

# Improving Urban Trees

2024 Georgia Tree Conference

November 5, 2024



*BREEDING FOR PRODUCTIVITY, RESILIENCE, SUSTAINABILITY*

**TEXAS A&M FOREST SERVICE**



# Introduction



Ph.D. Forestry TAMU '90

10 years in Forest Industry

23 years with TFS – WGFTIP

September 1, 2017:

WGFTIP Director

TFS Tree Improvement Coordinator

- Commercial Pine and Hardwood
- Virginia Pine – Christmas Tree
- Urban Tree Improvement
- West Texas Nursery (2024)

SAF Certified Forester

Texas Accredited Forester

# Improving Urban Trees

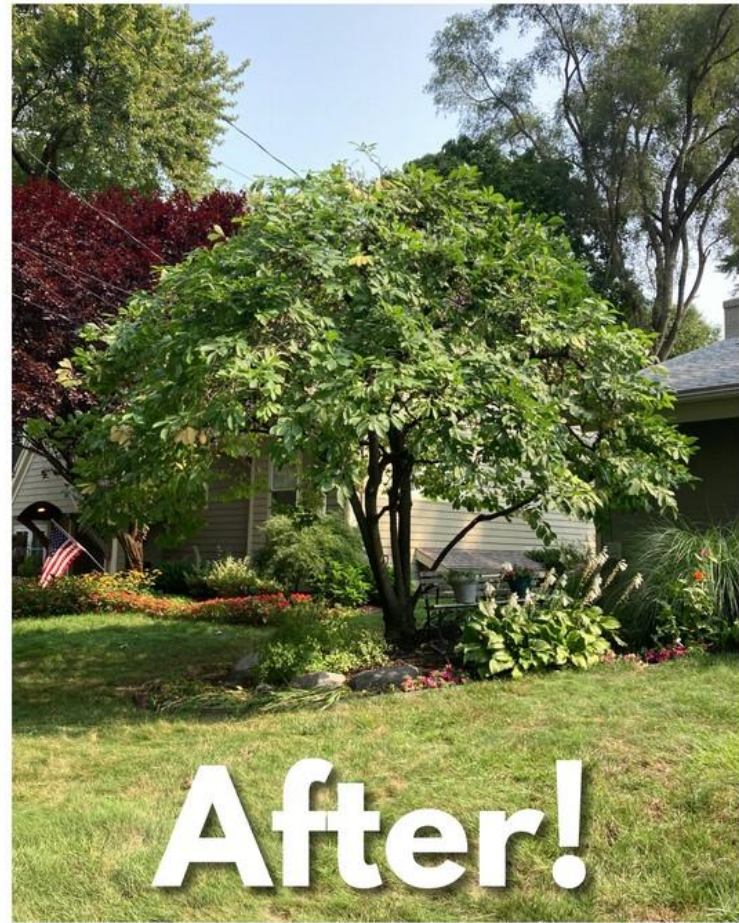
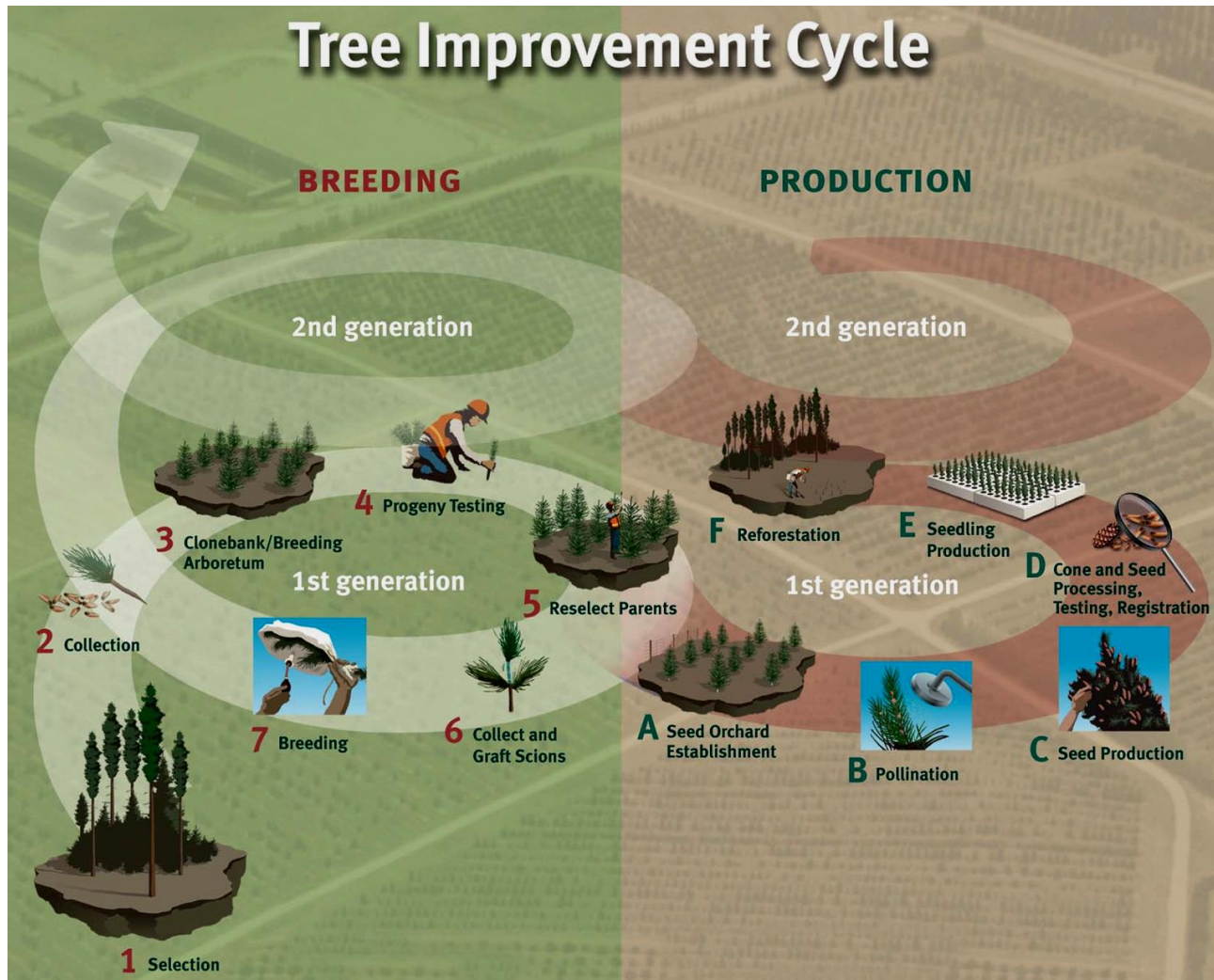


