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Jamie L. Whitten Plant Materials Center

2006 Annual Technical Report

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Associated ECS Staff, Jackson, MS

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Introduction

The Jamie L Whitten Plant Materials Center (MSPMC), located near Coffeeville, Mississippi, is operated by the USDA Natural Resources Conservation Service. Our mission is to select, test and transfer state-of-the-art plant materials and technology to meet the resource needs of a myriad and diverse customer base within our service area. Our program has developed an excellent internal system for identifying future plant materials needs, which is coupled with a seamless system of product development and program delivery. By working with a broad range of plant species, including grasses, forbs, and shrubs, the MSPMC seeks to address priority needs of its customers in NRCS field offices and land managers in both the public and private sector.

The MSPMC works closely with its customers to develop solutions for a broad range of conservation concerns and issues. Cropland erosion control, pastureland improvement, critical area erosion control, including urban conservation concerns, water quality improvement, and wildlife habitat enhancement are the major conservation issues in our service area, which includes the state of Mississippi (excluding the coastal counties), the delta regions of Arkansas, Louisiana, Tennessee, Missouri, Kentucky, and the Blackland Prairie of Alabama.

Activities

In order to develop improved resource technology, the MSPMC carries out numerous research studies, both on the center and at other locations within our service area. We often work cooperatively with other agencies and organizations in carrying out this research. Cooperators include the Mississippi Agricultural and Forestry Experiment Station (MAFES), Mississippi State University, Alcorn State University, Mississippi Association of Conservation Districts, Mississippi Soil and Water Conservation Commission, USDA Forest Service, and USDA Agricultural Research Service, and as well as other federal and state agencies and entities within NRCS.

The purpose of this publication is to provide information on studies actively being pursued at the MSPMC during 2006. Any results should be regarded as highly preliminary and should not be utilized until further testing is completed. An in-depth research report or summary is written after the completion of each study and are published annually in a MSPMC Technical Reports publication. Past reports and summaries are available from the MSPMC or are available on the Plant Materials Program web site at http://www.plant-materials.nrcs.usda.gov/mspmc/.

MSPMC Site Information

The MSPMC occupies more than 360 acres of land (200 acres in open fields) within the Holly Springs National Forest. The growing areas consist of both bottomland and upland fields, with most being of irregular size and shape, defined by streams, drainages, roads, and other topographic features. Bottomland fields are composed primarily of Oaklimeter silt loam soils, which are acidic and often wet. With proper drainage and management, these soils can become very productive. Soils on upland sites are predominantly Loring and Grenada silt loams with fragipans. These soils are also acidic and moderately to highly productive. This 2006 report contains the latest soil testing reports.

Rainfall (Table 1) was normal to dry during the spring and early summer of 2006. Rainfall in June and July was drier than normal, resulting in poor stand establishment and slower plant growth. A prolonged drought continued throughout the summer months. This absence of rain during seed set affected seed fill and quality of ‘Chiwapa’ Japanese millet and Lark selection partridge pea. Yields of ‘Highlander’ eastern gamagrass, harvested in July, were lower than we have obtained in any other production year to date. Temperatures (Table 2) during 2006 were fairly typical for this location, with the exception of slightly cooler than normal temperatures during periods of October, November, and December, while the monthly averages were near normal.

Last Frost (last date of 28^{o}F or less) in the spring of 2006 could not be ascertained due to gaps in available data (average date is March 20). First Frost (first date of 28^{o}F or less) in the fall of 2006 occurred November 3, 2006 (average date is November 10).

How Dry Was the Summer of 2006?

To provide some perspective, rainfall data at the Enid Dam weather station (MS2773) was studied for the period of 1944 to 2006. Additionally, only the period of May 1 to August 31 was examined. This period is the primary “growing season”, the period in which crops and grasslands depend upon rainfall to produce satisfactory crops, pasture, and hay. Typically 12” of water beyond rainfall is required thus stored soil moisture is required to prevent yield reductions. The “average” growing season rainfall in Yalobusha County is approximately 16”, with about 33 percent resulting in runoff, leaving 11” to replenish soil moisture and benefit the crops and grasslands. Therefore a growing season with “average” rainfall and sufficient stored soil moisture will meet most crop and grassland needs.

One problem with the summer of 2006, was that we went into it with many areas having below normal soil moisture (October and November of 2005 were “dry” months), meaning crops and grasslands were even more dependent upon rainfall as stored soil moisture was already deficient.

The average May to August growing season rainfall at Enid Dam is 15.8”. In the 63 year period studied (1944-2006), 2006 was the third driest on record (7.80”, half of the average), exceeded in dryness only by 1956 (7.11”), and 1988 (the driest at 5.23”). The previous summer, 2005, was the 7th driest in the period of record (9.75”).

In 2006, the Jamie L. Whitten Plant Materials Center (MSPMC) recorded 12.32” in the May to August growing season. However, June and July totaled less than 3”, a very dry period. Rainfall in August came after the middle of August, too late for many plants.

The ten driest years for the May-to-August “growing season” period is shown in the table below for the Enid Dam station.

May-August Growing Season
Average = 15.8” 1944-2006

Rank	**Rainfall** (inches)	**Year**
1	5.23	1988
2	7.11	1956
3	7.80	2006
4	8.86	1998
5	9.00	1976
6	9.50	1952
7	9.75	2005
8	10.01	1962
9	10.95	2000
10	11.07	1947

Table 1. Monthly and total rainfall in 2006 at the
Jamie L. Whitten Plant Materials Center, Coffeeville, MS.
Condition Value based on Coffeeville, MS, WETS Table.

Month	2006	Condition.
	--------------------in.--------------------	
January	6.49	NORMAL
February	5.19	NORMAL
March	3.46	DRY
April	4.10	NORMAL
May	5.16	NORMAL
June	1.67	DRY
July	1.32	DRY
August	3.59	NORMAL
September	7.43	WET
October	5.50	WET
November	4.65	NORMAL
December	7.44	WET
Total	56.00	NORMAL

Station: COFFEEVILLE
State: MS
ID: 221804
Latitude: 33.98 degrees
Longitude: -89.67 degrees
Elevation: 241 feet
Station period of record: 05/01/1909-03/24/2006

Table 2. Average monthly high and low temperatures recorded for Water Valley, MS in 2006 and 30-year Normals from WETS Tables

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
	-------	-------	-------	-------	-------	-------	°F	-------	-------	-------	-------	-------	-------
High	62.7	57.7	75.0	N/A	N/A	N/A	N/A	94.0	83.1	73.4	63.8	58.6	N/A
Low	32.2	22.8	39.5	N/A	N/A	N/A	N/A	71.2	58.1	45.5	36.8	34.0	N/A
30-yr High	50.9	56.4	65.2	7332	80.2	87.1	90.5	90.7	85.8	76.0	64.4	54.5	72.9
30-yr Low	28.5	31.8	39.7	47.1	56.7	65.2	69.3	67.5	60.9	48.2	39.4	31.5	48.8

WETS Station : COFFEEVILLE, MS1804 Creation Date: 09/06/2002

Latitude: 3359 Longitude: 08940 Elevation: 240

State FIPS/County(FIPS): 28161 County Name: Yalobusha

Start yr. - 1971 End yr. - 2000

		Precipitation (Inches)				
			30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month		avg	less than	more than		
January		5.44	3.68	6.51	8	0.8
February		4.83	3.30	5.77	6	0.5
March		6.40	4.42	7.63	7	0
April		5.81	3.20	7.08	6	0
May		5.88	3.53	7.14	7	0
June		4.71	2.38	5.76	6	0
July		4.46	2.98	5.34	6	0
August		3.16	2.15	3.77	5	0
September		3.70	1.98	4.51	5	0
October		3.40	1.87	4.14	4	0
November		5.54	3.64	6.65	6	0
December		6.06	3.54	7.37	7	0.1
Annual			51.55	64.24	73	1.5
Total		59.41				

WETS Station : WATER VALLEY 1 NNE, MS9400

Beginning and Ending Dates

Growing Season Length

3/20 to 11/10

235 days

ACTIVE STUDIES

New Studies

Effects of Cover Crops on Sweetpotato (Ipomoea batatas) Yield, Grade and Soil –Borne Insect Injury, and field soil loss and soil quality

Study Number:	MSPMC-T-0701-CR
Study Leader	Paul Rodrigue (MSPMC)
Duration	2006-2009 (3 growing seasons)
Cooperators	Robert Wimbish (Agronomist), Dr. Bill Burdine (MSU), Dr. Seth Dabney (ARS-NSL), Dr. Sherry Surrette (PMS), Earp Farms

Introduction:

Sweet potato is a crop which still utilizes conventional tillage in its production in Mississippi. The primary issue in the use of reduced tillage or cover crops has been the problem with winter weeds or cover crops harboring insects that pose a threat to the sweet potato crop. However, with the Conservation Security Program (CSP) being initiated, there is a need to reexamine production methods that will bring the Soil Conditioning Index (SCI) for sweet potato production to a positive value. Critical to a positive SCI are reduced tillage systems, crop rotations, and the use of cover crops.

Cover crops will be evaluated as part of a conservation tillage management system in the production of sweet potato. Based on previous work the selected treatments are show in Figure 1, the RCB plot design for the study. Plots will be 4 rows wide by 35 feet long with 10' alleys between the replications and at the ends of the block.

Treatments 2-8 will receive following tillage operations: fall disc, fertilize, disc, bed, roll/drag beds, seed cover crops. Plots will receive burndown herbicide (glyphosate) application late March/early April.

Evaluations will include %cover, dry matter production, sweet potato yield (grade).

2006

The cover crops were planted on October 6, 2006, by hand broadcast spreader. Cover crops seeded were: balansa clover, hairy vetch, crimson clover, rye, rye/balansa, wheat, 'Mercer' rye. Volunteer vegetation will be evaluated in the minimum till control plot.

Cover crop establishment was evaluated November 14, 2006. At this time it was evident that there was a residual chemical influence affecting the cover crop establishment. In discussing the situation with the farmer, it was determined that Command was used at planting. However, due to low rainfall throughout the growing season, it was likely that full activation was not achieved. Rainfall associated with the timing of cover crop seeding, probably resulted in activation of residual activity. This result can be considered non-typical (2006 drought).

2007

Cover crop measurements will be conducted in early 2007 until planting time. Sweet potato yield and grade will be evaluated at harvest to determine insect impact related to cover crops.

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Figure 1. Plot layout

Plots 35 feet long, 4 rows wide (flag center furrow)
10 foot alley between plots

10' Alley				
305	Conv. Tillage	ALT RYE -09	201	108
10' Alley				
304	Conv. Tillage	207	Conv. Tillage	102
10' Alley				
303	Conv. Tillage	204	Conv. Tillage	106
10' Alley				
302	Conv. Tillage	208	Conv. Tillage	103
10' Alley				
306	Conv. Tillage	205	Conv. Tillage	107
10' Alley				
ALT RYE- 09	301	203	Conv. Tillage	105
10' Alley				
308	Conv. Tillage	202	101	ALT RYE-09
10' Alley				

Treatment	Description	Flags
01	Conv.	Yellow
02	MinTtill Control	White
03	Balansa	Red
04	Hairy Vetch	Burnt Orange
05	Crimson	Pink
06	Rye	Blue
07	Rye/balansa	Red+Blue
08	Wheat	Bright Orange
09	Rye-Mercer	Yellow+White

Propagation Methods of Rivercane Arundinaria gigantea (Walt.) Muhl.

Study Number	MSPMC-T-0701-TE
Study Leader	Tommy Moss, Agronomist, MSPMC
Duration	2007-2011
Cooperators	John Ouellette, Research coordinator, Memphis Zoo; Dr. Scott Franklin, Asst. Prof. Dept of Biology, Univ. of Memphis, Brian Rude, Assoc. Prof., Dept of Animal and Dairy Sciences, and Dr. Brian Baldwin, Assoc. Prof. Agronomy, Dept. of Plant and Soil Sciences, MSU.

Introduction

Switchcane has been widely displaced in its native range. Attempts to reestablish the species is limited by methods of propagation and planting. Methodologies developed for propagation of bamboo will be assessed for its application to Switchcane. If methodologies prove successful, this will provide the plant materials to establish this native species back to its native range, providing a unique habitat for wildlife**.**

Cane [*Arundinaria gigantea* (Walt.) Muhl.] is the largest native grass in the U.S. It occurs in the southern and southeastern states from Texas and Oklahoma and eastward to West Virginia, Delaware and Florida. Tecta and gigantea are two subspecies of *Arundinaria gigantea*. Switchcane is a culturally significant plant for the Mississippi Band of Choctaw Indians. Cane fiber is used in Choctaw basketry and other tribal crafts. Limited research has been conducted to determine a method for propagating cane. One promising method is to plant culms and rhizomes, and culms attached to rhizomes. Reports indicate that planting culms with attached rhizomes provide larger, more vigorous plants than culms planted alone. Objective of this study is to determine if greenhouse propagation of switchcane (subspecies tecta) is possible and evaluate different propagation mediums.

2006

100 plants were available for initial study as provided by MSU. 25 pots were supplemented with 100 ppm phosphate as superphosphate 0-45-0. 25 pots were supplemented with 200 ppm nitrogen (as ammonium nitrate twice a week for three weeks followed by calcium nitrate twice a week for only one week). 25 pots of were treated with both the superphosphate and nitrogen. 25 pots had no treatments to serve as a control.

In the spring of 2007, additional propagation studies will begin with the cooperators. A portion of the existing plant material will be planted on the MSPMC to evaluate plant establishment, vigor, and growth. Greenhouse will be utilized to propagate plant materials for the 2008 planting season. Planting methods using a MSPMC planter will be evaluated.

Cropland Study Summaries

Improving Soil Degradation Created by Vegetative Barriers

Study No:	MSPMC-T-0112-CP
Study Leader:	Paul Rodrigue (begun by Joel Douglas)
Cooperator:	Seth Dabney, Agronomist, ARS, Oxford, MS
Duration:	2001 - 2006

Introduction

Conservation Practice Standard 601 was developed to govern the use of vegetative barriers to control erosion in sloping cropland. These barriers are highly effective in preventing soil from leaving agricultural fields, but because soil is moved through tillage and erosion from the upper portion of the area between the barriers and deposited above the next barrier, soil quality below each barrier decreases.

Objectives of the study are: 1) determine if benching has altered soil properties affecting crop productivity; 2) determine effectiveness of management alternatives at varying positions within benches for restoring crop productivity and profitability.

Treatments:
1) No poultry litter
2) 1X rate (4 tons) of poultry litter
3) 2X rate (8 tons) of poultry litter
Tillage (disking) vs. no tillage over all litter treatments
Deep tillage (paratilling) vs. no deep tillage immediately below the hedge only

2004

No treatments were applied in 2004. Soybeans were planted in late May to early June when the wheat that was planted the previous fall was harvested. A second planting of soybeans was required due to poor stands. USDA-ARS personnel from Oxford and Starkville monitored yields of the wheat and soybeans and conducted soil testing at multiple depths during the mid-summer.

2005 activity

In the spring of 2005, poultry litter was applied at the treatment rates described above. Corn was planted in the spring. The yield was as described below. In all years, the lower parts of formerly tilled fallow benches (positive lynchets) were more productive than the upper parts where the subsurface fragipan was shallower and fertility levels were lower. During the summer the degrading upper parts (negative lynchets) were more droughty than the aggrading lower parts. In contrast, the during the winter, the upper parts tended to be wetter as water moving laterally down the hillslopes seeped out of the hillside.

Averaged over manure application, similar results were obtained for corn grown in 2005 (Table 1).

Table 1. Within-bench position and management history affected corn grain yield in 2005, averaged over manure treatment.

Tillage	Tilled Fallow History			Sod History		
	Lower	Middle	Upper	Lower	Middle	Upper
	kg ha-1					
Till	5300	4400	2700	7309	4300	4000
No-till	3500	1700	1400	2300	1600	2900

Table 2. Manure affected above ground biomass production and N uptake where incorporated by tillage, but not in no-till (averaged across position).

Manure	Above-ground Biomass		N percentage		N uptake	
	Till	No-till	Till	No-till	Till	No-till
	kg ha-1		%		kg ha-1	
0	11600	7100	1.01	1.18	117	86
1	14600	13000	0.96	0.59	142	77
2	16800	10400	0.86	0.58	147	63

Table 3. Manure affected grain yield and N uptake where incorporated by tillage, but not in no-till (averaged across position).

Manure	Grain Yield		N percentage		Grain N uptake	
	Till	No-till	Till	No-till	Till	No-till
	kg ha-1		%		kg ha-1	
0	3800	2200	1.6	1.7	61	37
1	4400	2500	1.7	1.6	75	40
2	5900	2100	1.5	1.1	89	23

Manure increased corn biomass more (Table 2) and grain yields only (Table 3) when it had been incorporated by tillage. There were no interactions between slope position and manure or tillage. Biomass N percentage was highest in the zero manure plots that were fertilized with ammonium nitrate, but grain yield was lowest. This result suggesting that some factor other than N, likely P, was limiting productivity.

2006 Results

Winter wheat was planted in the fall of 2005 and was followed by no-till soybeans in the spring of 2006, however, the soybean crop failed due to the drought. Wheat yields are reflective of the spring 2005 tillage/manure treatments. No additional treatments were made since.

The data from Table 4 indicates that yield is increased by manure application only with a tillage treatment. The highest manure treatment with tillage provided the highest yield at 74 bu/ac.

Table 4. 2005 wheat yields resulting from manure and tillage treatments (applied 2005).

Tillage	Manure	Manure	Yield	Yield
	tons/ac	Mg/ha	bu/ac	Kg/ha
0	0	0	32	2154
0	4	9	33	2188
0	8	18	25	1674
1	0	0	32	2158
1	4	9	52	3514
1	8	18	74	4951

Note: wheat, 60 lbs/bu; 1 ton/ac = 2.24 Mg/ha ; 1 bu/ac (60 lb) = 67.19 Kg/ha

In the spring of 2007, another manure/tillage treatment will be applied, and corn will be planted.

Initial Evaluation of Little Barley

Study No: MSPMC-P-0411-CP
Study Leader: Tommy Moss
Duration: 2004 - 2008

Introduction

The cover crop comparison study (MSPMC-P-0114-CP) has demonstrated that little barley can provide ample ground cover and produce sufficient biomass to validate an initial evaluation study with the goal of developing a little barley seed source for release. It is desirable to assemble accessions from several locations in order to develop a cultivar or other plant release type with the widest possible region of adaptation. Desirable plant characteristics would be vigorous plants that produce seeds as early as possible in the spring. Early seed set might allow reseeding before burndown for agronomic crops, resulting in a self-sustaining stand. Germination and establishment are not a major concern for development of a little barley release, because it generally germinates in high numbers in the field and will naturally establish on a variety of sites.

2005 Activity

Due to transfer of personnel in 2005, this work was not conducted in the fall of 2005.

2006 Activity

Based upon the results to date, the study will continue but will focus on critical area planting, providing a cool season native plant material, and as an annually seeded cover crop. This study will resume in the fall of 2007.

Summary

Seed collections were made at various locations in Mississippi in April to May of 2004 to begin development of a little barley release. These collections will be compared to other accessions obtained from the PMCs in Georgia and Maryland. These collections came from Georgia, South Carolina, Maryland, and North Carolina. On September 23, a total of 53 accessions were planted in the little barley initial evaluation planting. Several of the collections had a low number of seeds for testing, so it was not possible to plant the seeds in rows. Instead, clumps of from 5 to 10 seeds were planted 3 ft apart. There were two replications of each accession. The plants will be evaluated for vigor, flowering chronology, and height in 2005. Plants will also be harvested and dry weights determined.

Testing was also required to determine the pollination mechanism of this species. Seeds were sown in containers in the greenhouse in the fall of 2004. They were placed in the shade house to provide a vernalization treatment to promote flowering. The flowers will be bagged to prevent cross pollination, the seed produced collected and germinated to determine if the plants are normally cross or self-pollinated. Self-pollinated plants produce seedlings that are fairly uniform in appearance and, because selfing is their normal pollination mechanism, they would still retain their normal vigor. Normally cross-pollinated plants either will not produce seed when isolated or, if they are adapted for self-pollination, the seedlings often become less vigorous. Since common barley is largely self-pollinated, chances are high that little barley is as well.

