Jamie L. Whitten
Plant Materials Center

2002 Annual Technical Report

Jamie L. Whitten Plant Materials Center
2533 County Road 65
Coffeeville, Mississippi 38922-2652
Phone (662) 675-2588
FAX (662) 675-2369

Table of Contents

Staff

Joel L. Douglas	Manager
Scott D. Edwards (Transferred)	Agronomist
Janet M. Grabowski	Agronomist
Patricia A. Taylor	Secretary
Jeff H. Tillman (Transferred)	Biological Technician
James O. Pomerlee	Gardener
Jon K. Allison	Gardener

Introduction

The Jamie L Whitten Plant Materials Center (PMC), 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 PMC seeks to address priority needs of its customers in NRCS field offices and land managers in both the public and private sector.

The PMC works closely with its customers to develop solutions for a broad range of conservation concerns and issues. Pastureland Improvement, cropland erosion control, critical area erosion control, wildlife habitat enhancement, and water quality improvement 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. Another emerging interest involves the production of perennial biofuel crops on marginal cropland in the region.

Activities

In order to develop improved resource technology, the PMC 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 PMC during 2000. 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 PMC Technical Reports publication. Past reports and summaries are available from the PMC or will soon be available on the Plant Materials Program web site at **http://Plant-Materials.nrcs.usda.gov**.

PMC Site Information

The PMC occupies more than 200 acres of land 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.

Rainfall (Table 1) in most months of 2002 equaled or exceeded averages for the previous 20 years. Two tropical storms came through Mississippi back-to-back in September, which made the rainfall total for that month vastly exceed normal levels. Rain events were fairly evenly distributed throughout the year creating ideal crop production conditions. Temperatures (Table 2) during 2002 were fairly typical for this area.

Table 1. Monthly and total rainfall in 2002 and 20-year averages at the Jamie L. Whitten Plant Materials Center, Coffeeville, MS.

Month	2002	20-yr. avg.
	----------in.----------	
January	9.66	4.35
February	4.10	5.81
March	6.08	5.38
April	8.57	6.08
May	8.98	5.10
June	2.40	5.41
July	6.11	4.16
August	5.36	3.51
September	11.09	4.06
October	7.43	4.17
November	4.30	6.64
December	7.00	6.74
Total	81.07	61.41

Table 2. Average monthly high and low temperatures recorded for Coffeeville, MS in 2002 and 20-year averages

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg.
	----------°F----------												
High	56	55	61	77	79	88	92	92	88	76	60	NA	75
Low	32	29	36	51	58	57	64	70	65	53	35	NA	50
20-yr High	52	58	66	73	81	87	91	90	86	74	63	53	73
20-yr Low	30	34	40	47	57	65	71	69	61	49	40	33	50

Cropland Study Summaries

Title: Management of Spatial Variability Created by Vegetative Barriers
Study No: MSPMC-P-0112-CP
Study Leader: Joel Douglas
Cooperator: Seth Dabney, Agronomist, ARS, Oxford, MS
Duration: 2001 - 2006

Introduction

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 from the upper portion of the area between the barriers and deposited above the barrier through tillage and erosion, soil quality below the 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 optimal crop productivity and profitability

Treatments:

1) "Check" (3000 lb/a limestone, about ½ rate of recommended based on soil test)
2) "Lime" (6000 lb/a limestone)
3) "M1" (3000 lb lime plus poultry litter to supply 50 lbs P_2O_5/a/year; about ½ rate of recommended P)
4) "M2" (3000 lb limestone plus poultry litter to supply 100 lbs P_2O_5/a/year)
5) "P1" (6000 lb lime plus superphosphate to supply 50 lbs P_2O_5/a/year)
6) "P2" (3000 lb lime plus poultry litter to supply 100 lbs)

2002 Data Collected

Tilled areas have been managed with tilled fallow from 1993 to 2001. 0.5 to 1 m high benches have developed. Soil samples were taken during summer 2001 to determine current fertility status. Results show uniformly low pH (4.2 to 4.5) throughout the area and throughout at least 2 feet of soil depth. Gradients in P and OM exist within the benches.

Summary

No fertilizer amendments/treatments were applied in 2002.

Soybeans [*Glycine max* (L.) Merr.] were no-tilled planted between the barriers in May 2002. Production was relatively poor and no soybeans were harvested. Heavy rainfall and slow drying conditions delayed wheat planting until late November. Wheat (*Triticum aestivum* L.) was broadcast planted between the barriers.

Title: Evaluation of Little Barley as a Potential Cover Crop
Study No: MSPMC-P-0114-CP
Study Leader: Janet Grabowski
Duration: 2001-2004

Introduction

Utilization of cover crops 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.

2002 Data Collected

The little barley seed lot had been stored for several years and germination was very poor. Without germination in the little barley plots, data collection in became pointless. Fresh little barley seeds were harvested at the PMC in the May. Plots were planted on October 17. All plots were cultipacked following planting. 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.

Summary

Germination in all plots was excellent, so data collection will proceed in 2003.

Title: Burndown Chemicals for Little Barley
Study No: MSPMC-P-0115-CP
Study Leader: Janet Grabowski
Duration: 2001-2004

Introduction

The cost of chemically burning down cover crops before planting is one factor that limits their use in crop production systems. Glyphosate and paraquat are two herbicides that are commonly used to provide cover crop burndown. Paraquat provides quicker burndown, but is a restricted-use pesticide, which may make it less desirable for some producers.

Little barley (*Hordeum pusillum* Nutt.) is a native grass that matures seed in early summer. Although genetic variability in maturity dates within native populations is likely, personal observations indicate that most plants will have begun or will soon begin to senesce at the normal cover crop burndown date of April 15. Therefore, burndown chemicals may not be required or, if needed, normal application rates might be reduced and still provide control of the little barley cover crop. Herbicide rates tested will be no burndown chemicals and glyphosate and paraquat at 1 lb ai/acre, 0.75 lb ai/acre, 0.5 lb ai/acre, 0.25 lb ai/acre for both herbicides (1X, 3/4X, 1/2X and 1/4X recommended burndown rates).

2002 Data Collected

Germination was very poor in the plots due to the old seed that was used. Fresh seed was harvested and plots were planted on October 18. After planting, the soil was cultipacked and 25 lb/acre N and 60 lb/acre P and K were applied to all plots.

Summary

Germination was excellent and treatments will be applied in 2003.

Title: Agroforestry Alley Cropping Demonstration
Study No: MSPMC-T-0117-CP
Study Leader: Joel Douglas
Cooperators: National Agroforestry Center; Jim Robbins, NRCS, Ft. Worth, TX
Jerry Lemunyon, NRCS, Ft. Worth, TX
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 an option of growing different crops in the same field creating a diversified farming enterprise. Conservation benefits alley cropping include but not limited to reducing surface runoff and erosion, improving nutrient management and increasing wildlife to diversify farming operations. Conservation benefits of this practice include but 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 on sloping topography. A 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 last January. Trees species include pecan [*Carya illinoinensis* (Wangenh.) K. Koch], which will provide an income source from nut production in addition to future timber production, and green ash (*Fraxinus pennsylvanica* Marsh.), which is a fairly fast-growing timber species. Roundup tolerant soybeans [*Glycine max* (L.) Merr.] are no-tilled planted between tree rows.

Summary

Over 90 percent of the green ash survived in 2002. Mediocre planting stock and deer pressure (rubs) attributed to poor pecan survival. Soybean yields ranged from 15 to 38 bu/acre (avg. 26 bu/acre). Highest yields were recorded on the lower 1/3 of the slope where more moisture was available for crop growth. Wheat (*Triticum aestivum* L.) was drilled planted and fertilized on 2 October and 2.5 ton/acre lime was applied 1 October. Pecan rows will be replanted in January 2003.

Biofuels Study Summaries

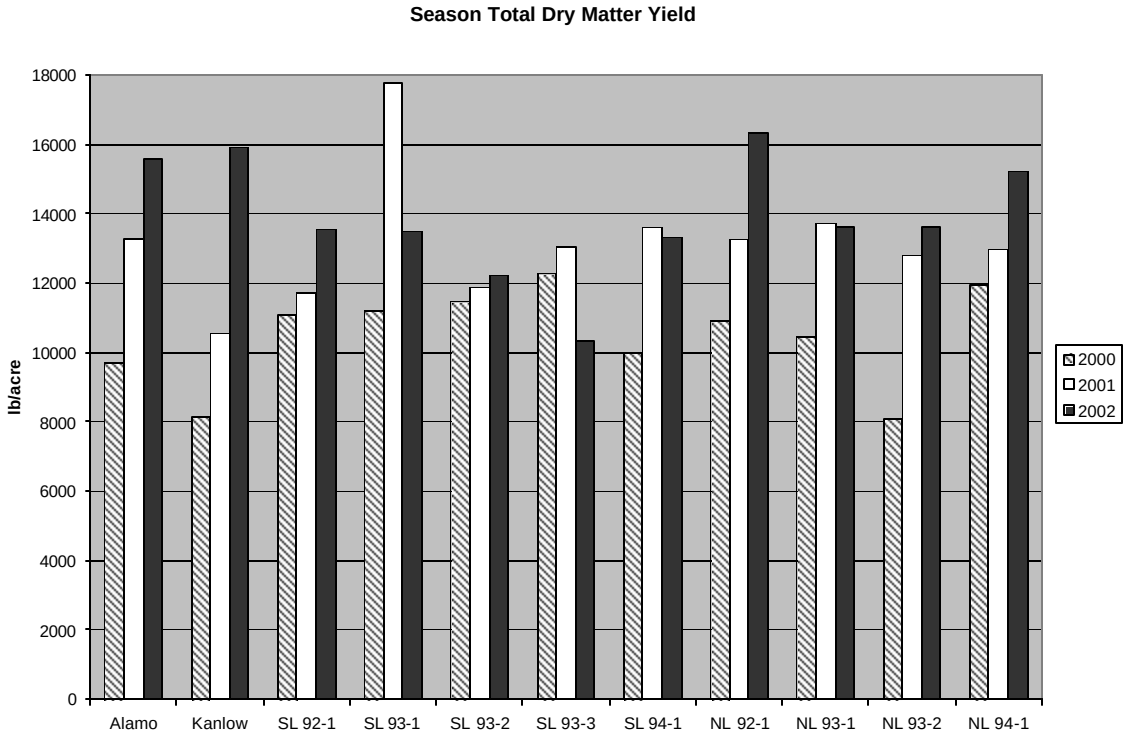
Title:	A Comparison of 9 Switchgrass Lines and Two Cultivars for Biomass Production
Study No:	MSPMC-T-9913-CP
Study Leader:	Janet Grabowski
Cooperators:	Charles Taliaferro, Oklahoma State University, Stillwater OK.
Duration:	1999 - 2002

Introduction

Switchgrass (*Panicum virgatum* L.) is a perennial grass crops chosen as an alternative energy source because of its superior agronomic traits, including biomass production. Oklahoma State University, in its switchgrass breeding program, emphasized increased biomass production as one of the essential elements for biofuel production. As result of this effort, nine breeding lines were developed and are undergoing further evaluation on different soils and climatic conditions in regions where switchgrass commonly occurs. The objective of this study is to compare nine switchgrass breeding lines to 'Alamo' and 'Kanlow' cultivars for total biomass production in a single harvest system.

2002 Data Collected

The following breeding lines were included in the study SL 92-1, SL 93-1, SL 93-2, SL 93-3, SL 94-1, NL 92-1, NL 93-1, NL 93-2, and NL 94-1. Alamo and Kanlow were included as standards for comparison in this trial. Nitrogen was applied in a single application at 80 lb/acre. There was single harvest made October 23 for biomass yield.