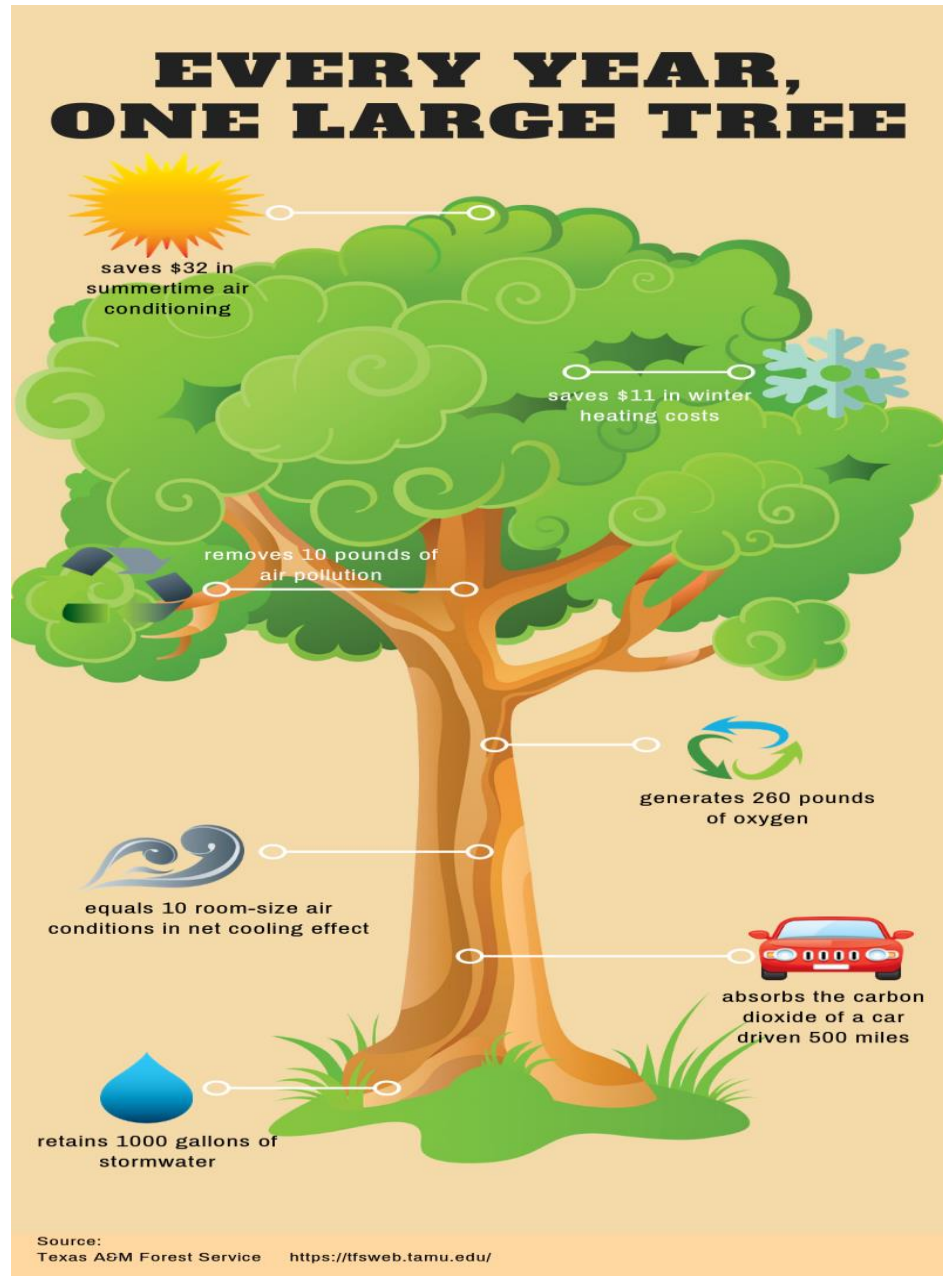
Photo courtesy of Woodland Tree Services

# Improving Urban Trees




## WHY IMPROVE URBAN TREES?

We all know the value of trees – especially in the urban environment!



But our trees are in peril  
– especially in the urban  
environment!

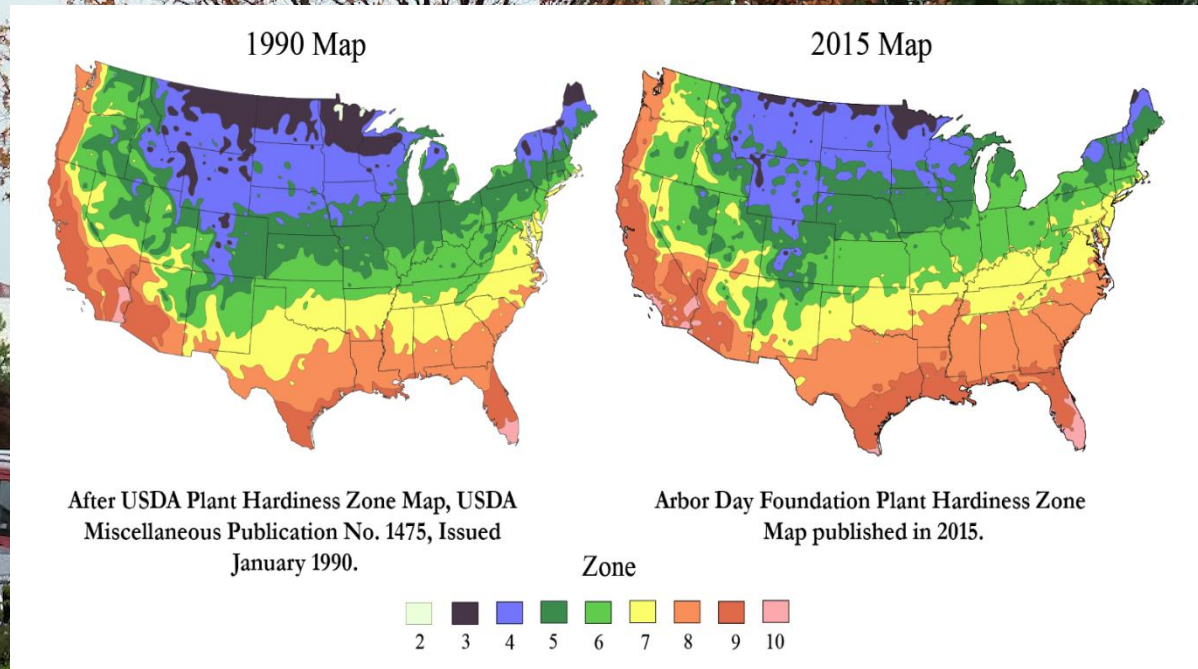




But our trees are in peril  
– especially in the urban  
environment!

**Quick Fact:** *Forest Service research (2023) shows that half the trees planted in an urban environment live just 13 to 18 years, with more than 30% dead within five years.*

But our trees are in peril  
– especially in the urban  
environment!



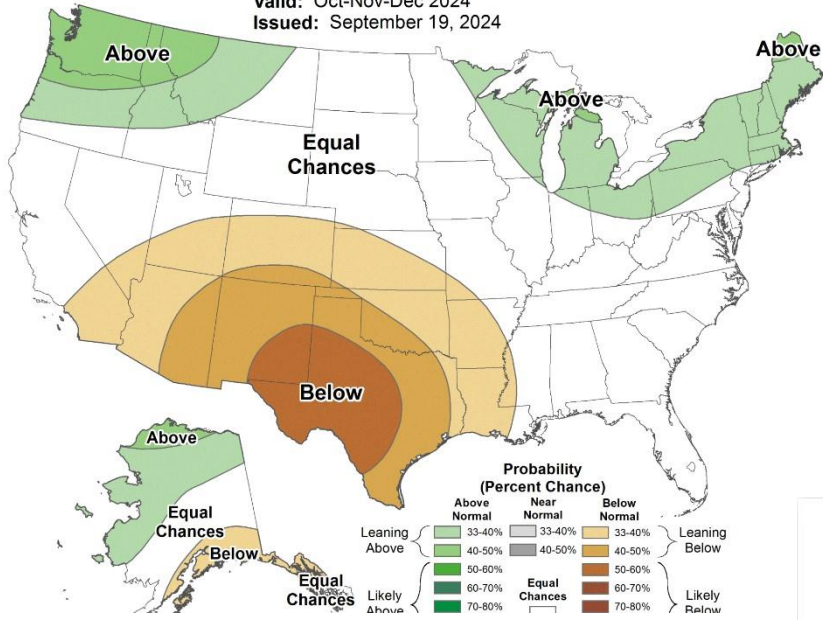




# Seasonal Precipitation Outlook



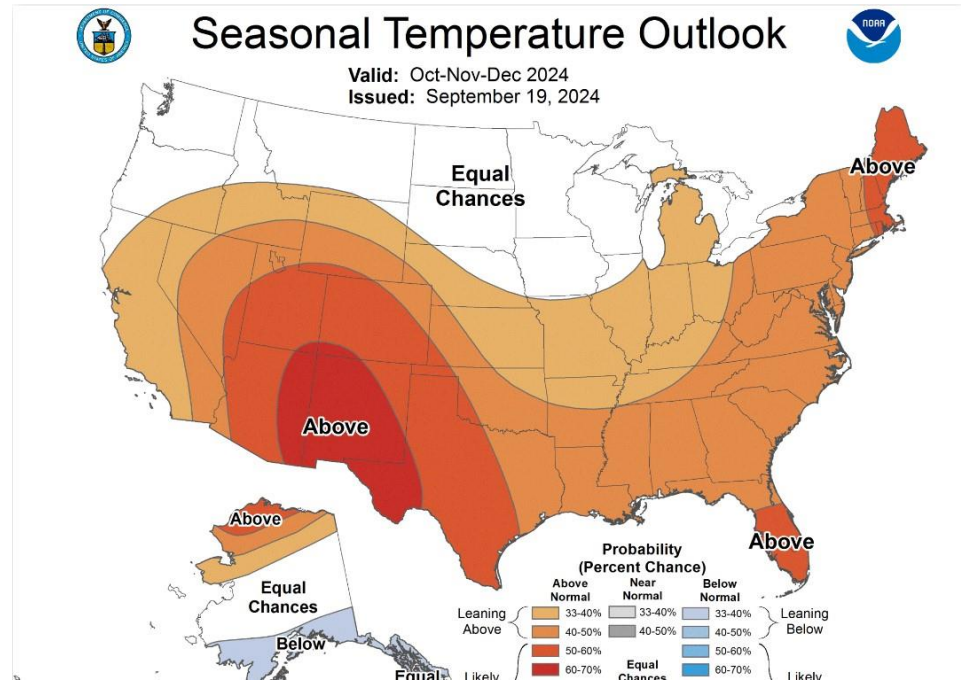
Valid: Oct-Nov-Dec 2024  
Issued: September 19, 2024