Agroforestry Alley Cropping Demonstration

Study No: MSPMC-T-0117-CP
Study Leader: Paul Rodrigue
Cooperators: National Agroforestry Center; Jim Robinson (ret.), NRCS, Ft. Worth, TX
Jerry Lemunyon, NRCS, Ft. Worth, TX and Seth Dabney, USDA-ARS, Oxford, MS
Duration: 2001 - 2010

Introduction

Agroforestry combines agriculture and forestry technologies to create diverse, profitable and sustainable land-use systems. One of the agroforestry practices that may appeal to many landowners is alley cropping (Conservation Practice 311). Alley cropping is the planting of trees or shrubs with agronomic, horticultural or forage crops cultivated in the alley between the rows of woody plants, giving farmers the option of growing different crops in the same field to create a diversified farming enterprise. Conservation benefits of alley cropping include but are not limited to reducing surface runoff and erosion, improving nutrient management, and increasing wildlife habitat.

In 2002 the PMC began cooperating with the National Agroforestry Center to demonstrate the potential for alley cropping in the Southeast using high value trees combined with no-till crops planted on sloping topography. A 5 acre hillside of Loring silt loam soil (up to an 8% slope) at the PMC was chosen as the study site. Trees were planted in single rows along the general contour of the field and perpendicular to the dominant slope on angles convenient for farming using the CORE4 recommendations. Trees species include pecan [*Carya illinoinensis* (Wangenh.) K. Koch], which will provide an intermediate income from nut production in addition to future timber production, and green ash (*Fraxinus pennsylvanica* Marsh.), which is a fairly fast-growing timber species.

2004

The green ash seedlings were planted in 2002 and there were no losses in 2004. Average basal diameter, measured on July 2, was 1.29 inches and the average height was 7.7 ft. Pressure from deer rubbing after planting affected their growth, creating multiple stem specimens. Alan Holditch, Mississippi NRCS State Forester, examined the trees in December and indicated that they would require pruning to redevelop a central leader. The pruning was scheduled for 2005.

The pecan trees had been replanted in January of 2003. Average basal diameter and height of these trees, measured on July 2, was 0.86 inches and 4 ft, respectively. An electric fence had been installed around the perimeter of the field in September of 2003 to prevent further rubbing by deer, however, they still damaged some of the pecan trees in the winter of 2004. Alan Holditch suggested that instead of replacing the most severely damaged ones with additional pecans, we should dig seedlings of yellow poplar (*Liriodendron tulipifera* L.) from native stands on the PMC and plant them alongside the pecans. If the pecans do not recover, the fast-growing yellow poplar can act as a substitute. This was scheduled to be done at the same time as the pruning.

The alleys were burned down on March 22 using 1 qt/ac of a generic glyphosate formulation plus 1 qt/ac of 2,4-D. Corn (Dekalb 69-70YG) was planted using a no-till drill on March 31. This non-Roundup-tolerant variety was selected because there was a concern that another year of glyphosate applications might damage the trees; it does however carry the BT gene to reduce the need for insecticide applications. A preemergence application of atrazine (2 qt/ac) plus metolachlor (Dual Magnum) (2 pt/ac) was made after planting. A synthetic pyrethroid (Fury) was applied in April to control armyworms. Fertilizer was applied in April at a rate of 119 lbs N/ac. Sample areas were harvested on September 19 and the corn was shelled to determine an average yield of 215 bu/ac Yields were higher than expected on this sloping hillside due to well distributed rainfall and a nearly perfect growing season. After the sample harvest, the corn was combined and removed from the field.

2005

The recommended pruning was conducted in January, 2005, by Alan Holditch and other individuals from the State Office Ecological Sciences Section and Lynn Ellison, Mississippi NRCS Area 1 Forester. Pecan survival was also evaluated at this time. The Yellow Popular were planted in February to replace the damaged pecans.

The alleys were burned down in February, 2005, using 1 qt/ac of a generic glyphosate formulation plus 1 qt/ac of 2,4-D. Asgrow 4603 RR Soybeans were planted using a no-till drill on March 30. Stand was evaluated on April 15 and an application of glyphosate applied April 18. A second application of glyphosate was made on May 5. The field was evaluated and scouted on June 30 and July 20. harvest took place in September with a yield of 47 bu/ac.

For the 2006 study year, Progeny 166 wheat was drilled into the soybean stubble in October. The stand was evaluated in December 2005.

2006 Activity

The Winter Wheat was harvested 6/5/06. The wheat had a net yield of 61.77 bu/acre. Input cost were $148 / acre.

*Progeny 166 was the variety
*last year that the lime application counts as part of the input cost (2 tons divided over past three seasons)
*higher N cost this season compared to past seasons
*wheat was $3.99 / bushel on the board the day of harvest
*net $98.50/acre
*trees are growing great, pecans finally seem to have took off and the green ash is 14-15 foot on average
*late group V soybean to be planted next

Soybeans were planted following the wheat harvest, however, due to drought conditions (3” rainfall in June and July), the crop failed.

There were four cost that went with the failed crop of beans. The cost on the soybeans were:

Seed cost......	$35.00 / acre
Planting cost.....	$20.00 / acre
Insecticide cost..	$ 2.50 / acre
Application cost..	$ 6.00 / acre
Total Input Cost...	$63.50 / acre

Corn will be planted per the rotation in the spring of 2007.

Summary of data to date

Crop	Input/acre[2/]	Yield bu/acre	Price/bu	Net Return/acre[3/]
2002				
Soybean	$97.00	26	$5.32 (Oct 2002)	**$41.32**
2003				
Wheat	$118.00	54	$3.08 (June 2003)	$48.32
Soybean	$91.00	41	$7.05 (Nov 2003)	$198.05
				$246.37
2004				
Corn	$265.00	180	$2.20 (Sept 2004)	**$131.00**
2005				
Soybean	$108.00	47	$5.75 (Nov 2005)	$162.25
2006				
Wheat	$148.00	61.2	$3.99 (June 2006)	$96.19
Soybean	$63.50	0		($63.50)
				$32.69

1/ Economic contribution of the trees is not considered

2/ Input cost figures obtained from http://www.agecon.msstate.edu/research/budgets.php

3/ Yield x Price - Input Cost = Net

Evaluation of Low Growing Switchgrass Ecotypes for Reduced Seed Dormancy

Study No: MSPMC-P-0208-BU
Study Leader: Paul Rodrigue (begun by Joel Douglas)
Cooperator: Brian Baldwin and Paul Meints, Mississippi State University
Duration: 2002 - 2006

Introduction

Many of the switchgrass cultivars that were released by the PM program, University, and ARS grass breeders are tall, robust types that may not be as well suited as low-growing ecotypes for some conservation practices such as vegetative barriers (Conservation Practice 601), critical areas (Conservation Practice 342), and wildlife habitat plantings (Conservation Practice 645) in the southeastern U.S. Selection for reduced seed dormancy in switchgrass (*Panicum virgatum* L.) has been shown to be a viable method for cultivar development. The PMC has an assembly of 92 collections of switchgrass with varying heights ranging from tall (7-8 or more ft), medium (5-6 ft), and short (4-3 ft) from which new selections can be made for cultivar release. We are using recurrent selection breeding techniques, selecting seedlings that germinate in the shortest period of time from switchgrass accessions in the short stature range that will then be allowed to cross and produce a short cultivar that establishes quickly to out-compete weeds.

2004 Data Collected

Twelve accessions were selected from the assembly that ranged in heights from 3 to 4.5 ft. These selections were transplanted in a 12 x 12 Latin square on 16 April 2002 (Table 1). Accession 9062816 lodged severely and 9062767 did not produce viable seed, so they were replaced with low-growing switchgrass plants from Dr. Brian Baldwin's research at Mississippi State University. This planting constitutes the mother block nursery. Seeds will be collected from these elites in the fall of 2004 for selection of early-germinating seedlings (Cycle 1 in the selection process) to be planted in a polycross block in 2005. Any plants that exceed the desired height range must be removed from all crossing blocks.

Table 1. Accessions and origins of 12 elite switchgrasses.

Accession	Origin
9062767*	Monroe Co., MS
9062836	Madison Co., MS
9062764	Chickasaw Co., MS
9062852	Montgomery Co., MS
9062788	Monroe Co., MS
9062816*	Carroll Co., MS
9062828	Clay Co., MS
9062763	Chickasaw Co., MS
9062829	Chickasaw Co., MS
9062789	Lamar Co., AL
9062802	Winston Co., MS
9062811	Lonoke Co., AR

* Replaced with MSU selections.

2005 Data Collected

Accession obtained from storage and existing plant populations were screened for immediate germination four months after harvest. Switchgrass (*Panicum virgatum* L.) Upland biotype, is a component of the short grass prairie of North America. Germination tests were conducted according to AOSA protocols. Screening was conducted on bulked seed of individual crossing blocks under the same conditions. Unselected plant populations were screened (in previous years) for rapid germination of individual seedlings. Subsequent screenings of first cycle were conducted to advance individual populations.

Advancement has been observed in the selected population. Progress on the upland biotype of switchgrass is not quite as far along as those advanced generations of lowland switchgrass planted at Starkville (pre-stratification germination cycle 0 = 0.5%; cycle 1 = 27%).

Table 1. Response of Switchgrass to selection for reduced seed dormancy.

Species	**Cycle of Selection**	**Pre-stratification Germination† (%)**	**Germination After Stratification ‡ (%)**
Switchgrass (Upland)	0	0.67	4.17
	1	4.00	17.67

† Pre-stratification germination over a 14 d germination under 16 hr/8hr day/light and 30° light/20°C dark temperature.

‡ Germination percentage after 14 d moist stratification at 3°C followed by return to germination conditions [14 d under 16 hr/8hr (day/light) and 30° light/20°C dark temperature].

2006 Activity

Cycle 2 was planted in June 2006 transplants that had been germinated and grown out at Mississippi State. Due to drought conditions, transplants were watered regularly until establishment occurred. Seed was collected from the Cycle 2 block in the fall of 2006 and germination test will be conducted in January 2007.

Selecting for Improved Seedling Establishment in Beaked Panicum

Study Number:	MSPMC-P-0209-BU
Study Leader:	Tommy Moss (begun by Janet Grabowski)
Cooperator:	Brian Baldwin, Mississippi State University Paul Meints, Mississippi State University
Duration:	2002 - 2006

Introduction

The PMC evaluated large collections of numerous accessions of beaked panicum (*Panicum anceps* Michx.) in the 1980s and the East Texas PMC is currently evaluating several accessions. Beaked panicum is not highly productive as a forage crop, but it has potential for critical area stabilization and is shade tolerant. Seeds exhibit dormancy that affects germination. Stratification has been shown to overcome this dormancy, but stratified seeds would be difficult to plant using conventional equipment. Selection for reduced dormancy has been illustrated in native warm-season grasses such as switchgrass (*P. virgatum*) and these techniques may also be possible to develop beaked panicum sources with reduced dormancy.

2004 Data Collected

The original mother plant nursery (Cycle 0), planted in 2002, contained seedlings of eight accessions of beaked panicum (9002928, 9028510, 9067071, 9067121, 9067102, 9067094, 9067079, and an unnumbered collection from Carroll Co., MS). This nursery was destroyed in 2004; however, seeds were collected from this block in both 2002 and 2003. Since this block was destroyed, the seedlings that resulted from its seed constituted the new mother plant nursery. There were 35 early germinating seedlings from seeds collected from the mother plant nursery in 2002 that were planted in the field on August 5, 2003.

This was not enough seedlings to constitute an acceptable crossing block, so additional plantings using the seeds collected from the original mother plant nursery in both 2002 and 2003 were made on January 20, 2004. In the previous year, the seeds were planted in flats of potting media and exposed to ambient conditions in the greenhouse for germination. However, in 2004, we counted 50 samples of 50 seeds of each seed lot and germinated them on filter paper in Petri dishes. The dishes were placed in a germinator maintained at 20°C/30°C (night/day) with lights on for 10 hours per day during the day cycle. The seeds were allowed to germinate for 14 days, with counts made at 7 day intervals. After 14 days, the seedlings were transplanted into cell packs; however, there were only 19 seedlings planted from the 2002 seed lot containers and 10 from the 2003. We decided to extend the germination period for an additional 14 days. Counts were again made at 7 day intervals and seedlings were transplanted into cell packs when large enough to survive this process. During this period, a total of 29 additional 2002 lot seedlings and 9 2003 lot seedlings were planted. Germination percentages averaged only 2.6% for the 2002 lot and 1% for the 2003 lot. A few seedlings were too weak or deformed and were not transplanted.

The dishes were then placed into a cooler maintained at approximately 7°C to expose the seeds to cold stratification. Germination counts were made every 7 days for 21 days. No seedlings were retained after stratification; this treatment was only to judge the levels of dormancy in the seed lots. The 2002 seed lot averaged 12% and the 2003 seed lot averaged 36% germination, indicating that dormancy was reduced in the 2002 seed, which had been stored at room temperature since collection. The seedlings were transplanted into 4” square containers when they had reached sufficient size. They were then added to the new mother plant nursery in May. Currently, there are 81 plants in the new mother plant nursery. None of the plants in the new nursery produced sufficient seed to harvest in 2004.

Accession 9002928 was identified as a superior accession during prior PMC testing and seed stocks had been increased for several years. This accession germinated well in the greenhouse in 2002, so it was decided that a new seed increase field would be planted. It was planted in the fall of 2002 using a Lilliston no-till drill. A large quantity of seed was planted to ensure a full stand and it germinated well in the field. The rows were spaced closer than was practical to maintain, so the field was sprayed with glyphosate in July or August using a hooded sprayer to define wider rows. The first year, little seed was produced, so this field was not harvested; however, seeds will be harvested in the fall of 2005.

2005 Data Collected

Accession obtained from storage and existing plant populations were screened for immediate germination four months after harvest. Beaked panicum (*Panicum capillare*) is a component of the short grass prairie of North America. Germination tests were conducted according to AOSA protocols. Screening was conducted on bulked seed of individual crossing blocks under the same conditions. Beaked panicum which was pooled for two growing seasons to obtain enough seed for the initial screening (this year).

The initial screening germination for the Beaked panicum is shown in Table 1.

Table 1. Response of Beaked Panicum to selection for reduced seed dormancy.

Species	Cycle of Selection	Pre-stratification Germination† (%)	Germination After Stratification ‡ (%)
Beaked Panicum	0	0	6.67

† Pre-stratification germination over a 14 d germination under 16 hr/8hr day/light and 30° light/20°C dark temperature.

‡ Germination percentage after 14 d moist stratification at 3°C followed by return to germination conditions [14 d under 16 hr/8hr (day/light) and 30° light/20°C dark temperature].

2006 Activity

Seedlings were unable to be established by Mississippi State University and therefore a cycle 1 crossing block could not be established at the MSPMC in the summer of 2006. Cycle 0 seed will be germinated and grown out for the Cycle 1 planting in 2007.

Summary

We have not made as much progress with beaked panicum as we have with some of the other native warm-season grasses that we are developing using similar techniques. We should be able to harvest seeds from the new mother plant nursery in 2005 and can initiate the selection process. We can also pursue release of 9002928 if it proves to be easy to establish. This will need to be determined using fresh seed, not seed lots that have been stored in the cooler for 10 or more years. Various researchers have demonstrated that dormancy of switchgrass seeds can be relieved by storing the seeds at room temperature. From the results of the stratification treatment, it appears that dormancy of the closely-related beaked panicum can also be reduced by this treatment.

Selecting for Improved Seedling Establishment in Purpletop

Study Number: MSPMC-P-0210-BU
Study Leader: Tommy Moss (begun by Janet Grabowski)
Cooperator: Brian Baldwin, Mississippi State University
Paul Meints, Mississippi State University
Duration: 2002 - 2006

Introduction

The PMC evaluated a large collection with numerous accessions of purpletop [*Tridens flavus* (L.) A.S. Hitchc.] in the 1980s. It has limited potential as a forage crop, but can be used for critical area stabilization and has some shade tolerance. Seeds exhibit dormancy that adversely affects germination. Stratification has been shown to overcome this dormancy, but stratified seeds would be difficult to plant using conventional equipment. Selection for reduced dormancy has been illustrated in native warm-season grasses such as switchgrass (*P. virgatum*). Recurrent selection techniques could also be used to develop sources of purpletop with reduced seed dormancy.

2004 Data Collected

The mother plant nursery that was planted in 2002 contained seedlings from three accessions (9028270, 9041780, and 9028355) and eleven unnumbered local collections (one from the Natchez Trace Parkway, five from Carroll Co., MS and one each from Franklin Co., Yalobusha Co., Lincoln Co., Pontotoc Co., and Grenada Co., MS). Each year seeds are collected from the mother plant nursery (Cycle 0) and the subsequent selection cycles and germination tests are performed to determine the progress that has been made in improving germination. The Cycle 1 crossing block was planted in 2003 and assigned the accession number 9077113.

Seeds collected from the Cycle 1 crossing block in the fall of 2003 were planted in germination flats containing a commercial seed germination potting mix on February 18 and placed in the germinator set at 20°C/30°C (night/day) with lights on for 10 hours per day during the day cycle. The seedlings became leggy due to low light levels, so they were moved to the greenhouse on March 4. Seed germination was good and only the largest, most vigorous seedlings were selected for transplanting. The crossing block (Cycle 2) to be planted in the field was to contain 12 rows with 12 plants in each row (144 seedlings); however, additional seedlings were transplanted into cell packs to allow for any potential losses. The seedlings were moved up into 4” pots when they reached sufficient size. The Cycle 2 crossing block was planted on June 7. These seedlings were assigned the accession number 9077134. All seedlings survived and flowered. Seeds were collected from all crossing blocks in September and October.

A germination test was conducted on seeds from the mother plant nursery and the Cycle 1 crossing block. An electronic seed counter was used to count five replications of 100 seeds of each lot which were placed in between two sheets of filter paper in Petri dishes and put in the germinator on January 20. Hairs on the lemma and palea, caused the seed to clump together and they did not count accurately. Seeds from the mother plant nursery averaged 1.4% and those from the Cycle 1 lot averaged 4.4% germination. The dishes were placed in a refrigerator for 14 days to provide a stratification treatment. Germination counts were conducted weekly for an additional 14 days, and then the number of seeds remaining in the dish were counted to determine the total number of seeds in each dish so that we could calculate germination percentages. Additional germination for the mother plant nursery seeds was 95% and for the Cycle 1 seeds additional germination was 90%. Because of the counting problems encountered in the first germination test, another test was initiated on April 27. For this test, the seeds were run through a brush machine to remove the lemma and palea. Samples of 100 seeds were counted and tested as above, except the germination period was 21 days and no stratification treatment was applied. Seeds from the mother plant nursery averaged 63% and those from the Cycle 1 lot averaged 73% germination.

Additional testing was also conducted in 2004 to attempt to determine the sources of dormancy in purpletop seed. The lemma and palea that surrounds the caryopsis was removed (hulled) from Cycle 1 seeds collected in 2003 by rubbing them between two sheets of sandpaper in a small box. Six replications of 100 hulled and unhulled seeds were counted out by hand; for the unhulled seed care was taken to select single, fully formed spikelets to avoid immature ones and ones that had not separated completely from neighboring ones in the panicle. The seeds were placed in Petri dishes between layers of filter paper and germinated for 14 days in the germinator (same settings as used for the germination test above), beginning on February 18. The seeds were then stratified for 14 days in the refrigerator using the same methods as for the germination test. Germination counts were made for an additional 14 days with counts made every 7 days. The second run of this experiment, which began on November 23, was identical to the first, except the lemma and palea were removed by running the seeds through a brush machine. Results are presented in Table 1.

Table 1. Effect of removing the palea and lemma on germination of purpletop seeds.

Test date	Treatment	Germination		
		Initial	Stratified	Total
		---------------------------%	-------------------------	
02/18/04	intact	23	58a	81a
	hull	32NS[1]	4b	32b
11/23/04	intact	38b[2]	59a	96NS
	hull	79a	5b	81

[1] Not significant at $P<0.05$.

[2] Pairs of values in columns with different letters are significantly different at $P<0.05$.

