caterpillar)

Young Carpenterworm larvae (caterpillar)

Shed exoskeletons of Carpenterworms left by emerging adult moth

Boring and tunneling of the Carpenterworm



Exit hole with shedded exoskeleton present

Greene County 4-H Livestock Project Group

Cooperating: Greene County Fair Association, Greene County Community Fund, Greene County Farm Bureau, Local, State and National Businesses, Financial Supporters, Livestock Producers, and all 4-H Livestock Families

Lead Agent: Blake Davis

Objective: Train youth in broiler and animal husbandry principles such as selection, nutrition, and preparation for show, parasite control, and herd/flock management. Assist youth in developing youth livestock projects tailored for competitive events in Arkansas and Nationally. Promote development of youth communication, record keeping, budgeting, and teamwork skills. Showmanship and sportsmanship are a major thrust of this educational program.

Livestock Show Events:

Greene County Fair, NEA Livestock Show, Arkansas Youth Expo, Arkansas State Fair, Buffalo Island Northeast District Jr. Livestock Show, Crowley's Ridge Classic Jr. Livestock Show, North American International Livestock Expo, National Western Stock Show, Mississippi Youth Expo, numerous jackpot shows in Arkansas, and numerous national breed shows and events

Educational Trainings:

On farm visits with extensive one-on-one training, Statewide Livestock Show Clinics conducted in Greene County every other year. (*Sponsored by major feed companies*)

Photos: *Beckett R. and Jackson R. exhibited the Grand and Reserve Champion Meat Pen Fryer Rabbit at the Arkansas State Fair.*

Youth Statistics:

We had over 30 4-H youth in Greene County that exhibited a total of 150 livestock projects throughout 2022. Numerous youths participated in all available shows and livestock training events, but a few of the younger Cloverbud members exhibited only at local shows.

Project Statistics:

4-H members exhibited numerous livestock entries in 2022. Projects included swine, goats, sheep, cattle, broilers, and rabbits. Greene County 4-Her's received numerous scholarships throughout the 2022 show season. Many youths use these funds to finance other projects and to fund their college education. Scholarship programs have become a new innovative way to reward the 4-H youth for their hard work. This was another outstanding year for Greene County 4-Her's!

Left: Elissa V. exhibited the Grand Champion Hampshire Market Hog at the Arkansas State Fair.
Right: Jackson R. exhibited the Reserve Champion Light Cross Market Hog at the Arkansas State Fair.

Greene County 4-H had a total of four youth members in the Arkansas State Fair Sale of Champions. They brought home over $13,000 in premium money and scholarships.

Left: Jackson R., Beckett R., Elissa V., Millie F., and Karie H. were inducted into the Arkansas State Fair "Purple Circle Club."

Greene County 4-H had a total of five youth members that were inducted into the "Purple Circle Club." The "Purple Circle Club" is an awards program recognizing junior livestock exhibitors who earned championship honors at the Arkansas State Fair.

2022 Top Notch Intercollegiate Swine Judging Contest

Cooperating: Greene County Fair Association, Greene County 4-H Foundation, Greene County Agriculture Instructors, Greene County 4-H Livestock Project Group members & volunteers, and participating collegiate livestock judging teams

Lead Agent: Blake Davis

Objective: To provide an educational swine judging contest to promote growth in knowledge of the livestock industry through livestock evaluation and enhance competitive judging skills-including animal selection and reasoning skills. To provide the opportunity for youth 4-H members to observe a collegiate-level swine judging contest and to promote development of youth communication, decision-making, note taking, speaking, and teamwork skills. To provide hands-on opportunity for youth 4-H members to conduct and manage a judging contest with a large, diverse audience.

Educational Method:

The contest consisted of eight swine classes for the collegiate teams to evaluate. Of those eight classes, four classes of oral reasons were presented to professionally qualified reasons takers in the livestock industry. The youth 4-H members observed the course and management of the contest. The youth and 4-H volunteers were given show management responsibilities to allow the 4-H members to "learn by doing" in a controlled and safe manner. Following the contest, both the collegiate and youth 4-H members observed livestock evaluation and reasoning by a professional for each of the contest classes.

