

**PERFORMANCE  
OF  
WOODY SPECIES  
FOR  
RIPARIAN FOREST BUFFERS  
AT THE  
JIMMY CARTER PLANT  
MATERIALS CENTER**



## **INTRODUCTION:**

Riparian forest buffers provide food, water, and cover for wildlife and domesticated animals, provide shade and food, and reduce water temperature for aquatic ecosystems. They remove sediment from water flowing through them. They act as sponges to hold water in streambanks. They provide a higher water table and a more stable streamflow. They protect streambanks and reduce erosion, and help dissipate the energy of floodwater.

Land use practices have directly affected the quality and quantity of riparian areas in the United States. Estimates of riparian acreage vary, and there has been no systematic effort to characterize their extent and distribution. One estimate suggests that there may have been as much as 121 million acres of riparian habitat. Today about one-third of that amount exists across the United States and these remaining riparian areas tend to be fragmented and unevenly distributed.

To develop the plant technology needed to restore, maintain and enhance riparian areas the Jimmy Carter Plant Materials Center is studying woody species that can be recommended for riparian forest buffers.

## MATERIALS AND METHODS:

Loblolly pine, yellow poplar, sycamore, blackgum, cherrybark oak, sweetgum, white oak, bald cypress, green ash, red maple, ogeechee lime and water oak are being grown at the Jimmy Carter Plant Materials Center for water quality evaluation in forest buffer test plots. One of the early goals of the evaluation is to determine which tree buffer produces the highest overall production (growth and survival) and which species uptakes the most applied fertilizer. All of these trees are native to the Southeastern United States. The PMC is evaluating these woody species in cooperation with the ARS Southeast Watershed Research Lab in Tifton Ga.

In the winters of 1993 and 1994, 160 trees of each species listed above were planted to a 54 feet X 100 feet plot in the northeast corner of the PMC in Americus Ga. Preliminary growth and survival data were collected in 1994-1998, in June 1998 soil and tissue samples were taken from the test plots. In May 1999, 30 #/ac P and 158 #/ac N were applied to evaluate nutrient uptake. Soil and tissue samples were taken again in June 1999.

## RESULTS AND DISCUSSION:

Green ash and cherrybark oak have produced the highest survival rate of any riparian tree species in the test. Green ash has produced the highest overall growth measurements. Tables' 1-5 show survival and growth measurements of the tree species tested. Tables' 2-5 does not contain data on the trees with the poorest survival rating.

In June 1998, Dr. Richard Lowrance of the ARS Southeast Watershed Research Laboratory, in conjunction with the PMC, took tissue and soil samples of the tree plots. Tissue samples consisted of leaf, stem and fruit tissue. These samples will be analyzed for baseline nutrient content. Samples taken in June 1999 should provide data indicating the ability of the riparian species to absorb and translocate N and P.

**TABLE 1** MEAN % SURVIVAL OF FOREST BUFFER TREES

Tree Species	August	August	August	September	July
	1994	1995	1996	1997	1998
Loblolly pine	21	16	13	13	13
Yellow poplar	14	14	8	8	8
Sycamore	18	27	20	20	20
Blackgum	84	68	66	63	63
Cherrybark oak	91	89	89	89	88
Sweetgum	77	71	73	74	74
White oak	66	49	46	44	44
Bald cypress	81	71	70	68	68
Green ash	81	81	82	82	82
Red maple	88	76	71	72	71
Ogeechee lime	38	35	35	34	35
Water oak	75	73	70	70	70

\*Low survival trees were not included in further data tables

**TABLE 2**                    **MEAN CROWN WIDTH (CM) OF FOREST BUFFER TREES IN AUGUST**

<u>Tree Soecies</u>	(1994)	(1995)
Blackgum	22.13	54
Cherrybark oak	25.59	58
Sweetgum	27.3	52
White oak	24.78	41
Bald cypress	17.99	33
Green ash	65.83	94
Red maple	20.72	48
Ogeechee lime	40.10	78
Water oak	33.2	63

**TABLE 3**                    **MEAN HEIGHT (CM) OF FOREST BUFFER TREES**

Tree Species	August	August	August	September	July
	1994	1995	1996	1997	1998
Blackgum	56.7	79	155	270.3	308.9
Cherrybark oak	56.73	96	207	312.5	382.8
Sweetgum	61.54	129	261	383.2	464.3
White oak	38.94	78	105	158.0	194.6
Bald cypress	57.36	87	146	216.0	263.6
Green ash	169.98	263	399	543.2	613.8
Red maple	56.18	108	219	342.0	401.9
Ogeechee lime	84.15	170	281	412.9	467.6
Water oak	60.26	100	197	350.8	391.0

**TABLE 4**                    **TRUNK DIAMETER OF FOREST BUFFER TREES**

<u>Tree Soecies</u>	<u>Mean Diameter Main Trunk Ground Level (mm)</u>				
	August 1994	August 1995	July 1996	September 1997	July 1998
Blackgum	1.232	14.4	26.6	35.2	54.4
Cherrybark oak	5.61	12.1	28.0	46.0	63.6
Sweetgum	10.54	24.5	42.3	65.5	88.9
White oak	6.73	11.0	19.4	24.5	35.6
Bald cypress	8.06	18.0	31.0	43.7	63.2
Green ash	25.49	46.4	69.7	82.7	107.8
Red maple	8.19	20.7	43.0	56.0	76.9
Ogeechee lime	16.57	35.6	64.3	110.5	126.6
Water oak	9.23	21.7	30.9	49.9	66.2

**TABLE 5****CROWN WIDTH OF FOREST BUFFER TREES - SEPTEMBER 1997**

<u>Tree Species</u>	<u>Mean Crown Width (cm) at 1/2 Tree Height</u>	
	<u>September 1997</u>	<u>July 1998</u>
Blackgum	170.6	220.3
Cherrybark oak	197.3	222.4
<b>Sweetgum</b>	165.3	205.7
White oak	97.5	106.0
Bald cypress	126.1	151.2
Green ash	289.4	319.7
Red maple	167.5	201.0
Ogeechee lime	315.2	341.1
Water oak	202.1	246.0