During the course of conducting the hulling test, we noticed that the hulled seeds were often covered with fungal growth and it was generally less pronounced for the intact seeds. We wanted to determine if we could use a fungicide (Captan) to prevent this fungal growth and further improve germination of the hulled seeds. This study was initiated on April 1. The seeds were hulled as was done in the initial hulling test (i.e. using sandpaper). The seeds were separated from the chaff using a South Dakota, they were screened using a 6 X 22 screen, and four replications of 100 hulled seeds were counted for each treatment by hand and placed in a Petri dish between two layers of filter paper. Captan (wettable powder formulation containing 48.9% Captan and 1.1 % related derivatives) was applied at the applied at the label rate of 3 tablespoons per gallon. The Captan dishes were treated using 3 ml of the fungicide solution at initial wetting and they were watered using distilled water alone at subsequent irrigations. The Petri dishes were placed in the germinator set at 15°C/30°C (night/day) with lights on for 10 hours per day during the day cycle. Germination counts were made weekly for 21 days. This test was only run once.

Table 2. Effect of Captan treatment on germination of hulled purpletop seeds.

Treatment	Initial (7 days)	Total
	---------------------------%	------------------------
Control	14b[1]	52b
Captan	32a	83a

[1] Pairs of values in columns with different letters are significantly different at $P<0.05$.

An additional test was conducted to attempt to determine if water-soluble inhibitors are present in the lemma and palea prevent germination and promote dormancy. For this test seeds collected in the fall of 2003 from the Cycle 1 crossing block were used. The lemma and palea were removed by squeezing between the fingernails of the thumb and index finger. The treatments consisted of hulled seeds being germinated in the dish with the hulled material present (but not touching) the seeds and the other treatment with the hulls removed. This hulling method was extremely time-consuming, so 4 reps of only 25 seeds were used for each treatment. The dishes for the first run were placed in the germinator on March 31 and it was set at 15°C/30°C (night/day) with lights on for 10 hours per day during the day cycle. Seeds were germinated for 21 days with counts made weekly. In most dishes, all seeds had germinated by the end of the germination period. This test was repeated on November 22, using the same methods except the germinator was set at the standard 20°C/30°C temperatures. Germination in most all of the dishes was at or near 100%, except for two that dried severely after the first count. Germination in those dishes was still 92% and 84%.

To determine how the results of these germinator studies translate to seeds planted in the field, another study was initiated to determine germination of hulled and unhulled seeds that were either treated with Captan or left untreated. A sample of seeds from the 2003 Cycle 1 seed lot was run through brush machine for the hulling treatment. They were then cleaned by using a South Dakota seed blower and screened to produce a clean seed sample. The treatments consisted of 250 seeds for each treatment replicated three times. The hulled seeds were counted with a mechanical seed counter and the intact seeds were counted by hand. Captan was applied by dusting the same formulation used in the previous study on the seeds at planting. The area in the field where this study was to be planted was initially burned down using 1 qt/ac or a generic glyphosate formulation (4 lb ai/gal) on March 25. Although weed control was fairly good, an additional treatment using Gramoxone (1 lb ai/ac) was made right before planting. The seeds were planted on April 28 in shallow rows (10 feet long) formed in the soil. The soil was then firmed back over the seeds. Accurate germination counts were difficult because of weed growth and also due to plant tillering. Counts were made sporadically during the growing season, with the final count in December after annual weeds had senesced. Also on December 7, a 3-foot-long section of the row was sampled to determine the number of flowering culms. Data is presented in Table 3; however, no statistical analysis was possible due to the sampling difficulty.

Table 3. Germination counts and number of culms recorded for purpletop seed hulling/Captan treatment field test

Treatment	Seedling counts				# Culms
	05/20	06/15	09/03	12/03	
	------------Per row (250 seeds planted)------------				--Per 3 ft row--
Intact	2	60	81	51	44
Hulled	2	40	55	60	32
Intact with Captan	1	57	55	41	24
Hulled with Captan	6	42	54	40	31

2005 Data Collected

Accession obtained from storage and existing plant populations were screened for immediate germination four months after harvest. Purpletop (*Tridens flavus*) is a component of the short grass prairie of North America. Germination tests were conducted according to AOSA protocols. Screening was conducted on bulked seed of individual crossing blocks under the same conditions. Unselected plant populations were screened (in previous years) for rapid germination of individual seedlings. Subsequent screenings of first cycle (and second cycle in case of purpletop) were conducted to advance individual populations.

Advancement has been observed in the selected populations (Table 1). Purpletop has made significant progress, and the post-stratification germination indicates the quality and viability of this seed with a combine germination of 77-92% viable seed.

Table 1. Response of Purpletop for reduced seed dormancy.

Species	**Cycle of Selection**	**Pre-stratification Germination† (%)**	**Germination After Stratification ‡ (%)**
Purpletop	0	1.17	83.00
	1	1.17	75.33
	2	15.17	76.83

† Pre-stratification germination over a 14 d germination under 16 hr/8hr day/light and 30° light/20°C dark temperature.

‡ Germination percentage after 14 d moist stratification at 3°C followed by return to germination conditions [14 d under 16 hr/8hr (day/light) and 30° light/20°C dark temperature].

2006 Activity

Cycle 3 was planted in June 2006 transplants that had been germinated and grown out at Mississippi State. Due to drought conditions, transplants were watered regularly until establishment occurred. Seed was collected from the Cycle 3 block in the fall of 2006 and germination test will be conducted in January 2007.

Summary

Germination percentages have been improved during each cycle of selection as expected. There is little phenotypic diversity in purpletop plants, so once germination percentages have reached an acceptable point, there is little if any other selection that needs to be made. It appears that germination rate and vigor of the Cycle 2 plants (accession 9077134) were high enough to justify release of this material. All available seed was hand-collected from this block to plant a field to increase in order to obtain enough for release. The field selected for the increase planting required an additional year of preparation to control weeds, so the planting is scheduled for 2006. Further germination testing will take place in 2005 on seed collected the previous fall to verify that germination percentages continued to improve for seeds collected from the Cycle 2 plants compared to the previous cycles.

The study on removal of the palea and lemma shows that early germination can be greatly improved by this treatment (Table 1). Hulled seed would be easier to plant because a planter with a fluffy seed box would not be necessary. The low total germination for the hulled seed in the first run shows that the method used to remove the coverings (rubbing between sand paper) was too vigorous and damaged the seeds. Germination of the hulled seeds in the second run was slightly lower than for the intact seeds (Table 1); however, the difference was not significant, indicating that if the hull can be removed though gentler means, it will not adversely affect germination. Although removal of the lemma and palea improved early germination, it could affect the ability of the seeds to withstand adverse environmental conditions or fungal attack in the field. This would need to be determined using larger-scale field plantings. Even with this concern, it appears that developing commercially feasible methods to hull purpletop seeds, possibly using a roller-type device similar to those used to hull rice seeds, is an avenue that should be explored.

The Captan test shows that this fungicide can improve the germination of hulled seeds (Table 2). It is not known if this increase is due entirely to the suppression of fungal growth or if Captan has some germination-promoting effects on purpletop seeds, as this has been noted for some other species. Interestingly, the germination of the Captan-treated seed was high, even though the seeds were hulled using sandpaper. It is difficult to provide uniform treatment of all seeds using this method and perhaps the seed coats and/or embryos were not as seriously damaged during this treatment for this test.

Results of the test with the removed lemma and palea being either present or absent from the germination containers shows that there are no water soluble inhibitors in these structures that affects germination. Either the inhibitors are not water soluble, which is highly unlikely, or the effect of the palea and lemma is mechanical. These structures adhere tightly to the caryopsis and it appears they may interfere with emergence of the seedling until natural forces in the soil can soften or degrade them.

It is difficult to glean any trends from the field planting; however, it does appear that the hulling treatment did not adversely affect establishment. Also, the Captan treatment did not appear to promote germination in the field. The planting rate used, which converts to 25 seeds per foot, provided a uniform stand of purpletop and, until further research determines the optimum planting rate, may be an acceptable one for seed production stands.

Pasture/Hayland Study Summaries

Herbicides for seed production of 'Highlander' eastern gamagrass

Study No.	MSPMC-T-0524-PA
Study Leader	Tommy Moss (begun by Janet Grabowski)
Cooperators	John Byrd, Al Rankins – Mississippi State University Charles Meister – University of Florida
Duration	2005-2007

INTRODUCTION

Highlander eastern gamagrass was released in 2003 to be used primarily as a forage crop (Grabowski et al., 2003). In order to produce sufficient seed for the commercial market, growers need effective herbicide treatments that can be legally applied to the crop. The main focus of this research is to develop herbicide recommendations for seed producers; however, many of the herbicides tested may also have application for establishment of Highlander for forage production and other conservation practices.

There are currently no herbicides that are labeled for eastern gamagrass establishment. Because Highlander will not be grown on large acreages, it is unlikely that chemical companies would be willing to pursue labeling of herbicides for this crop. This makes it an ideal candidate for the IR-4 (Interregional Research Project No.4) program, a cooperative effort between the state agricultural experiment stations, the Cooperative State Research, Education and, and Extension Service, and the USDA, Agricultural Research Service to register pesticides for use on minor crops.

Eastern gamagrass is a close relative of corn, so it likely would be tolerant to many herbicides used for corn production. Eberle et al. (2003) used atrazine on their seed establishment plots and the Jamie L. Whitten PMC has used spring applications of this chemical for many years on both seed production fields and study areas where Highlander was planted. Atrazine has activity against both grasses and broadleaves; however, a single application in the spring only provides a limited period of weed control and control of some problem weeds is poor. It might also have applicability for post-emergence use; however, if used in the spring and later in the season, application rates would need to be adjusted to ensure that maximum application rates per acre are not exceeded. Unfortunately, the manufacturer will not expand the current label on atrazine for any additional crops (Charles Meister, personal communication); however, we will still include it in this study as a standard treatment. Growers may still be able to use it for stand establishment if they establish corn with the eastern gamagrass. Dual (metolachlor) and Prowl (pendimethalin) have been used on some established production fields and on newly-planted fields at the Jamie L Whitten PMC to provide premergence control of grasses; however, further research is needed on all these chemicals to document that they are indeed safe for use at planting and on young stands of Highlander. Both the Jamie L. Whitten PMC and the PMC in New York have looked at Accent (nicosulfuron) for post-emergence grass control on established stands of eastern gamagrass. 2,4-D and Aim (carfenthrazone) have been used for post-emergence broadleaf control on established Highlander stands at the Jamie L. Whitten PMC and Basagran (bentazon) has been used for nutsedge (*Cyperus* spp.) control, although it will also control some broadleaves.

Tolerance of Highlander to these and other herbicides will also need to be demonstrated before IR-4 clearance can be sought.

Experimental Design	Randomized Complete Block Design	
Treatment 1	Title:	Establishment treatments
	Description:	Apply herbicides at planting
Treatment 2	Title:	Spring maintenance treatments
	Description:	Apply herbicides on established stands
Treatment 3	Title:	Post-emergence treatments
	Description:	Apply herbicides on established stands

Materials and Methods

The establishment herbicide testing will be conducted in the greenhouse. Herbicides will be applied using a CO_2 plot sprayer (calibrated to 20 gal/ac) to standard bedding plant flats (1020 size) containing field soil planted with 50 stratified seeds of Highlander. Seeds will be planted 0.5 to 0.75 inch deep. There will be an untreated control. Atrazine will be the standard treatment at a rate of 2 lb ai/ac (2 qt/ac). Other herbicides that will be screened are Dual Magnum at 2 lb ai/ac (2 pt/ac); Prowl 3.3EC at 1 lb ai/ac (2.4 pt/ac); Axiom DF at 0.75 lb ai/ac of FOE 5043 and 0.19 lb ai/ac of metribuzin (22 oz Axiom/ac); Gallery 75DF (isoxaben) at 0.75 lb ai/ac (1 lb/ac); Karmex 4L (diuron)at 1 lb ai/ac (2 pts/ac); Barricade 65WG (prodiamine) at 0.75 lb ai/ac (1.15 lb/ac); Python WDG (flumetsulam) at 0.80 oz ai/ac (1 oz/ac); and Frontier 7.5E (dimethamid) at 1.3 lb ai/ac (22 oz/ac). There will be four replications of each treatment. The number of seedlings that emerge and injury ratings will be recorded at weekly intervals. The shoots will be cut at the soil surface and average dry weight per shoot will be determined to evaluate effect of the treatments on plant growth. Any preemergence herbicides that do not damage the germinating Highlander seeds should be safe to use on established stands and could be used for preemergence control of weeds when applied as spring maintenance treatments.

The spring maintenance herbicide testing will be conducted on stands of Highlander located at the MSPMC. A one-year-old stand (planted in 2004 and 2005) and an established stand (planted in 2002, 2003 or 2004) will be treated in March of 2005 and 2006. Plot size will be 5 foot x 8 foot and there will be three replications of each treatment. There will be an untreated control plot. Herbicide treatments will include atrazine 4L at a rate of 2 lb ai/ac (2 qt/ac); Dual Magnum at 2 lb ai/ac (2 pt/ac); Prowl 3.3 EC at 1 lb ai/ac (2.4 pt/ac); Karmex 4L at 1 lb ai/ac (2 pts/ac); and Axiom DF at 0.75 lb ai/ac of FOE 5043 and 0.19 lb ai/ac of metribuzin (22 oz Axiom/ac). All field herbicide treatments will be applied using the CO_2 plot sprayer as described above. Injury ratings will be taken at 7, 14, 21, and 28 days after treatment. Seed heads will be harvested from the treated area in approximately mid-July, the seeds removed, and weighed to determine if there are any adverse effects of the herbicides on seed production.

The post-emergence testing will be conducted on stands of Highlander located at the MSPMC. A one-year-old stand (planted in 2004 and 2005) and an established stand (planted in 2002, 2003 or 2004) will be treated in May of 2005 and 2006. Plot size will be 5 foot x 8 foot and there will be three replications of each treatment. Atrazine will be applied at 2 lb ai/ac (2 qt/ac) Other herbicides to be tested are: Aim 2EC at 0.008 lb ai/ac (0.51 oz/ac) plus nonionic surfactant (0.25% v/v); Clarity 4SL (dicamba) at 0.25 lb ai/ac (0.5 pt/ac); Permit 75DF (halosulfuron) at 0.047 lb ai/ac (1 oz/ac) plus crop oil concentrate (1.0% v/v); Accent 75DF at 0.5 oz ai/ac (0.67 oz/ac) plus crop oil concentrate (1.0% v/v); Evik 80DF (ametryn) at 1.6 lb ai/ac (2 lb/ac) plus nonionic surfactant (0.25%v/v), and 2,4-D Amine 4L at 1.0 lb ai/ac (2 pt/ac). The crop oil concentrate will be at least 80% active and the nonionic surfactant will be 80% active. There will also be a control plot for comparison purposes. Injury ratings will be taken at 7, 14, 21, and 28 days after treatment. Seed heads will be harvested from the treated area in approximately mid-July, the seeds removed, and weighed to determine if there are any adverse effects of the herbicides on seed production.

2005 Activity

Analysis of data indicated development of crop injury at 1 and 2 weeks after herbicide treatment. The general pattern at 3 and 4 weeks after treatment showed a decrease in observable plant injury to the gamagrass. In some cases, there were no significant differences between the control and herbicide treatments at week 4. Data analysis results are shown below.

POSTEMERGE
ONE YEAR OLD STAND

DAY 10

2,4-D amin	10.000	A
aim	10.000	A
clarity	10.000	A
control	10.000	A
permit	9.333	AB
accent	9.000	B
atrazine	8.667	BC
evik	8.000	C

DAY 16

2,4-D amin	10.000	A
aim	10.000	A
clarity	10.000	A
control	10.000	A
permit	9.333	AB
accent	9.000	B
atrazine	8.667	BC
evik	8.000	C

DAY 24

2,4-D amin	10.000	A
aim	10.000	A
clarity	10.000	A
control	10.000	A
accent	9.667	AB
atrazine	9.000	BC
permit	9.000	BC
evik	8.333	C

DAY 31

2,4-D amin	10.000	A
accent	10.000	A
aim	10.000	A
clarity	10.000	A
control	10.000	A
permit	10.000	A
atrazine	9.667	A
evik	9.000	B

POSTEMERGE
ESTABLISHED STAND

DAY 10

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
aim	9.667	A
permit	9.667	A
accent	9.000	AB
atrazine	9.000	AB
evik	8.333	B

DAY 17

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
accent	9.667	A
aim	9.333	AB
permit	9.000	AB
atrazine	8.667	AB
evik	8.000	B

DAY 24

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
accent	9.667	A
aim	9.667	A
atrazine	9.000	A
permit	9.000	A
evik	8.667	A

DAY 31

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
accent	9.667	AB
aim	9.667	AB
atrazine	9.667	AB
permit	9.667	AB
evik	8.667	B

POSTEMERGE COMPARISON OF
ONE YEAR OLD AND ESTABLISHED STANDS

DAY 10

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
aim	9.833	A
permit	9.500	AB
accent	9.000	BC
atrazine	8.833	C
evik	8.167	D

DAY 17

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
aim	9.667	AB
accent	9.333	ABC
permit	9.167	BC
atrazine	8.667	CD
evik	8.000	D

DAY 24

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
aim	9.833	A
accent	9.667	AB
atrazine	9.000	BC
permit	9.000	BC
evik	8.500	C

DAY 31

2,4-D amin	10.000	A
clarity	10.000	A
control	10.000	A
accent	9.833	A
aim	9.833	A
permit	9.833	A
atrazine	9.667	A
evik	8.833	B

SPRING MAINTENANCE
ONE YEAR OLD STAND

EVAL 1

atrazine	10.000	A
control	10.000	A
dual	10.000	A
karmex	10.000	A
prowl	10.000	A
axiom	9.667	A

EVAL 2

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.333	B
axiom	9.000	B

EVAL 3

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.667	A
axiom	9.333	A

EVAL 4

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.333	A
axiom	8.667	A

SPRING MAINTENANCE
ESTABLISHED STAND

SPRING MAINTENANCE COMPARISON OF
ONE YEAR OLD AND ESTABLISHED STANDS

EVAL 1

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.500	AB
axiom	9.333	B

EVAL 2

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.167	B
axiom	9.167	B

EVAL 3

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.333	B
axiom	9.167	B

EVAL 4

atrazine	10.000	A
control	10.000	A
dual	10.000	A
prowl	10.000	A
karmex	9.167	B
axiom	8.833	B

Preliminary results from 2006 injury rating data collection and analysis:

No 2006 data was taken on establishment herbicide testing conducted in the field. Seed germination was very low due to extremely dry conditions. Therefore data was collected on the one-year-old stand and the maintenance stand. The lack of an establishment stand will prevent one-year old data from being collected in 2007. The lack of a treatment that would guarantee damage was an omission in this study.

In the post-emergences trial, the trend in the data is that only the Evik and Select herbicides are showing any damage of concern that is both temporary and permanent. In the spring maintenance study only the Dual and Karmex treatments are showing any damage of concern that is both temporary and permanent.