# Seasonal Temperature Outlook



Valid: Oct-Nov-Dec 2024  
Issued: September 19, 2024



New Research

# To Fight Climate Change With Trees, America Needs More Seedlings

New research estimates the U.S. would need to double production to meet its reforestation goals



**Alex Fox**

Correspondent

April 8, 2021

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<https://www.smithsonianmag.com/smart-news/seedling-shortage-could-hamper-bids-fight-climate-change-trees-180977446/>

# Reforestation Is Great! But We're Running Out of Seeds

Planting trees is a popular solution to carbon emissions. But where will all those seedlings come from?





**Feature • February 21, 2023**

# The quiet crisis in America's forests

The solutions to the seed shortage are out there, but will we apply them in time?

# TFS Urban Tree Improvement Program

- Pilot program initiated in Dallas County in 1973
- Representatives from ten municipalities in attendance
- Objective:  
'To develop a dependable ***seed supply*** of well-adapted, fast-growing, native tree species designed for urban areas.'



# TFS Urban Tree Improvement Program - History

## Why Tree Improvement?

- Over 50% of the planting stock used in urban environments was produced out of state
- Poorly adapted to the soils and climate of Texas
- High mortality, poor growth



# TFS Urban Tree Improvement Program - History

## Why Tree Improvement?

- Utilize native rather than introduced or exotic species
- Population-level improvement rather than cultivar development – utilize and preserve genetic diversity
- Cooperative model
  - ✓ Municipalities
  - ✓ Commercial growers



# TFS Urban Tree Improvement Program

## Cooperative Members...

### The cities of

- Baytown
- Burleson
- Carrollton
- Dallas
- Ft. Worth
- Garland
- Houston
- Plano
- Richardson

### and the following commercial growers:

- Aldrich Nurseries – Von Ormy
- Altex Nurseries – Alvin
- Dallas Nurseries Garden Center - Lewisville
- LMS Landscape - Dallas
- Rennerwood Nursery – Tennessee Colony
- Robertson’s Tree Farm - Whitehouse
- Superior Foliage Tree Farm - Tomball





# TFS Urban Tree Improvement Program

## Cooperative Model

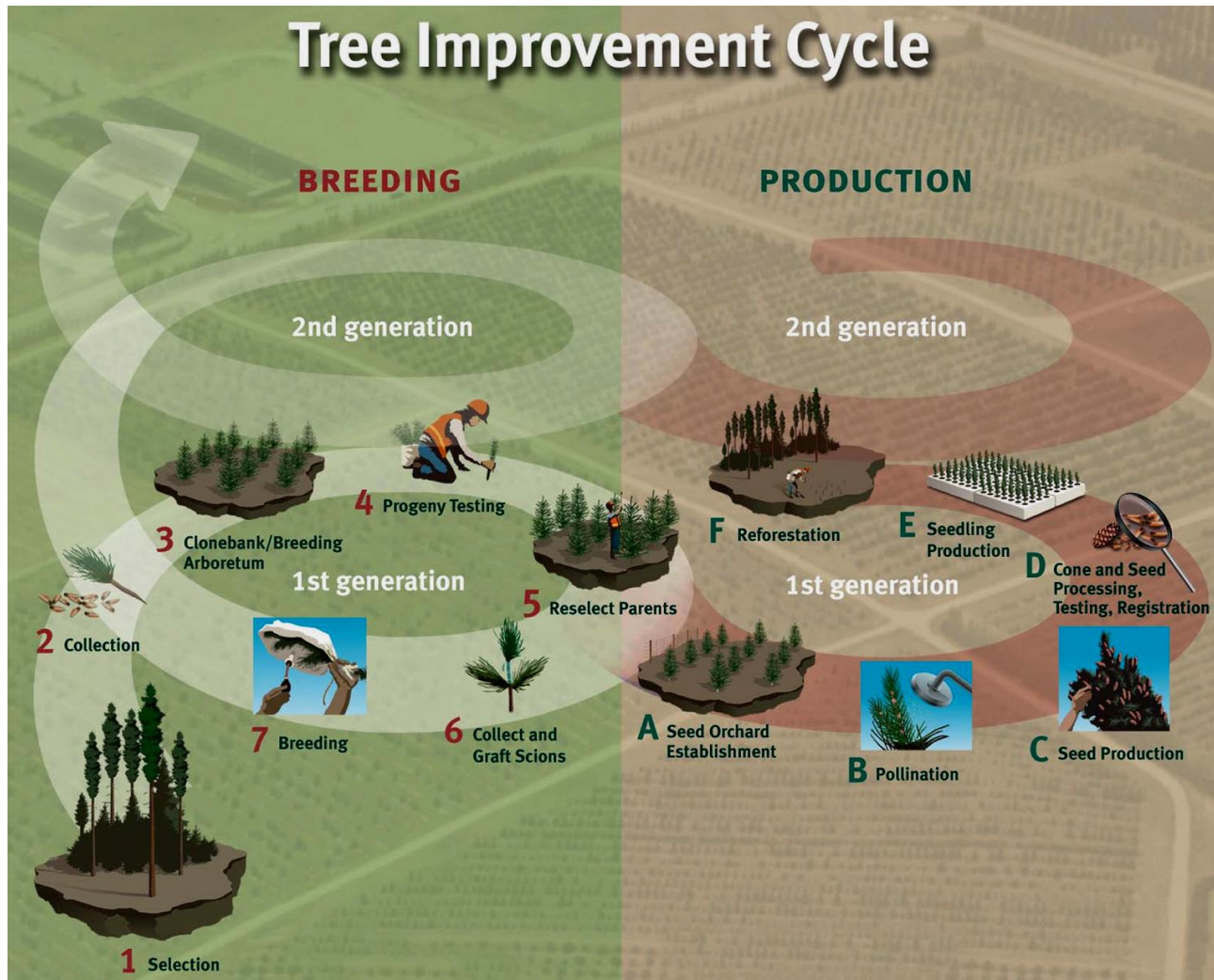
- ✓ Municipalities
- ✓ Commercial growers

