

Black Willow Tree Improvement for the LMAV

by

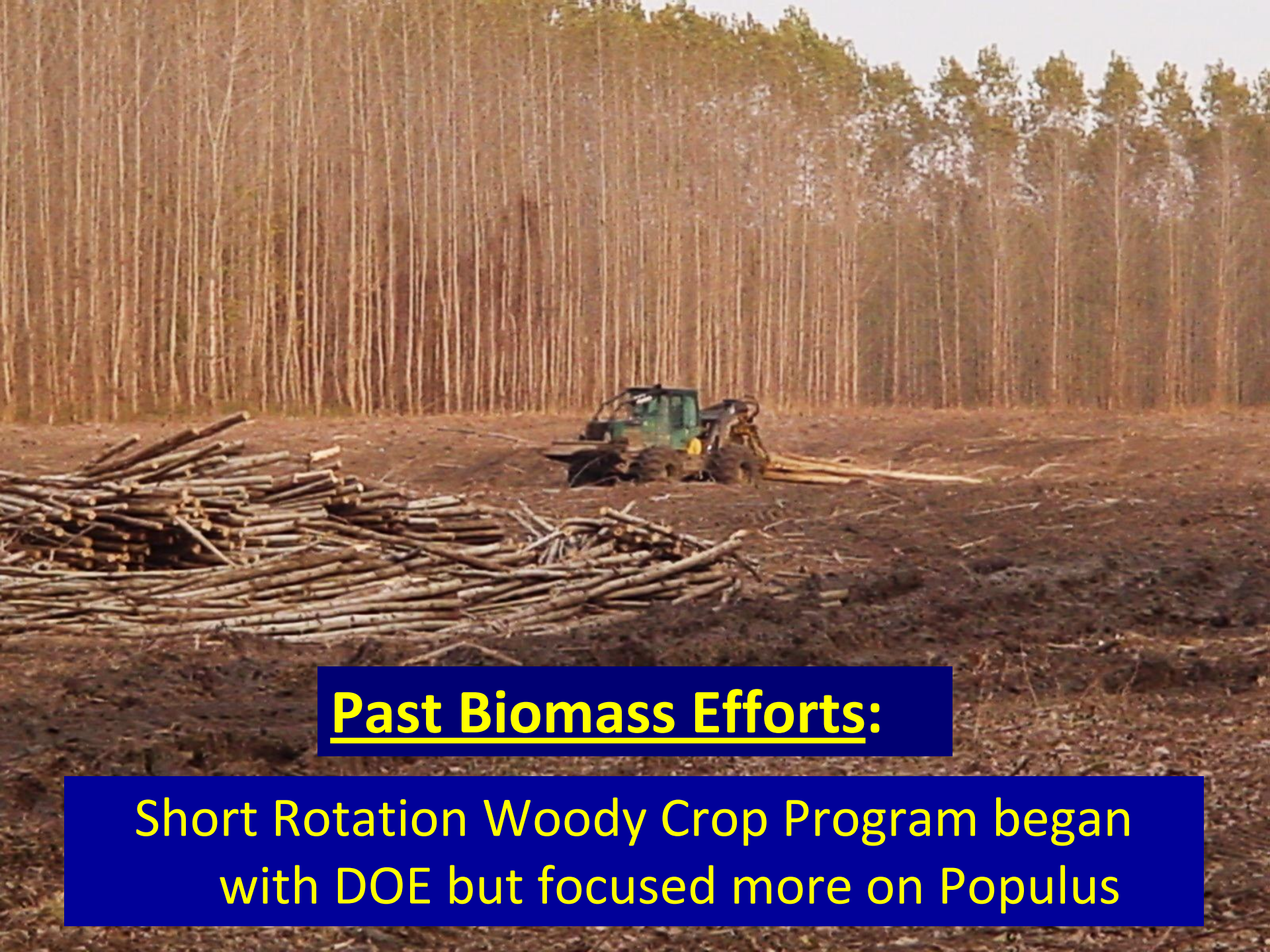
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Black Willow Tree Improvement for the LMAV

**This work is being funded by the USDA Forest
Service Center for Bottomland Hardwood
Research located at Stoneville, MS**

**Focus – Maximum production of biomass on
marginal sites in the LMAV for biofuels and
bioenergy**



Past Biomass Efforts:

Short Rotation Woody Crop Program began with DOE but focused more on Populus



Past Biomass Efforts:

Very little work has been
done on black willow in
the LMAV

Black Willow Tree Improvement for the LMAV

Positive Characteristics:

1. Fast growth rates
2. Ease of vegetative propagation – clonal production
3. Ability to grow on sites are typically unacceptable for other fast-growth species

Black Willow Tree Improvement for the LMAV

Starting a New Program:

1. Relatively small focusing on areas which may be best for the LMAV
2. Since vegetative propagation is easily done – concentrate on clonal selection
 - a. collection of different geographic sources, stands, and individuals within stands

Black Willow Tree Improvement for the LMAV

This first step is to quickly develop a small set of clones that will provide desired characteristics