2006 GAMAGRASS POST-EMERG HERBICIDE TREATMENTS

LSD All-Pairwise Comparisons Test of aveEval for Trt (average of all evaluation dates)

```
Trt       Mean Injury Rating
control    9.0667  A
accent     8.7000  AB
atrazine   8.6833  AB
aim        8.5500  AB
permit     8.5500  AB
clarity    8.4500  AB
2,4-D ami  8.3167   B
Select     7.4667    C
evik       6.2500     D

Alpha              0.05     Standard Error for Comparison  0.3497
Critical T Value    2.0     Critical Value for Comparison  0.7052
Error term used: Error, 43 DF
There are 4 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #1 for Trt

```
Trt          Mean Injury Rating
control    9.3333  A
atrazine   9.1667  AB
aim        9.0000  AB
accent     8.9167  AB
permit     8.8333  AB
Select     8.6667   B
2,4-D ami  8.5833   B
clarity    8.5833   B
evik       7.2500    C

Alpha              0.05     Standard Error for Comparison  0.3003
Critical T Value    2.0     Critical Value for Comparison  0.6055
Error term used: Error, 43 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #2 for Trt

```
Trt         Mean Injury Rating
control    9.1667  A
accent     8.7500  AB
atrazine   8.7500  AB
aim        8.6667  AB
permit     8.5000  AB
clarity    8.4167  AB
2,4-D ami  8.2500   B
Select     8.0833   B
evik       6.3333    C

Alpha              0.05     Standard Error for Comparison  0.4459
Critical T Value    2.0     Critical Value for Comparison  0.8992
Error term used: Error, 43 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #3 for Trt

```
Trt          Mean Injury Rating
control    8.9167  A
accent     8.6667  A
permit     8.5833  A
atrazine   8.5000  A
clarity    8.2500  A
aim        8.2500  A
2,4-D ami  8.1667  A
Select     7.0000   B
evik       5.8333    C

Alpha              0.05     Standard Error for Comparison  0.4763
Critical T Value    2.0     Critical Value for Comparison  0.9606
Error term used: Error, 43 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #4 for Trt

```
Trt          Mean Injury Rating
control    8.8333  A
clarity    8.4167  A
accent     8.3333  A
atrazine   8.2500  A
2,4-D ami  8.2500  A
aim        8.1667  A
permit     8.1667  A
Select     6.0000   B
evik       5.5000   B

Alpha              0.05     Standard Error for Comparison  0.4762
Critical T Value    2.0     Critical Value for Comparison  0.9604
Error term used: Error, 43 DF
There are 2 groups (A and B) in which the means
are not significantly different from one another.
```

2006 GAMAGRASS SPRING MAINTENANCE HERBICIDE TREATMENTS

LSD All-Pairwise Comparisons Test of aveEval for HERB (average of all evaluation dates)

```
HERB        Mean Injury Rating
control   9.5500  A
atrazine  9.4000  A
prowl     9.1167  A
axiom     9.1167  A
dual      8.4500   B
karmex    7.2667    C

Alpha              0.05     Standard Error for Comparison  0.2742
Critical T Value    2.0     Critical Value for Comparison  0.5616
Error term used: Error, 28 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #1 for HERB

```
HERB        Mean Injury Rating
control   10.000  A
atrazine   9.917  A
axiom      9.917  A
prowl      9.833  A
dual       9.083   B
karmex     8.667   B

Alpha              0.05     Standard Error for Comparison  0.2734
Critical T Value    2.0     Critical Value for Comparison  0.5600
Error term used: Error, 28 DF
There are 2 groups (A and B) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #2 for HERB

```
HERB        Mean Injury Rating
control   9.7500  A
atrazine  9.1667  AB
prowl     9.0833  AB
axiom     8.9167   BC
dual      8.3333    C
karmex    7.3333     D

Alpha              0.05     Standard Error for Comparison  0.3323
Critical T Value    2.0     Critical Value for Comparison  0.6808
Error term used: Error, 28 DF
There are 4 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #3 for HERB

```
HERB        Mean Injury Rating
atrazine  9.0000  A
control   8.8333  A
axiom     8.6667  A
prowl     8.6667  A
dual      8.0000   B
karmex    6.5000    C

Alpha              0.05     Standard Error for Comparison  0.3178
Critical T Value    2.0     Critical Value for Comparison  0.6511
Error term used: Error, 28 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

LSD All-Pairwise Comparisons Test of evaluation date #4 for HERB

```
HERB        Mean Injury Rating
atrazine  9.5000  A
control   9.4167  A
axiom     8.9167  AB
prowl     8.9167  AB
dual      8.2500   B
karmex    6.5833    C

Alpha              0.05     Standard Error for Comparison  0.4062
Critical T Value    2.0     Critical Value for Comparison  0.8321
Error term used: Error, 28 DF
There are 3 groups (A, B, etc.) in which the means
are not significantly different from one another.
```

Forage Production of perennial warm season grasses in a silvopasture system

Study No.	MSPMC-T-0523-PA
Study Leader	Paul Rodrigue
Cooperators	Jim Robinson (retired) Forester, CNTSC, Ft. Worth, TX; Walter Jackson, GLSI Specialist, ECS, Jackson, MS
Duration	2005-2015

INTRODUCTION

The purpose of the study begun in 2005 is to evaluate the effect loblolly pines have on yield and quantity of three perennial warm season forage grasses and mixed grasses.

Silvopasture combines intensively managed forests with managed forages to produce a sustainable land use system. Several southeastern states have adopted this system (e.g. AL, FL, GA, LA, and MS). In many of the silvopasture systems, long leaf pine, loblolly pine or slash pine is grown at low stocking densities (35-300 stems per acre) with various mixtures of warm season perennial grasses and clovers (Robinson et al., 2002).

Light or radiation, temperature and soil moisture are critical environmental factors influencing development and maturation of forages (Smith and Nelson, 1985). In a silvopasture system, where trees are intensively managed for quality wood and pruned to allow sunlight to penetrate the ground, quality of light, soil moisture and temperature become increasingly important for production of warm season forages.

There is a lack of information on production of well managed warm season forages under intensively managed pines from the time forages are established until growth of trees begin impacting production.

Study Initiation

2005 Activities

A loblolly pine stand planted in January, 2001, for another study was thinned to create 4 20’ x 91’ plots (trees are on a 20’ x 7’ spacing). These plots are each divided into three reps. Existing warm season grasses in the plots were sprayed with glyphosate (1 qt/ac) in early October 2004, except one plot which will serve as a mixed grass plot.

The three plots to be planted were sprayed in March 2005 with glyphosate and 2,4-D. The plots were then fertilized for P and K in April and burned down again with glyphosate in May 2005. Plots were planted in May of 2005.

‘Alamo’ switchgrass was no-till drilled at 8 lb PLS/acre. ‘Highlander’ eastern gamagrass was planted on 20” rows at a rate of 3 to 4 seed per ft, and common bermudagrass was drilled at a rate of 5 lb/acre. Stands were evaluated in July and considered successful. Plots were mowed in September of 2005.

Harvests will be timed to optimize yield and quality. For switchgrass use 50-60 days; eastern gamagrass-45 days; bermudagrass-35 days. The number of cuttings will be affected by rainfall conditions. Dry matter yield will be determined by cutting a swath from the center of each plot. Sub samples collected for dry matter production will be used for tissue analysis for forage quality.

2006 Activity

2006 was the first year of growth for the planted grasses. Therefore little data was expected during 2006. However, an extended drought in 2006 further slowed stand development and growth.

In order to prevent additional stress on the plants, it was decided to take only one fall forage clipping. Table 1 below provides the preliminary data for dry matter yield averaged over the replicates. The mixed stand is the grasses present and established prior to initiation of the study.

Table 1. Dry matter Yield

Species	Dry Matter Yield lbs/ac	Dry Matter Yield Kg/ha
mixed	2629	2944
‘Alamo’	2253	2523
bermuda	2104	2356
‘Highlander’	2326	2605

Note: 1 lb/ac = 1.12 Kg/ha

In 2007, normal forage harvest practices for the species in the study will be followed. Harvest will be on a 30 or 45 day schedule dependent upon species.

The study is expected to last for ten growing seasons.

Water Quality Study Summaries

Evaluation of Little Bluestem Ecotypes for Reduced Seed Dormancy

Study No:	MSPMC-P-0208-WL
Study Leader:	Paul Rodrigue (begun by Joel Douglas)
Cooperator:	Brian Baldwin and Paul Meints, Mississippi State University
Duration:	2002 - 2006

Introduction

There are few cultivars of little bluestem [*Schizachyrium scoparium* (Michx.) Nash] that are adapted to the PMC service area, especially for the southern reaches of the area, and seed is difficult to obtain from commercial sources. With the growing emphasis on planting native warm-season grasses in many farm programs for erosion control and wildlife habitat, cultivar development is a priority. Seed dormancy is a major factor affecting field establishment of little bluestem. Selection for reduced dormancy has been illustrated in native grasses such as switchgrass and green needlegrass [*Nassella viridula* (Trin.) Barkworth].

2004 Data Collected

A mother plant nursery (Cycle 0) was planted with 300 selections from isolated areas on PMC property and transplanted in four complete blocks (5 rows, 15 plants/row) in 2002. Seeds were collected from individual plants in mother plant nursery in November 2002, placed in paper bags, and stored at room temperature. Replicated germination tests were conducted in January/February 2003 to identify plants that produced seeds that germinated in 14 days without stratification. Analysis of variance was used to determine the top 20 performers. From these 20, the top 12 plants with the highest germination percentages were identified. The seedlings from these 12 and early germinating ones from two other collections made in Madison County were planted in a 14 X 14 Latin square crossing block (Cycle 1) in 2003. Some of these died and sections of the identified plants in the mother block were dug to replace the lost ones on January 14, 2004, taking care to not cause much damage to the original mother plant. A germination test was initiated on March 3 to determine the relative levels of dormancy present in both seed sources. Data for this test is not available.

Some progress has been made in selecting early germinating little bluestem plants for crossing. There is a great deal of phenotypic variability in the both crossing blocks. This is not an undesirable situation; however, we will need to be sure to remove plants with weak stems that lodge from later selection cycles because that tendency interferes with harvesting. Seeds were collected from both the mother plant nursery and the Cycle 1 block in November 2004 for germination testing and further selection will be performed on the Cycle 1 seed lot.

2005 Data Collected

Accession obtained from storage and existing plant populations were screened for immediate germination four months after harvest. Little bluestem (*Schizachyrium scoparium*) is a components of the short grass prairie of North America. Germination tests were conducted according to AOSA protocols. Screening was conducted on bulked seed of individual crossing blocks under the same conditions. Unselected plant populations were screened (in previous years) for rapid germination of individual seedlings. Subsequent screenings of first cycle (and second cycle in case of little bluestem) were conducted to advance individual populations.

Advancement has been observed though little bluestem's advance is minimal (Table 1). Little bluestem showed limited initial progress, but this progress seems to have stalled. This is not an indicator of no further potential progress though. It is suspected the pollen load from the adjacent "prairie" (source of the mother plants) is so great that it overwhelms the pollen from the "isolated" elite mother plants. Efforts will be made to enforce isolation from contaminating pollen and the next generation should proceed.

Table 1. Response of Little Bluestem to selection for reduced seed dormancy.

Species	**Cycle of Selection**	**Pre-stratification Germination† (%)**	**Germination After Stratification ‡ (%)**
Little Bluestem	0	0.8	2.83
	1	2.7	10.50
	2	1.7	13.50

2006 Activity

Cycle 3 was planted in June 2006 transplants that had been germinated and grown out at Mississippi State. Due to drought conditions, transplants were watered regularly until establishment occurred. Seed was collected from the Cycle 3 block was collected in the fall of 2006 and germination test will be conducted in January 2007.

Wildlife Habitat Improvement Study Summaries

Cultural Practices for Improving Trailing Wildbean Seed Production

Study No: MSPMC-T-0308-WL
Study Leader: Tommy Moss (begun by Janet Grabowski)
Duration: 2003 - 2007

Introduction

Trailing wildbean (*Strophostyles helvula* (L.) Ell.) is an annual, trailing, herbaceous legume that is a good source of food for upland game bird species and has potential for controlling erosion on field borders and sandy banks. The Jamie L. Whitten PMC evaluated several selections of trailing wildbean and released one of these as Hopefield Selection in 1997. The trailing habit of this plant creates difficulties in harvesting seed and has so far prevented it from being produced on a commercial scale. ‘Quail Haven’ reseeding soybean (*Glycine soja* Sieb. & Zucc.) is another legume with trailing stems that was released by the PMC. We normally grow it with a light stand of corn to support the stems and improve harvest. Using corn as a companion crop limits the use of herbicides that can be used on the Quail Haven crop and also attracts some types of wildlife that can damage the planting. For these reasons, grain sorghum stubble from the previous season is being examined to replace the need for corn in PMC Quail Haven production fields. This practice will also be tested on Hopefield Selection to see if it can support the plant and improve harvest. Trailing wildbean has been found growing in several production fields of Lark Selection partridge pea. Partridge pea has an upright growth habit and a similar ripening period as Hopefield Selection and they could be grown together, allowing production of both species on the same acreage. Yields of these two treatments will be compared to Hopefield Selection planted alone. A Lark Selection only treatment was included to determine what effect the trailing wildbean has on its seed production.

2004 Data Collected

The field selected for this study has an Oaklimiter silt loam soil. The grain sorghum stubble needed to be removed from all other treatments before planting. In order to do this, the stubble treatment plots were located in the field and a Lawn Genie was used to cut the stubble on the rest of the field, vacuum it up, and remove it from the field. This was accomplished on April 6. The field was limed at a rate of 2 ton/ac on April 7. The field was fertilized according to soil test recommendations with 152 lbs P and 60 lbs K by combining the appropriate amounts of 0-46-0 and 0-20-20; this was applied on May 10. Existing weeds were burned down using 1 qt/ac of a generic glyphosate formulation (4 lb ai/gal) and 1 qt/ac 2,4-D (4 lb ai/gal). The tractor was used to spray all areas of the field except the grain sorghum stubble plots on April 27 and the stubble plots were sprayed on April 28 using a hand sprayer. Each treatment plot was 13.5 feet wide to accommodate the 4-row planter and 20 feet long and there were four replications. The alleyways between replications were 20 feet wide to provide room for the tractor at planting and the plot combine at harvest. The plots were planted on May 10. The partridge pea seeds was scarified and inoculated (Cowpea type) before planting. The trailing wildbean seeds were inoculated using Strophostyles Special inoculant before it was planted. The recommended planting rate for Hopefield Selection (8 lb/ac) equals approximately 6 seeds per foot of row and the planter was calibrated to deliver as close to this number as seeds as was possible. The recommended rate of Lark Selection is 5 lb/ac and this equals approximately 22 seeds per foot; approximately this number of seeds were planted per foot or row in the plots with partridge pea only. Lark Selection is a large, vigorous plant and will provide a great deal of competition for the trailing wildbean plants in the treatment where they are both planted. Therefore, the planting rate in the treatment with both species was reduced by half (11 seeds per foot of row). After planting, Dual Magnum (1.5 pt/ac) was sprayed on the plots. On June 25, a post-emergent application of Select was sprayed to control grassy weeds. The plots were harvested on October 3. We had hoped to harvest them using a plot combine, but mechanical problems required the plots to be harvested using two passes of a walk-behind sicklebar mower, which harvested 6 feet from the center of each plot. The harvested plant material was collected, loosely bagged, and placed in a greenhouse to dry thoroughly.

The harvested plant material was then threshed using a small plot bundle thresher and seed cleaning techniques were used to recover the seeds. All treatments were screened by hand. Hopefield Selection seeds were run though a 10/64 X 3/4 slotted screen to remove larger pieces of trash and then over a 7 round hole screen to remove smaller trash. They were then blown in a South Dakota seed blower (5.4 mm opening setting) to remove lighter seeds and trash. And then finished with a 9 round hole screen. The Lark Selection seeds were screened through a 5/64 X 3/4 slotted screen, over a 1/12 round hole bottom screen, blown in the South Dakota seed blower (2.7 mm setting) and finished with a 9 round hole screen. The seed sample was then weighed. The treatment with both seed types was initially screened using the ones listed for Hopefield Selection, blown, and the yields of this seed type were determined. All material that passed through the screens was retained, screened and blown using the methods listed for Lark Selection, and the yields of this seed type were also determined. There were morning-glory (*Ipomoea* spp. and *Jacquemontia* spp.) and other seeds, as well as inert matter, that were difficult to remove from the seed samples, so 10 g of the Hopefield Selection treatment samples and 3 g of the Lark Selection samples were separated to determine the percentage of pure seed present. Yields were then adjusted based on this purity value to determine the actual yield of each type of seed. Yields per acre were then calculated. Data for Hopefield Selection (Table 1) and Lark Selection (Table 2) are presented separately because yields between species cannot be compared.

Table 1. Seed harvest data for Hopefield Selection trailing wildbean using various planting methods.

Treatment	Seed Yield	
	--------g/plot--------	--------lb/ac---------
Hopefield Alone	82	65
Grain Sorghum Stubble	109	87
Hopefield + Lark	74	59
LSD (0.05)	NS	NS

Table 2. Seed harvest data for Lark Selection partridge pea.

Treatment	Seed Yield	
	--------g/plot--------	--------lb/ac---------
Lark Alone*	62	49
Lark + Hopefield	46	37
LSD (0.05)	NS	NS

* The planting rate for this plot was the full recommended rate of 5 lb/ac, however, in the plots with both species, the rate was halved.

2004 Summary

No yield differences in trailing wildbean yields were detected for any treatment (Table 1). The highest yield was in the grain sorghum plots. The grain sorghum had not grown well in this field in 2002, likely due to a low pH, and the stalks did not hold up as well as if the plants had been growing more vigorously. By late summer, it was difficult to find any standing stalks in the field. If there was any beneficial effect from the sorghum stubble, it had to either be due to better seed bed conditions in these plots or to some physical protection that the stalks provided for the trailing wildbean seedlings early in the growing season. The trailing wildbean seedlings did not only use the plant supports were intentionally provided in the plots, they also climbed up on any upright weeds and the stakes at the corners of the plots.

Because the planting rate used for Lark Selection in the plots that were also planted with Hopefield selection was half that of the plots with no wildbean planted, it would seem logical that yields of this treatment would be a great deal lower. However, this was not the case. They were slightly reduced, but no different than those of the combination treatment (Table 2). It appears that the recommended seeding rate for Hopefield Selection production fields, which equates to 22 seeds per foot of row may be too high and the plants are competing with one another. This study will be repeated in 2005.

2005 Data Collected

CULTURAL PRACTICES FOR IMPROVING TRAILING WILDBEAN SEED PRODUCTION – SUMMARY OF 2005 DATA

Means of Trailing wildbean SEED YIELD for TRT

TRT	N	Mean (g)	SE
With grain sorghum stubble	3	7.8729	3.8075
Partridge pea + trailing wb	4	6.6925	3.2973
Trailing wb w/ no support	4	9.6200	3.2973

Tukey HSD All-Pairwise Comparisons Test of SEED for TRT

TRT	Mean (g)	Homogeneous Groups	
Trailing wb w/ no support	9.6200	A	= 7.6 lb/ac
With grain sorghum stubble	7.8729	A	= 6.2 lb/ac
Partridge pea + trailing wb	6.6925	A	= 5.3 lb/ac

2006 Activity

Drought prevented establishment of satisfactory stands. Stands were replanted and irrigation applied, however, satisfactory stands were not established, probably due to lateness in season.

Preliminary results:

No yield differences in trailing wildbean yields were detected for any treatment. The highest yield was the plots where trailing wildbean was grown with no support.

Total 2005 yields were lower than 2004 yields. This was possibly due to dry weather in 2005 prior to harvest and a later harvest date which allowed more pods to mature and dehisce, discharging seed on the ground.

Determining Tolerance of Partridge Pea and Trailing Wildbean to Preemergence Herbicides

Study No: MSPMC-T-0309-WL
Study Leader: Tommy Moss (begun by Janet Grabowski)
Duration: 2003 - 2007

Introduction

Lark Selection partridge pea and Hopefield Selection trailing wildbean are two native legumes that were released by the Jamie L. Whitten PMC primarily for wildlife habitat improvement. Both species are annuals and do not set seed until fall. Due to the long growing season of these species, weed competition is a problem in PMC production fields. Also, both species are recommended for use in field borders, where they have a high likelihood of being exposed to herbicides sprayed on the adjacent crop. For these reasons, tolerance of these two species to commonly used herbicides needs to be assessed. Previous research has demonstrated the tolerance of these species to several post-emergence herbicides that are recommended locally for soybean production. Both species tolerate Dual (metolachlor) for preemergence applications; however, this herbicide provides poor control of many problem weeds such as morning-glories. The tolerance of Lark Selection and Hopefield Selection to additional preemergence herbicides used primarily on soybeans will be determined in this study.