– Select and prioritize species to work with

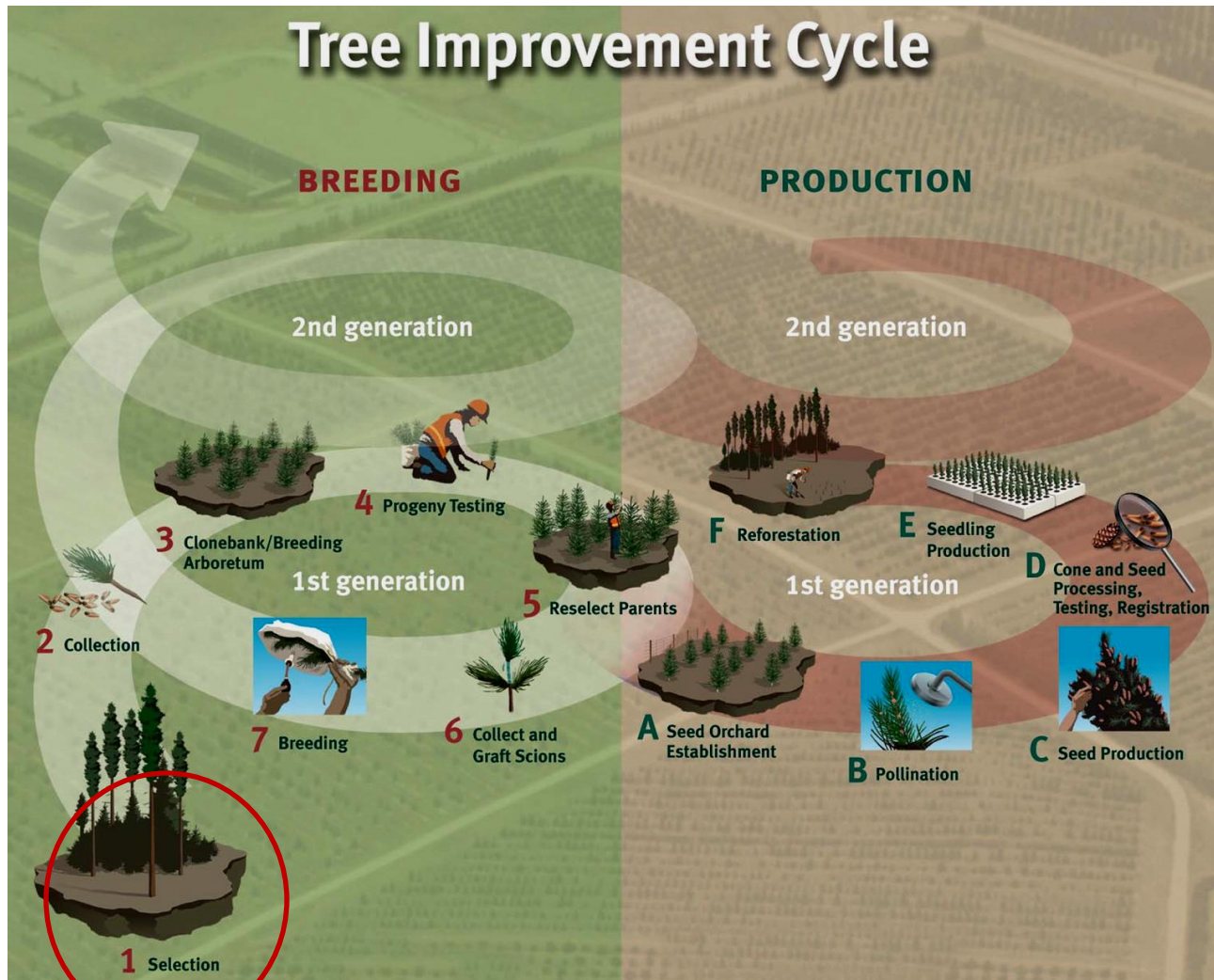
- Shumard oak – 1973
- Live oak – 1974
- Sweetgum – 1975
- Baldcypress – 1980
- Bur oak, Caddo maple, southern magnolia – 1983
- American sycamore – 1987
- bigtooth maple, cedar elm, chinkapin oak, slash pine - 1988



# Improving Urban Trees



# Improving Urban Trees



# TFS Urban Tree Improvement Program - Selection

## Member Responsibilities:

- Select and prioritize species to work with
- Identify potentially superior individuals
- Collect seed
- Establish tests



*Figure 37. Jack Summers, superintendent of parks, City of Garland, Texas, and Dallas Urban Forester Bobby Young score an outstanding specimen of shumard oak located in Garland.*



# TFS Urban Tree Improvement Program - Selection

## Cooperative Model

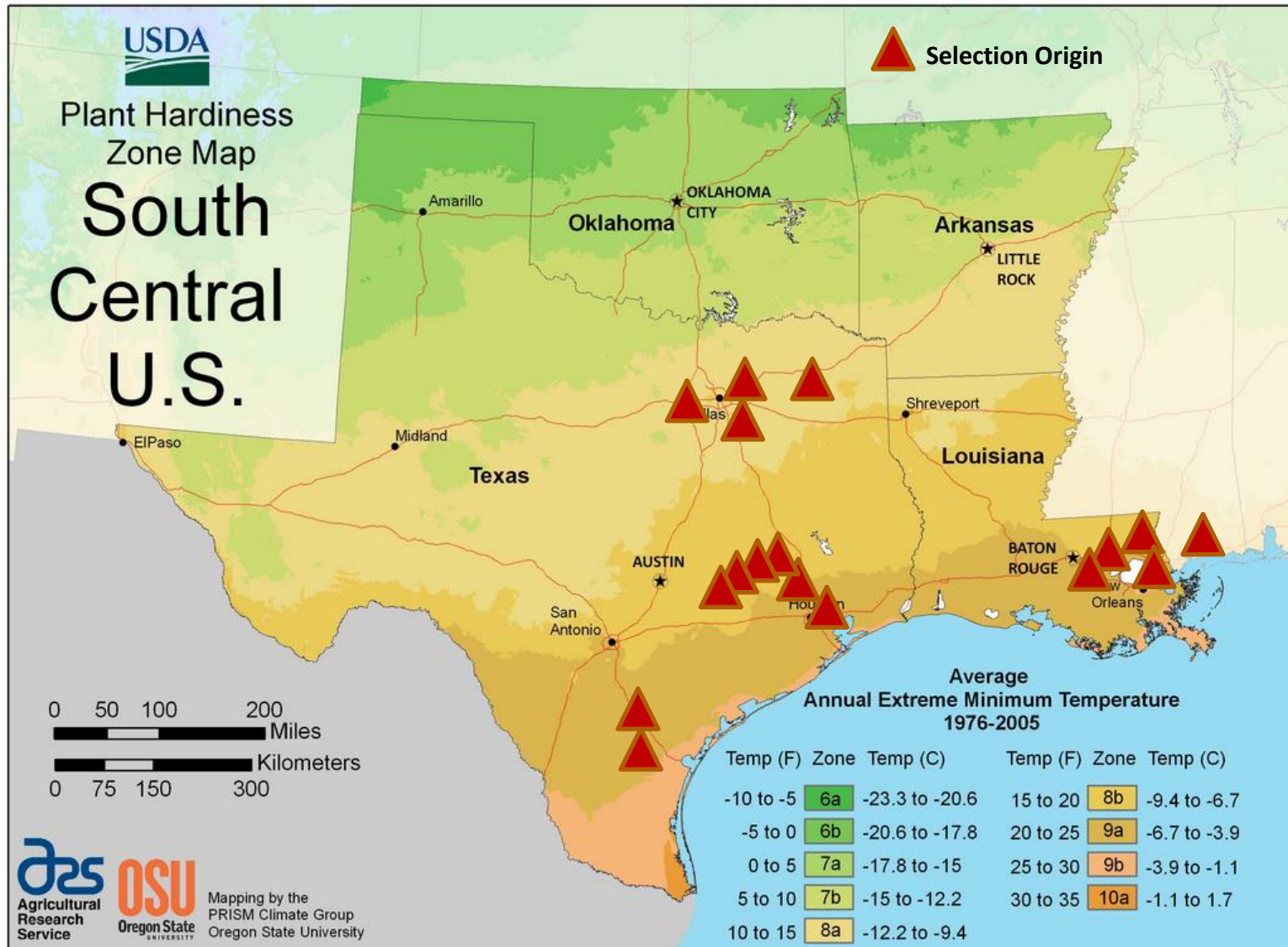
- ✓ Municipalities
- ✓ Commercial growers