Summary

Overall yields were high again in 2002 due to adequate moisture during the growing season. The highest yielding line was NL 93-1, but the yield difference between it and the next highest yielding selection, Kanlow, was less that 500 lb/acre. Yields of SL 93-1, which was the highest yielding line in 2002 dropped off markedly in 2003. Yields of the breeding lines were quite variable over the years and it does not appear, that at this location, any of these lines is significantly higher yielding that Alamo, the cultivar currently used for bioenergry production. This was the final year of data collection for this study; however, the plots are being maintained for the near future.

Title: Evaluations of Harvest Systems for Biomass Production of Accession 9062680 Eastern Gamagrass
Study No: MSPMC-T-0005-BF
Study Leader: Janet Grabowski
Cooperators: Sandy McLaughlin, Oak Ridge National Laboratory
Duration: 2000 - 2002

Introduction

Eastern gamagrass [*Tripsacum dactyloides* (L.) L.] has potential as an herbaceous biomass energy crop for marginal cropland in the southeastern states. In addition to clipping frequency and fertility, genotype greatly influences biomass production. The PMC selected accession 9062680, a tetraploid genotype, for release as a perennial forage crop for the southeastern states because of its wide range of adaptation, yield, and resistance to disease. Information is needed on harvest systems that maximizes biomass production before accession 9062680 can be considered for use as a bioenergy crop. The objective of this study is to determine the optimum clipping frequency to maximize production of 9062680 eastern gamagrass using a one and two cut harvest system.

2002 Data Collected

Plots were harvested using a gas-powered hedge trimmer at a height of approximately 6 in. The one cut plots were harvested August 6 and the two cut plots were harvested on June 19 and September 9. Fertilizer was applied at 60 lb/acre P and K; N was applied at 120 lb/acre N in a single spring application on the one cut plots and a split application of 60 lb/acre N in the spring and after the first harvest on the two cut plots.

Table 1. Dry matter yields for 9062680 eastern gamagrass under two harvest regimes at the Jamie L. Whitten Plant Materials Center, Coffeeville, Mississippi, 2000-2002.

Year	System	Annual Yield[1]	Nitrogen Content		Ash Content	
		-------lb/ac-------	----------%----------			
2000	1-cut	7 797a	0.7		4.7	
	2-cut	13 223b	NA	0.7	NA	5.1
2001	1-cut	11 401a	0.9		4.0	
	2-cut	13 079a	1.0	NA	4.0	NA
2002	1-cut	**6 941b**	NA		NA	
	2-cut	**10 859a**	NA	NA	NA	NA

[1] Values within each harvest year followed by different letters are significantly different at P<0.05.

Summary

There was a significant difference in the dry matter yields for the two harvest systems, with the two cut system having the highest yield. In the two previous years, there had been no significant difference between the one cut and two cut plots when the one cut harvest was made in August to maximize biomass production. In this year, there was little additional growth between the first harvest of the one cut system in mid-June and the one cut harvest made in August. There was ample rainfall during this period to sustain plant growth, so the yield difference cannot be attributed to water stress. Previous research has shown that N fertility should have been adequate, but possibly other nutrients could have become limiting. Tissue analyses were not conducted in 2002, but the samples were retained for future testing. This was the final year of this study and the results will be summarized in a report in 2003 or 2004.

Title: Evaluations of Harvest Systems for Biomass Production of Caucasian Bluestem in Mississippi
Study No: MSPMC-T-0007-BF
Study Leader: Janet Grabowski
Cooperators: Department of Energy, Oak Ridge National Laboratory
Duration: 2000-2002

Introduction

Caucasian bluestem [*Bothriochloa bladhii* (Retz.) S.T. Blake] is an introduced grass that has been widely planted for forage production in the Southern Plains. It is not commonly used in the southeastern states; however, there are reports of it having been planted in Louisiana and Florida. It is highly productive, tolerant of both cold and drought, and requires less nitrogen fertilizer than many other forage crops. Plants will tolerate close mowing and require frequent clipping or grazing to prevent damage to the plant stand. Caucasian bluestem apparently can be managed for forage production in a similar manner as bermudagrass, which a majority of Southeast growers already produce. Because this grass is capable of producing high yields, it may have potential as a biofuel crop. However, yields and management schemes for optimum biomass production would need to be determined before Caucasian bluestem could be grown for this purpose. Therefore, the objective of this study is to compare one and two cut systems for biomass production of Caucasian bluestem.

2002 Data Collected

Atrazine (1.5 pt/ac) was sprayed over the study plots on March 15. P and K were applied on April 9 at a rate of 60 lb/acre (both). N was applied to the plots at a rate of 120 lb/acre on the one clip plots and 60 lb/acre on the two clip plots on April 22, with a second application of N on the two clip plots immediately after the first harvest. A 3 ft X 20 ft strip in the center of each plot was the harvest area. The first clipping for the two clip plots was on July 2 and the second on September 9. The one cut plots were harvested on August 6. A representative grab sample was taken from all plots at harvest to determine DM percentage, % N and ash content. The data is presented in Table 1. All plots were mowed to a uniform height in October after the final harvest.

Table 1. Dry matter yields for Caucasian bluestem under two harvest regimes at the Jamie L. Whitten Plant Materials Center, Coffeeville, Mississippi, 2000-2002.

Year	System	Annual Yield[1]	Nitrogen Content		Ash Content	
		-------lb/ac-------	----------%----------			
2000	Establishment	2 740	1.1		5.2	
2001	1-cut	11 237b	0.6		4.6	
	2-cut	14 962a	1.6	0.8	6.5	4.4
2002	1-cut	**7 661b**	NA		NA	
	2-cut	**11 947a**	NA	NA	NA	NA

[1] Values within each harvest year followed by different letters are significantly different at P<0.05.

Summary

The 2002 harvest dates were adjusted based on results from the previous year and therefore, harvests from the two years would not be comparable. However, the yields of the one cut plots were lower than in the previous year, when the harvest was made approximately one month earlier. This was due to stand reduction in the one cut plots; something that was expected based upon previous reports citing the need for frequent clipping. In both years, the two cut system

yielded significantly more biomass than the one-cut system. The first cutting in this system was delayed in 2002 to attempt to reduce N concentrations in the plant tissue; this should be confirmed when analyses are conducted in 2003. The two cut system would be the best management regime for Caucasian bluestem. This was the final year of this study and the results will be summarized in a report in 2003 or 2004.

Title: Evaluations of Harvest Systems for Biomass Production of 'Alamo' Switchgrass
Study No: MSPMC-T-0008-BF
Study Leader: Janet Grabowski
Cooperators: Sandy McLaughlin, Oak Ridge National Laboratory
Duration: 2000 - 2002

Introduction

'Alamo' switchgrass (*Panicum virgatum* L.) is a perennial warm season native grass that has performed well in switchgrass variety trials at Auburn University for biomass production (D. Bransby, personal communication). Because of these and other trials, Alamo has become the recommended switchgrass cultivar for biofuel production in the southeastern states.

A one and two cut harvest system that maximizes yield of switchgrass has shown varying degrees of success depending on cultivar and location. Timing of the last harvest is critical for long-term sustainable yields in either system. To maximize yield of Alamo in a one or two cut system and promote regrowth in the spring, the plants should be clipped either once in early September (one cut) or in mid June and again on September 1 (two cut). This strategy would appear to allow the plants adequate time for regrowth before frost; thus, providing the plants with a protective insulation for the winter months and reducing late winter and early spring weed competition. The objective of this study is to compare a one and two cut system on biomass production of 'Alamo' switchgrass with 120 lb/N/acre applied per year.

2002 Data Collected

The one cut plots were harvested September 9 and the two cut plots were harvested on June 19 and September 9. Fertilizer was applied at 60 lb/acre P and K and N was applied at 120 lb/acre in a single spring application on the one cut plots and a split application of 60 lb/acre N in the spring and after the first harvest on the two cut plots.

Table 1. Dry matter yields for Alamo switchgrass under two harvest regimes at the Jamie L. Whitten Plant Materials Center, Coffeeville, Mississippi, 2000-2002.

Year	System	Annual Yield[1]	Nitrogen Content		Ash Content	
		-------lb/ac-------	----------%----------			
2000	1-cut	18 480a	0.3		2.6	
	2-cut	17 169a	0.7	0.5	3.9	3.4
2001	1-cut	21 565a	NA		NA	
	2-cut	18 344b	0.9	NA	4.3	NA
2002	1-cut	**17 450a**	NA		NA	
	2-cut	**10 462b**	NA	NA	NA	NA

[1] Values within each harvest year followed by different letters are significantly different at P<0.05.

Summary

There were significant differences in season total dry matter yield between systems (Table 1). Yields were highest for the one cut system in both 2001 and 2002. Rainfall was adequate for plant growth throughout the growing season in 2002, however, overall yields declined somewhat from the previous years. These plots were previously used for a forage yield study and therefore had been in continuous harvest for a long period of time. The N applied should have been sufficient to sustain yields; however, some other nutrient could have become limiting in the plots.

Long-term fertility needs may need to be addressed in switchgrass biomass production systems. Tissue analyses were not conducted in 2002, but the samples were retained for future testing. This was the final year of testing and the results of this study will be summarized in a report in 2003 or 2004.

Pasture/Hayland Study Summaries

Title: Effect of Clipping Management on Seed Quality of Low-growing Switchgrass
Study No: MSPMC-T-9807-PA
Study Leader: Janet Grabowski
Duration: 1998-2002

Introduction

Switchgrass (*Panicum virgatum* L.) is a native warm season grass used for forage, erosion control, biomass production and other resource conservation uses. Seed quality is often adversely affected by a high number of immature seeds and infection by diseases (ergot). Preliminary findings at MSPMC and Mississippi State University indicated that seed quality appeared to be better if plants were clipped during the growing season. Clipping would also allow the producer to market a hay crop in addition to the seed crop produced. This study examines the effect of clipping once during the growing season (targeted at the boot stage) on seed quality of several switchgrass accessions.

2002 Data Collected

All phases of this study except germination testing had been completed in 2001. Seeds from the 2001 seed collection were prechilled on April 3 and germination testing was conducted on April 17. Seed counts were conducted at 7 and 14 days according to Association of Official Seed Analysts rules. Germination percentages presented are the total germination during the evaluation period.

Table 1 Seed germination data on switchgrass seed collected in 2001 two management regimes at Coffeeville, MS.

Treatment	Germination[1]
	----------%----------
Clip	37a
Unclip	3b

[1] Values followed by different letters are significantly different at P<0.05.

Summary

There was a significant difference in seed germination between the two clipping regimes, with the highest germination from plants that had been clipped (Table 1). There was no interaction between accession and clipping, indicating that both accessions reacted similarly to the clipping treatment. In the previous year, germination had been so poor for both treatments that no differences could be detected. There was a drought in 2000 and adverse environmental conditions have been shown to have a deleterious effect on switchgrass seed quality. This data from the 2001 seed, when rainfall during the late summer was good, shows that the clipping treatment did improve germination of switchgrass seeds. This shows that clipping may improve seed quality, but only in years with favorable conditions or when plants can be irrigated during the critical seed formation stage.