2004 Data Collected

The herbicide treatments used are listed in Table 1. Dual was included as the standard treatment that we typically use. An untreated control was also included. This study was planted in the same field as the trailing wildbean cultural practice study and the soil type was Oaklimeter silt loam. The herbicides were sprayed on May 11. The field was limed at a rate of 2 ton/ac on April 7. The field was fertilized according to soil test recommendations with 152 lbs P and 60 lbs K by combining the appropriate amounts of 0-46-0 and 0-20-20; this was applied on May 10. Existing weeds were burned down using 1 qt/ac of a generic glyphosate formulation (4 lb ai/gal) and 1 qt/ac 2,4-D (4 lb ai/gal) on April 27. The plot size was 5 foot by 10 foot and there were three replications. The plots were planted on May 5. The partridge pea seeds was scarified and inoculated (Cowpea type) before planting. The trailing wildbean seed was inoculated using Strophostyles Special inoculant before it was planted. Planting rate was the recommended broadcast rate of 8 lb/ac of Lark Selection and 10 lb/ac of Hopefield Selection. The seeds were planted by broadcasting them over the plots and raking them into the soil. Injury ratings were taken on May 26 and June 9 (Table 2 and 3). Time constraints did not allow statistical analysis of this data before presentation here.

Table 1. Herbicide treatment information.

Herbicide Formulation	Amount Active	Rate
Dual Magnum	7.62 lb/gal	1.5 pt/ac
Prowl 3.3 EC	80%	2 pt/ac
Python WDG	3.3 lb/gal	1 oz/ac
Command 3 ME	3 lb/gal	2-2/3 pt/ac
Pursuit WDG	70%	1.44 oz/ac
Scepter	1.5 lb/gal	10.5 oz/ac
Zorial Rapid 80	78.60%	1.25 lb/ac
Valor	51%	2 oz/ac
Frontier	7.5 lb/gal	21 fl oz/ac

Table 2. Average injury ratings for pre-emergence herbicides applied on Lark Selection partridge pea at the Jamie L. Whitten PMC, Coffeeville, MS.

Treatment	Injury rating[1]	
	05/26	06/09
Control	10	10
Dual	7	9
Prowl	8	10
Python	3	3
Command	9	10
Pursuit	7	9
Scepter	5	5
Zorial	1	1
Valor	4	6
Frontier	NA	10

[1] Visual control ratings 1 = dead; 3 = 75% dead; 5 = 50% dead; 7 = 25% dead; 9 = slight injury; and 10 = no injury.

Table 3. Average injury ratings for pre-emergence herbicides applied on Hopefield Selection trailing wildbean at the Jamie L. Whitten PMC, Coffeeville, MS.

Treatment	Injury rating[1]	
	05/26	06/09
Control	10	10
Dual	10	9
Prowl	7	9
Python	8	10
Command	7	10
Pursuit	8	9
Scepter	7	9
Zorial	4	2
Valor	4	5
Frontier	7	9

[1] Visual control ratings 1 = dead; 3 = 75% dead; 5 = 50% dead; 7 = 25% dead; 9 = slight injury; and 10 = no injury.

2005 Data Collected

Determining Tolerance of Partridge Pea and Trailing Wildbean to Preemergence Herbicides

Partridge Pea 2004 Evaluation #1 (5/26/2004)

HERBICIDE	Mean	
control	10.000	A
Command	9.000	AB
Prowl	8.000	AB
Pursuit	7.333	ABC
Dual	6.667	BC
Frontier	5.000	CD
Scepter	5.000	CD
Valor	3.667	DE
Python	3.000	DE
Zorial	1.000	E

Partridge Pea 2004 Evaluation #2 (6/9/2004)

HERBICIDE	Mean	
Command	10.000	A
control	10.000	A
Frontier	10.000	A
Prowl	10.000	A
Dual	8.667	A
Pursuit	8.667	A
Valor	6.333	B
Scepter	5.000	B
Python	2.667	C
Zorial	1.000	C

Trailing Wildbean 2004 Evaluation #1 (5/26/2004)

HERBICIDE	Mean	
control	10.000	A
Dual	10.000	A
Pursuit	8.000	A
Python	8.000	A
Frontier	7.333	AB
Scepter	7.333	AB
Command	7.000	AB
Prowl	6.667	AB
Valor	3.667	BC
Zorial	2.333	C

Trailing Wildbean 2004 Evaluation #2 (6/9/2004)

HERBICIDE	Mean	
Command	10.000	A
control	10.000	A
Python	9.667	A
Pursuit	9.333	A
Scepter	9.333	A
Dual	9.000	A
Frontier	9.000	A
Prowl	7.667	AB
Valor	5.000	BC
Zorial	1.667	C

Trailing Wildbean 2005 Evaluation #1 (6/15/2005)

```
HERBICIDE   Mean
control   10.000  A
Python     9.333  AB
Frontier   9.000   BC
Prowl      8.667   BC
Scepter    8.333    CD
Zorial     7.667     DE
Dual       7.333      E
Command    7.333      E
Pursuit    7.000      E
Valor      1.519       F
```

Trailing Wildbean 2005 Evaluation #2 (6/22/2005)

```
HERBICIDE   Mean
control   10.000  A
Frontier  10.000  A
Prowl      9.667  AB
Python     9.333  AB
Scepter    9.000   BC
Dual       8.333    CD
Command    7.667     D
Pursuit    7.667     D
Zorial     7.667     D
Valor      1.426      E
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Trailing Wildbean 2005 Evaluation #3 (6/29/2005)

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HERBICIDE   Mean
control   10.000  A
Frontier  10.000  A
Prowl     10.000  A
Python    10.000  A
Dual       9.333  AB
Scepter    9.000   BC
Command    8.667   BCD
Pursuit    8.333    CD
Zorial     8.000     D
Valor      0.981      E
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Trailing Wildbean 2005 Evaluation #4 (7/18/2005)

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HERBICIDE   Mean
Command   10.000  A
control   10.000  A
Frontier  10.000  A
Prowl     10.000  A
Python    10.000  A
Dual       9.667  A
Scepter    9.333  A
Pursuit    9.333  A
Zorial     9.333  A
Valor      0.963   B
```

Preliminary observations from 2005:

In 2005 all treatments in the Trailing Wildbean, except Valor, recovered from any initial impact of the treatment by the final evaluation.

2006 Activity

As with the cultural practices study, drought prevented establishment of satisfactory stands. Stands were replanted and irrigation applied, however, satisfactory stands were not established, probably due to lateness in season.

Summary

The herbicides that caused the least injury to Lark Selection were Prowl, Command, and Frontier. Frontier and Prowl have greatest activity against grasses, so it is not surprising that they did not injure this legume. The discovery that Command can be safely used on Lark Selection is exciting because it controls many species of morning glories. Dual caused a small amount of injury in the wetter areas of the field. Pursuit also caused some early injury that the plants seemed to recover from by the second rating. Python and Scepter both caused a great deal of injury and Zorial killed all plants.

Trailing wildbean is not as susceptible to herbicide damage as partridge pea. The only herbicides that injured it were Zorial and Valor, and the injury was severe. We noticed in the Valor plots that the plants that survived the treatment were vigorous, but there was only about a half stand compared to the other plots. Again, the only damage from Dual was in wetter areas of the field; however the injury was slight. We often have cool, wet conditions in the spring and for this reason, we might want to examine switching our normal pre-emergence treatment on PMC production fields to one of the herbicides that caused less injury that controls a similar spectrum of weeds.

Establishing Chiwapa Japanese Millet in Group IV Soybeans for Waterfowl Habitat

Study No: MSPMC-T-0410-WL
Study Leader: Paul Rodrigue
Cooperator: Kevin Nelms, Area Biologist, NRCS, Greenwood, MS
Duration: 2004 – 2006

Introduction

Many growers in the Mid-South have installed water-control structures to allow retention of water on their fields in the winter months to provide habitat for wildlife (Conservation Practice 644). Waterfowl utilized wasted seed from the agronomic crops in addition to weed seeds and other plant parts as their winter food source. However, research by wildlife biologists has shown that seeds of agronomic crops degrade quickly under flooded conditions. Also, the widespread use of Roundup-ready crops in the past decade has severely impacted the number of weeds that are present in the fields to produce seeds or provide other plant parts for food. To ameliorate these circumstances, some growers plant a late-season crop after they harvest their agronomic crops specifically to provide a food source for waterfowl. One popular crop for this use is a 90-day seed-ripening millet. However, in most years, it is difficult to get the millet established due to lack of rainfall in the late summer after the agronomic crop is harvested.

In 1965, the PMC released ‘Chiwapa’ Japanese millet (*Echinochloa frumentacea* Link), which is a 120-day millet. In the past, it has not used as extensively as the shorter-season millet cultivars. However, we realized that it might be possible to seed this millet into an established agronomic crop in the mid-summer, when rainfall and overall soil moisture are better. The seeds could be flown on the fields and would germinate and remain as small plants under the canopy of the agronomic crop until harvest allowed more light penetration for growth. Because this plant is an annual, it would make every attempt to produce seed before frost. We began a study to demonstrate the potential of this approach in producer’s fields planted with Group IV soybeans in the Delta (Bolivar, Sunflower, Tallahatchie, and Quitman Counties). June 15, July 15, and August 15 were chosen as target planting dates to use for the initial demonstrations.

2004 Data Collected

Actual planting dates were June 16, July 19, and August 13. Each plot was 30 feet by 50 feet. Chiwapa seeds were broadcast by hand on the plot at the recommended rate of 25 lb/ac. The producers managed their fields using standard agronomic practices.

The study sites in Bolivar, Sunflower and Tallahatchie Counties were terminated before seed yield was determined. General observations by Kevin Nelms in early fall at the Sunflower location revealed good to excellent stands. It was anticipated that this site would have produced a substantial seed crop had it not been destroyed.

Percent stand, seed yield, seed quality (seed fill) and available seed on the ground that shattered prior to harvest were determined at the Quitman County site on Hugh Campbell’s farm on December 15, 2004 (Table 1). Percent stand was an estimate of standing and lodged seed stalks in each plot. Seed yield by planting date was determined from 2 random locations in each plot by hand harvesting seed from a 4 ft^2. area. Seeds were allowed to dry at room temperature and seed fill determined by removing the palea and lemma to determine condition of the grain.

Table 1. Percent stand, seed yield, seed quality and available seed on the ground of 'Chiwapa' Japanese millet at Quitman county site, 15 December 2004.

Planting Date	Percent Stand	Yield	Seed Fill[1/]	Available Seed on the Ground[2/]
June 16	43	80	3	1
July 19	72	144	5	2
August 13	0	0	0	0

1/ Seed fill rating - 1= good; 3 = fair; 5 = poor
2/ Available seed on the ground - 1= good; 3 = fair; 5 = poor

2005 Data Collected

In 2005, 5 locations in the Delta (Mississippi Valley Alluvial Plain) of Mississippi were planted in this study. The locations were in Quitman, Tallahatchie, Grenada, Humphreys, and Sharkey counties.

All locations are in soybean production and were planted in Group IV maturity varieties in April. Row configurations ranged from wide 30" row spacings to very narrow 10" drilled spacings. The 'Chiwapa' was planted on 30' x 50' plots t a rate of 30 lbs/ac.

Two millet planting dates were 6/21/05 and 7/15/05. A scheduled planting for the first of July was cancelled due to 3 of 5 locations not receiving any rainfall since the first planting date.

Table 2. Percent stand, seed yield, seed quality and available seed on the ground of 'Chiwapa' Japanese millet at Quitman county site, 15 December 2005.

Planting Date	County	Percent Stand	Yield	Seed Fill[1/]	Available Seed on the Ground[2/]
June 21	Grenada	<1%	0		5
	Tallahatchie	<5%	0		5
	Quitman	N/A	N/A		
	PMC	N/A	N/A		
	Humphreys	N/A	N/A		
	Sharkey	N/A	N/A		
July 15	Grenada	<1%	0		5
	Tallahatchie	63%	0		4
	Quitman	N/A	N/A		
	PMC	N/A	N/A		
	Humphreys	N/A	N/A		
	Sharkey	N/A	N/A		

In 2005, yield samples did not contain any seed that had matured. The crop was planted on time but drought conditions slowed establishment; also crop was hit by an early frost before seed filled out.

Fields in Quitman, Humphreys, and Sharkey were disked by landowners prior to evaluation due to dry conditions.

2006 Chiwapa/Soybean Study Info:

- 1.25 lbs = 30 lbs/acre on a 30X50 plot
- PLS = 1.5 lbs/plot
- 3 sites with near same soybean planting dates
- Millet planting dates are scheduled for June 16, June 30, July 14

Tallahatchie County site info:
*4.7 maturity group beans planted on 4/7/06
*Pioneer 94B73 is soybean variety / 19 inch row spacing
*Soil type is alligator clay
*Average plant height on 6/16 is 20-24 inches, canopy almost closed

Coahoma County site info:
*4.6 maturity group beans planted on 4/6/06
*Dekalb 4651 is variety / drilled row spacing (solid)
*Soil type is
*Average plant height on 6/16 is 14-18 inches, near complete canopy

Washington County site info:
*4.4 maturity group beans planted on 4/7/06
*Monsanto 4403 is variety / row spacing is 15 inch twin drilled rows
*Soil type is
*Average plant height on 6/16 is 14-18 inches, not canopied

2006 results are presented in Table 3 for the Washington Co. site only, the other sites having failed to establish a stand. Again, the drought of 2006 had a non-typical impact.

Table 3. Washington Co. site results.

```
Planting date 1

Variable          N        Mean
%Stand            2      10.000
lbperAC           2      30.452
seed fill         2      3.0000
avail seed        2      3.5000


Planting date 2

Variable          N        Mean
%Stand            3      11.667
lbperAC           3      8.3047
seed fill         3      3.6667
avail seed        3      4.0000

Planting date 3

Variable          N        Mean
%Stand            3      73.333
lbperAC           3      1.7620
seed fill         3      5.0000
avail seed        3      5.0000
```

Summary

The July 19 planting produced the highest percent stands and the highest seed yield, but seed quality was lower than for the June 16 planting. We had expected that percent stand and seed yield should have been higher for the July 19 planting because the soybeans would have reached peak production in late July and begun to senesce, allowing the millet to begin to make growth. Although seed availability was good in December the seed quality, as measured by percent fill, was poor. Poor seed fill was attributed to low rainfall which was encountered in late summer and early fall. We also saw this at the PMC, where a foundation seed field of ‘Chiwapa’ Japanese millet did not produce as much filled seed as was harvested in the previous year. This was due to extremely low rainfall at the PMC (no measurable rainfall in September) that negatively impacted seed set.

The lowest percent stand was observed in the August 13 and June 16 plantings (Table 1). Observations made in July indicated that a significant amount of seed germinated in the June 16 plots, but canopy cover from the soybean reduced the sunlight available for the millet to make substantial growth. Seedlings observed beneath the soybean canopy in July were extremely weak. It is interesting to note that millet growing in the tractor tracks was vigorous and more productive, which supports the theory that sunlight was the limiting factor effecting June planted millet growth into Group IV soybeans. Although the measured seed yield was lower than expected, a significant amount of seeds that shattered from the plant would be considered available for migratory birds or for reseeding. Seed quality in June 16 plots was fair.

Poor results in the August 13 planting were due to the lack of rainfall at planting time. A limited amount of seed germinated but, because rainfall was sparse, seedlings did not survive.

In 2005, a drought after planting and an early frost prevented the development of measurable seed yield. In 2006 drought once again had an impact, causing the loss of two sites. The remaining site showed the best seed yield from the earliest planting date, but showed the greatest stand from the later planting date.

From the results to date, it appears that the practice of planting a waterfowl food source into Group IV soybeans has merit, it appears that ‘Chiwapa’ may not be the best plant material. Therefore, future trials may include browntop millet and a shorter growing season variety of Japanese millet.

Sunflower Variety and Herbicide Test

Study No: MSPMC-P-0118-CP
Study Leader: Paul Rodrigue, Tommy Moss (initiated by J.L. Douglas)
Cooperator: Kevin Nelms, Biologist, NRCS, Greenwood, MS
Duration: 2004 – 2006

Introduction

The mourning dove (*Zenaida macroura*) is the most hunted game bird in the Southeast and very popular in Mississippi. Landowners commonly plant fields specifically to attract doves for harvest. Sunflowers (*Helianthus annuus*) are frequently planted for dove.

Wildlife biologists frequently recommend planting "peredovick" variety of sunflowers based on a 1980 U.S. Fish and Wildlife study of bird food preferences. Dove and many other species of wild birds showed a preference for black oil-type sunflowers. Peredovick was the best known variety of black oil sunflowers for use in the Southeast. However, the oil crop growth of sunflower in the U.S. has resulted in increased varieties available for southern use. These varieties need to be tested for use in Mississippi and compared to peredovick performance.

Doves are not strong scratchers and rarely perch on seed heads to feed. Therefore, seed must be available on relatively clean, open ground. Many sunflower fields become unattractive to dove due to weed pressure. Historically, very few herbicides were labeled for use on sunflowers and weed control recommendations were not complete. Again, due to increased cropping of sunflowers, new herbicides have recently been labeled for use. In addition, genetically modified herbicide resistant varieties of sunflower are now being marketed. Herbicide efficacy needs to be evaluated due to large price differences and unfamiliarity of new herbicide performances in Mississippi. The study will result in development of a sunflower dove field system best suited to Mississippi. This system can then be confidently recommended to landowners by NRCS personnel.

Materials and Methods

Variety plots will be 10' by 40' with 3 replicates in a randomized complete block. Eight to twelve varieties will be selected for the study based on possible southern performance. Plots will be planted at a rate of 2 seeds per foot on 30" rows using a no-till planter. Plots will be planted in mid-April. Plots will be fertilized with 50 lbs/acre N at planting and 50 lbs/acre N at 3-4 weeks after germination.

Remainder of test fields will be planted using the same equipment, rates, and dates. Herbicide evaluations will be randomly arranged in this field and marked using flags and GPS. Herbicide treatments will be applied using a boom sprayer. Treatments will consist of an untreated control, preemerge of metolachlor (Dual Magnum) at 1.33 pts./acre and sulfentrazone (Spartan) at 4 oz./acre and postemerge of clethodim (Select 2 EC) at 8 oz./acre, preemerge of metolachlor (Dual Magnum) at 1.33 pts./acre and postemerge of imazamox (Beyond) at 5 oz./acre. When needed, treatments will be incorporated by rainfall.

Final Evaluations

Variety testing will be evaluated using seed yield. Herbicide efficacy will be evaluated using a line transect to estimate percent bare ground. Cost data will also be utilized to compare herbicide and variety economics.

2005 Results

In 2005, four black oil sunflower varieties and two herbicide treatments were evaluated.

Three replicates of peredovick, Triumph FTB (“For the Birds”), Triumph 665, and Triumph FTB Clearfield were compared. Peredovick averaged 457 lbs/ac, Triumph FTB averaged 1259 lbs/ac, Triumph 665 averaged 958 lbs/ac, and Triumph FTB Clearfield averaged 882 lbs/ac.

The two herbicide treatments compared were label recommended rates of Dual Magnum and Beyond for Clearfield variety, and Dual Magnum, Spartan 4F, and Select 2EC. Dual/Beyond averaged 22 percent bare ground and Dual/Spartan/Select averaged 88 percent bare ground.

Preliminary Data: 2005

Variety	Treatment	Percent Bare Ground	Sample Weight (Ounces)	Estimated Yield (lbs/acre)	Estimated Cost/acre
Perodovick	Control	0.0	trace	trace	
Perodovick	Control	0.0	4.5	147.0	
Perodovick	Control	0.0	0.8	26.1	
		0.0		57.7	
Triumph 665	Control	0.0	3.7	120.9	
Triumph 665	Control	0.0	16.6	542.3	
Triumph 665	Control	0.0	8.7	284.2	
		0.0		315.8	
Triumph FTB	Control	0.0	13.1	428.0	
Triumph FTB	Control	0.0	4.1	133.9	
Triumph FTB	Control	0.0	17.6	575.0	
		0.0		379.0	
Triumph FTB	Control	0.0	24.9	813.5	
Triumph FTB	Control	0.0	14.4	470.4	
Triumph FTB	Control	0.0	18.4	601.1	
		0.0		628.4	
Triumph FTB	Dual/Beyond	20.0	30.7	1003.0	$48.67
Triumph FTB	Dual/Beyond	25.0	28.5	931.1	$48.67
Triumph FTB	Dual/Beyond	20.0	21.8	712.2	$48.67
		21.7		882.1	
Perodovick	Dual/Spartan/Select	90.0	14.8	483.5	$44.82
Perodovick	Dual/Spartan/Select	90.0	18.4	601.1	$44.82
Perodovick	Dual/Spartan/Select	90.0	8.8	287.5	$44.82
		90.0		457.4	
Triumph 665	Dual/Spartan/Select	85.0	38.0	1241.5	$70.00
Triumph 665	Dual/Spartan/Select	87.5	32.1	1048.7	$70.00
Triumph 665	Dual/Spartan/Select	92.5	17.9	584.8	$70.00
		86.3		1145.1	
Triumph FTB	Dual/Spartan/Select	90.0	34.9	1140.2	$51.96
Triumph FTB	Dual/Spartan/Select	82.5	47.6	1555.1	$51.96
Triumph FTB	Dual/Spartan/Select	82.5	33.1	1081.4	$51.96
		85.0		1258.9	

2006 Activity

In 2006, the trial was expanded to include 8 varieties. In addition to the MSPMC, the trail was duplicated at two additional locations with help from private cooperators. 2006 was an extremely dry year across all three planting sites.