1. This initial step is aimed at short-term gains and at this point not designed for continued long-term goals
 - a. However, if this initial step proves to be worthwhile selections could provide the beginnings of a breeding base for more long-term sustained gains

Black Willow Tree Improvement for the LMAV

- 2. We focused on sampling native stock from areas known for producing superior riparian stock**
 - a. As superior clones are developed from the initial sampling scheme - new additional clonal stock will be brought in from new areas**
 - b. These selections will be based on growth, rooting, and disease resistance.**

Native Population



Sampling Scheme

5 Geographic Areas

4 Stands/Geographic Area

- Each stand separated by at least 1 mile

5 Individuals/Stand

- 1- 2 yr-old whips





Oklahoma

Arkansas

TUN

(34°44'N:90°26'W)

Legend:

● 2008-2009 Sampling Locations

ROS

(33°48'N:91°03'W)

Mississippi

TRN

(31°04'N:95°45'W)

BRZ

(30°32'N:96°26'W)

Louisiana

Houston

ATC

(29°45'N:91°14'W)

Mississippi Delta

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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Native Population

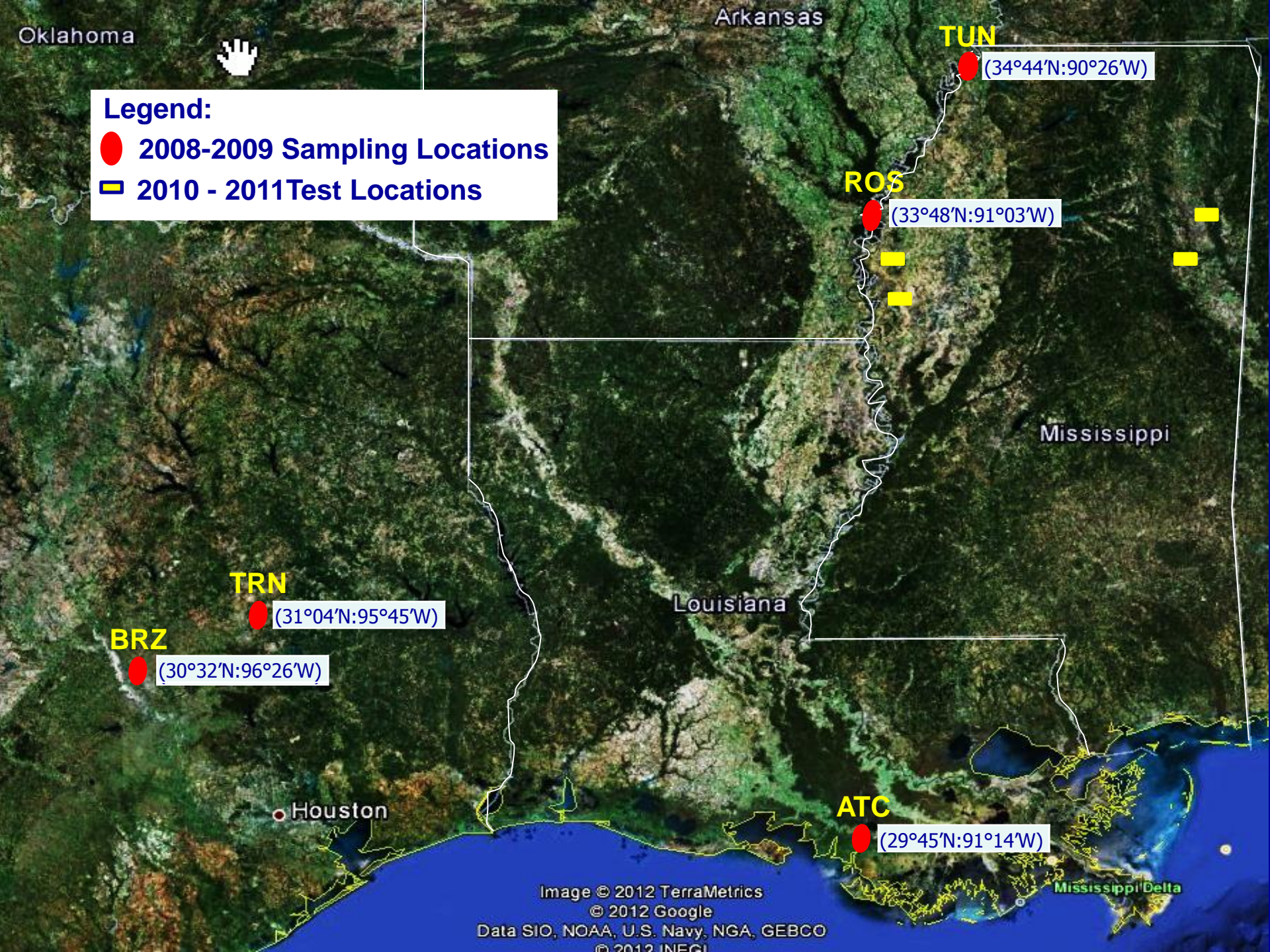
Sampling Scheme

Nursery I

Established in 2009

- 5 Geographic Areas
- 4 Stands/Geographic Area
 - Each stand separated by at least 1 mile
- 5 Individuals /Stand
 - 1- 2 yr-old whips