Title: Yield Response of 9062680 Eastern Gamagrass to Nitrogen Fertility
Study Number: MSPMC-P-0016-PA
Study Leader: J.L. Douglas
Cooperator: D. Lang, Agronomist, Department of Plant and Soil Science, Mississippi State University;
R.L. Ivy, Agronomist, Mississippi Agricultural and Forestry Experiment Station (MAFES), Prairie, MS
Duration: 2001-2003

Introduction

Proper fertilization is an important management tool for increasing forage production and quality of perennial grass crops. Previous studies have shown that eastern gamagrass [*Tripsacum dactyloides* (L.)L.] responds to increased nitrogen fertilizer but response varies with genotype/cultivar and geographical region. A cooperative study began in 2001 with Mississippi State University to evaluate the effects of N rates on production estimates of 9062680 eastern gamagrass on different soil types at Coffeeville (Oklimeter silt loam), Prairie (Houston Clay) and Starkville (Marietta loam). Nitrogen rates of 0, 120, 240, 360 and 480 lb N/acre were applied in equal split applications, beginning in April and after each harvest except the last one. Plots were harvested on a 45-day interval beginning in May and ending in August or September.

2002 Data Collected

Table 1. Harvest dates by location and year.

Location	2001			2002		
	1st	2nd	3rd	1st	2nd	3rd
Prairie	17 May	10 July	August 23	21 May	9 July	22 August
Coffeeville	15 May	28 June	August 15	16 May	2 July	15 August
Starkville	22 May	5 July	September 5	22 May	15 July	4 September

Table 2. Yield efficiency of accession 9062680 by N rate, year and location.

N Rate	Coffeeville		Prairie		Starkville	
(kg ha^{-1})	2001	2002	2001	2002	2001	2002
	---kg kg^{-1} N---					
134	17	17	13	16	13	20
268	17	17	13	19	14	20
402	11	15	8	20	7	22
536	9	9	11	20	7	16

Yield efficiency = forage yield (fertilize) – forage yield (control) / N fertilizer applied.

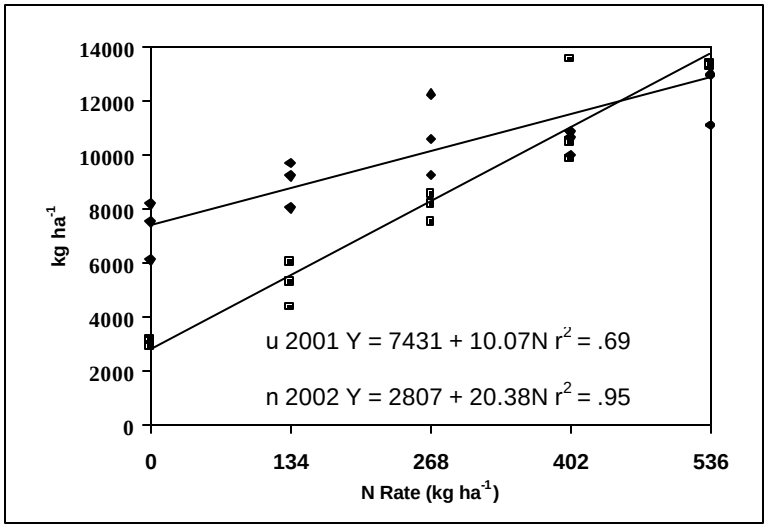


Fig. 1a. Season total dry matter yield for accession 9062680 in 2001 and 2002 as a function of N rates at Prairie, MS.

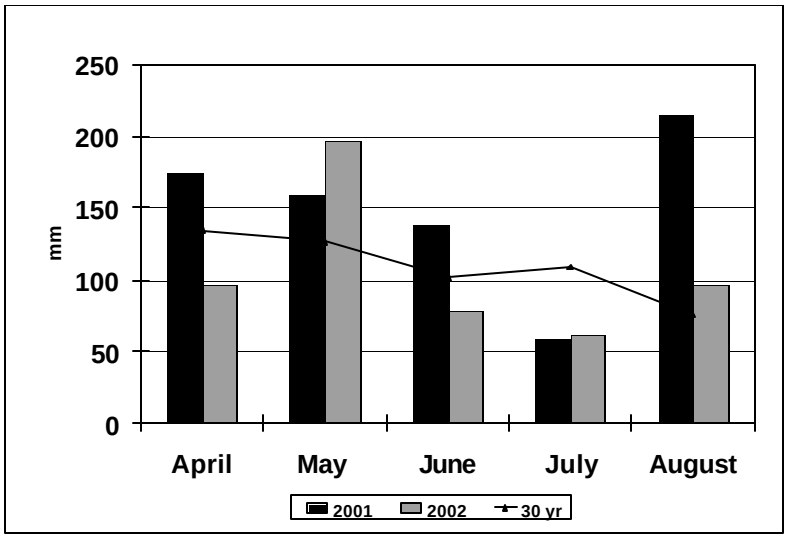


Fig. 1b. Monthly rainfall totals in 2001 and 2002 during the growing season and the 30 year monthly average at Prairie, MS.

Table 3. Percent N content and CP percentages of accession 9062680 by harvest date and N rates in 2001 and 2002 at Prairie, MS.

N Rate (kg/ha^{-1})	2001			2002		
	1st	2nd	3rd	1st	2nd	3rd
	----------%----------					
0	1.1 (6.9)[1]	.90 (5.6)	1.2 (7.5)	1.1 (7.0)	.91 (5.7)	.96 (6.0)
45	1.3 (8.1)	.77 (4.8)	1.0 (6.3)	1.4 (8.9)	1.1 (7.0)	1.3 (8.1)
90	1.7 (10.6)	.87 (5.3)	1.3 (8.1)	1.4 (8.9)	.92 (5.8)	1.1 (6.9)
134	1.6 (10.0)	1.1 (6.9)	1.2 (7.5)	1.6 (10.0)	1.3 (8.1)	1.4 (8.8)
179	1.7 (10.6)	1.1 (6.9)	1.4 (8.8)	1.6 (10.0)	1.4 (8.8)	1.1 (7.0)
N Linear (P<.05)	.05	.05	NS[2]	.05	.05	NS

1 = Protein concentration are listed in parenthesis. 2 = Not significant

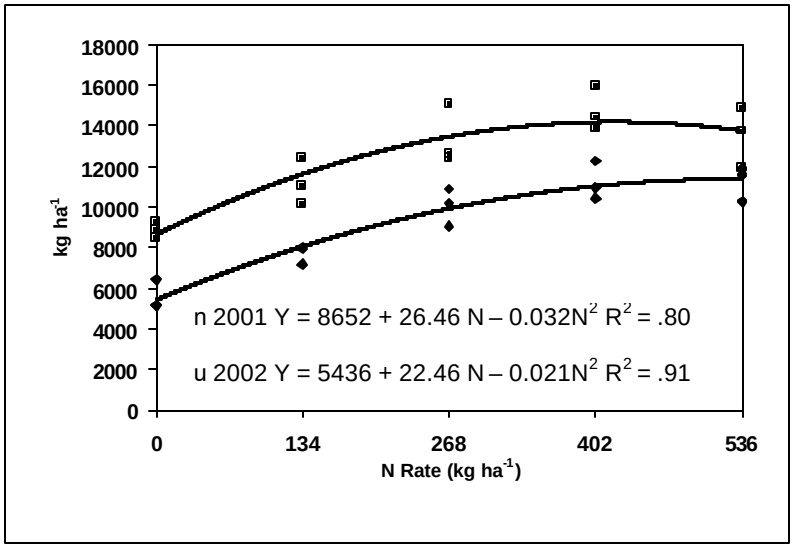


Fig. 2a. Season total dry matter yield for accession 9062680 in 2001 and 2002 as a function of N rates at Coffeeville, MS.

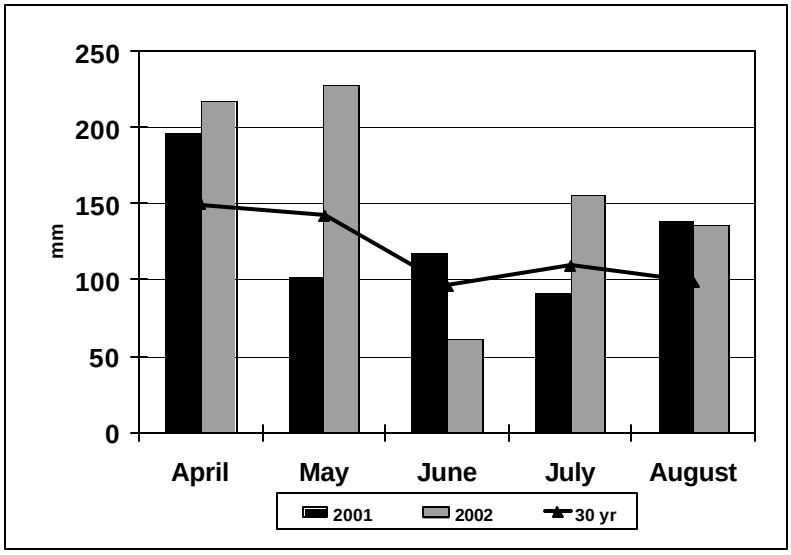


Fig. 2b. Monthly rainfall totals in 2001 and 2002 during the growing season and the 30 year monthly average at Coffeeville, MS.

Table 4. Percent N content and CP percentages of accession 9062680 by harvest date and N rates in 2001 and 2002 at Coffeeville, MS.

N Rate (kg/ha^{-1})	2001			2002		
	1st	2nd	3rd	1st	2nd	3rd
	----------%----------					
0	1.2 (7.5)[1]	1.1 (6.9)	1.1 (6.9)	1.9 (11.9)	.79 (4.9)	1.2 (7.5)
45	1.2 (7.5)	1.4 (8.8)	1.2 (7.5)	2.0 (12.5)	1.1 (6.9)	1.3 (8.1)
90	1.3 (8.1)	1.4 (8.8)	1.5 (9.4)	1.9 (11.9)	1.0 (6.2)	1.6 (10.0)
134	1.3 (8.1)	1.3 (8.1)	1.6 (10.0)	2.1 (13.1)	1.4 (8.8)	2.1 (13.1)
179	1.3 (8.1)	1.5 (9.4)	1.7 (10.6)	2.1 (13.1)	1.5 (9.4)	2.3 (14.4)
N Linear (P<.05)	NS[2]	NS	.05	NS	.05	.05

1 = Protein concentration are listed in parenthesis. 2 = Not significant

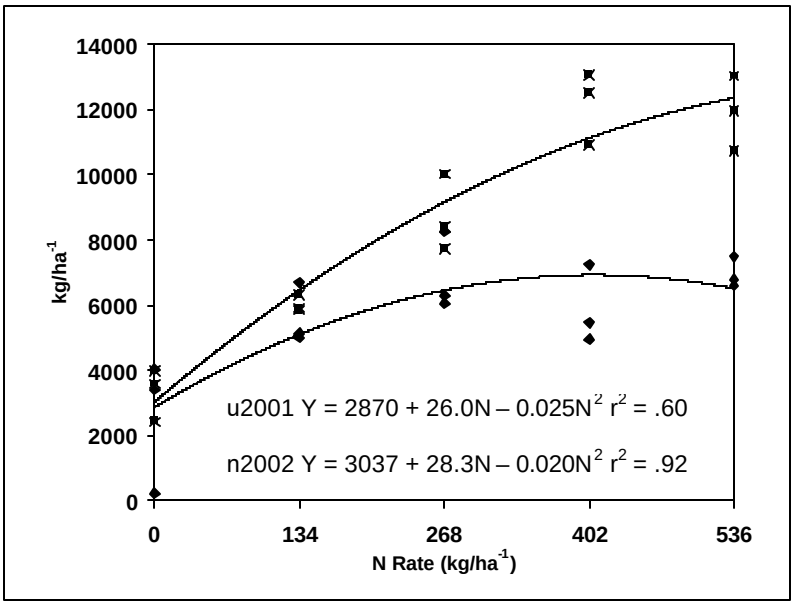


Fig. 3a. Season total dry matter yield for accession 9062680 in 2001 and 2002 as a function of N rates at Starkville MS.