Trial at Coahoma County, MS

Plot Number	Yield (Ounces)	Est. Yield (lbs/ac)	% Bare Ground	Variety	Herbicide Treatment
101	89.6	2,927.2	82	Pioneer 63A70	Dual + Spartan / Select
102	81.6	2,665.9	80	Dekald 3830	Dual + Spartan / Select
103	57.6	1,881.8	74	Dekalb 3868	Dual + Spartan / Select
104	50.4	1,646.6	74	Dyna-Grow 93C05	Dual + Spartan / Select
105	54.4	1,777.2	98	Triumph 665	Dual + Spartan / Select
106	68.8	2,247.7	86	Triumph 660CL	Dual + Beyond
107	27.2	888.6	86	Perodovick	Dual + Spartan / Select
108	25.6	836.4	6	Perodovick	Control
109	59.2	1,934.1	4	Triumph 660CL	Control
110	48	1,568.2	2	Triumph 665	Control
201	60.8	1,986.3	94	Pioneer 63A70	Dual + Spartan / Select
202	80	2,613.6	78	Dekalb 3830	Dual + Spartan / Select
203	60.8	1,986.3	82	Dekalb 3868	Dual + Spartan / Select
204	83.2	2,718.1	92	Dyna-Grow 93C05	Dual + Spartan / Select
205	89.6	2,927.2	94	Triumph 665	Dual + Spartan / Select
206	60.8	1,986.3	92	Triumph 660CL	Dual + Beyond
207	40	1,306.8	88	Perodovick	Dual + Spartan / Select
208	48	1,568.2	20	Perodovick	Control
209	51.2	1,672.7	2	Triumph 660CL	Control
210	49.6	1,620.4	4	Triumph 665	Control
301	60.8	1,986.3	84	Pioneer 63A70	Dual + Spartan / Select
302	102.4	3,345.4	90	Dekalb 3830	Dual + Spartan / Select
303	83.2	2,718.1	80	Dekalb 3868	Dual + Spartan / Select
304	76.8	2,509.1	90	Dyna-Grow 93C05	Dual + Spartan / Select
305	83.2	2,718.1	84	Triumph 665	Dual + Spartan / Select
306	67.2	2,195.4	80	Triumph 660CL	Dual + Beyond
307	32	1,045.4	70	Perodovick	Dual + Spartan / Select
308	32	1,045.4	0	Perodovick	Control
309	59.2	1,934.1	12	Triumph 660CL	Control
310	51.2	1,672.7	6	Triumph 665	Control

Trial at Sharkey County, MS

Plot Number	Yield (Ounces)	Est. Yield (lbs/ac)	% Bare Ground	Variety	Herbicide Treatment
101	19.2	660.3	44	Pioneer 63A70	Dual + Spartan / Select
102	19.2	660.3	46	Dekald 3830	Dual + Spartan / Select
103	44.8	1,540.6	58	Dekalb 3868	Dual + Spartan / Select
104	16	550.2	64	Dyna-Grow 93C05	Dual + Spartan / Select
105	32	1,100.5	56	Triumph 665	Dual + Spartan / Select
106	28.8	990.4	48	Triumph 660CL	Dual + Beyond
107	25.6	880.4	48	Perodovick	Dual + Spartan / Select
108	2.1	72.2	10	Perodovick	Control
109	9.6	330.1	2	Triumph 660CL	Control
110	16	550.2	6	Triumph 665	Control
201	28.8	990.4	10	Pioneer 63A70	Dual + Spartan / Select
202	16	550.2	30	Dekalb 3830	Dual + Spartan / Select
203	35.2	1,210.5	48	Dekalb 3868	Dual + Spartan / Select
204	19.2	660.3	58	Dyna-Grow 93C05	Dual + Spartan / Select
205	19.2	660.3	12	Triumph 665	Dual + Spartan / Select
206	44.8	1,540.6	52	Triumph 660CL	Dual + Beyond
207	16	550.2	4	Perodovick	Dual + Spartan / Select
208	4.8	165.1	2	Perodovick	Control
209	9.6	330.1	8	Triumph 660CL	Control
210	4.8	165.1	6	Triumph 665	Control
301	22.4	770.3	24	Pioneer 63A70	Dual + Spartan / Select
302	16	550.2	54	Dekalb 3830	Dual + Spartan / Select
303	22.4	770.3	58	Dekalb 3868	Dual + Spartan / Select
304	43.2	1,485.6	50	Dyna-Grow 93C05	Dual + Spartan / Select
305	12.8	440.2	44	Triumph 665	Dual + Spartan / Select
306	28.8	990.4	30	Triumph 660CL	Dual + Beyond
307	12.8	440.2	50	Perodovick	Dual + Spartan / Select
308	6.4	220.1	2	Perodovick	Control
309	30.4	1,045.4	14	Triumph 660CL	Control
310	12.8	440.2	8	Triumph 665	Control

Trial at MSPMC, Yalobusha County, MS

Plot Number	Yield (Ounces)	Est. Yield (lbs/ac)	% Bare Ground	Variety	Herbicide Treatment
101	27.2	888.6	72	Pioneer 63A70	Dual + Spartan / Select
102	22.4	731.8	40	Dekald 3830	Dual + Spartan / Select
103	22.4	731.8	72	Dekalb 3868	Dual + Spartan / Select
104	16	522.7	76	Dyna-Grow 93C05	Dual + Spartan / Select
105	3.2	104.5	66	Triumph 665	Dual + Spartan / Select
106	9.6	313.6	74	Triumph 660CL	Dual + Beyond
107	28.8	940.9	54	Perodovick	Dual + Spartan / Select
108	2.1	68.6	2	Perodovick	Control
109	3.2	104.5	30	Triumph 660CL	Control
110	2.1	68.6	2	Triumph 665	Control
201	28.8	940.9	54	Pioneer 63A70	Dual + Spartan / Select
202	22.4	731.8	30	Dekalb 3830	Dual + Spartan / Select
203	25.6	836.4	60	Dekalb 3868	Dual + Spartan / Select
204	19.2	627.3	54	Dyna-Grow 93C05	Dual + Spartan / Select
205	25.6	836.4	32	Triumph 665	Dual + Spartan / Select
206	22.4	731.8	74	Triumph 660CL	Dual + Beyond
207	28.8	940.9	34	Perodovick	Dual + Spartan / Select
208	2.1	68.6	2	Perodovick	Control
209	25.6	836.4	34	Triumph 660CL	Control
210	2.1	68.6	4	Triumph 665	Control
301	22.4	731.8	74	Pioneer 63A70	Dual + Spartan / Select
302	41.6	1,359.1	46	Dekalb 3830	Dual + Spartan / Select
303	22.4	731.8	20	Dekalb 3868	Dual + Spartan / Select
304	28.8	940.9	60	Dyna-Grow 93C05	Dual + Spartan / Select
305	22.4	731.8	50	Triumph 665	Dual + Spartan / Select
306	38.4	1,254.5	44	Triumph 660CL	Dual + Beyond
307	27.2	888.6	22	Perodovick	Dual + Spartan / Select
308	2.1	68.6	6	Perodovick	Control
309	2.1	68.6	2	Triumph 660CL	Control
310	2.1	68.6	0	Triumph 665	Control

2007 Plans

The trial will be conducted at three locations again in 2007. Data will result in a sunflower dove field system best suited to Mississippi. This system can then be confidently recommended to landowners by NRCS and other agency personnel.

CLOSED STUDIES

Response of 'Highlander' Eastern Gamagrass to Poultry Litter Application

Study No:	MSPMC-P-0303-NU
Study Leader:	Paul Rodrigue (begun by Joel Douglas)
Cooperators:	Joe Johnson, MAFES, Holly Spring, MS David Lang, Mississippi State University, Mississippi State, MS
Duration:	2004 - 2007

Introduction

The environmental impacts of land-applied poultry litter on water quality are dependent on many variables, including but not limited to soils, climate, rainfall, topography, application rate, and the plant species present on the land receiving the litter. Over 97% of the poultry litter in the mid-South is applied on land with stands of bermudagrass [*Cynodon dactylon* (L.) Pers.] or bahiagrass (*Paspalum notatum* Flugge). Highlander eastern gamagrass is a warm-season perennial bunchgrass released for use in the southeastern U.S. Because Highlander produces a large amount of biomass and can utilize fairly high levels of nitrogen, it may have potential for use in waste utilization plans (Conservation Practice 633). This study was developed to determine its response to poultry litter applications of 0, 4, 6 tons per acre in a single application in the spring and 8 tons per acre in a split application, with 4 tons applied in the spring and the other 4 tons in mid-summer. There will two different types of poultry litter used, one normal poultry litter, unaltered from the form removed from the houses, and the other a pelletized source.

2004 Data Collected

The plots to be used in this study were established for two previous fertilizer utilization studies, one looking at forage production (biomass) and the other looking at seed production response to N rate that were completed in 2003 and 2004, respectively. Because the plots had been given differing rates of fertilizer in the previous studies, this year we attempted to equalize conditions between the plots. Soil samples were taken from each plot on March 9 and fertilizer was applied to each individual plot on April 29 based on the recommendations received from the tests. The biomass was harvested from the plots on July 7 (Table 1 and Table 2). Nitrogen was applied on all plots at a rate of 60 lb/ac immediately after harvest.

Table 1. 2004 Biomass yield from previous biomass response to N rate study after plots were fertilized according to soil test recommendations.

Previous N rate	Yield
--------------------------lb/ac--------------------------	
0	2 849
112	2 534
112 split	2 574
224	2 566
224 split	2 953
LSD (0.05)	NS†

† Not significant at $P < 0.05$.

Table 2. 2004 Biomass yield from previous seed production response to N rate study after plots were fertilized according to soil test recommendations.

Previous N rate	Yield
--------------------------lb/ac--------------------------	
0	5 400
40	7 638
80	7 344
120	6 199
160	6 093
LSD (0.05)	NS[†]

[†] Not significant at $P < 0.05$.

2005 Data Collected

No data collected in 2005.

2006 Activity

Due to the retirement of a primary cooperator, this study has been terminated.

Summary

The fertilization regime successfully equalized yields for the plots in each study that had received differing rates of N fertilizer (i.e. statistical analysis showed the differences were not significant). The yields of the seed production plots were higher than the biomass plots and this was probably due to the greater harvesting pressure applied to the biomass plots. Only one type of poultry litter (normal or pelletized) will be applied to each set of plots from the previous studies, so any yield differences between the two sites will have no effect on response to the varying poultry litter rates. The poultry litter treatments were to be implemented in 2005; however, due to staffing changes that occurred late in the year, it was decided that this study would be put on hold. The poultry litter applications should now begin in 2006.

Evaluation of Little Barley as a Potential Cover Crop

Study No: MSPMC-P-0114-CP
Study Leader: Tommy Moss (begun by Janet Grabowski)
Duration: 2001 - 2005

Introduction

Utilization of cover crops (Conservation Practice 340 and 327) has been limited by a perception that the benefits of their use do not justify the additional expense involved in planting. Little barley (*Hordeum pusillum* Nutt.) is a native, annual cool-season grass that matures its seeds in late spring to early summer. A limited amount of research on using little barley as a cover crop has been conducted by NRCS in North Carolina and Georgia. This study will evaluate its growth characteristics to determine if it will provide suitable erosion protection. Standard cover crops used for comparison will be wheat (*Triticum aestivum* L.), crimson clover (*Trifolium incarnatum* L.), and hairy vetch (*Vicia villosa* Roth). We will also determine if sufficient seeds will be mature at the time of spring burndown to sustain little barley populations into the next year, thereby reducing or eliminating the need for replanting.

2004 Data Collected

Plots were planted on September 25, 2003. The conventional cover crops were planted at the recommended rates, which were 90 lb/ac wheat, 20 lb/ac crimson clover, and 30 lb/ac hairy vetch. The legumes were inoculated at planting. Little barley was planted at approximately 75 seeds per ft^2. There were three replications of each cover crop and the plots were 5 foot x 10 foot. After planting, 60 lb/acre P and K were applied to all plots and 25 lb/acre N was applied to the wheat and little barley plots. The little barley seed used for planting was harvested from natural stands on the PMC and it was not possible to remove many other types of seed during the cleaning operation, which resulted in some crimson clover plants in the little barley plots. On March 16, 2,4-D Amine 4L at a rate of 1 qt/ac plus nonionic surfactant (0.25% v/v) was sprayed on the plots to control the clover. Stand ratings, determined using line transects of the plots, were taken on January 16, March 12, and April 15. A 3-square-foot section from the center of each plot was harvested on April 15 and air-dried to determine dry matter (DM) yields. Data is presented in Table 1. Additional plots were planted on October 14 for evaluation in 2005. A lack of little barley seed required planting rates for the 2005 plots to be reduced to 40 seeds per ft^2. The little barley and wheat plots were sprayed on November 16 with 2,4-D plus surfactant at same rates used on the previous year's plots to control broadleaf weeds. Select was applied at 10 oz/ac plus 1.0% (v/v) crop oil on the vetch and clover plots to control annual ryegrass.

Table 1. Stand ratings and dry matter yields of cover crops.

Cover Crop	Stand Ratings			DM Yield
	01/16	03/12	04/15	
	----------------------------%----------------------------			-------lb/ac-------
Little barley	89	94	96	4 991
Wheat	65	76	42	6 655
Crimson clover	80	83	88	3 328
Hairy vetch	47	65	97	5 143
LSD (0.05)	19	NS[†]	22	1 161

[†] Not significant at $P < 0.05$.

2005 Activity

Little Barley Cover Crop Evaluation – 4/27/05

Plot	Rep	Crop	Dry Wt. (g)
101	1	Little barley	16.52
102	1	Hairy vetch	m
103	1	Crimson clover	7.83
104	1	Wheat	7.58
201	2	Wheat	17.85
202	2	Hairy vetch	m
203	2	Little barley	15.85
204	2	Crimson clover	16.97
301	3	Crimson clover	9.03
302	3	Wheat	15.3
303	3	Little barley	7.12
304	3	Hairy vetch	m

Crop	**Mean Dry Wt.**		**(lbs/ac)**
Wheat	13.577g	A	(433.7)
Little barley	13.163g	A	(420.5)
Crimson clover	11.277g	A	(360.2)

No hairy vetch data – deer ate all plants

2006

Based upon the results to date, the study will continue but will focus on critical area planting, providing a cool season native plant material, and as an annually seeded cover crop. This study will resume in the fall of 2007 as part of MSPMC-P-0411-CP.

Summary

Stands of little barley were excellent at all rating periods. Wheat stands were somewhat low, but high quality seed was planted at the recommended rates, so the stands should be comparable to what would be present in a producer’s field. Crimson clover stands were high at all rating periods. Hairy vetch provided little ground cover during the early ratings, but formed an almost solid stand by the final rating. This growth pattern is typical of hairy vetch. The yields of wheat were significantly higher than any of the other cover crops. Hairy vetch and little barley provided comparable yields. Crimson clover yields were lower than all other species. The planting rate of little barley was high (75 seeds per square foot) and the high percentage of ground cover obtained is probably not necessary to provide adequate erosion control. Further research needs to be conducted on planting rates to determine a rate that would be economically feasible for commercial use.

TECHNICAL REPORTS

Listed below are the most current technical reports and fact sheets written by staff at the Jamie L. Whitten Plant Materials Center. Technical reports written in previous years and other PMC publications are available electronically at the Plant Materials Program web address listed in the Introduction Section.

<u>2000</u>

Tolerance of Legume Species to Postemergence Soybean Herbicides -- Joel Douglas, Janet Grabowski and William Benoist

Wildflower Seed Production at the Jamie L. Whitten Plant Materials Center -- Janet Grabowski

Estimating Digestibility in Eastern Gamagrass -- Joel Douglas, Scott Edwards and David Lang

Germination of Two Genotypes of Eastern Gamagrass With and Without the Cupulate Fruitcase and Stratification -- Joel Douglas and Janet Grabowski

Eastern Gamagrass as a Potential Biofuel Crop -- Joel Douglas

Analysis of the Potential for Using Caucasian Bluestem as a Biofuel Crop in the Southeastern United States -- Janet Grabowski

Weeping Lovegrass as a Potential Bioenergy Crop -- Scott Edwards

Native vs Introduced: What do these Terms Mean and Why are they Important -- Janet Grabowski

<u>2001</u>

Results of a WRP Planting in the Lower Mississippi Valley Alluvium -- Janet Grabowski, Paul Rodrigue, and Joel Douglas

Influence of Seeding Depth on Seedling Emergence of Eastern Gamagrass -- Joel Douglas

Spring Flood Tolerance of Selected Perennial Grasses -- Joel Douglas

Evaluation of Harvest Systems for Biomass Production of Alamo Switchgrass -- Scott Edwards

Morton Germplasm Shrub Willow -- Janet Grabowski

<u>2002</u>

Response of Native Wildflowers and Grasses to Postemergence Herbicides -- Janet Grabowski

Response of Two Switchgrass (*Panicum virgatum* L.) Ecotypes to Seed Storage Environment, Storage Duration, and Prechilling -- Janet Grabowski, Joel Douglas, David Lang, Paul Meints, and Clarence Watson, Jr.

