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Objectives

- To determine the suitability of selected warm season grass species for use in riparian buffers where occasional flooding can occur.
- To determine if results obtained under controlled greenhouse conditions can adequately identify suitable warm season grasses for riparian buffers.

Introduction

- Natural Resources Conservation Service (NRCS) provides guidance on what plant materials are suitable for various conservation applications including riparian buffers.
- Many plant species develop aerenchyma in their roots in response to waterlogged conditions. These intercellular spaces allow movement of oxygen from shoot into submerged root tissues allowing continued growth and nutrient uptake.
- Aerenchyma roots have been observed in several warm season grass species and increased aerenchyma formation have increased growth and survival under waterlogged conditions.
- In a previous greenhouse pot experiment, potential candidates of warm season grasses were identified for their ability to extend their roots into saturated soil.

Materials and Methods

Cultivars selected

- Nine cultivars of warm season grasses from the greenhouse study were selected for evaluation in this field study:
 - Big Bluestem - Bonilla, Niagara, Suther
 - Indiangrass - Osage, Suther
 - Switchgrass - Hightide, Shelter
 - Eastern gamagrass - Meadowcrest
 - Prairie cordgrass - Red River

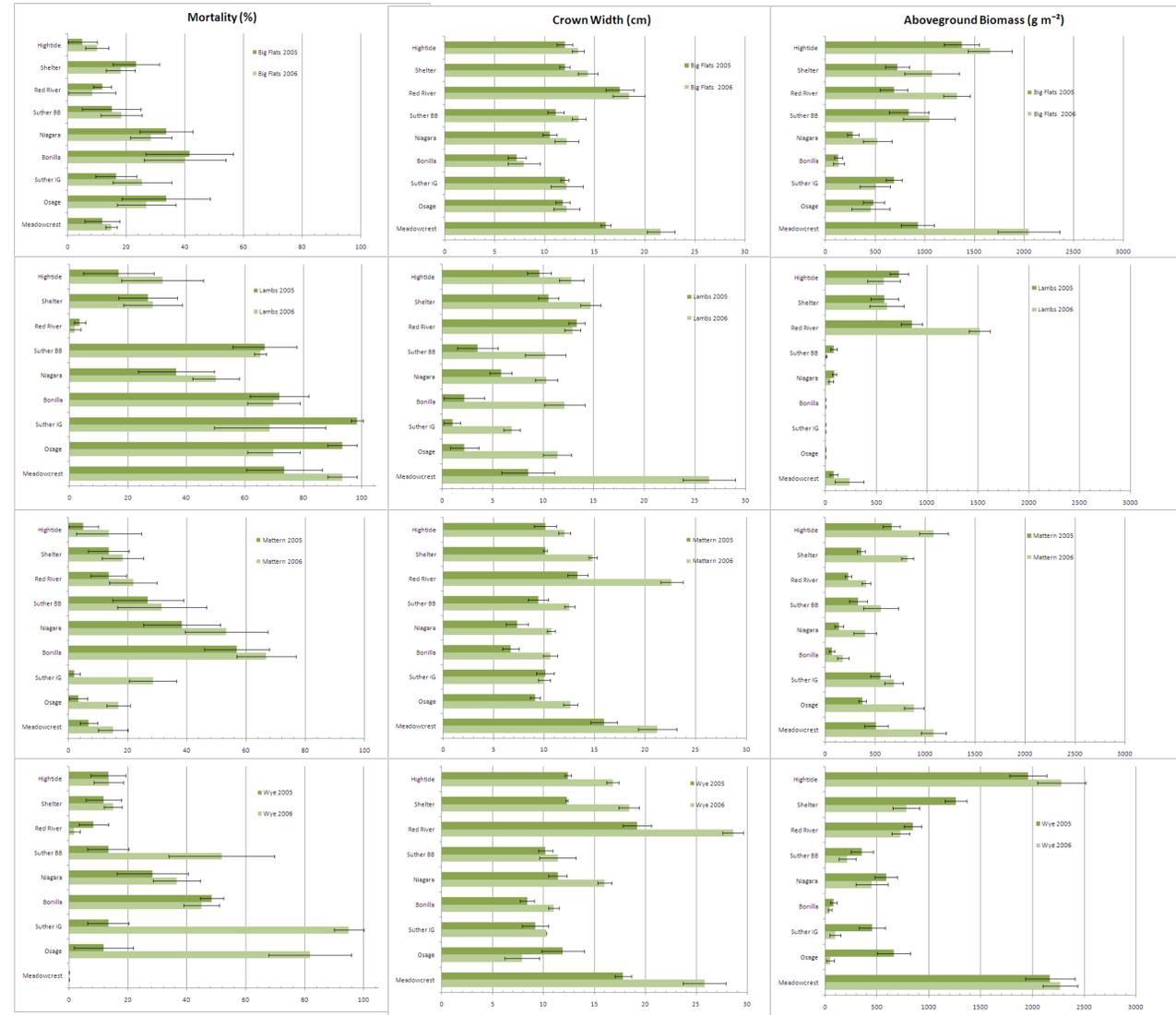
Plots determined

- Four research plots were located and planting dates selected:
 - University of Maryland, Wye Research Center, MD April 20, 2004
 - ARS Mattern Watershed, Klingerstown, PA May 10, 2004
 - NRCS, Big Flats Plant Materials Center, NY May 11, 2004
 - USACOE Lambs Creek Recreation Area, Mansfield, PA May 13, 2004
 - Prairie cordgrass - Red River

Data collected

- Seeds were sown in 164 ml containers in the greenhouse seven months before transplant in to the research plots in mid-May 2004