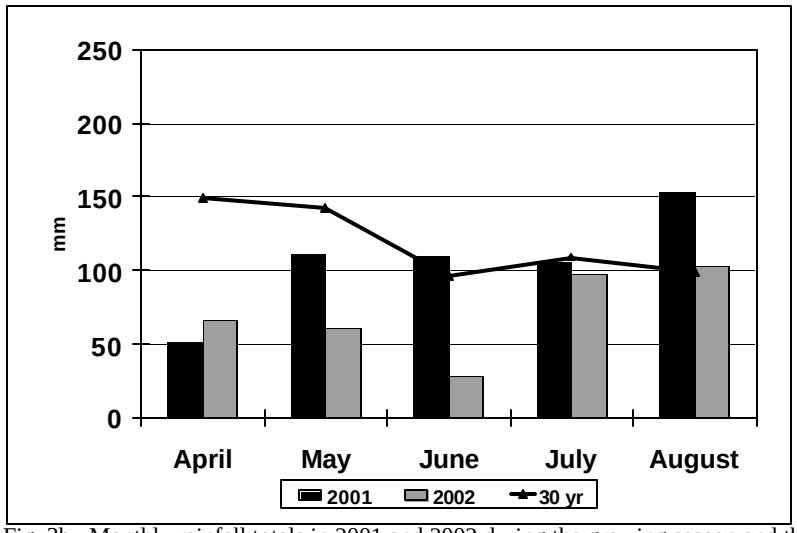


Fig. 3b. Monthly rainfall totals in 2001 and 2002 during the growing season and the 30 year monthly average at Starkville, MS.

Table 5. Percent N content and CP percentages of accession 9062680 by harvest date and N rates in 2001 and 2002 at Starkville, MS.

N Rate (kg/ha^{-1})	2001			2002		
	1st	2nd	3rd	1st	2nd	3rd
	----------% ----------					
0	1.8 (11.4)[1]	1.9 (12.1)	1.3 (8.3)	-----[2]	-----	-----
45	1.9 (11.9)	1.9 (11.7)	1.6 (10.1)	-----	-----	-----
90	1.7 (10.4)	2.1 (13.0)	1.7 (10.5)	-----	-----	-----
134	1.8 (11.5)	2.3 (14.3)	2.2 (14.0)	-----	-----	-----
179	2.0 (12.4)	2.5 (15.6)	2.1 (13.3)	-----	-----	-----
N Linear (P<.05)	NS[3]	NS	.05			

1 = crude protein percentage is in parenthesis. 2 = 2002 protein analysis not available at the time this report was written. 3 = Not significant.

N Uptake

Table 6. N uptake by harvest date and total of 9062680 eastern gamagrass as influenced by N rate in 2001 at Prairie, MS.

	N Uptake[2/]			
	Harvest Date			
N Rate(lb/acre)	05/15	06/28	08/15	Total
	----------lb/acre----------			
0	9	9	9	27
120	16	17	12	44
240	20	33	24	77
360	31	62	39	132
480	40	67	44	151
Mean	23	37	26	86
LSD (0.05)[1/]	6	15	11	27

[1] Least significant difference at P<0.05. [2] lb N Uptake = (yield x %N /100)

Table 7. N uptake by harvest date and total of 9062680 eastern gamagrass as influenced by N rate in 2002 at Coffeeville, MS.

	N Uptake[3/]			
	Harvest Date			
N Rate (lb/acre)	05/17	07/10	08/23	Total
	----------lb/acre----------			
0	48	14	8	69
120	53	29	20	101
240	64	34	35	133
360	80	55	49	184
480	85	57	49	191
Mean	66	38	32	136
LSD (0.05)[1/]	26	18	4	40

[1] Least significant difference at P<0.05. [2] Not significantly different.
[3] lb N Uptake = (yield x %N /100)

Yield increase, N recovery and use efficiency

Table 8. Maximum dry matter yield increase, apparent fertilizer N recovery and N-use efficiency of eastern gamagrass fertilized with five rates of N at Prairie, MS in 2002.

N Rate (lb/acre)	Maximum DM Yield Increase over 0 N	AFNR[1/]
	lb/acre	%
120	1945	14
240	4470	21
360	7341	29
480	9496	26

[1/] Apparent fertilizer N recovery = [(N uptake $_f$ – N uptake $_c$)/fertilizer N applied] x 100 where F = fertilized plants and C = unfertilized control.
[2/] [(forage yield $_f$ – forage yield $_c$)/fertilize N applied) where F = fertilized plants and C = unfertilized control.

Table 9. Maximum dry matter yield increase, and apparent fertilizer N recovery of 9062680 eastern gamagrass fertilized with five rates of N at Coffeeville, MS in 2002.

N Rate (lb/acre)	Maximum DM Yield Increase over 0 N	AFNR[1/]
	lb/acre	%
120	1903	27
240	3979	27
360	5035	32
480	5068	25

[1/] Apparent fertilizer N recovery = [(N uptake $_f$ – N uptake $_c$)/fertilizer N applied] x 100 where F = fertilized plants and C = unfertilized control.

Summary

Accession 680 eastern gamagrass was responsive to increasing rates of N as measured by yield and CP percentage at Prairie, Coffeeville and Starkville. Yields increased linearly at Prairie with increased N rates suggesting that more N may be needed before a peak N rate can be reached (Fig. 1a). Yield response at Coffeeville and Starkville increased curvilinearly with increasing rates of N (Fig. 2a, 3a). At Coffeeville, N rate at maximum yield in 2001 and 2002 was 419 and 530 kg ha^{-1}. These N rates produced maximum yields of 11 123 and 13 797 kg ha^{-1}. At Starkville, N rate at maximum yield was 409 to 694 kg ha^{-1} in 2001 and 2002. These N rates produced peak yields of 6935 and 12 876 kg ha^{-1}. Nitrogen rate at maximum yield in 2002 was 23 percent higher than the highest level of N applied at Starkville (536 kg ha^{-1}), suggesting that 680 may respond to higher rates of N in a normal rainfall year. Crude protein percentages did not seem to be effected by growth stage of maturity at harvest. Crude protein percentages of 680

generally increased with increased rates of N (Table 3, 4, 5). Crude protein percentages of 680 fertilized with 45 or 90 kg ha^{-1} N after each harvest would meet the protein requirements for non lactating beef cattle. Nitrogen removal increased with increased rates of N and was higher at Coffeeville than Prairie (Table 6, 7). Soil type and rainfall influenced these results. Nitrogen recovery generally increased with increased N (Table 8, 9). Yield efficiency varied between N rates and years, and was greatly affected by the shape of the response curve (Table 2). Additional yield data may be needed before making N recommendations for 680.

Title: Increase Uniformity of Seed Ripening in Eastern Gamagrass Using Ethephon
Study No: MSPMC-T-0017-PA
Study Leader: Janet Grabowski
Duration: 2000-2002

Introduction

Indeterminate flowering of eastern gamagrass [*Tripsacum dactyloides* (L.) L.] results in combine seed harvests containing a mixture of immature fruit structures that do not contain a caryopsis and mature ones that do. It is difficult to separate filled fruits from unfilled ones using normal seed cleaning techniques. Ethephon is an ethylene-generating compound that can be used to promote ripening and increase harvest uniformity. Prep is the formulation of ethephon generally used on cotton (*Gossypium hirsutum* L.) and is therefore the chemical most readily available for local purchase. A preliminary test indicated spraying with Prep may improve uniformity of seed ripening of eastern gamagrass. The objective of this study is to determine if applications of Prep to eastern gamagrass (accession 9062680) inflorescences can improve uniformity of seed ripening.

2002 Data Collected

All phases of this study had been completed by 2002 except seed germination testing of seeds harvested in 2001. Seeds were stratified on January 9 and the seed flats were put in the germinator on March 5. Germination counts were conducted every 7 days for 35 days.

Table 1. Seed germination percentages for eastern gamagrass accession 9062680 treated with ethephon.

Treatment	Germination	
	2000	2001
	----------%----------	
Control	19	9
Ethephon	10	10
LSD (0.05)	NS[1]	NS

[1] Values are not significantly different at P<0.05.

Summary

Despite the low germination percentages ethephon did not appear to have an adverse effect on germination of seeds harvested from treated plants. However, the early senescence of seeds from treated plants indicated that this treatment was not commercially viable. This study will be summarized in a research report in the near future.

Title: Field Evaluation Planting of 9062680, 'Jackson' and 'Pete' Eastern Gamagrass
Study No: MSPMC-F-0018-PA
Study Leader: Joel Douglas
Cooperators Roscoe Ivy, MAFES Prairie Research Station, Bisoondat Macoon, Brown Loam Experiment Station
Duration: 2000 - 2003

Introduction

This project will compare the yield performance of 9062680 ('Highlander') to Jackson, and Pete eastern gamagrass at Coffeeville, Prairie and Raymond, MS. This data will also be used to support the release of Highlander as a cultivar of eastern gamagrass.

2002 Data Collected

Yields of Highlander, Pete and Jackson eastern gamagrass were compared at Coffeeville, Prairie, and Raymond, Mississippi in 2001 and 2002 (Table 1). Dry matter yields of Highlander and Jackson was comparable at all locations except Coffeeville, where Jackson once again succumbed to same disease encountered in 1997-98 at the PMC (*Rhizoctonia* and *Pythium*). Yields of Pete were lower at all location except at Raymond; however, the difference was only significant in 2001 at the Prairie location.

Table 1. 2001 and 2002 dry matter yield of Highlander and Jackson eastern gamagrass at Coffeeville, Prairie, and Raymond, Mississippi.

	Coffeeville		Prairie		Raymond	
	2001	2002[†]	2001	2002	2001	2002
	----------kg ha^{-1}----------					
Highlander	13 801	8316	16 165	14 371	----[§]	21 600
Pete	10 972	7409	11 581	12 454	----	26 280
Jackson	12 415	----[‡]	18 822	16 199	----	18 130
LSD (0.05)	NS		2971	NS		NS

[†] Two harvests were made this year as opposed to three harvests in 2001.
[‡] No plants survived after 2001. Plants showed signs of *Pythium* spp. and *Rhizoctonia* spp damage.
[§] Not harvested in 2001.

Title: Seed Production of 9062680 Eastern Gamagrass as Influenced by N Fertility

Study Number: MSPMC-T-0019-PA

Study Leader: J.L. Douglas and Janet Grabowski

Cooperator: D. Lang, Agronomist and Paul Meints, Agronomist, Department of Plant and Soil Science, Mississippi State University; R.L. Ivy, Agronomist, Mississippi Agricultural and Forestry Experiment Station (MAFES), Prairie, MS

Duration: 2001-2003

Introduction

Low seed yield is an obstacle that limits seed production acreage of eastern gamagrass [*Tripsacum dactyloides* (L.)L.]. Average seed yield range from 64 to 293 bulk lb/acre at PMCs in Texas and Kansas. Fertilization with nitrogen has shown to be an effective method for stimulating growth of fertile tillers and increasing seed yields and quality of agronomic grass crops. A cooperative study began with Mississippi State University in 2001 to determine the effect of N fertility on seed production and quality of 9062680 eastern gamagrass. The study was conducted at the PMC (Coffeeville), Prairie (Experiment Station) and Starkville (MSU South Farm). Nitrogen rates of 0, 100, 200 lb/acre were applied in single applications in the spring when plants reached 8 inches (mid-April) and N rates of 100 and 200 lb/acre were split into two equal rates of 50 and 100 lb/acre. The first split application rate was applied when the plants reached 8 inches (mid-April) and the second application was applied when 50 percent of the reproductive stems were in the boot stage (mid-May).