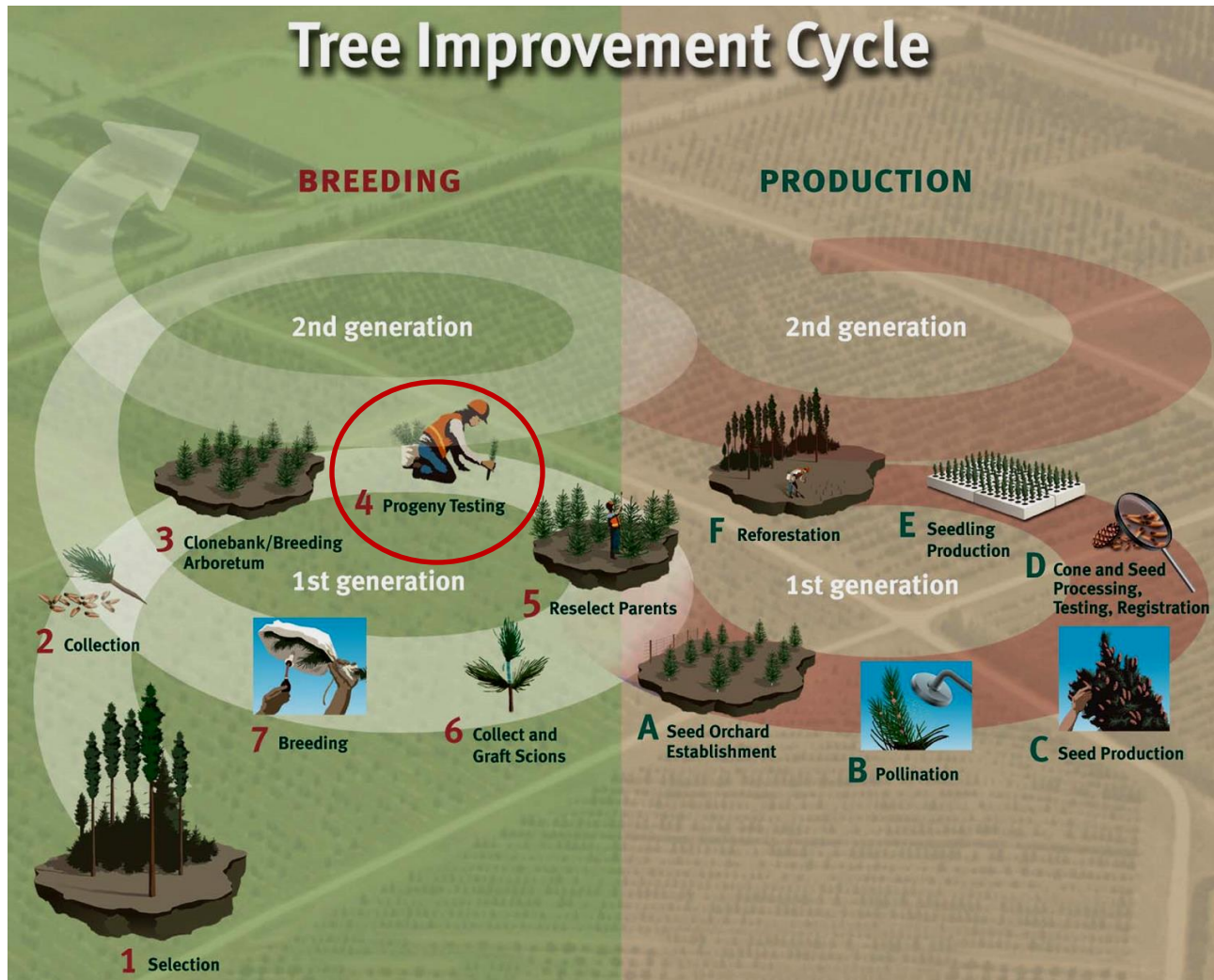
*Figure 24. A live oak selection for the Urban Tree Improvement Program.*



# Selection - Live oak (*Quercus virginiana/fusiformis*)



# Improving Urban Trees



# TFS Urban Tree Improvement Program - History

## Member Responsibilities:

- Collect seed
- Establish tests
- Tests measured at ages 1 (survival of primary importance), and ages 3 and 5 (growth)

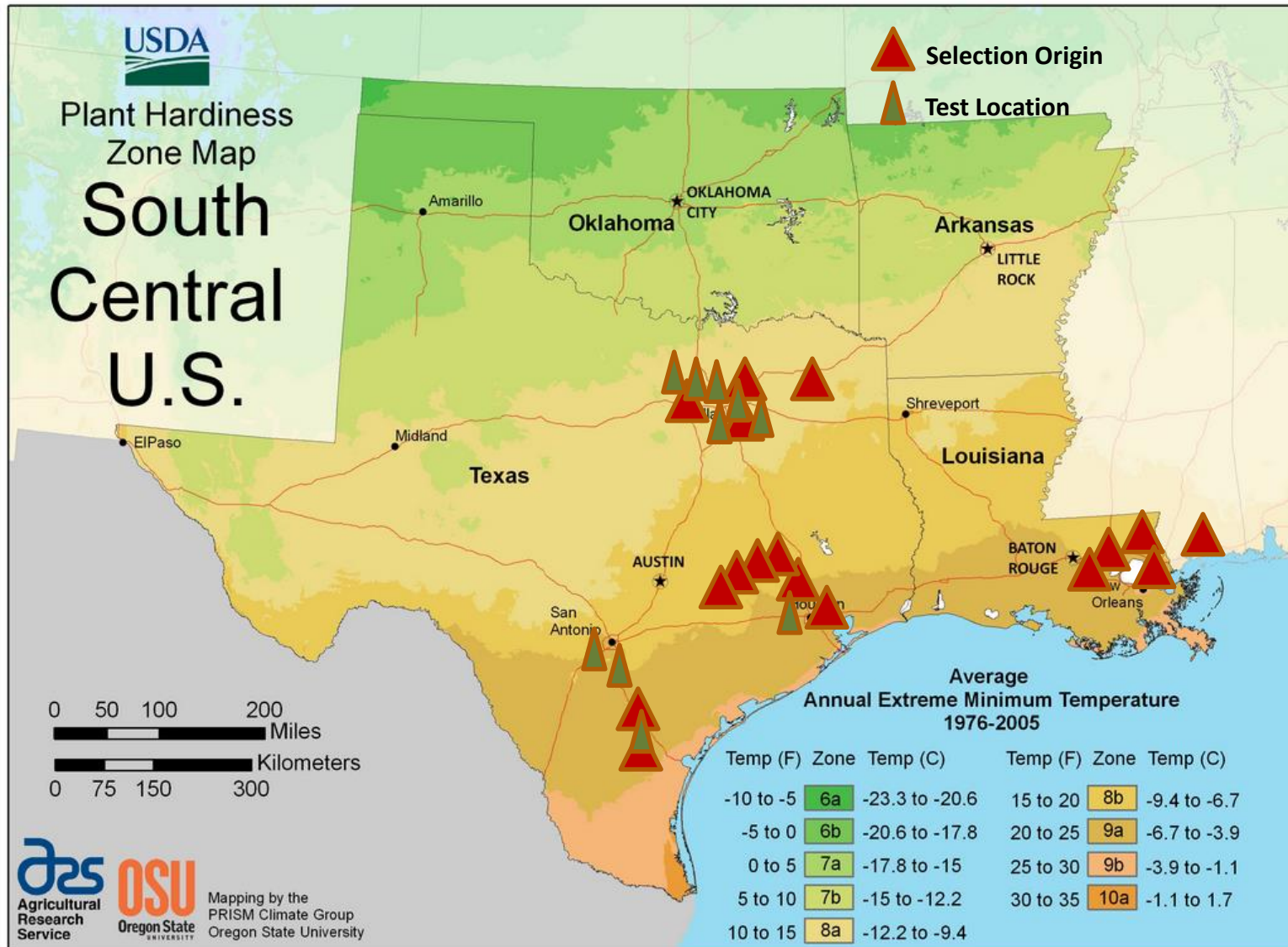


*Figure 28. Trees being removed for transplanting after the final measurements have been obtained from a live oak progeny test in the City of Fort Worth.*





# Testing - Live oak (*Quercus virginiana/fusiformis*)



# TFS Urban Tree Improvement Program – Results

## What Does it Mean?

### Genetic Improvement in TFS Urban Seed Orchards

<u>Species</u>	Orchard Acres			Average % Improvement		
	<u>Hudson</u>	Weeping		<u>Survival</u>	<u>Height</u>	<u>Diameter</u>
		<u>Mary</u>	<u>TOTAL</u>			
Shumard oak	2.1	2.5	4.6	12.1	20.8	23.3
Live oak	4.3	1.8	6.1	4.4	20.3	19.5
Baldcypress	1.3	1.5	2.8	0.7	18.3	7.1
Bur oak	1.6		1.6	3.9	23.4	23.9
Cedar elm	1.2	0.8	2.0	7.8	21.6	13.6
Chinkapin oak	0.7	0.9	1.6	6.3	9.0	12.0