Greene County 4-H members drive hogs in the center of the show ring as collegiate livestock judging teams surround the outside of the show ring.

Results:

Nine collegiate livestock judging teams representing six different states made for a total of 150 contestants participating in this first-year event. The event took place at the Greene County Fairgrounds.

Greene County 4-H youth were provided with an astounding amount of hands-on learning in diverse areas of focus. Through the course of management of the contest, responsibilities and tasks varied. Some of the responsibilities and tasks led by 4-H members and volunteers included: management of registration, leading and assisting contestants, driving and preparing (*rinsing, watering, keeping animals cool*) hogs to be judged, coordinating classes to and from the show ring, announcing and timekeeping, preparing the reasons rooms,

keeping refreshment stations full, preparing boxed meals, and preparing the scantrons for scoring. These tasks varied in educational emphasis including animal science, health/ food safety, and communication.

Greene County 4-H members drive hogs out of the show ring and prepare another class of hogs to enter from the grooming chutes.

Leadership Paragould Agriculture Day

Event Coordinator(s): Paragould Regional Chamber of Commerce & City of Paragould

Project Team: Sue McGowan, Allison Hestand, Leadership Paragould Committee, Tony Lucius, & UADA Extension Agents

Sponsors: Paragould School District, Legacy Equipment, Unico Bank, Ridge Retreat & Adventure Center, MFA Agri Services, Bayer Crop Sciences, & Farm Credit Midsouth

Non-profit Partners: Greene County Library, Pilots for Christ, & Greene County Rescue Squad

Presenters: Adam Eades, Barkley Rowland, Bobb Knott, Brad Smithee, Brent Cox, Brian Wooldridge, Bryan Privett, Bryce Anderson, Cary Clayton, Chris Harden, Clay Smith, Cody Gray, Cruz Hill, Dave Freeze, David Pigue, Derek Boling, Devon Bryant, Donis Hamilton, Harlee Haney, Jeremy Frankenberger, Jimmy Williams, Joey Massey, Jonathan Mays, Justin Blackburn, Justin Burlison, Kelly Wright, Lance Blythe, Lance Winn, Larry Baker, Matt Wright, MFA Ag Staff, Mike Williams, Patrick Lenderman, Ron Bellomy, Ronnie Hill, Steven Hill, Terry Gray, Terry Smith, Tiffany Hinson, Tony Lucius, & Walker McMilan

Program Goal & Background:

The goal of the Leadership Paragould program is to "help develop leaders for tomorrow." The program helps members grow personally and professionally and gives them the tools and the challenge to "go forth and lead." This program covers numerous community topics presented by community leaders and non-profit organizations.

The Agriculture & Transportation session is one of the subject areas covered in the annual Leadership Paragould program. The objective of the Ag Day program is to share the local, regional, state, and national value and diversity of Greene County agriculture with members of the Leadership Paragould class.

The Greene County Cooperative Extension Service has had the opportunity to assist with this program since 2013. Each year in June, class members gather early and hear a presentation from UADA Cooperative Extension Agents about the economic impact that agriculture has on the economy. This is normally followed by a presentation from one of the many non-profit organizations in Greene County.

Agriculture business and farm tours take up most of the day. The goal is to provide agriculture education directly from local agriculture producers and experts. These agriculture tour locations change slightly from year-to-year to help showcase the agriculture diversity in Greene County.

The day normally concludes with an "agriculture panel discussion." The panel is comprised of a diverse group of agriculture producers and industry professionals. The discussions are facilitated by UADA agents. The discussion is open with no agenda. The goal is for class members to ask anything they wish and get learn straight from the agriculture professionals. The discussion is always interesting, funny, educational and a little "heated" at times. There are always myths dispelled during the discussions. All-in-all it provides class members, committee members, and agricultural professionals with an opportunity to get to know one another and see how we can all work together for a better community.