2002 Data Collected

Table 1. Percent fertile tillers, average number of tillers and inflorescences per plant and seed yield of eastern gamagrass by N rate at Prairie, MS, 2002.

N Rate (lb/ac)	FT [1]	TT[2]	PI[3]	AI[4]
	-%/plant-	----Avg/plant----		
0	20	71	8	30
100[6]	24	134	12	44
100 (50)[7]	18	109	12	45
200[8]	24	125	13	51
200 (100)[9]	27	112	13	48
Mean	23	110	12	44
LSD (0.05)[10]	NS[11]	43	NS	NS

[1] Percent fertile tillers.
[2] Average number of total tillers (both vegetative and fertile).
[3] Primary inflorescence.
[4] Axillary inflorescence.
[5] Seed yield (lb/ac). Yield was calculated from the heaviest seed fraction harvested from a 6 x 9 ft plot.
[6] Single application of 100 applied April 18.
[7] 100 lb split. First 50 lb/ac applied April 18; second 50 lb/ac applied 12 May 2002.
[8] Single application of 200 applied April 18.
[9] 200 lb split. First 100 lb/ac applied April 18; second 100 lb/ac applied 12 May 2002.
[10] Least significant difference at $P<0.05$.

[11] Not significantly different.

Table 2. Percent fertile tillers, average number of tillers and inflorescences per plant and seed yield of eastern gamagrass by N rate at Coffeeville, MS, 2002.

N Rate (lb/ac)	FT [1]	TT[2]	PI[3]	AI[4]
	-%/plant-	----Avg/plant----		
0	38	47	16	48
100[6]	39	61	21	62
100 (50)[7]	48	56	23	70
200[8]	43	62	22	67
200 (100)[9]	42	54	20	59
Mean	42	56	20	61
LSD (0.05)[10]	NS[11]	12	NS	NS

[1] Percent fertile tillers.
[2] Average number of total tillers (both vegetative and fertile).
[3] Primary inflorescence.
[4] Axillary inflorescence.
[5] Seed yield (lb/ac). Yield was calculated from the heaviest seed fraction harvested from a 6 x 9 ft plot.
[6] Single application of 100 applied April 17.
[7] 100 lb split. First 50 lb/ac applied April 17; second 50 lb/ac applied 10 May 2002.
[8] Single application of 200 applied April 17.
[9] 200 lb split. First 100 lb/ac applied April 17; second 100 lb/ac applied 10 May 2002.
[10] Least significant difference at P<0.05.
[11] Not significantly different.

Table 3. Seed yield, percent fill and caryopsis weight of 9062680 eastern gamagrass fertilized with five N rates at Prairie, MS, 2002.

N Rate	Yield[1] (lb/acre)	Percent Germ[3]	Percent Seed Fill[2]	Caryopsis Wt[4] (g)
0	131	65	57	.65
100	159	69	86	.58
100 (50)[5]	157	65	57	.57
200	227	56	57	.62
200 (100)[6]	163	58	80	.61
Mean	167	63	67	.60
LSD (0.05)[7]	61	NS	18	NS

[1] Seed yield. Plots harvested July 18, 2001 from 6 x 9 ft plots. Yield was calculated from the heaviest seed fraction determined by an air fractionating aspirator.
[2] Percent seed fill was determine by examining 5% of the heaviest seed fraction for the presence or absence of a filled caryopsis
[3] % germination (3 reps of 100 seed in the greenhouse)
[4] Caryopsis weight. Average weight of 10 caryopses.
[5] 100 lb split. First 50 lb/ac applied April 16; second 50 lb/ac applied May 16, 2002.
[6] 200 lb split. First 100 lb/ac applied April 16; second 100 lb/ac applied May 16, 2002.
[7] Least significant difference at P<0.05.
[8] Not significantly different.

Table 4. Seed yield, percent fill and caryopsis weight of9062680 eastern gamagrass fertilized with five N rates at Coffeeville, MS, 2002.

N Rate	Yield[1] (lb/acre)	Percent Germ[3]	Percent Seed Fill[2]	Caryopsis Wt[4] (g)
0	182	60	71	.66
100	61	34	49	.61
100 (50)[5]	104	60	74	.60
200	101	54	80	.67
200 (100)[6]	94	49	54	.56
Mean	108	51	65	.62
LSD (0.05)[7]	NS	18	NS	NS

[1] Seed yield. Plots harvested July 18, 2001 from 6 x 9 ft plots. Yield was calculated from the heaviest seed fraction determined by an air fractionating aspirator.
[2] Percent seed fill was determine by examining 5% of the heaviest seed fraction for the presence or absence of a filled caryopsis
[3] % germination (3 reps of 100 seed in the greenhouse)
[4] Caryopsis weight. Average weight of 10 caryopses.
[5]100 lb split. First 50 lb/ac applied April 16; second 50 lb/ac applied May 16, 2002.
[6]200 lb split. First 100 lb/ac applied April 16; second 100 lb/ac applied May 16, 2002
[7] Least significant difference at P<0.05.

Summary

Prairie

Percent fertile tillers and average number of total tillers and inflorescences (primary and axillary) as influenced by N rates is presented in Table 1. There was a slight trend in the increase of fertile tillers, total tillers and inflorescences with N but was only significant in the total number of tillers. Average number of primary inflorescences increased as N rates increased. Applying N in single or split applications did not affect the production of primary inflorescences. Number of axillary inflorescences increased as N rates increased. Increase in the number of axillary inflorescences from applied N was over 60 percent. Nitrogen fertilizer increased seed yield 20 to over 50 percent compared to 0 lb/ac (Table 3). A single application of N at 200 lb/ac significantly increased seed yields over all other N treatments but would not be economically feasible. Nitrogen had limited to no affect on percent germination and caryopsis weight (Table 3). Percent fill was highest at 100 lb/acre (single) and 200 lb/acre split application rates.

Coffeeville

Percent fertile tillers and average number of total tillers and inflorescences (primary and axillary) as influenced by N rates is presented in Table 2. Nitrogen increased the percentage of fertile tillers and total number of tillers as well as primary and axillary inflorescences, but only significantly increased the total number of tillers. Heavy rainfall prior to harvest caused many of the seed to shatter, reducing the amount of the yield. Nitrogen had limited to no effect seed yields, percent germination, percent seed fill and caryopsis weight (Table 4). The high seed yield in the 0 lb/acre may be due to a higher uniformity of ripening.

Title: Comparison of Silage Quality of 9062680 Eastern Gamagrass
Study No: MSPMC-T-0020-PA
Study Leader: Joel Douglas
Cooperators: Billy Johnson and Joey Murphey, MAFES, Coastal Plain Experiment Station, Newton, MS; Joe Johnson and Randy Saunders, MAFES, Holly Springs, MS
Duration: 2001 - 2003

Introduction

Corn (*Zea mays* L.) is recognized as the best agronomic crop for making high-energy silage (Ball et al., 1991). One of the disadvantages of using corn for silage is annual establishment costs and considerable soil loss on marginal or sloping cropland. A more sustainable silage production system that would lessen soil erosion and reduce establishment costs is to utilize perennial grass crops as opposed to annual crops.

Eastern gamagrass [*Tripsacum dactyloides* (L.) L.], a native warm season perennial grass, has shown to produce high yields with favorable quality when timely harvested and has yielded excellent animal performance when properly grazed.

Previous research in Missouri has shown eastern gamagrass has potential for use as a perennial silage crop. However, additional work is needed in the Southeast to determine the suitability of using accession 9062680 as a perennial silage crop.

2002 Data Collected

Table 1. 2002 silage yield and quality estimates of Highlander eastern gamagrass and corn varieties at Holly Springs and Newton, Mississippi.

Variety	Yield[†]	CP[‡]	ADF[§]	NDF[¶]	IVTD[#]
	----Mg ha^{-1}----	----------%----------			
			Holly Springs		
Highlander[††]	42.6	10	42	74	54
Pioneer 32K61	35.9	8	32	54	77
			Newton		
Highlander[‡‡]	61.6	10	36	68	64
McNair 508	26.5	9	31	53	80
Northrup King N91-R9	31.4	9	28	64	77

[†] Silage yields based on 35% dry matter; [‡] crude protein; [§] acid detergent fiber; [¶] neutral detergent fiber; [#] *in vitro* true digestibility; [††] forage quality estimates are the average of the 19 June and 5 August harvests; [‡‡] forage quality estimates are from 12 July harvest only (additional harvests 21 May and 2 October).

Summary

Total silage yields of Highlander exceeded those of corn at both locations. Forage quality estimates of crude protein, acid detergent fiber, and neutral detergent fiber were similar for Highlander and the corn varieties but digestibility was higher for corn.

Title: Yield and Persistence of Four Experimental Lines, 'Pete', 'Jackson' and 9062680 Eastern Gamagrass
Study No: MSPMC-P-0021-PA
Study Leader: J.L. Douglas
Cooperator: Tim Springer, Agronomist, ARS, Woodward, OK
Duration: 2001-2003

Introduction

The PMC is working cooperatively with Agriculture Research Service (ARS) Southern Plains Range Research Station, Woodward, Oklahoma to evaluate yield and persistence of four experimental lines of eastern gamagrass [*Tripsacum dactyloides* (L.) L.]. The experimental lines are FGT-I, FT-II, FT-IV and FT 94-8. Pete, Jackson' and 9062680 were included in the trial for comparison. Nitrogen fertilizer is applied at 240 lb/acre in equal split applications beginning in April and after each 45-day harvest except the last one. The PMC is collecting forage production and persistence data while the ARS determines forage quality estimates.

2002 Data Collected

Table 1. Forage yield of eastern gamagrass cultivars and four experimental lines from ARS Southern Plains Range Research Station, Woodward, OK, at Coffeeville, MS 2002.

	DM Yield		
	Harvest Date		
Entry	05/16	07/02	Total
	----------lb/acre----------		
9062680	3959	2920	6879
Pete	3411	2591	6002
Jackson	-----[1/]	-----	-----
FGT-I	2335	2112	4447
FT-II	2562	*	2562
FT-IV	2556	*	2556
FT-94-8	619	*	619
Mean	2574	2541	3844

1/ - Dead; * - did not recover after the 16 May harvest

Summary

Several accessions were slow to recover after the last harvest in 2001. Plots were burned 9 March and several accessions were slow recovering. Jackson did not survive and several accessions did not recover after the 16 May harvest and died before the end of the growing season. Samples were collected from the dead plants and sent to the plant diagnostic lab at Oklahoma State University along with healthy plant samples for comparison. Laboratory examination did not yield a positive identification of the cause of death. Additional work is planned by ARS, Woodward, OK to determine the cause of death. Accession 9062680 ('Highlander') did not yield has high as previous years but was the highest yield accession in 2002.