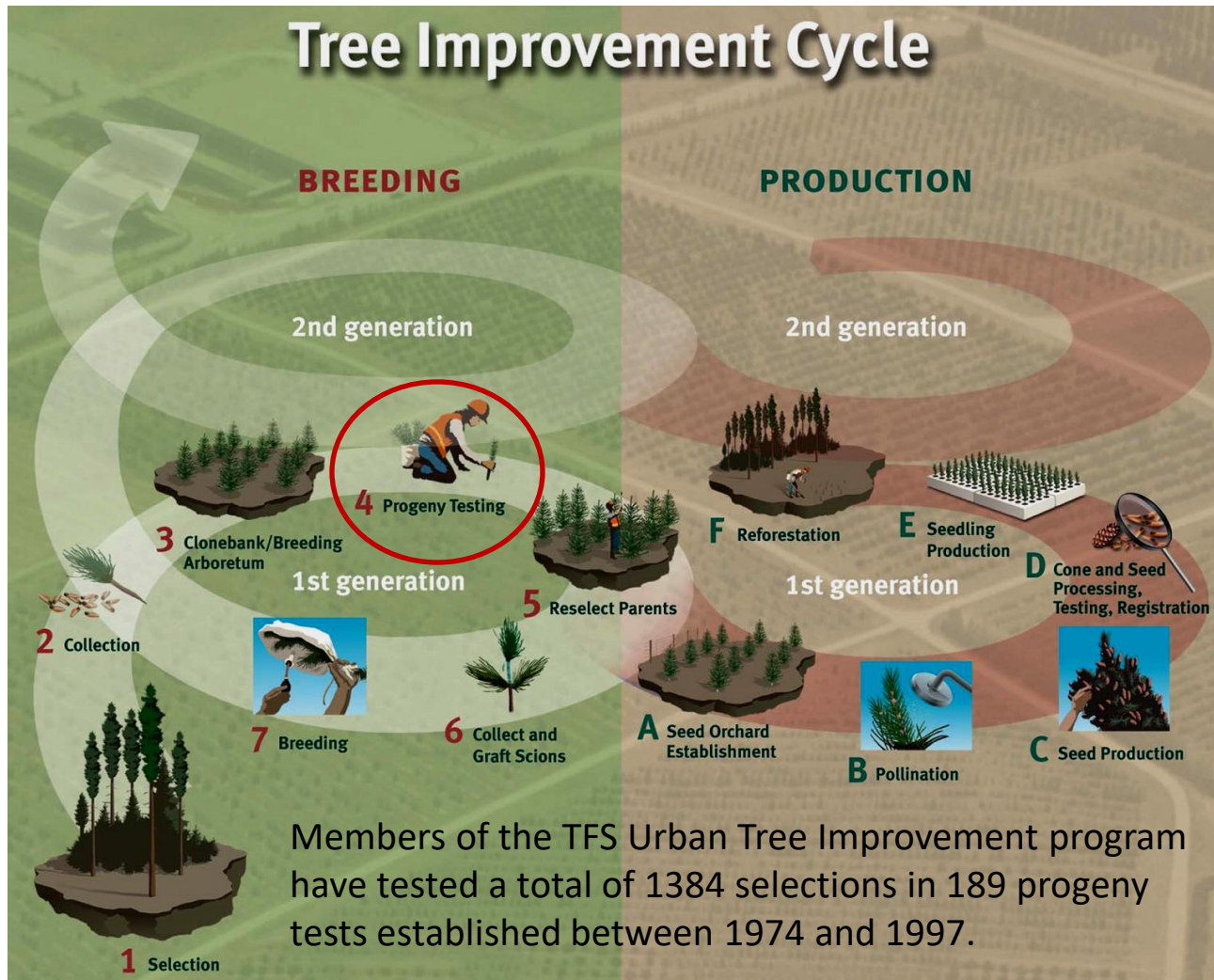
# TFS Urban Tree Improvement Program - History

## Benefits of Progeny Testing:

- Superior families to be identified in tests at age 3.
- Seed to be collected from all selections identified as superior after age-5 evaluation and made available to the membership directly or as seedlings for a fee established by the members.

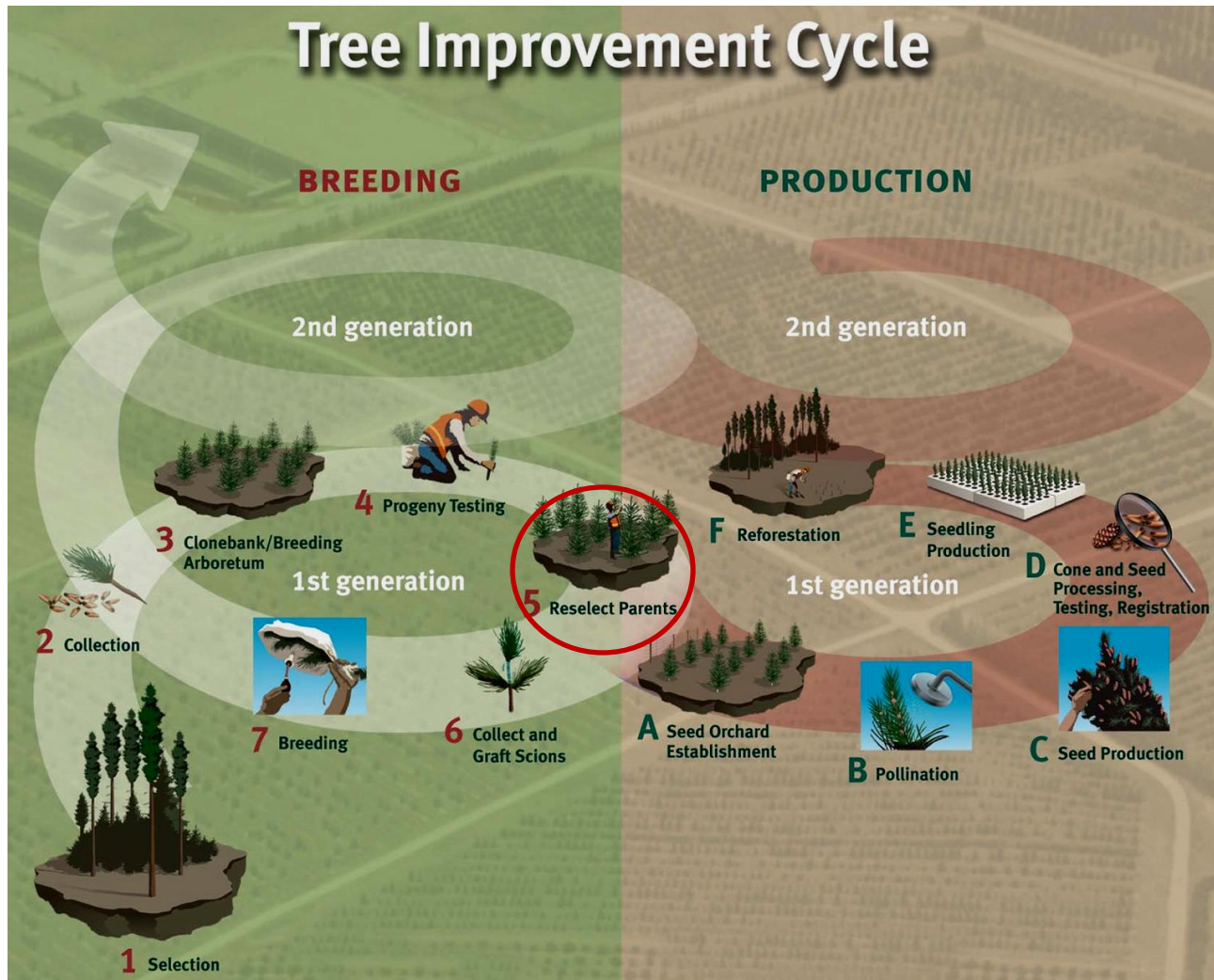


# Improving Urban Trees



Members of the TFS Urban Tree Improvement program have tested a total of 1384 selections in 189 progeny tests established between 1974 and 1997.