A New Eastern Gamagrass Cultivar for the Southern United States -- Janet Grabowski, Scott Edwards, and Joel Douglas

Establishment Methods for 'Alamo' Switchgrass -- Scott Edwards

Eastern Gamagrass Response to Nitrogen Fertilization in Northern Mississippi -- Joel Douglas, Scott Edwards, David Lang, Robert Elmore, Roscoe Ivy, and Jimmy Howell

Vegetative Barriers, A New Conservation Buffer Practice -- Joel Douglas, Jerry Lemunyon, David Lightle, Edwin Mas, Robert Glennon, and Seth Dabney

Perennial Lespedeza Evaluation -- Joe Snider, Janet Grabowski, and Joel Douglas

2003

Evaluation of Warm Season Grass Species and Management Practices to Improve Biomass Production Potential in the Mid-South -- Janet Grabowski, Scott Edwards, and Joel Douglas

How to Use a Ragdoll Test to Estimate Field Germination -- Joel Douglas, Janet Grabowski, and Lee Daughtry

Yield, Quality and Persistence of Thirteen Genotypes of Eastern Gamagrass at Three Southern Locations -- Joel Douglas, Mike Owsley, and Lance Tharel

Handling Tips for Improving Tree and Shrub Plantings -- Joel Douglas, Janet Grabowski, Alan Holditch, and Lynn Ellison

2004

Efficacy of Chemical Seed Treatments and Stratification to Overcome Dormancy in Eastern Gamagrass Seeds -- Janet Grabowski and Joel Douglas

Converting Pastureland in Mississippi to Loblolly Pine -- Janet Grabowski, Joel Douglas, Lynn Ellison, and Alan Holditch

Cover Crops for Conservation Tilled Cotton -- Joel L. Douglas, Walter J. Jackson, and James Parkman

Using Native Little Barley as a Cover Crop -- Janet M. Grabowski, Joel L. Douglas, James S. Parkman, and Joe R. Johnson

Influence of Nitrogen Fertilization on Seed Production of Highlander Eastern Gamagrass in northern Mississippi -- Joel L. Douglas, Janet M. Grabowski, David Lang, Paul Meints, and Robert Elmore

2005

"Highlander" Eastern Gamagrass Plant Guide, Janet Grabowski, Joel Douglas

Native Wildflower Production Techniques in Mississippi, Janet Grabowski

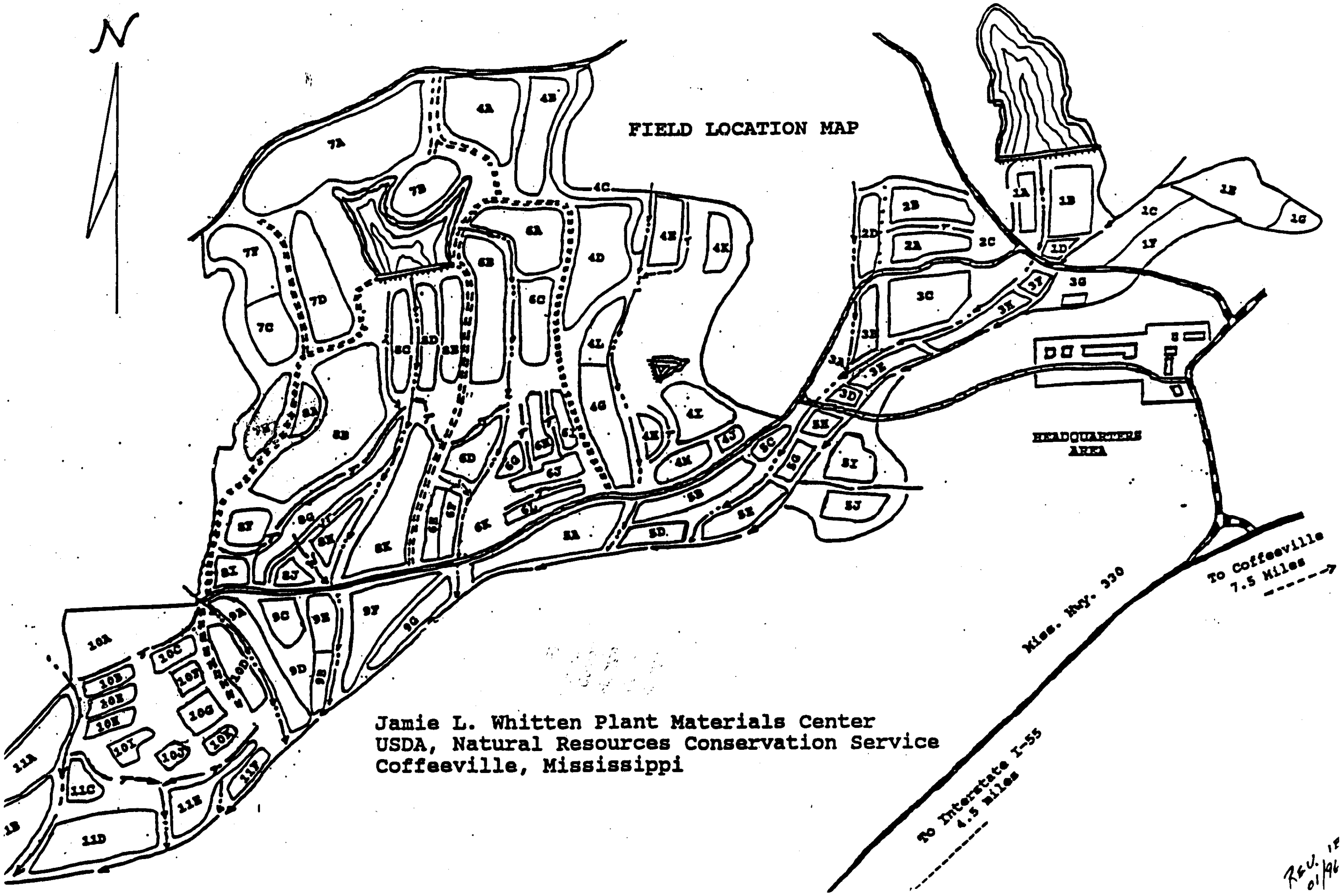
2006

Technical Note 101 ESTIMATED SEED PRODUCTION COST BUDGETS FOR COFFEEVILLE PMC RELEASES. Coffeeville, MS. 2006. 18p.

Plant Vendors of Conservation Plants for the Mid & Southeast U.S.. Plant Vendors. Coffeeville, MS. 2006. 29p.

SOIL TEST RESULTS 2007

Figure 1. Plot Map of MSPMC



Jamie L. Whitten Plant Materials Center
USDA, Natural Resources Conservation Service
Coffeeville, Mississippi

Mississippi State University Extension Service
MIssissippi State University and U.S. Dept. of Agriculture Cooperating

Plant and Soil Sciences-----Soil Testing Lab
Box 9610
Mississippi State, MS 39762

February 2, 2007

USDA-NRCS Plant Materials Ctr
2533 CR 65
Coffeeville, MS 38922

Yalobusha County

9381

Lab#: 2036 -- 2116

AAA578014

Soil Lab No : 1002036

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-A	5.7	53	89	2470	112	193	2.8	91	10.2	1.34	1.5	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H	M	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002036

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-A	5.7	53	89	2470	112	193	2.8	91	10.2	1.34	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002037

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-B	5.8	42	64	2066	93	168	1.1	95	7.6	1.17	1.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H	M	M					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002037

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-B	5.8	42	64	2066	93	168	1.1	95	7.6	1.17	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002038

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-C	5.7	48	77	1952	123	147	1.3	98	7.3	1.02	1.0	1	080	30	60	70# actual N 200# 5-15-30	80# actual N 176# 0-17-34
		M	L		H+	M	H										
												2	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34
												3	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 9030, 621

Soil Lab No : 1002038

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
1C-C	5.7	48	77	1952	123	147	1.3	98	7.3	1.02	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002039

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
2B	5.2	22	155	1157	631	229	2.0	165	10.3	1.59	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002040

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3B	5.4	28	77	1236	137	170	2.0	89	5.7	1.18	1.0	1	080	60	60	80# actual N	60# actual N
		L	L		H+	M	H									300# 0-20-20	250# 8-24-24
												2	080	60	60	80# actual N	60# actual N
																300# 0-20-20	250# 8-24-24
												3	080	60	60	80# actual N	60# actual N
																300# 0-20-20	250# 8-24-24

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 9030, 621

Soil Lab No : 1002040

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3B	5.4	28	77	1236	137	170	2.0	89	5.7	1.18	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002041

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-A	4.8	48	96	957	119	122	2.7	94	5.5	.85	1.5	1	060	25	25	35# actual N	52# actual N
		M	M		H+	L	H									192# 13-13-13	104# 8-24-24
												2	060	25	25	35# actual N	52# actual N
																192# 13-13-13	104# 8-24-24
												3	060	25	25	35# actual N	52# actual N
																192# 13-13-13	104# 8-24-24

Crop : 34 Perennial summer grass pasture

At Bottom of Report, See Comment Numbers : 340, 9020, 9050

Soil Lab No : 1002041

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-A	4.8	48	96	957	119	122	2.7	94	5.5	.85	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002042

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-B	5.2	56	96	1115	109	192	2.0	87	5.7	1.33	1.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	M	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002042

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-B	5.2	56	96	1115	109	192	2.0	87	5.7	1.33	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002043

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-C	5.3	55	133	886	125	131	2.3	78	5.6	.91	1.5	1	000	30	60	50# 0-0-60 150# 0-20-20	125# 0-24-24 50# 0-0-60
		M	M		H+	L	H										
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002043

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-C	5.3	55	133	886	125	131	2.3	78	5.6	.91	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002044

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-D	5.0	49	113	1098	146	168	2.8	88	6.1	1.17	1.5	1	000	30	60	50# 0-0-60	125# 0-24-24
		M	M		H+	M	H									150# 0-20-20	50# 0-0-60
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002044

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-D	5.0	49	113	1098	146	168	2.8	88	6.1	1.17	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002045

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-E	4.7	47	115	1506	193	167	3.6	91	7.6	1.16	1.5	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	M	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002045

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3C-E	4.7	47	115	1506	193	167	3.6	91	7.6	1.16	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002046

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3D	6.8	68	140	1911	147	132	3.2	153	6.5	.92	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002047

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3E	7.0	88	116	1669	85	158	3.0	65	4.7	1.1	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002048

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3G	6.8	40	109	3449	98	174	1.3	83	10.0	1.21	0.0	1	@@@	95	130	475# 0-20-20 58# 0-0-60	396# 0-24-24 58# 0-0-60
		M	L		H	M	M										
												2	@@@	60	90	300# 0-20-20 50# 0-0-60	250# 0-24-24 50# 0-0-60
												3	@@@	60	90	300# 0-20-20 50# 0-0-60	250# 0-24-24 50# 0-0-60

Crop : 62 Corn,Irrigated 200 yield

At Bottom of Report, See Comment Numbers : 620, 9020, 9100, 622, 621

Soil Lab No : 1002048

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
3G	6.8	40	109	3449	98	174	1.3	83	10.0	1.21	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002049

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4E	5.0	61	134	820	235	206	1.8	87	7.0	1.43	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002050

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4G	5.5	61	108	1598	187	252	1.4	96	7.8	1.75	1.5	1	130	60	120	110# actual N	353# 0-17-34
		M	L		H+	H	H									400# 5-15-30	130# actual N
												2	130	60	120	130# actual N	400# 0-15-30
																353# 0-17-34	130# actual N
												3	130	60	120	130# actual N	130# actual N
																353# 0-17-34	400# 0-15-30

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002050

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4G	5.5	61	108	1598	187	252	1.4	96	7.8	1.75	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002051

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4H	6.2	15	88	1537	185	141	1.0	92	6.5	.98	0.0	1	000	120	60	130# 0-46-0	130# 0-46-0
		VL	L		H+	M	M									300# 0-20-20	250# 0-24-24
												2	000	80	60	65# 0-46-0	65# 0-46-0
																300# 0-20-20	250# 0-24-24
												3	000	60	60	300# 0-20-20	250# 0-24-24

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 622, 9190, 621

Soil Lab No : 1002051

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4H	6.2	15	88	1537	185	141	1.0	92	6.5	.98	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002052

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
4I	5.2	29	158	1080	446	276	2.0	96	10.5	1.92	3.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002053

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5A-A	5.8	55	92	2087	122	177	1.8	83	7.9	1.23	1.0	1	080	30	60	70# actual N 200# 5-15-30	80# actual N 176# 0-17-34
		M	L		H	M	H										
												2	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34
												3	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 9030, 621

Soil Lab No : 1002053

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5A-A	5.8	55	92	2087	122	177	1.8	83	7.9	1.23	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002054

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5D	6.9	38	86	2582	185	138	2.1	82	8.1	.96	0.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	L	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 622, 9190, 621

Soil Lab No : 1002054

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5D	6.9	38	86	2582	185	138	2.1	82	8.1	.96	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002055

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5E-A	5.6	84	144	1424	129	160	1.9	78	7.2	1.11	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002056

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5E-B	5.1	72	193	1107	116	154	2.0	70	6.3	1.07	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002057

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5E-C	6.0	107	207	1831	150	173	2.4	76	7.9	1.2	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002058

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5F	5.7	60	127	1683	167	163	3.1	76	7.9	1.13	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002059

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5G	6.4	68	127	2005	218	220	3.1	78	8.0	1.53	0.0	1	130	60	120	110# actual N 400# 5-15-30	353# 0-17-34 130# actual N
		M	L		H+	H	H										
												2	130	60	120	130# actual N 353# 0-17-34	400# 0-15-30 130# actual N
												3	130	60	120	130# actual N 353# 0-17-34	130# actual N 400# 0-15-30

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 621

Soil Lab No : 1002059

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5G	6.4	68	127	2005	218	220	3.1	78	8.0	1.53	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002060

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5H	5.7	61	144	1440	206	180	3.1	81	7.1	1.25	1.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002061

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5I-A	4.8	100	139	778	153	212	1.9	90	6.9	1.47	2.0	1	130		120	130# actual N 200# 0-0-60	
		H	L		H+	H	H										
												2	130		120	130# actual N 200# 0-0-60	
												3	130		120	130# actual N 200# 0-0-60	

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002061

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5I-A	4.8	100	139	778	153	212	1.9	90	6.9	1.47	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002062

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5J-A	5.3	47	203	1271	200	262	2.0	97	8.2	1.82	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002063

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5J-B	5.2	64	203	1342	214	288	2.3	84	8.8	2	2.0	1	100	80		100# actual N 174# 0-46-0	100# actual N 400# 0-20-0
		M	H		H+	H	H										
												2	100	80		100# actual N 174# 0-46-0	100# actual N 400# 0-20-0
												3	100	80		100# actual N 174# 0-46-0	100# actual N 400# 0-20-0

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 9030, 621

Soil Lab No : 1002063

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
5J-B	5.2	64	203	1342	214	288	2.3	84	8.8	2	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002064

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6A	4.9	41	320	1305	877	580	5.2	114	16.6	4.03	4.0	1	060	25		60# actual N 54# 0-46-0	60# actual N 125# 0-20-0
		M	H+		H+	H+	H+										
												2	060	25		60# actual N 54# 0-46-0	60# actual N 125# 0-20-0
												3	060	25		60# actual N 54# 0-46-0	60# actual N 125# 0-20-0

Crop : 34 Perennial summer grass pasture

At Bottom of Report, See Comment Numbers : 340, 9020, 9050

Soil Lab No : 1002064

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6A	4.9	41	320	1305	877	580	5.2	114	16.6	4.03	4.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002065

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6B	6.0	49	148	4435	480	351	2.0	101	16.8	2.44	0.0	1	@@@	95	130	475# 0-20-20	396# 0-24-24
		M	L		H+	H	H									58# 0-0-60	58# 0-0-60
												2	@@@	60	90	300# 0-20-20	250# 0-24-24
																50# 0-0-60	50# 0-0-60
												3	@@@	60	90	300# 0-20-20	250# 0-24-24
																50# 0-0-60	50# 0-0-60

Crop : 62 Corn,Irrigated 200 yield

At Bottom of Report, See Comment Numbers : 620, 9020, 622, 621

Soil Lab No : 1002065

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6B	6.0	49	148	4435	480	351	2.0	101	16.8	2.44	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002066

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6C	5.4	46	172	2245	476	338	2.1	104	13.1	2.35	2.5	1	000	30	60	50# 0-0-60	125# 0-24-24
		M	M		H+	H	H									150# 0-20-20	50# 0-0-60
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002066

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6C	5.4	46	172	2245	476	338	2.1	104	13.1	2.35	2.5	1	080	30	30	80# actual N	80# actual N
		M	M		H+	H	H									150# 0-20-20	125# 0-24-24
												2	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24
												3	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 9030, 621

Soil Lab No : 1002066

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6C	5.4	46	172	2245	476	338	2.1	104	13.1	2.35	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002067

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6D-A	6.7	66	218	2497	290	204	1.1	94	9.2	1.42	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002068

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6D-B	6.5	88	166	2506	219	167	2.6	78	8.5	1.16	0.0	1	030	30	90	230# 13-13-13 100# 0-0-60	
		H	M		H+	M	H										
												2	030		90	30# actual N 150# 0-0-60	
												3	030		90	30# actual N 150# 0-0-60	

Crop : 51 Southern peas for hay

At Bottom of Report, See Comment Numbers : 510, 9020

Soil Lab No : 1002068

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6D-B	6.5	88	166	2506	219	167	2.6	78	8.5	1.16	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002069

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6E	6.6	36 L	104 L	2029	204 H+	163 M	1.2 M	79	7.8	1.13	0.0	1	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
												2	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
												3	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 621

Soil Lab No : 1002069

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6E	6.6	36	104	2029	204	163	1.2	79	7.8	1.13	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002070

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6G	4.8	42	140	1324	306	249	1.9	83	9.9	1.73	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002071

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6H	5.1	29 L	158 M	1881	594 H+	210 H	1.3 H	108	11.7	1.46	2.0	1	000	60	60	300# 0-20-20 50# 0-0-60	
												2	000	60	60	300# 0-20-20 50# 0-0-60	
												3	000	60	60	300# 0-20-20	

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002071

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6H	5.1	29	158	1881	594	210	1.3	108	11.7	1.46	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002072

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6I	6.0	86	320	2661	289	288	1.6	87	10.5	2	0.0	1	130			130# actual N	
		H	H		H+	H	H										
												2	130			130# actual N	
												3	130			130# actual N	

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 621

Soil Lab No : 1002072

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6I	6.0	86	320	2661	289	288	1.6	87	10.5	2	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002073

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6J-K	5.2	33	175	1663	402	246	2.2	95	10.4	1.71	2.0	1	130	80	120	130# actual N	400# 5-15-30
		L	L		H+	H	H									353# 0-17-34	110# actual N
																43# 0-46-0	43# 0-46-0
												2	130	80	120	130# actual N	400# 5-15-30
																353# 0-17-34	43# 0-46-0
																43# 0-46-0	110# actual N
												3	130	80	120	130# actual N	400# 5-15-30
																353# 0-17-34	43# 0-46-0
																43# 0-46-0	110# actual N

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002073

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6J-K	5.2	33	175	1663	402	246	2.2	95	10.4	1.71	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002074

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
6L	4.6	30	162	1076	461	219	0.6	100	11.0	1.52	3.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002075

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7C-A	5.4	51	278	2398	593	200	2.4	104	13.1	1.39	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002076

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7C-B	4.5	38	170	1757	519	274	1.5	86	14.9	1.9	4.0	1	000	30	60	50# 0-0-60	125# 0-24-24
		M	M		H+	H	H									150# 0-20-20	50# 0-0-60
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 9190

Soil Lab No : 1002076

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7C-B	4.5	38	170	1757	519	274	1.5	86	14.9	1.9	4.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002077

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7D	6.3	52	184	4094	445	292	1.2	94	14.9	2.03	0.0	1	000	30	30	150# 0-20-20	125# 0-24-24
		M	M		H+	H	M					2	000	30	30	150# 0-20-20	125# 0-24-24
												3	000	30	30	150# 0-20-20	125# 0-24-24

Crop : 18 Pasturegrass w/Perennial annual legumes

At Bottom of Report, See Comment Numbers : 180, 9020

Soil Lab No : 1002077

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7D	6.3	52	184	4094	445	292	1.2	94	14.9	2.03	0.0	1	000	30	60	50# 0-0-60 150# 0-20-20	125# 0-24-24 50# 0-0-60
		M	M		H+	H	M										
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9190

Soil Lab No : 1002077

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
7D	6.3	52	184	4094	445	292	1.2	94	14.9	2.03	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002078

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8A	5.6	84	323	2647	430	298	1.9	78	12.7	2.07	2.0	1	000				
		H	H		H+	H	H										
												2	000				
												3	000				

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002078

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8A	5.6	84	323	2647	430	298	1.9	78	12.7	2.07	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002079

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8C	4.4	82	129	612	135	183	2.1	79	7.5	1.27	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002080

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8D	4.9	58	148	727	225	207	2.5	87	8.6	1.44	3.0	1	130	60	120	110# actual N	353# 0-17-34
		M	L		H+	H	H									400# 5-15-30	130# actual N
												2	130	60	120	130# actual N	400# 0-15-30
																353# 0-17-34	130# actual N
												3	130	60	120	130# actual N	130# actual N
																353# 0-17-34	400# 0-15-30

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002080

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8D	4.9	58	148	727	225	207	2.5	87	8.6	1.44	3.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002081

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8E	5.6	31	218	2416	1063	426	4.5	88	16.0	2.96	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002082

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8F	5.6	48	314	1289	450	387	3.8	74	10.2	2.69	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002083

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8G	6.8	201	283	5204	306	230	2.0	84	16.1	1.6	0.0	1	130		120	130# actual N 200# 0-0-60	
		H+	M		H+	H	H										
												2	130		120	130# actual N 200# 0-0-60	
												3	130		120	130# actual N 200# 0-0-60	

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 621

Soil Lab No : 1002083

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8G	6.8	201	283	5204	306	230	2.0	84	16.1	1.6	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002084