Title: Response of Eastern Gamagrass Accession 9062680 Seeds to Various Stratification Periods
Study No: MSPMC-T-0222-PA
Study Leader: Janet Grabowski
Duration: 2002-2004

Introduction

Eastern gamagrass [*Tripsacum dactyloides* (L.) L.] seeds require a cool, moist stratification period to overcome dormancy. Standard commercial practice is for growers to stratify eastern gamagrass seeds for 6 to 8 weeks at 5-10°C prior to sale. However, all lots of eastern gamagrass seed do no respond similarly to this stratification treatment. Also, scheduling problems may require growers to hold seed in stratification for a longer period of time before it can be shipped. Accession 9062680 has been extensively tested and shown to be a superior eastern gamagrass for much of the Southeast and the Jamie L. Whitten PMC will be releasing it as 'Highlander' in 2003. Its response to stratification has not been determined. Therefore, the objectives of this study were to evaluate germination of seed from stratification periods ranging of 2, 4, 6, 8, and 10 weeks and to determine the response extended stratification periods ranging of 2, 4, 6, 8, 10 and 12 months.

2002 Data Collected

Seed used for testing was harvested from production fields at the PMC in 2001. Stratification of seeds for the stratification period phase of the study was staggered to allow planting of all treatments in the greenhouse at the same time. Seeds were soaked in tap water for 24 hours, drained, and placed in the cooler. Stratification of the 10 week treatment began on February 27 and every two weeks subsequent treatments were also stratified. Seeds were planted in flats in a commercial potting medium and put in the greenhouse on May 8. The extended stratification treatments were tested in the germinator, so all treatments were stratified on March 6 and treatments were planted every two months as scheduled. Germination counts were made every 7 days for 35 days and then the potting medium was dried to facilitate recovery of seeds that did not germinate to determine their seed quality. Recovered seeds were soaked in water over night and then opened and the caryopsis (if present) was examined. This allowed adjustment of the germination percentages in each treatment based on the number of seeds that had the potential to germinate.

Table 1. Germination of 9062680 eastern gamagrass seeds exposed to extended stratification periods tested in the germinator.

Stratification period[1]	Germination	Germinable
2 month	23	33
4 month	21	38
6 month	25	43
8 month	17	NA[2]

[1] Stratification periods 10 month and 12 month were not planted until 2003.
[2] Seed fill has not been determined at this time.

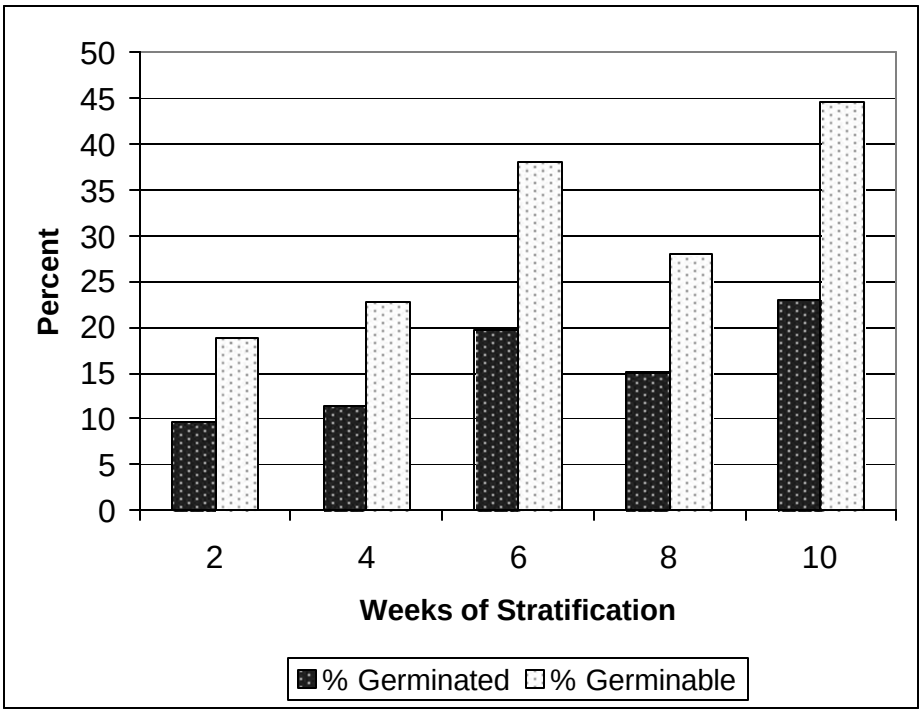


Fig. 1. Germination and germinable percentages for 9062680 seeds stratified for 2-10 weeks.

Summary

Germination was highest for the 10 week stratification period (Fig.1). It appears that stratification for 6 weeks or longer is best for this seed lot. The extended stratification phase of the study is still in progress, but it does not appear that there are adverse effects from storing 9062680 seeds for longer than the recommended 6 to 8 weeks (Table 1). This study will be repeated using seed harvested in 2002 to determine if stratification response is stable for different lots of 9062680 seeds. We neglected to include a control treatment at 0 weeks and 0 months stratification in the study; this will be remedied in the next planting.

Critical Area Study Summaries

Title: Evaluation of Switchcane Propagation Methods
Study Number: MSPMC-T-0105-CR
Study Leader: J.L. Douglas
Cooperator: Tim Oakes, SCT, NRCS Tribal Liaison
Seth Dabney, Agronomist, ARS, Oxford, MS
Duration: 2001-2003

Introduction

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.

2002 Data Collected

Switchcane culms were dug from plants growing in the field and planted in the greenhouse on March 15. Field soil was not washed off of the roots and rhizomes before planting. Propagation mediums tested were 100% perlite, 50% perlite/50% peat moss (v/v), and Pro-Mix BX commercial potting medium. Ten propagules were planted in each medium. Regeneration was evaluated weekly thoughout the month of April and on June 7. Subjective vigor ratings and culm numbers were evaluated surviving plants on December 6 (Table 1).

Table 1. Evaluation data for switchcane grown in three propagation mediums in the greenhouse.

Medium	# Regenerating[1]	Vigor[2]	# Culms
Perlite	9	4	3
Perlite/Peat	9	4	2
Pro-Mix BX	9	4	2
LSD (0.05)	NS[3]	NS	NS

[1] Number surviving of the 10 plants originally planted.
[2] Vigor ratings used were 1 = excellent; 3 = good; 5 = fair; 7 = poor; 9 = very poor; and 10 = none

Summary

There were no differences between number of culms regenerating, vigor, or number of culms for any of the propagation mediums (Table 1). Although March is somewhat later than the recommended division date for switchcane, only one plant in each medium did not regenerate new growth after planting. Lack of regeneration was probably due more to the size and vigor of the individual planting propagule than to the propagation medium used. The growing medium was kept moist during the establishment phase, but the containers were not placed under mist as would be required for cuttings. The commercial potting medium would be the easiest and most

economical propagation medium to use and would be probably hold the root ball together better when transplanting.

Title: Evaluation of Virginia Wildrye Selections and Cultivar
Study No: MSPMC-P-0107-CR
Study Leader: Janet Grabowski
Duration: 2001-2003

Introduction

Virginia wildrye (*Elymus virginicus* L.) is a native cool-season grass often found in the Southeast growing in low woods, along ditches, and in waste places. Several PMCs have studied it for use as an early-season forage, however, it has not been found to produce enough plant matter for this use. Some desirable attributes that it does possess are shade tolerance and little or no seed dormancy that results in fairly high germination rates compared to many native grasses. This indicates that it could be a useful component in revegetation mixtures, replacing some or all of the introduced species currently used for immediate stabilization, and it could act as a nurse crop for other native species in the mix. 'O'Ma'Ha', originating from the southwestern US, is the only commercially available cultivar of this species. This study will compare this cultivar to several accessions of Virginia wildrye, from this and other PMCs, to determine if additional releases should be made for the Southeast.

2002 Data Collected

Plants were established in the plots in 2001 and evaluation continued during 2002. Plots were fertilized with 50 lb/acre N on April 22 using ammonium nitrate. Plots were sprayed atrazine on March 9 and were hand-weeded later in the growing season as needed. Plant survival and vigor were evaluated on March 28 and June 27.

Table 1 Plant evaluation data for Virginia wildrye accessions at Coffeeville, Mississippi.

Selection	Origin	03/28		06/27	
		# Plants	Vigor[1]	# Plants	Vigor
O'Ma'Ha	Stock Seed	9	2	9	1
Local	MSPMC	8	4	8	5
Natchez Trace	S. Miss.	6	2	6	6
436971	ETPMC	8	2	8	2
45763	STPMC	8	4	8	7
45845	STPMC	8	5	7	6
LSD (P<0.05)		NS[2]	2	NS	2

[1] Vigor ratings used were 1 = excellent; 3 = good; 5 = fair; 7 = poor; and 9 = very poor.
[2] Values not significantly different at P<0.05.

Summary

In the spring, there was profuse seedling establishment in the plots and alleyways. Survival of the field-dug Natchez Trace plants was not as good as for the other accessions planted using containerized stock (Table 1). Vigor ratings of both south Texas accessions were very poor because the plants were stunted and weak. These selections appear to be poorly suited for the climate and soils at Coffeeville. Accession 436971, the Natchez Trace, and the local accession collected on the PMC were all larger plants than O'Ma'Ha. The genetic makeup of these plants is not known; they might be larger ecotypes or they could be the result of hybridization with the larger species, Canada wildrye (*Elymus canadensis* L.). O'Ma'Ha plants were very uniform in appearance, whereas, there was more diversity in the two Mississippi accessions, which were not from a single line selection. O'Ma'Ha did well at the PMC, but more plantings would be needed

to verify its range of adaptation in Mississippi. There may be justification for releasing one of the larger selections for uses where is larger plant is desired. Evaluations will continue through 2003.

Title: Agroforestry Site Preparation Demonstration
Study No: MSPMC-T-0118-CR
Study Leader: Janet Grabowski
Cooperators: Lynn Ellison, NRCS Area I Forester, Tupelo, MS
Duration: 2001 - 2003

Introduction

Forestry is ranked as one of the top revenue producing crops in Mississippi, which means that many acres of trees are planted in Mississippi. Additional interest has been spurred by the Conservation Reserve Program that offers financial incentives to encourage tree planting on marginal cropland.

The success or failure of a new tree planting is influenced primarily by the ability of the root system to begin quickly taking up water and nutrients. Perennial weed competition from both grass and woody species can effect survival, vigor, and production of young seedlings. This demonstration will provide hard data on how various site preparation techniques commonly used in Mississippi affect survival and growth of loblolly pine (*Pinus taeda* L.) seedlings.

2002 Data Collected

Site Preparation Treatments:
1. Control – No activity
2. Mowing – (07/10)
3. Roundup – 4 qt/acre (9/19/01)
4. Roundup – 4 qt/acre (9/19/01) + Oust – 3 oz/acre no surfactant (03/5)
5. Roundup – 4 qt/acre (9/19/01) + Oust – 3 oz/acre no surfactant (03/5) + Arsenal 4 oz/acre (04/02)
6. Arsenal 4 oz/acre (04/02) + 2 oz/acre Oust no surfactant (04/02)
7. Arsenal 4 oz/acre (04/02) + 2 oz/acre Oust no surfactant (04/02) + Transline 4 oz (04/02)

The planting area was mowed to height of 3 inches on September 4, 2001. Herbicide treatments were sprayed in a 5 to 6 foot band over the planting row. The mowing treatment consisted of one pass of a 3-foot wide bushhog on either side of the planting row. Superior loblolly pine seedlings received from International Paper were planted on January 22. An initial basal stem diameter measurement was taken on March 27. Basal stem diameter and plant height measurements and survival were evaluated on January 9, 2003. Weed cover and species present in the treatment row were evaluated on July 1.

Table 1. Stem basal diameter, height and % weed stand of loblolly pine seedlings under different site preparation treatments at Coffeeville, Mississippi.