Native Population

Sampling Scheme

- 5 Geographic Areas
- 4 Stands/Geographic Area
- 5 Individuals /Stand
 - 1- 2 yr-old whips

Nursery I

Established in 2009

Cuttings

Nursery II

Established in 2010

Clonal Screening Trial I

- Established in 2010 and 2011
- Design : 4 Reps, 2 tree row plots
- Total of 4 Trials testing 113 clones



12/13/2010

Early-Age Results from Clonal Screening Trials

Stoneville, MS Test Site – Est. 2010

<u>Sources</u>	---Age 1---		-----Age 2-----		
	Surv (%)	HT (ft)	Surv (%)	HT (ft)	D (in)
ATC	100	7.1a	100	14.4ab	1.8a
BRZ	95	6.8a	95	15.2a	1.8a
TRN	96	5.5c	96	12.2c	0.9c
ROS	99	6.8a	99	14.0b	1.1b
TUN	97	6.2b	96	13.6b	1.1b



Early-Age Results from Clonal Screening Trials

Mean performance of the five geographic sources included in the 2010 Black Willow Screening Trial located on the Mississippi Agricultural Experiment Station near Prairie, MS and Stoneville, MS

<u>Sources</u>	-----Stoneville, MS-----			-----Prairie, MS-----		
	1 HT (ft)	2 HT (ft)	2 D (in)	1 HT (ft)	2 HT (ft)	2 D (in)
TUN	6.2b ¹	13.6b	1.11b	6.2d	10.6b	0.63b
ROS	6.7a	14.0b	1.14ab	7.1bc	11.0b	0.68b
TRN	5.5c	12.2c	0.93c	7.4ab	11.1b	0.78a
BRZ	6.8a	15.2a	1.30a	6.8cd	10.5b	0.68b
ATC	7.1a	14.4ab	1.29a	7.7a	12.0a	0.81a

¹-Means sharing a common letter are not significantly different at an alpha level of 0.05 16

Top Performing Clones Combined 2010 Analysis

<u>Clone</u>	<u>1 HT (ft)</u>	<u>Clone</u>	<u>2 HT (ft)</u>	<u>Clone</u>	<u>2 D (in)</u>
ATC 2-3	8.5	ATC 2-5	15.4	ATC 2-5	1.3
ATC 2-5	8.3	ROS 1-2	15.4	ROS 1-2	1.3
ROS 1-2	8.2	BRZ 2-2	15.1	ATC 2-3	1.3
ATC 2-1	8.1	ATC 2-3	14.9	ATC 1-1	1.2
ATC 1-1	8.0	ATC 1-6	14.8	TRN 2-3	1.2
BRZ 2-2	7.9	TUN 3-2	14.5	ATC 1-6	1.2
ROS 2-4	7.9	ATC 1-3	14.4	BRZ 2-2	1.2
Mean	6.8		12.6		0.9

2011 Test Sites

<u>Sources</u>	Hollandale		Prairie	
	---Age 1---		---Age 1---	
	Surv (%)	HT (ft)	Surv (%)	HT (ft)
ATC	100	8.7b	100	5.0a
BRZ	100	9.2a	99	4.9a
TRN	99	7.3d	100	4.3b
ROS	100	9.1a	100	4.8a
TUN	100	8.1c	100	4.8a
SBW	97	9.8	0	-----

Native Population

Nursery I

Established in 2009

Nursery II

Established in 2010

Clonal Screening Trial I

- 2 Trials established in 2010
- 77 clones examined

- 2 Trials established in 2011
- 113 clones examined

Selections

Standard Clone Tests

- 1 Test established in 2012
- 25 clones

- 2 Test to be established in 2013
- 25 clones

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2nd Stage of the Program

1. Establishment of a number of highly replicated clone tests

2. Enlarge the stands that

3. Establish some plot trials for



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Clone Test

1. Selection of 25 clones from the 2010 Screening Trial placed into a single test in 2012
2. Results at Age 1
 - a. Survival extremely high
 - b. Excellent growth - Test mean of 12 ft., Top performing clones averaging 13.8 to 14.3 ft.
 - c. Only one sandbar clone included but the shortest at age 1 (8.3ft)



Black Willow Tree Improvement for the LMAV

2nd Stage of the Program

- 2. Enlarge the sampling area to include additional stands that may be useful further North**
- 3. Establish screening trials as well as larger block plot trials for growth and yield information**

Oklahoma

Arkansas

TUN

Legend:

- 2008-2009 Sampling Locations
- 2010 - 2011 Test Locations
- 2012-2013 Sampling Locations

ROS

Mississippi

TRN

BRZ

Louisiana

Houston

ATC

Mississippi Delta

Black Willow Tree Improvement for the LMAV

Summary:

1. Black willow survives well on acidic soils while sandbar willow not adapted to this pH level
2. Black willow cuttings root vigorously resulting in high survival rates
3. Leaf retention among sources such as ATC is evident
4. Ease of vegetative propagation makes a clonal refinement program very effective
5. Increased sampling from additional sites in the South needed to increase population base

Questions

