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A COMPARISON OF SWITCHGRASS ECOTYPES FOR STIFF GRASS HEDGES

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INTRODUCTION

Switchgrass (*Panicum virgatum* L.) is a leading candidate for stiff grass hedge plantings for erosion control on sloping cropland (Dewald et al., 1996). Although switchgrass possesses many desirable characteristics, management of this tall growing grass (7-8 feet) as a hedge must be considered. Annual mowing during the growing season may be necessary to prevent shading of crops in rows nearest the hedge, thus reducing crop yield (Ritchie et al., 1996). From a management and yield perspective, a lower growing switchgrass with favorable plant architecture and stem properties (Dunn and Dabney, 1996) would be better accepted by farmers.

In 1994, a collection of 92 switchgrass ecotypes was made by the USDA-Natural Resources Conservation Service for summer forage and other conservation uses. Region of collection included Mississippi, eastern Arkansas and western Alabama. Vegetative rootstock of each collection was divided into single planting units and transplanted into replicated plots at the Jamie L. Whitten Plant Materials Center (PMC) near Coffeeville, Mississippi, on an Oaklimeter silt loam soil. 'Alamo' and 'Blackwell' switchgrass cultivars were included in the assembly for visual and quantitative comparisons.

A study was initiated in October 1996 to screen the assembly for ecotypes with desirable grass hedge characteristics using Alamo, Blackwell and miscanthus (*Miscanthus sinensis* Anderss.) for comparison.

MATERIALS AND METHODS

Visual comparisons were made on 8 October 1996 to evaluate accessions for erect growth, plant height and apparent stem size and density. This initial screening resulted in the selection of several accessions for potential use as a grass hedge (Table 1). These accessions rated high in plant vigor, disease and insect resistance (data not shown).

Quantitative measurements for plant height, basal circumference, and stem diameter were collected from the center two plants in two replicated plots. Plant height was determined by measuring from the ground to the top of the seedhead. Stem diameter was determined by randomly measuring ten

Table 1. Accessions selected for potential use as grass hedges.

Accession	Origin
9062836	Madison County, MS
9062788	Monroe County, MS
9062807	Webster County, MS
9062821	Kemper County, MS
9062780	Pontotoc County, MS
9062839	Chickasaw County, MS

stems at one foot above the ground. Basal circumference was measured at ground level. Stem density was determined by counting the number of stems per ft^2.

Data was analyzed by analysis of variance and mean separation was performed by least significant difference procedures (LSD) at the $P \leq 0.05$ (Gomez and Gomez, 1984).

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RESULTS AND DISCUSSION

Height is an important selection criteria for grass hedges. Lyles et al. (1984) reported that crop yield may be affected at distances of two times the height of the hedge. In this study, plant height was similar for Mississippi collections and Blackwell, but significantly shorter than Alamo and miscanthus (Table 2).

Table 2. Plant architecture and stem properties of Mississippi switchgrass collections, switchgrass cultivars and miscanthus.

Plant Material	Ht[1]	BC[2]	SD[3]	St D[4]
	-feet-	inch		stems/ft^2
Madison	5.5	50	.21	106
Pontotoc	4	39	.19	139
Chickasaw	6	50	.26	92
Webster	4.5	53	.25	55
Monroe	5	53	.25	106
Kemper	4.5	53	.25	106
Alamo	8	48	.31	170
Blackwell	4.5	41	.12	169
Miscanthus	7	34	.16	223
Mean	5.5	47	.25	130
LSD (0.05)	1.5	7	.07	50

1 - plant height; 2 - basal circumference; 3 - stem diameter; 4 - stem density.

Basal circumference indicates tillering and subsequent spread of plants and is a useful parameter for characterizing plants for stiff grass hedges. Excluding the Pontotoc accession, Mississippi collections had larger basal circumferences than the switchgrass cultivars and miscanthus, but this difference was only significant for miscanthus and Blackwell (Table 2).

Stem diameter and stem density are important for trapping sediment and withstanding intense flow rates that may occur in concentrated flow areas (Dunn and Dabney, 1996). Alamo had significantly larger stems than miscanthus, Blackwell and the Pontotoc accession but diameter did not differ significantly from the Monroe, Webster, Kemper, and Chickasaw accessions(Table 2).

Miscanthus had significantly more stems/ft^2 than Mississippi collections and switchgrass cultivars (Table 2). Miscanthus produced 100 and 30% more stems than Mississippi collections and switchgrass cultivars, respectively (Table 2). Stem production of switchgrass cultivars was significantly more than the Mississippi collections except for the Pontotoc accession.

SUMMARY AND CONCLUSIONS

Miscanthus has shown to be effective in trapping sediment in runoff plots (Dabney and McGregor, 1993) and under field conditions (Ritchie et al., 1996). In this study, miscanthus had the highest stem density. Miscanthus is an ornamental grass that is propagated primarily from transplanting live shoots. Rootstock expense and labor for establishment combined with the potential for it to become invasive (Hitchcock, 1951) may restrict its use in cropland.

Blackwell exhibited acceptable height and stem density, but lack of stem size and stiffness restrict its use as a stiff grass hedge in the South. Furthermore, below average plant vigor and foliar diseases have been observed at the PMC (data not shown).

Alamo displayed favorable stem size and density, and has demonstrated the ability to withstand high flow rates in flume studies (Dabney et al., 1996). Mowing is recommended to control plant height. Mowing should be performed before seedheads develop to minimize plant height and biomass that interfer with crop performance in rows nearest the hedge. Furthermore, unmanaged residue may interfer with planting equipment in the spring.

Height of Mississippi collections are more suitable for grass hedges than miscanthus and Alamo. Average height of six Mississippi collections was five feet compared to eight and seven feet for Alamo and miscanthus, respectively. Excluding the Pontotoc accession, Mississippi collections had larger basal circumferences than miscanthus and switchgrass cultivars. A comparison of stem sizes revealed that Mississippi collections were similar to Alamo's and much larger than miscanthus and Blackwell. Although Mississippi collections did not produced as many stems per ft^2 as miscanthus and switchgrass cultivars, stem production should be sufficient for an effective hedge. In field studies of grass hedges at the PMC, plants with six to ten stems per ft^2 trapped as much sediment as plants with 42 stem per ft^2(unpublished data).

Plans are to increase seed of Mississippi collections and conduct seed quality tests. Selected collections will be used in a test to determine their impact on soybean yield in rows nearest the hedge as compared to a clipped and unclipped Alamo switchgrass hedge. Data from these tests will be used to select one for further evaluations under field conditions.

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