Treatment	Diameter (mm)	Height (cm)	% Weed Stand
Control	6.6	52	98
Mowing	8.1	61	100
Roundup	9.9	65	93
Roundup + Oust	10.5	64	55
Roundup + Oust + Arsenal	11.1	74	49
Arsenal + Oust	8.9	58	92
Arsenal + Oust + Transline	8.2	54	95
LSD (0.05)	2.1	12	18

Summary

The Roundup + Oust and the Roundup + Oust + Arsenal treatments provided the best weed control (Table 1). Roundup alone does not provide adequate weed control during the first growing season. Weed stands in the Arsenal + Oust and the Arsenal + Oust + Transline treatments were not much lower than in the control plots. The majority of the weeds present on this site were grasses and broadleaves. If competing woody species had been present, weed control ratings for these treatments would have been much higher than in this study. Basal diameters (1 mm = 0.04 inches) were measured below the lowest branch on the seedlings. Those same treatments that resulted in the lowest weed stands resulted in significantly improved basal diameters and plant heights. There was almost no tree mortality in any of the treatments. This is probably due to the fact that superior pine seedlings were used and they were planted carefully. Losses would be expected to be much higher on larger tracts that did not receive herbicide treatments, especially if lower quality seedlings were used.

Title: Evaluation of Little Bluestem Ecotypes for Reduced Seed Dormancy
Study No: MSPMC-P-0208-CR
Study Leader: J.L. Douglas
Cooperator: Brian Baldwin and Paul Meints, Mississippi State University
Duration: 2002-2006

Introduction

There are few cultivars of little bluestem 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 (*Panicum virgatum* L.), kleingrass (*Panicum coloratum* L.) and green needlegrass [*Nassella viridula* (Trin.) Barkworth].

2002 Data Collected

300 mother plants were selected from isolated areas on the PMC property and transplanted in four complete blocks (5 rows, 15 plants/row) in April 2002 (cycle 1). Seeds were collected from each individual plant in November, placed in paper bags and kept at room temperature until January.

Replicated germination tests will be conducted in January/February 2003 to identify seeds that germinate in 14 days without the traditional two week stratification period recommended by AOSCA. Seeds that germinate within 14 days will be removed from the petri dishes and grown in the greenhouse. "Elite" mother plants will be lifted from the original mother plant nursery and transplanted in an isolation block while 10 (ten) plus plants, from each elite mother plant that was planted in the greenhouse, will be transplanted in polycross in June 2003. Consequently, this block will serve as cycle 2 and recurrent selection used to advance the population.

Title: Selecting for Improved Seedling Establishment in Beaked Panicum
Study Number: MSPMC-P-0209-CR
Study Leader: 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 (*Panicum virgatum* L.)and these techniques may also be possible to develop beaked panicum sources with reduced dormancy.

2002 Data Collected

We began with 63 accessions, 57 that had been tested at the PMC in the initial evaluation in the 1980s, five from the East Texas PMC and one new collection of made in Carroll County, Mississippi. The new collection was not accessioned because selections will be made based on germination rather than the material being carried on as a single line. Seed of the accessions from the Mississippi PMC were planted in 601 cell packs using commercial seed germination medium and put in the germinator on December 27, 2001. On January 11, the containers were moved into the refrigerator for a stratification treatment and they were moved back into the germinator on January 25. The East Texas accessions were planted on January 28, moved into the refrigerator on February 11, and then put back in the germinator on February 25. Seedlings were initially transplanted into 806 cell packs and then into 4 inch pots before transplanting into the field on July 25. Seed was collected from the block in September and October.

Table 1. Beaked panicum seed sources that germinated and the number of seedlings transplanted into the field evaluation block at Coffeeville, Mississippi.

Accession	Origin	# Seedlings Transplanted
9002928 – '93 increase	Virginia via Quicksand PMC	106
9028510 – '90 increase	Wayne Co., MS	2
9067071	East Texas PMC	3
9067121	East Texas PMC	4
9067102	East Texas PMC	1
9067094	East Texas PMC	3
9067079	East Texas PMC	Died prior to planting
Collection	Carroll Co., MS	6

Summary

No beaked panicum seed germinated without stratification. After a 14-day stratification treatment, seed from eight sources germinated (Table 1). The reason for the poor germination of the Mississippi PMC seed was that the seed from the majority of the 57 initial evaluation accessions was old and had lost viability. Two accessions that had been selected as superior from the initial evaluation had seed lots from later increases that were still viable. Germination of the

East Texas PMC accessions was also not good because the seed appeared to be somewhat green. Germination testing and selection of early germinating seedlings will take place in 2003.

Title: Selecting for Improved Seedling Establishment in Purpletop
Study Number: MSPMC-P-0210-CR
Study Leader: 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 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 (*Panicum virgatum* L.). Recurrent selection techniques could also be used to develop sources of purpletop with reduced seed dormancy.

2002 Data Collected

We began with 41 accessions, 31 that had been tested at the PMC in the initial evaluation in the 1980s, one that was increased for the National Park Service planting along the Natchez Trace Parkway and twelve new collections from various locations within Mississippi. The new collections were not accessioned because selections will be made based on germination rather than the material being carried on as a single line. Seeds were planted in 601 cell packs using commercial seed germination medium and put in the germinator on January 11. On January 25, the containers were moved into the refrigerator for a stratification treatment. They were moved back into the germinator on February 8 and then into the greenhouse on February 25. Seedlings were initially transplanted into 806 cell packs and then into 4 inch pots before transplanting into the field on July 25. Seed was collected from in September and October.

Table 1. Purpletop seed sources that germinated and the number of seedlings transplanted into the field evaluation blocks at Coffeeville, Mississippi.

Accession	Origin	# Seedlings Transplanted
9028270 – '90 increase	Yell Co., AR	4
9041780 – '90 increase	KY-1930 from Quicksand PMC	43
9028355	Boone Co., AR	1
9028497	Nevada Co., AR	Died prior to planting
National Park Service – '96 inc.	Natchez Trace Parkway	8
Collection #1	Franklin Co., MS	98
Collection #2	Yalobusha Co., MS	7
Collection #3	Lincoln Co., MS	11
Collection #5	Carroll Co., MS	6
Collection #6	Carroll Co., MS	3
Collection #7	Carroll Co., MS	8
Collection #8	Carroll Co., MS	4
Collection #9	Pontotoc Co., MS	2
Collection #11	Grenada Co., MS	2
Collection #12	Carroll Co., MS	3

Summary

There was virtually no germination of seed from the initial evaluation seed packets. The exception was one seed that germinated for both accessions 9028355 and 9028497 (the 9028497 seedling died prior to transplanting into the field). Germination was better for the seed lots of 9028270 and 9041780, which were later increases, as well as for the National Park Service increase. The Collection # 1 plants flowered and set seed later than most of the other plants. Seeds from this block were kept separate from the plants of the other accessions, which were mainly in another planting block. Germination testing and selection of early germinating seedlings will take place in 2003.

Water Quality Study Summaries

Title: Effect of Land Applied Poultry Litter on Yield, N and P Content of Warm Season Grasses
Study No: MSPMC-T-0002-NU
Study Leader: Joel Douglas
Cooperators: Randy Saunders, North Mississippi Research Center, Holly Springs, MS
Joe Johnson, North Mississippi Research Center, Holly Springs, MS
Duration: 2000 - 2003

Introduction

Water quality impacts from land applied poultry litter are dependant on many variables: soil, rainfall, climate, plant species, shallow versus concentrated flow, application rate, waste characteristics, and many others. In an attempt to limit adverse environmental effects, the Mississippi began requiring all poultry facilities that generate dry litter or waste must obtain a permit. The NRCS is charged with supplying the technical support for these plans.

Application rates and required acreage are based on soil type and the nutrient removal capacity of the plants receiving the land applied poultry litter. Nutrient removal capacity is determined by percent nutrients in the plant tissue and by season total dry matter yield of each crop. The objective of this study is to evaluate the nutrient removal and yield potential of 9 warm season grass species receiving poultry litter as the fertilizer source.

2002 Data Collected

Table 1. Yield response of warm season grasses using poultry litter as a N source Coffeeville, MS 2002.

240 lb/acre	DM Yield			
	Harvest Date			
Entry	06/04	07/25	09/04	Total
	lb/acre			
Johnsongrass	1956	1179	984	4119
'Sumerall 007' bermudagrass	2088	1337	1296	4721
'Pensacola' bahiagrass	2203	2538	1054	5795
'Alamo' switchgrass	3011	3091	678	6779
'Highlander' eastern gamagrass	3924	2111	1082	7116
Mean	2636	2051	1019	5706
LSD (0.05)[1/]	1518	1082	602	1518

1 – least significant difference.

Table 2. Yield response of warm season grasses using poultry litter as a N source Coffeeville, MS 2002.

140 lb/acre	DM Yield			
	Harvest Date			
Entry	06/04	07/25	09/04	Total
	----------lb/acre----------			
Weeping lovegrass	3388	2128	332	5847
Caucasian bluestem	583	942	581	2106
Common bermudagrass	1754	749	770	3272
Dallisgrass	1504	[2/]	1611	3115
Mean	1807	1273	824	3585
LSD (0.05) [1/]	1538	775	338	1679

1 – least significant difference; 2 – plots not harvested.

Table 3. Yield response of warm season grasses using poultry litter as a N source Holly Springs, MS 2002.

240 lb/acre	DM Yield		
	Harvest Date		
Entry	07/02	08/23	Total
	------lb/acre------		
Johnsongrass	7005	6136	13 140
'Sumerall 007' bermudagrass	6350	5402	11 752
'Pensacola' bahiagrass	4063	4524	8586
'Alamo' switchgrass	9649	7956	17 604
'Highlander' eastern gamagrass	11040	5535	16 570
Mean	2636	5911	13 530
LSD (0.05) [1/]	3622	945	

1 – least significant difference.

Table 4. Yield response of warm season grasses using poultry litter as a N source, Holly Springs, MS 2002.

140 lb/acre	DM Yield		
	Harvest Date		
Entry	07/02	08/23	Total
	----------lb/acre---------		
Weeping lovegrass	7935	6092	14 028
Caucasian bluestem	7405	7912	15 317
Common bermudagrass	5435	4248	9683
Dallisgrass	6205	6112	12 318
Mean	6745	6091	12 836
LSD (0.05) [1/]	NS[2/]	NS	NS

1 – least significant difference; 2 – Not statistically significant

Summary

Coffeeville

Litter application rates were based on N needs of the receiving crop. Grass entries were subdivided into two groups based on N requirements: 240 lb/N/acre and 140 lb/N/acre. Yields were low in 2002 compared to 2001 despite satisfactory rainfall (Table 1 and 2). Nitrogen may have been limiting in the later cuttings. Dallisgrass was slow to recover after the 4 June harvest and was not harvested again until 4 September. The native grasses (Alamo switchgrass and eastern gamagrass) produced higher yields than the introduced grasses (bermudagrass, bahiagrass and Johnsongrass) in the high N group. Weeping lovegrass produced the highest yield in the low N group.

Holly Springs

Yields at Holly Springs were much higher than at Coffeeville (Table 3 and 4). Low rainfall in late spring and early summer delayed the first harvest until 2 July, which explains the high yields in the first harvest. The native grasses produced higher yields than the introduced grasses in the high N group. This same trend occurred at Coffeeville (Table 3). Weeping lovegrass, Caucasian bluestem and dallisgrass produced higher yields than common bermudagrass in the low N group.

Tissue analyses for N and P were not available at the time this report was written; therefore, removal rates are pending until analyses can be completed.