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

2022 Greene County Extension Soil Trends

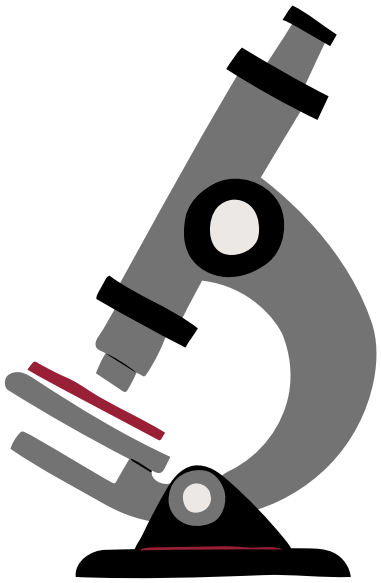
7,678 soil samples were submitted to the UofA Soils Lab for analysis from Greene County during the 2022 program year*

Total of 44,296 acres were represented by samples

***as of October 1, 2021- September 30, 2022**

Most common crop recommendations requested for Greene County samples:

- Row Crops (Soybeans, Rice, Corn)
- Forages (Hay & Pasture)
- Vegetable Garden
- Lawn (Bermudagrass)
- Food Plots



Your Greene County Cooperative Extension Service

www.uaex.uada.edu/counties/greene

UofA DIVISION OF AGRICULTURE RESEARCH & EXTENSION

University of Arkansas System

Annual Update

2022 Greene County Extension Education Outreach

- Total Educational Contacts: 754,081
- Total County Volunteer Hours: 1,405 Hours
- Value of Volunteer Efforts: $42,079.75

Greene County 4-H Program

Overview of Programs

- 247 4-H Members
- 46 4-H Volunteers
- 16 4-H Clubs/ Project Groups
- Total Educational Contacts: 12,728

Key Programs & Activities Conducted:

County Events:

- Hosted county Giant Pumpkin & Watermelon Contest, Livestock Judging Workshop, 4-H "Harvest" Party, Fall Farm Mudder, Christmas Community Service Activity, Poultry BBQ Contest, Get Real- Here's the Deal Youth Financial Literacy Activity, Dairy Recipe Contest, 4-H Coloring Contest, Citizenship Community Service Project at Memorial Gardens, Youth Teaching Garden Educational Sessions, 4-H Craft Night, Fair Entry Prep Night, & 4-H O'Rama Competitions
- Conducted a Intercollegiate Swine Judging Contest- 150 collegiate contestants from nine different colleges representing six different states competed. Over 40 4-H youth and volunteers were involved in planning, hosting, serving, and conducting the event.

Virtual Activities:

- Hosted virtual Ross Photography Contest (2,698 people reached)

Leadership & Achievements:

- 2 youth named Arkansas 4-H Teen Stars
- 6 youth received district-level record book awards
- 1 youth received state-level record book award

Community Economic Development

Key Programs & Activities Conducted

- Assisted with & conducted community beautification projects, Paragould Farmers Market, Paragould Community Garden, Chamber Board, Leadership Paragould Program
- Partnered to establish Paragould as a "Tree City USA" community

Agriculture & Natural Resources

Overview of Program

- Educational Contacts: 743,828
- 2,053 Farm/Site Visits
- 13 Demonstrations
- 35 Master Gardener Members
- 10 Master Gardeners Beautification Projects

Key Programs & Activities Conducted

Rice:

- Arkansas Rice Performance Trial (Cultivar Test)
- Potassium management program - 8 fields
- IPM survey & scout reporting - 5 fields
- Barnyard herbicide resistance screening - 4 fields

Soybean:

- Soybean Research Verification Program
- Soil Health team project (NRCS & GCCD & others cooperating)
- Potassium management program - 10 fields
- Last season potassium demonstration
- IPM Survey & scout reporting (disease & insect) - 5 fields
- Corn earworm moth trapping program – 6 sites checked weekly (June- August)
- Grow for the Green Soybean Yield Challenge

Corn:

- Hybrid Trial
- Poultry litter rate study
- Potassium management program – 3 fields
- Southwestern Corn Borer Moth Trapping – 4 sites checked weekly (June- July)

Wheat:

- Wheat Research Verification Program

Horticulture:

- Fall Garden Seminar
- Brown Bag Lunch – 8 garden-education sessions
- Monthly Master Gardener Newsletter
- Plant, Nurture, Grow- Zoom Drip Irrigation Presentation

Livestock & Forages:

- Monthly Livestock & Forage Newsletters/e-Updates
- Weekly Forage IPM survey & scouting
- Livestock & Forage Field Day
- Bi-Annual Calfhood Vaccinations
- Bi-Annual Breeding Soundness Exams
- Multiple Weed Control Demonstrations
- Small Ruminant Dewormer Study
- Cow Herd Improvement Programs
- Tick Collection Survey
- Beef Quality Assurance Certification Programs
- On-Farm Forage Nitrate Sampling

Program Partners

We want to thank the many businesses & individuals who contributed to our 2022 Greene County Extension Crop, Livestock, & Youth Demonstrations, Programs, & other Projects. Many are listed below.