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8H	5.4	234	252	1765	195	266	2.8	100	9.2	1.85	2.0	1	130			130# actual N	
		H+	H		H+	H	H					2	130			130# actual N	
												3	130			130# actual N	

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002084

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8H	5.4	234	252	1765	195	266	2.8	100	9.2	1.85	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002085

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8I	5.2	79	153	1380	108	207	1.4	96	7.8	1.44	2.0	1	000		60	100# 0-0-60	
		H	M		H	H	H					2	000		60	100# 0-0-60	
												3	000		60	100# 0-0-60	

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002085

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8I	5.2	79	153	1380	108	207	1.4	96	7.8	1.44	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002086

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8J	5.1	46	128	1136	249	174	1.3	101	10.0	1.21	3.0	1	080	30	60	80# actual N 176# 0-17-34	80# actual N 200# 0-15-30
		M	L		H+	M	H										
												2	080	30	60	80# actual N 200# 0-15-30	80# actual N 176# 0-17-34
												3	080	30	60	80# actual N 200# 0-15-30	80# actual N 176# 0-17-34

Crop : 49 Sunflower

At Bottom of Report, See Comment Numbers : 490, 9020, 9030

Soil Lab No : 1002086

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8J	5.1	46	128	1136	249	174	1.3	101	10.0	1.21	3.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002087

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8K-A	4.7	50	209	400	225	369	3.7	109	8.9	2.56	3.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002088

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8K-B	5.0	53	143	1368	176	279	3.4	89	8.3	1.94	2.0	1	080	30	30	80# actual N	80# actual N
		M	M		H+	H	H									150# 0-20-20	125# 0-24-24
												2	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24
												3	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24

Crop : 49 Sunflower

At Bottom of Report, See Comment Numbers : 490, 9020, 9030

Soil Lab No : 1002088

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
8K-B	5.0	53	143	1368	176	279	3.4	89	8.3	1.94	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002089

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9A-A	6.4	60	144	2278	167	219	1.7	97	8.6	1.52	0.0	1	080	30	30	80# actual N	80# actual N
		M	M		H+	H	H									150# 0-20-20	125# 0-24-24
												2	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24
												3	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 621

Soil Lab No : 1002089

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9A-A	6.4	60	144	2278	167	219	1.7	97	8.6	1.52	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002090

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9A-B	5.3	69	125	1805	155	274	3.3	102	9.5	1.9	2.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	H	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002090

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9A-B	5.3	69	125	1805	155	274	3.3	102	9.5	1.9	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002091

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9B	5.4	74	296	1652	246	268	5.6	83	9.0	1.86	2.0	1	130			130# actual N	
		H	H		H+	H	H+					2	130			130# actual N	
												3	130			130# actual N	

Crop : 4 Corn & sorghum for silage

At Bottom of Report, See Comment Numbers : 40, 9020, 9030, 621

Soil Lab No : 1002091

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9B	5.4	74	296	1652	246	268	5.6	83	9.0	1.86	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002092

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9C	5.3	75	268	1311	157	226	2.5	77	8.0	1.57	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002093

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9D	6.6	58	161	3043	337	268	2.9	105	11.2	1.86	0.0	1	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
		M	M		H+	H	H										
												2	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
												3	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 621

Soil Lab No : 1002093

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9D	6.6	58	161	3043	337	268	2.9	105	11.2	1.86	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002094

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9E	6.2	66	173	3057	333	276	2.7	101	11.5	1.92	0.0	1	000	30	60	50# 0-0-60 150# 0-20-20	125# 0-24-24 50# 0-0-60
		M	M		H+	H	H										
												2	000	30	60	50# 0-0-60	125# 0-24-24
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 622, 9190, 621

Soil Lab No : 1002094

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9E	6.2	66	173	3057	333	276	2.7	101	11.5	1.92	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002095

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9E-A	6.2	176	315	3866	426	464	42.2	103	14.0	3.22	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002096

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9F-G	5.5	49	102	1742	272	212	3.5	133	8.9	1.47	1.5	1	080	30	60	70# actual N 200# 5-15-30	80# actual N 176# 0-17-34
		M	L		H+	H	H										
												2	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34
												3	080	30	60	80# actual N 200# 5-15-30	80# actual N 176# 0-17-34

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 9030, 621

Soil Lab No : 1002096

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
9F-G	5.5	49	102	1742	272	212	3.5	133	8.9	1.47	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002097

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10A	6.6	31	159	3541	345	327	2.0	73	12.3	2.27	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002098

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10B-A	5.6	32	147	1795	333	253	1.7	103	10.0	1.76	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

Total Soluble Salt : 0.1 Low

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002099

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10C-A	6.9	71	166	3518	286	230	1.8	84	11.4	1.6	0.0	1	080	30	30	80# actual N 150# 0-20-20	80# actual N 125# 0-24-24
		M	M		H+	H	M										
												2	080	30	30	80# actual N 150# 0-20-20	80# actual N 125# 0-24-24
												3	080	30	30	80# actual N 150# 0-20-20	80# actual N 125# 0-24-24

Crop : 49 Sunflower

At Bottom of Report, See Comment Numbers : 490, 9020

Soil Lab No : 1002099

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10C-A	6.9	71	166	3518	286	230	1.8	84	11.4	1.6	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002100

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10C-B	6.8	71	170	3534	295	216	1.9	79	11.6	1.5	0.0	1	080	30	30	80# actual N	80# actual N
		M	M		H+	H	H									150# 0-20-20	125# 0-24-24
												2	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24
												3	080	30	30	80# actual N	80# actual N
																150# 0-20-20	125# 0-24-24

Crop : 49 Sunflower

At Bottom of Report, See Comment Numbers : 490, 9020

Soil Lab No : 1002100

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10C-B	6.8	71	170	3534	295	216	1.9	79	11.6	1.5	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002101

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10D-G	6.5	42	112	2779	220	193	1.2	86	9.7	1.34	0.0	1	@@@	70	100	292# 0-24-24	350# 0-20-20
		M	L		H+	M	M									50# 0-0-60	50# 0-0-60
												2	@@@	35	70	206# 0-17-34	146# 0-24-24
																	58# 0-0-60
												3	@@@	35	70	206# 0-17-34	146# 0-24-24
																	58# 0-0-60

Crop : 5 Corn & sorghum for grain

At Bottom of Report, See Comment Numbers : 50, 9020, 9100, 622, 621

Soil Lab No : 1002101

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10D-G	6.5	42	112	2779	220	193	1.2	86	9.7	1.34	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002102

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10E-A	5.6	90	235	2529	392	346	3.7	107	11.8	2.4	2.0	1	000				
		H	H		H+	H	H+					2	000				
												3	000				

Crop : 18 Pasturegrass w/Perennial annual legumes

At Bottom of Report, See Comment Numbers : 180, 9020, 9050

Soil Lab No : 1002102

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10E-A	5.6	90	235	2529	392	346	3.7	107	11.8	2.4	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002103

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10F-A	6.8	61	154	2700	304	212	2.1	96	9.9	1.47	0.0	1	060	25	25	35# actual N	52# actual N
		M	M		H+	H	H									192# 13-13-13	104# 8-24-24
												2	060	25	25	35# actual N	52# actual N
																192# 13-13-13	104# 8-24-24
												3	060	25	25	35# actual N	52# actual N
																192# 13-13-13	104# 8-24-24

Crop : 34 Perennial summer grass pasture

At Bottom of Report, See Comment Numbers : 340, 9020

Soil Lab No : 1002103

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10F-A	6.8	61	154	2700	304	212	2.1	96	9.9	1.47	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002104

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10F-B	6.8	84	277	2973	345	206	2.5	95	10.9	1.43	0.0	1	000				
		H	H		H+	H	H					2	000				
												3	000				

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 622, 9190, 621

Soil Lab No : 1002104

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10F-B	6.8	84	277	2973	345	206	2.5	95	10.9	1.43	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002105

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10H-A	5.8	52	162	2335	330	279	3.3	171	10.7	1.94	1.5	1	000	30	30	150# 0-20-20	125# 0-24-24
		M	M		H+	H	H					2	000	30	30	150# 0-20-20	125# 0-24-24
												3	000	30	30	150# 0-20-20	125# 0-24-24

Crop : 18 Pasturegrass w/Perennial annual legumes

At Bottom of Report, See Comment Numbers : 180, 9020, 9050

Soil Lab No : 1002105

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10H-A	5.8	52	162	2335	330	279	3.3	171	10.7	1.94	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002106

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10H-C	4.8	57 M	116 L	1435	255 H+	246 H	2.6 H	91	9.8	1.71	2.5	1	000	30	60	176# 0-17-34	200# 0-15-30
												2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002106

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10H-C	4.8	57	116	1435	255	246	2.6	91	9.8	1.71	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002107

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10I	5.2	26 L	152 M	2029	426 H+	276 H	1.2 M	82	11.3	1.92	2.0	1	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
												2	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
												3	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 9030, 621

Soil Lab No : 1002107

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10I	5.2	26	152	2029	426	276	1.2	82	11.3	1.92	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002108

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10J	5.4	37	99	1435	233	240	1.6	87	8.7	1.67	2.0	1	060	25	50	35# actual N	52# actual N
		M	L		H+	H	H									192# 13-13-13	42# 0-0-60
																42# 0-0-60	104# 8-24-24
												2	060	25	50	35# actual N	52# actual N
																192# 13-13-13	42# 0-0-60
																42# 0-0-60	104# 8-24-24
												3	060	25	50	35# actual N	52# actual N
																192# 13-13-13	42# 0-0-60
																42# 0-0-60	104# 8-24-24

Crop : 34 Perennial summer grass pasture

At Bottom of Report, See Comment Numbers : 340, 9020, 9050

Soil Lab No : 1002108

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10J	5.4	37	99	1435	233	240	1.6	87	8.7	1.67	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002109

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10K	6.5	93	387	4282	356	315	4.0	79	15.2	2.19	0.0	1	100			100# actual N	
		H	H+		H+	H	H					2	100			100# actual N	
												3	100			100# actual N	

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 621

Soil Lab No : 1002109

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10K	6.5	93	387	4282	356	315	4.0	79	15.2	2.19	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002110

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10L	5.3	62	129	2106	256	262	3.4	106	10.6	1.82	2.0	1	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24
		M	L		H+	H	H					2	100	80	80	100# actual N 400# 0-20-20	100# actual N 100# 0-20-20
												3	100	80	80	100# actual N 400# 0-20-20	100# actual N 333# 0-24-24

Crop : 9 Soybeans/Small winter grain rotation

At Bottom of Report, See Comment Numbers : 90, 9020, 9030, 621

Soil Lab No : 1002110

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
10L	5.3	62	129	2106	256	262	3.4	106	10.6	1.82	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002111

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11A	5.6	42	92	1665	119	189	1.5	100	7.7	1.31	1.5	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H	M	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002111

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11A	5.6	42	92	1665	119	189	1.5	100	7.7	1.31	1.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002112

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11B	6.0	38	75	1989	193	184	2.0	143	8.3	1.28	0.0	1	080	30	60	70# actual N	80# actual N
		M	L		H+	M	H									200# 5-15-30	176# 0-17-34
												2	080	30	60	80# actual N	80# actual N
																200# 5-15-30	176# 0-17-34
												3	080	30	60	80# actual N	80# actual N
																200# 5-15-30	176# 0-17-34

Crop : 32 Small grain(oats,Wheat,Rye,Barley)

At Bottom of Report, See Comment Numbers : 320, 9020, 621

Soil Lab No : 1002112

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11B	6.0	38	75	1989	193	184	2.0	143	8.3	1.28	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002113

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11C	6.5	41	88	2062	208	220	1.5	163	8.5	1.53	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002114

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11D	6.7	71	89	3353	115	226	1.6	73	10.2	1.57	0.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H	H	M					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 622, 9190, 621

Soil Lab No : 1002114

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11D	6.7	71	89	3353	115	226	1.6	73	10.2	1.57	0.0	1	080	30	60	80# actual N 176# 0-17-34	80# actual N 200# 0-15-30
		M	L		H	H	M										
												2	080	30	60	80# actual N 200# 0-15-30	80# actual N 176# 0-17-34
												3	080	30	60	80# actual N 200# 0-15-30	80# actual N 176# 0-17-34

Crop : 49 Sunflower

At Bottom of Report, See Comment Numbers : 490, 9020

Soil Lab No : 1002114

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11D	6.7	71	89	3353	115	226	1.6	73	10.2	1.57	0.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020

Soil Lab No : 1002115

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11E	5.6	44	72	979	147	154	1.6	117	7.7	1.07	2.5	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	M	H										
												2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002115

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11E	5.6	44	72	979	147	154	1.6	117	7.7	1.07	2.5	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Soil Lab No : 1002116

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11F	5.5	45	86	1005	160	156	1.7	113	7.5	1.08	2.0	1	000	30	60	176# 0-17-34	200# 0-15-30
		M	L		H+	M	H					2	000	30	60	176# 0-17-34	200# 0-15-30
												3	000	30	60	176# 0-17-34	200# 0-15-30

Crop : 1 Soybeans

At Bottom of Report, See Comment Numbers : 9020, 9030, 622, 9190, 621

Soil Lab No : 1002116

Field ID	Extractable Nutrient Levels lbs/acre										Recommended Lime	Needed Plant Nutrients Pounds Per Acre				Example of Fertilizer Mixture to Supply Recommended Plant Nutrients	
	pH	P	K	CA	MG	S	ZN	NA	CEC	%OM	Tons/Acre	YR	N	P205	K20	Example 1	Example 2
11F	5.5	45	86	1005	160	156	1.7	113	7.5	1.08	2.0	1	000				
												2	000				
												3	000				

Crop : 21 Unspecified crop

At Bottom of Report, See Comment Numbers : 210, 9020, 9030

Keys :
* pH = Soil Acidity
* P = Phosphorus
* Ca = Calcium
* Mg = Magnesium
* S = Sulfur
* Zn = Zinc
* Na = Sodium
* K = Potassium
* N = Nitrogen
* OM = Organic Matter
* P205 = Phosphate
* K20 = Potash
* CEC = Cation Exchange Capacity
* VL = Very Low
* L = Low
* M = Medium
* H+ = Very High
*EX = Excessive
*TX = Toxic

These are only samples for each mixture; other fertilizer mixtures can be used. Call your county agent if you need assistance determining the amount of other mixtures to be applied.

Comments :

40 Apply all of the P and K and 1/2 to 1/3 of the N as a preplant fertilizer on corn or sorghum for silage. The remainder of the N should be applied as sidedress approximately 1 month later. If a winter legume cover crop (such as clover or vetch) is grown, decrease the recommended nitrogen rate to 30-60 lbs per acre, depending upon the condition of the cover crop. If soil tests indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

50 Nitrogen (Corn & Sorghum for Grain) Comment. Apply 1.3 lbs of actual N per bushel of expected yield, therefore for 150 bushels of corn per acre then apply 195 lbs of actual N per acre. Apply all of the P and K and 1/3 to 1/2 of the N as preplant fertilizer on corn or sorghum for grain. The remainder on the N should be applied as sidedress approximately 1 month later. If soil tests indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

90 These recommendations are for small grain/soybean rotation. The recommended P and K rates are sufficient for both crops and should be applied in the fall. Where wheat follows soybeans no preplant N is necessary; otherwise, apply 20-30 lbs of N at preplant. In late winter (Feb) apply 80-100 lbs of N. Increase N rates 20-30 percent on clay soils.

180 Perennial or late-maturing annual legumes with summer grass annual pasture includes white clover, red clover, arrowleaf clover, lespedeza, or subterranean clover with bermuda, dallis or bahiagrass. Where legume covers less than 1/3 of the ground, apply 60 lbs of N per acre each time forage is grazed down or cut for hay. For reseeding clover or clover seed harvest, apply 1 to 1.5 lbs boron per acre. Loss of stand is sometimes due to K deficiency. If the pasture is regularly cut for hay, apply an additional 30 lbs of K per acre for each ton of hay harvested. If soil test indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

210 No crop was indicated for this sample; therefore no recommendations can be made. Note: the suggested lime recommendation is suitable for most crops. It is not suitable for crops requiring very low soil pH values.

320 Applicable to oats, wheat, rye, or barley for grain. Subject to previous yield levels, the N rate can be increased to 80-100 lbs for wheat and decreased to 60-80 lbs for other grains. When recommended, P and K and 20-30 lbs of N should be applied in the fall at or just prior to planting. The spring application of N, at the rate of 80-100 lbs per acre, should be applied in Feb. Increase N rates 20% to 30% on clay soils. If these crops are to be used for grazing, apply 60 lbs or more of N at planting. Apply the late winter N treatment when cattle are removed (on or about Feb 1). If soil tests indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

340 Perennial summer grass pasture includes bahia, bermuda, and dallisgrass. Apply all of the P and K and 60-80 lbs of N before growth starts. Repeat the N application by mid-July if more growth is desired. Loss of stand is sometimes due to K deficiency. If soil tests indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

490 Applicable to sunflowers grown for grain. All the P and K and half the N should be used as a preplant fertilizer. The remainder of N should be applied as a sidedress approximately 1 month later.

510 Apply all recommended P and K just prior to planting.

620 Applicable to 200 bushel irrigated corn: All the P and K and one-half to one-third of the N should be used as preplant fertilizer. The remainder of the N should be applied as sidedress, approximately one month later or when the corn is 16 to 18 in. high. Apply 1.3 lbs of actual N per bushel of expected yield, therefore for 200 bushels of corn per acre then apply 260 lbs of actual N per acre. If soil tests indicate L or M level for magnesium, use 10-20 lbs per acre of a magnesium source.

621 Growers utilizing crop rotation should base supplemental fertility needs upon the crop with the highest nutrient demand in their rotation system. This may require another soil sample or a maintenance fertilizer application irrespective of a zero fertilizer recommendation for the current crop.

622 Nitrogen (Corn, Irrigated 200 yield) Comment. Apply 1.3 lbs of actual N per acre, therefore for 200 bushels of corn per acre then apply 260 lbs of actual N per acre. Corn or sorghum grown in fields following rice production or winter flooding/duck hunting often experiences severe phosphorus deficiency. The transition from a flooded environment to a dry soil reverts soluble ferrous phosphates to unavailable ferric phosphates. This ties up phosphorus in a form unavailable for crop uptake.

9020 The sulfur level reported is a calculation based on the organic matter level and is an indication of the potential reserve sulfur from this source. For this reason, fertilizer sulfur is not indicated by this test and a field that is low in organic matter will show a low sulfur level, even if sulfur fertilizer has been applied. Use the sulfur level as a guide for the need of applications of sulfur fertilizer, particularly on cotton, corn, sorghum, commercial horticulture crops, and hay crops.

9030 Lime is most effective in conventionally tilled crop production if applied 3 or more months prior to planting. If application this far in advance is not possible, lime can be applied anytime, but will not be as effective the first year. The lime recommendation assumes a calcium carbonate equivalent (CCE) of 100%. However, many commercially available liming materials CCE values are lower.
Recommended rates should be adjusted upward when CCE is less than 100%. CCE values are used to determine two grades of limestone-based materials in Mississippi, A and B. Example of adjusted lime recommendation (ALR) for a two ton recommended rate if CCE = 80%: (ALR)=2 tons lime per acre x (100/80)=2.5 tons per acre. Additional information on lime characteristics is available in MSU Extension information sheet No. 1587, Agricultural Limestone Neutralizing Value. If a lime recommendation exceeds more than 2 tons per acre, it would be more economical to apply 2 tons then submit another soil sample or apply the remaining lime before the next crop.

9050 The lime recommendation for this crop is for establishment and assumes the lime will be incorporated into the soil with tillage. If the lime is to be placed on top of the ground and not incorporated, only use 1 ton per acre per year; for example if the lime recommendation is 2 tons per acre, use one ton now and one ton at the same time next year.

9100 Use 1 to 2 lbs zinc per acre for corn with a soil test zinc level of medium.

9190 Soybeans-molybdenum:For top yields of soybeans, apply 1/2 to 1 ounce of sodium molybdate or equivalent annually per bushel of seed if the soil pH is below 7.0.

Dr. Karl Crouse, Soil Testing Specialist

If you have any questions regarding this report, please call your local county extension office at 662-675-2730.