# Improving Urban Trees



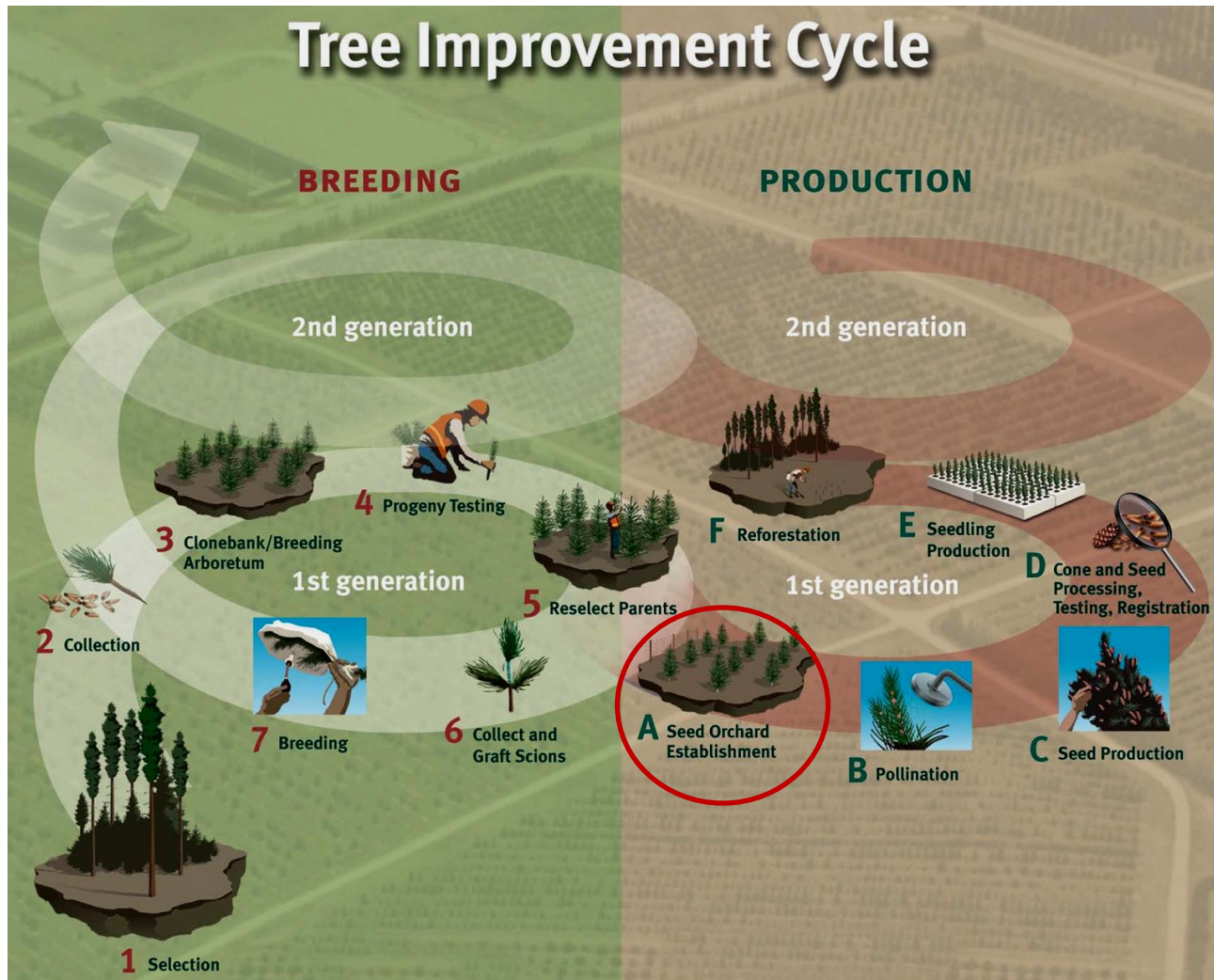
# TFS Urban Tree Improvement Program

## Number of Selections in the TFS Urban Tree Improvement Program

<u>Species</u>	<u># Families Tested</u>	<u># Selections</u>
Shumard oak	282	60
Live oak	250	58
Sweetgum	208	48
Baldcypress	210	36
Bur oak	112	29
Magnolia	103	27
Cedar elm	94	29
Chinkapin oak	<u>125</u>	<u>17</u>
<b>TOTALS:</b>	<b>1384</b>	<b>304</b>



# Improving Urban Trees



# TFS Urban Tree Improvement Program

## Percent Performance Improvements of Top 15 – 20% of Families in the TFS Urban Tree Improvement Program by Species and Age

<u>Species</u>	<u>Age</u>	<u>Survival</u>	<u>Height</u>	<u>Diameter</u>
Shumard oak	3	13 - 26	16 - 21	15
Shumard oak	5	19 - 28	18 - 21	21 - 24
Live oak	3	30	15 - 21	17
Live oak	5	30	13 - 20	10 - 18
Sweetgum	3	16 - 18	11 - 12	-
Sweetgum	5	-	11	10
Baldcypress	3	-	5 - 13	5 - 14
Baldcypress	5	-	10	-
Magnolia	3	-	11 - 25	9 - 17
Magnolia	5	<b>19</b>	11 - 22 ( <b>24</b> )	7 - 26 ( <b>38</b> )
Bur oak	3	-	13 - 19	11 - 18
Bur oak	5	-	6 - 18 ( <b>16</b> )	6 - 19 ( <b>21</b> )
Cedar elm	5	-	8.7	-

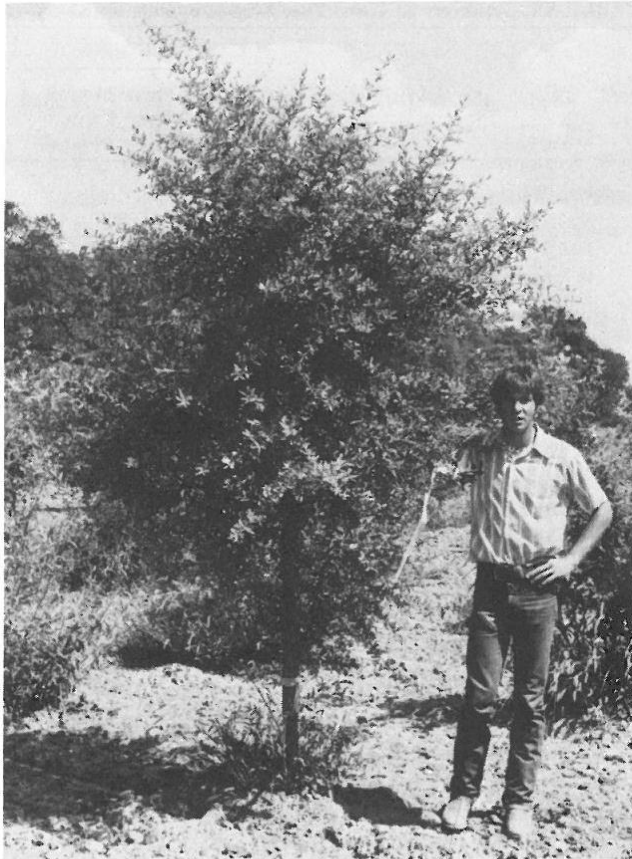
Numbers in **bold** represent performance of specific selections





# TFS Urban Tree Improvement Program – Seed Orchards

- Grafting for seed orchards begun in 1982



*Figure 17. Live oak second-generation selection at Fort Worth for the Urban Tree Improvement Program.*

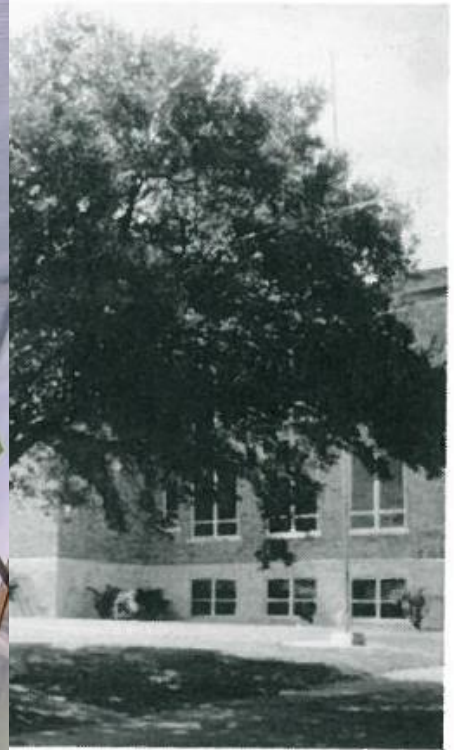


*Figure 24. A live oak selection for the Urban Tree Improvement Program.*



# TFS Urban Tree Improvement Program – Seed Orchards

- Grafting for seed orchards begun in 1982



*for the Urban Tree*

Figure 17. Live oak second-generation  
the Urban Tree Improvement Program

# TFS Urban Tree Improvement Program – Seed Orchards

- Seed orchards to be established to provide seed/seedlings to members
  - Primary location: Hudson, TX (Angelina County)
  - Secondary locations: Weeping Mary (Cherokee County)  
Brazos Bottom (Burleson County) – Live oak only



# TFS Urban Tree Improvement Program

- Since 1983, the TFS Urban Tree Improvement Program has made available to its members more than 68,000 seedlings and 1.8 tons of seed.