Farmers:

Britt & Justin Blackburn, Derek & Royce Boling, Ryan Boozer, Jason Boyd, Nathan Davis, Johnny Distretti, Carlos & Shane Eason, Shawn & Brandon Finch, Nick Fox, Brad & Randy Gray, Chris Hardin, Ronnie & Steven & Cruz Hill, Greg & Shannon & Larry & Gary King, Brandon Martin, Larry & Linda Morris, Justin & Roy Newsom, Tyler & Raney Nutt, Clint Pigue, David Pigue, Ron Pigue, Jim Pillow, Danny & Stacey Rice, Dallas & Rob & Ronnie & Ryan Roberts, Chris & Allen & Randy Russom, Clay & Terry Smith

Consultants:

Sterling Clifton, Jack Cox, Brandon Davis, Dustin Engler, Shane Frost, Austin Miller, Chris Murray, Lance Ramthun, Mike Simmons, Charles Wood, Justin Threlkeld, Luke Zitzelberger

Business Supporters:

4 S & J Inc., AgriGold, Anheuser-Busch, Baker Implement Company Inc., BASF, C & H Insurance, Delaplaine Seed Company, Final Drive Genetics, GreenPoint AG, Hog Air Aviation, Horizon AG LLC., Kin Co AG Aviation Inc., Lawrence County Seed Company, Legacy Equipment, MFA Agri Services, Nutrien Ag Solutions, Riceland Foods, Inc., Scott Flying Services Inc., Simplot Grower Solutions, Steve Cobb & Family, Vance Cupp & Sons, Inc.

Community Supporters:

City of Paragould, Greene County Cattlemen's Association, Greene County Conservation District, Greene County 4-H Foundation, Greene County Fair Association, Greene County Farm Bureau Board, Greene County Quorum Court, Paragould City Council, Paragould Parks & Recreation, Paragould Regional Chamber of Commerce, USDA Natural Resources Conservation Service

University Staff:

Scharidi Barber, Dr. John Boyd, Jerry Clemons, Dr. Mike Daniels, Dr. Jason Davis, Chris Elkins, Dr. Travis Faske, Dr. Shane Gadberry, Blair Griffin, Dr. Jarrod Hardke, Dr. John Jennings, Dr. Jason Kelley, Dr. Kelly Loftin, Dr. Gus Lorenz, Dr. Jason Norsworthy, Dr. Trent Roberts, Dr. Jeremy Ross, Kenny Simon, Ples Spradley, Scott Stiles, Dr. Glenn Studebaker, Priscella Thomas-Scott, Andy Vangilder, Cheri Villines

Individual Supporters:

Josh Agee, Langston Ashmore, Ron Bellomy, Justin Blackburn, Cory Burton, Brent Carpenter, Steve Cobb & Family, Dr. Steve Copeland, Vance Cupp Jr., Adam Eades, Stan Foster, Cody Gray, Terry Gray, Vicki Griggs, Aaron Harmon, Kristie Head, Allison Hestand, Colin Hester, Sherry & Jim Holland, Bill Jones, James Kashak, Jordan Leatherman, Patrick Lenderman, Doug Manning, Kim Mayberry-Holifield, Daniel Mayer, Jeremy McClelland, Rusty McMillon, Paula Norman, Blaine & Vicki Nunn, Bill Pollard, Adam Rawls, Stephen Riggs, Casey Rogers, Jason Scatterfield, Randy Scott, Harvey Songer, Andy Swindle, Rich Tate, Pauletta Tobey, Mindy Tritch, Caleb Wall, Scott Watson, Richard Yeazel

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