Title: Evaluation of Native Mixtures on WRP Sites Using Sculptured Seeding Techniques
Study No: MSPMC-T-0003-WE
Study Leader: Janet Grabowski
Cooperators: Paul Rodrigue, National Wetlands Science Institute
Duration: 2000-2005

Introduction

The sculptured seed technique was developed to increase success of prairie seeding projects. This technique involves varying components of the seeding mixture based on changes in topographic and soil features within the planting site. WRP sites are also highly variable, which can limit establishment success if a single seed mixture were planted on the entire site. Based on results of a previous planting on a WRP site, we feel that the major determinant of successful establishment is likely to be elevation, because elevation affects the amount and season of ponding. The objective of this study is to utilize sculptured seeding on two WRP planting sites and to evaluate establishment, growth, and survival of native species that can provide potential sources of wildlife food and cover. If possible, spring and summer plantings will be made on each planting site.

2002 Data Collected

This was study was designed to be a cooperative effort between the PMC, State Office WRP coordinating individuals, and the Wetland Science Institute. Thus far, this cooperative effort has not come together to the stage where the plantings have been installed.

Summary

The objective of this study is still a point of interest for many individuals involved in WRP site development and we hope it will receive priority in 2003 or 2004.

Wildlife Habitat Improvement Summary

Title: Southern Crabapple Evaluation
Study No: MSPMC-P-0106-WL
Study Leader: Janet Grabowski
Duration: 2001-2005

Introduction

There is a need for additional native species for wildlife habitat improvement. Several southeastern crabapple (*Malus* spp.) accessions, originally obtained from the Georgia PMC, were planted at Coffeeville in 1976 and 1977. Five trees of each accession were planted in the original study plots. They were evaluated until 1983, but the trees were not mature enough at that time to determine their fruiting characteristics. A change in program direction resulted in inactivation of the original study. Recently, wildlife biologists have indicated a need for crabapple selections that are well adapted to the Southeast. The surviving accessions will be evaluated and selections made.

2002 Data Collected

Table 1. Fruit (Fr.) abundance (Abun.), maturity (Mat.) and overall plant (Pl.) vigor of southeastern native crabapples evaluated on September 20, 2001.

Accn	# Trees	Fl. Abun.	Fr. Mat.[1]	Fr. Size	Pl. Vigor	Comments
434127	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	
434134	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	
434115*	2	Good	Late	Mid	Good	Short; Flat-topped
434113	3	Poor	Mid	Mid	Fair	Fairly short; Rounded
434116	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	
434123	1	Fair	Early	Mid	Poor	Vase-shaped
434121*	3	Good	Late	V. Large	Good	Mid-sized; Flat-topped
434117	5	Poor	Too few to judge		Poor	Upright rounded
434124	2	Good	Late	Mid	Poor	Vase-shaped
434122*	3	Excellent	Mid	Large	Good	Large; Rounded
434132	2	Fair	Late	Large	Good	Large; Rounded
434120	3	Poor	Late	Mid	Fair	Rounded
434119	3	Fair	Late	Mid	Fair	Rounded
434131	2	Poor	Late	Mid	Good	Rounded
434112*	3	Excellent	Late	Mid	Good	Weeping
434125**	3	Good	Mid	Small	Good	Vase-shaped
434118	1	Poor	Mid	Small	Poor	Rounded
434128	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	1 dead tree present
434135	2	Fair	Early	Mid	Good	Vase-shaped
434126**	3	Good	Late	Large	Good	Flat-topped
434114**	2	Good	Mid	Small	Good	Rounded
434130	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	
434133	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	
434129	0	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	

[1] Fruit maturity – early = more than 50% fallen on evaluation date; mid = less than 50% fallen on evaluation date; late = just beginning to drop on evaluation date.

* Indicates superior performing accessions; ** Indicates second tier superior accessions.

Selections were made in 2001 based on based on fruit production, vigor, and plant growth characteristics. Accession 434121, released by the Georgia PMC as 'Big O' is the commercial standard for comparison. Accessions 434115, 434122, and 434112 were selected as possible releases (Table 1). Accessions 434125, 434126, and 434114 had lesser potential, but were still worthy of consideration.

Flowering observations were made on April 9 to supplement the fruit evaluations made in the previous year. *Malus* spp. are difficult to root from cuttings, but further work with this accessions requires asexual propagation of the selected accessions. Hardwood cuttings were taken on January 23 from 434121 (Big O), 434115, 434122, 434112, 434125, and 434126 and placed in flats with a 50%/50% (v/v) peat/perlite medium over bottom heat in an unheated building. The two latter accessions were included because there was room for six flats on the heating mat. May 21, softwood cuttings root were taken from the same accessions and stuck in peat/perlite medium and put under mist in the greenhouse. Accession 434114 would have been included but there was no good wood from which to take cuttings, so accession 434135 was substituted.

Table 2. Flower abundance (Abun.) and estimated percentage of flowers open on southeastern native crabapples evaluated on April 9, 2002.

Accn	# Trees	Flower Abun.	% Open	Comments
434127	0	xxxxxxxx	xxxxxxxx	
434134	0	xxxxxxxx	xxxxxxxx	
434115*	2	Good	10	
434113	3	Good	40	
434116	0	xxxxxxxx	xxxxxxxx	
434123	1	Poor	90	Lots of flowers lost petals
434121*	3	Excellent	70	
434117	5	Fair	80	
434124	2	Fair	50	
434122*	3	Good	0	
434132	2	Fair	0	
434120	3	Excellent	90	
434119	3	Good	20	
434131	2	Good	0	
434112*	3	Good	10	
434125**	3	Good	80	
434118	1	Good	10	
434128	0	xxxxxxxx	xxxxxxxx	
434135	2	Fair	20	
434126**	3	Good	10	
434114**	2	Fair	80	Lots of flowers lost petals
434130	0	xxxxxxxx	xxxxxxxx	
434133	0	xxxxxxxx	xxxxxxxx	
434129	0	xxxxxxxx	xxxxxxxx	

* Indicates superior performing accessions; ** Indicates second tier superior accessions.

Summary

A storm before the evaluation period knocked many of the petals off of some of the early flowering accessions. This made it somewhat difficult to accurately evaluate their flowering performance. The only management that these trees have received for many years is regular mowing to control plant growth between them. Surviving plants have been subjected to

considerable abuse from mowers, insects, diseases, and animals. This severely limits their annual growth, which decreases the chances of propagating them from cuttings. None of the cuttings taken at either growth stage rooted. Air-layering will be attempted in 2003.

Title: Partridge Pea Inter-center Strain Trial
Study No: MSPMC-P-0106-WL
Study Leader: Janet Grabowski
Cooperators Randy King, Arkansas PMC
Jim Stevens, East Texas PMC
Morris Houck, Jr., Texas PMC
John Lloyd-Reilley, South Texas PMC
Rich Wynia, Kansas PMC
John Vandevender, West Virginia PMC
Mike Owsley, Georgia PMC
Clarence Maura, Jr., Florida PMC
Roger Hansard, North Carolina PMS
Duration: 2002-2004

Introduction

The annual legume, partridge pea [*Chamaecrista fasciculata* (Michx.) Greene], is an excellent food source for wildlife and is also suitable for planting on many critical areas. The only commercially available cultivar of partridge pea is 'Comanche', released by the Texas PMC in Knox City; it was originally collected in Throckmorton County, Texas. Lark Selection, collected in Marion County, Arkansas, was released by this PMC in 1997 and Riley Germplasm, collected in Riley County, Kansas, was released by the Kansas PMC, Manhattan, Kansas, in 1999. The full range of adaptation of these two pre-varietal releases is not known. This inter-center strain trial will determine the survival and growth potential of these releases at sites throughout the Southeast and southern Plains states, using Comanche as the standard of comparison.

2002 Data Collected

Cooperators were lined up for this study in February. Seed packets and planting instructions were mailed to cooperators on April 15. Plots were planted at the PMC on April 24 and fertilizer was applied at a rate on 60 lb/acre P and K. Dual (2 lb a.i./acre) was sprayed over the treatment plots on May 2. Evaluations were taken on July 19 and September 27. Plots at the other locations were planted and evaluated based on local conditions. Some of the sites had no evaluation data because plots were lost due to drought and only early season ratings were available from the South Texas location because plants died during the summer.

Table 1. Stand, vigor, and seed production ratings of three partridge pea sources at five locations.

Location	Strain	07/19			09/27			
		Stand[1]	Vigor		Stand	Vigor	Seed Prod.	% Seed Mat.
Mississippi	Comanche	5	3		4	4	5	52
	Lark	6	3		3	3	3	30
	Riley	3	3		5	7	6	98
LSD (0.05)		NS[2]	NS		2	2	2	19
		07/02			09/27			
East Texas	Comanche	3	1		3	1	3	----
	Lark	6	4		3	4	6	----
	Riley	4	4		5	3	6	----
LSD (0.05)		NS	3		NS	NS	NS	
		06/17						
South Tex.	Comanche	8	5		10	10	----	----
	Lark	10	10		10	10	----	----
	Riley	10	8		10	10	----	----
LSD (0.05)		1	4		NS	NS		
		06/28						
Florida	Comanche	1	3		1	2	1	----
	Lark	2	3		2	3	2	----
	Riley	6	6		7	7	8	----
LSD (0.05)		3	2		4	2	2	
					10/10		11/13	
Kansas	Comanche	----	----		6	4	6	13
	Lark	----	----		6	2	4	33
	Riley	----	----		8	5	6	33
LSD (0.05)					NS	NS	NS	NS

[1] Stand, vigor and seed production ratings used were 1 = excellent; 3 = good; 5 = fair; 7 = poor; 9 = very poor; and 10 = none.

[2] Values are not significantly different at $P<0.05$.

Summary

Riley plants matured early at the Mississippi and Florida locations. This more northerly seed source could not make use of the longer growing season at these sites. Lark performed best at Mississippi, Florida, and Kansas. Comanche, from a Texas source, performed well in Texas. This study will be repeated in 2003. Hopefully weather conditions will allow data collection at more sites than was possible in 2002.

Technical Reports

Listed below are the most current technical reports 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.

1998-1999

Evaluation of Sulfuric Acid Scarification for Improving Germination of Yellow Lotus Seed -- Janet Grabowski

Harvest Aid Chemicals for Trailing Wildbean Production -- Janet Grabowski

Eastern Gamagrass Establishment: I. Greenhouse Planting Depth Study -- Joel Douglas

Eastern Gamagrass Establishment: II. Effect of Hot Water Treatment on Seed Germination -- Janet Grabowski and Joel Douglas

Management Systems for Southernpea Double Cropped with Wheat -- Herby Bloodworth

Evaluation Lark Selection Partridge Pea and Hopefield Selection Trailing Wildbean for Use in Critical Area Seed Mixtures -- Janet Grabowski and Joe Snider

Clipping Effect on Yield and Quality of Eastern Gamagrass, Switchgrass and Bermudagrass-- Scott Edwards, Joel Douglas and Herby Bloodworth

2000

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

2001

Results of a WRP Planting in Quitman County, Mississippi -- 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

Reseeding Methods of 'Meechee' Arrowleaf Clover -- Scott Edwards

2002

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

Morton Germplasm Shrub Willow -- Janet Grabowski

Seed Production of Eastern Gamagrass as Influenced by Nitrogen Fertilization -- Joel Douglas, David Lang, Paul. Meints, Robert Elmore, Roscoe Ivy, and Jimmy Howell

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

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

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

Establishment Methods for 'Alamo' Switchgrass -- Scott Edwards