- Each cultivar was planted in three rows with 17 plants per row spaced at .3 meters between and within rows. Data was collected from the center row.
- Environmental conditions including stream and flooding depths, duration, and precipitation were recorded in 2004 to 2006.
- Data collected: survival, plant height, crown width, vigor and aboveground biomass.

Results



Crew planting the Wye site, April 20, 2004

Site
Wye Research Center, MD
Coordinates
38.5°N 76.1°W
Elevation (m)
0
Annual rainfall (mm)
1100
Annual T_{air} (C°)
13.2
Soil type
Sandy loam, loam
Brief site description
Coastal Wetland



The Wye site one year after planting

Site Data



Site
Big Flats Plant Materials Center
Coordinates
42.1°N 77.0°W
Elevation (m)
274
Annual rainfall (mm)
892
Annual T_{air} (C°)
8.5
Soil type
Silt Loam
Brief site description
Sloping stream bank



Site
Lamb's Creek, PA
Coordinates
41.5°N 77.1°W
Elevation (m)
331
Annual rainfall (mm)
850
Annual T_{air} (C°)
7.8
Soil type
Silt Loam
Brief site description
Reservoir flood plain



Site
Mattern Watershed, PA
Coordinates
40.7°N 76.6°W
Elevation (m)
270
Annual rainfall (mm)
1060
Annual T_{air} (C°)
9.3
Soil type
Clay, silty clay
Brief site description
Watershed headwaters

Conclusions

- 'Red River' prairie cordgrass, 'Meadowcrest' eastern gamagrass, 'Hightide' switchgrass, and 'Shelter' switchgrass consistently performed the best for survival, vigor and biomass production.
- 'Suther' big bluestem and 'Osage' indiagrass were intermediate, while 'Niagara' big bluestem, 'Suther' indiagrass and 'Bonilla' big bluestem were consistently the lowest ranked cultivars.
- Despite the presence of aerenchyma, a wide range of flooding tolerance for root growth exists as determined from the prior greenhouse study.
- Flooding tolerance as determined in the greenhouse study did a reasonably good job in predicting performance under riparian conditions in the field.
- It is still recommended to verify controlled greenhouse results with field studies before recommending particular cultivars for use in riparian zones.