TFS Indian Mound Nursery Alto, TX

TFS Greenhouse – College Station, TX

# Texas Tested Texas Tough

## Our Program

Through selection and testing of local sources of native species, our program is dedicated to enhancing the health, resilience, and beauty of trees in urban environments by increasing viability, vigor, and climate adaptation.

## Our Seeds

Seed orchards have been established for each of the species in the program. Seeds from the hardest selections, identified through rigorous testing, are now available to anyone to plant. *Texas Tested, Texas Tough* trees are disease resistant, drought tolerant, have accelerated growth and enhanced adaptability to environment stressors.

## Our Work

We work closely with each grower utilizing *Texas Tested, Texas Tough* seed to make sure that seedling production standards are met or exceeded. This helps ensure that only the best selections go into production.

## Our Pledge

Trees are a life-long investment and growing a *Texas Tested, Texas Tough* tree ensures a lifetime of enjoyment from a tree tested to withstand the harshest urban environment.

The Urban Tree Improvement Program provides a range of services aimed at improving the health and resiliency of Texas trees through:

Research & Development | Tree Selection | Seed Production

**GROW** TEXAS TESTED  
TEXAS TOUGH

As a partner,  
you will receive

Your Choice of Select  
Species Seeds

Tree Tags

Customizable  
Postcard

Support from



For more info, contact

Texas A&M Forest Service  
TREE IMPROVEMENT PROGRAM

tip@rfs.tamu.edu  
979.862.8751

Trees labeled as *Texas Tested, Texas Tough* descend from genetic lines that are proven to withstand a variety of conditions, including drought, heat and pests. *Texas Tested, Texas Tough* trees were developed to thrive in harsh Texas climates.

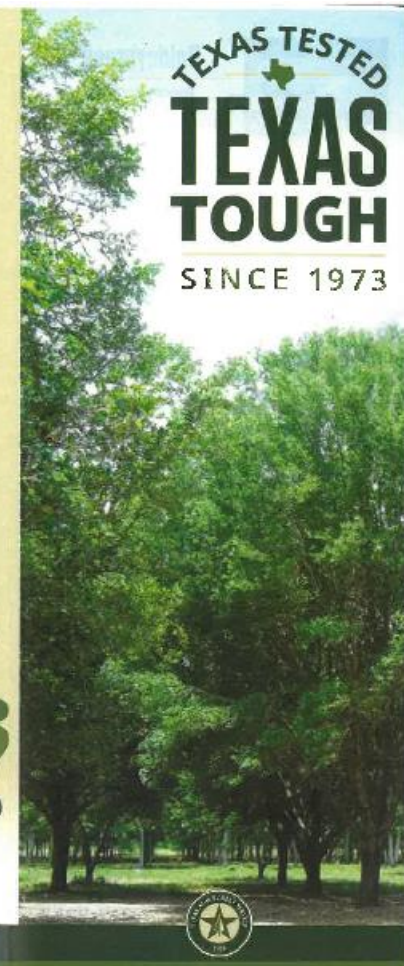
Want seeds?



**TEXAS TESTED**  
**TEXAS TOUGH**  
SINCE 1973

TEXAS A&M FOREST SERVICE  
GO TEXAS

Improve Seeds | Monitor Growth | Increase Longevity



# Texas Tested Texas Tough



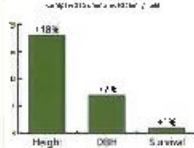
## Baldcypress

*Taxodium distichum*

- › Straight, conical form
- › Fine-textured foliage that turns copper colored in the fall

- MODERATE
- FULL SUN
- DECIDUOUS
- UP TO 2' PER YEAR
- HT: 30' WIDTH: 60'

### BY THE NUMBERS



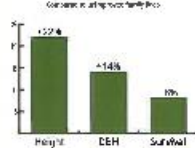
## Cedar Elm

*Ulmus crassifolia*

- › A great addition to any landscape
- › Extensive root systems aid in soil stabilization

- MINGRATE
- FULL SUN
- DECIDUOUS
- UP TO 1.5' PER YEAR
- HT: 30' WIDTH: 40'

### BY THE NUMBERS



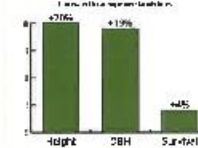
## Live Oak

*Quercus virginiana*

- › A statement piece in any landscape
- › Low arching limbs provide dense shade

- MINGRATE
- FULL SUN
- WINTERFA
- UP TO 2.5' PER YEAR
- HT: 50' WIDTH: 100'

### BY THE NUMBERS



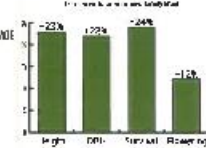
## Southern Magnolia

*Magnolia grandiflora*

- › Large, stately evergreen tree
- › Large glossy leaves
- › Showy, fragrant flowers

- HIGH
- FULL SUN OR PART AL SHIDE
- EVERGREEN
- UP TO 3" PER YEAR
- HT: 80' WIDTH: 60'

### BY THE NUMBERS



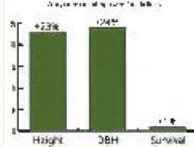
## Bur Oak

*Quercus macrocarpa*

- › A large shade tree found in a variety of soils and habitats
- › Known for its large acorns

- LOW
- FULL SUN
- DECIDUOUS
- UP TO 2' PER YEAR
- HT: 70' WIDTH: 80'

### BY THE NUMBERS



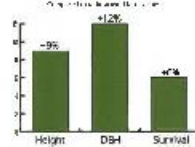
## Chinkapin Oak

*Quercus muhlenbergii*

- › Versatile for all landscapes
- › Simple, toothed leaves that turn a variety of colors in the fall

- LOW
- FULL SUN
- DECIDUOUS
- UP TO 2' PER YEAR
- HT: 30' WIDTH: 40'

### BY THE NUMBERS



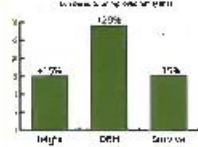
## Shumard Oak

*Quercus shumardii*

- › Large, handsome shade tree
- › Iconic leaves turn scarlet in the fall

- MODERATE
- FULL SUN
- DECIDUOUS
- UP TO 2.5' PER YEAR
- HT: 100' WIDTH: 80'

### BY THE NUMBERS



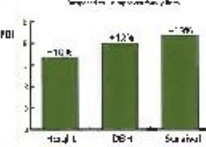
## Sweetgum

*Liquidambar styraciflua*

- › Unique star-shaped leaves
- › Vibrant fall color
- › Unusual seed pod

- LOW TO MODERATE
- FULL SUN OR PARTIAL SHAD
- DECIDUOUS FALL CO
- 2 TO 3' PER YEAR
- HT: 100' WIDTH: 80'

### BY THE NUMBERS



### CORNER

- Water Needs
- Growth Rate
- Light Needs
- Mature Size
- Trunk Type



Since 1945, Texas A&M Forest Service has worked to conserve and protect the resources and lands of Texas. Among state agencies, Texas A&M Forest Service is a leader in both sustainable forest management as well as incident response.

Customers should specify the number of tree tags to be used in retail space once seedlings have reached retail maturity. To purchase an order of tree tags, use the QR code on the back or visit [www.TexasToughTrees.com/edu](http://www.TexasToughTrees.com/edu).

The Urban Tree Improvement Program was established more than 40 years ago to create a supply of trees for future landscapes. Spanning decades, this program has produced some of the hardest, climate-adaptable tree species that are now offered in Tough Texas Tested, Texas Tough.

# Improving Urban Trees in Georgia

- Partnerships/Collaboration/Grants
  - Sharing the workload (seedling production, testing, seed orchards)

# Improving Urban Trees in Georgia

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  - and the wealth

## URBAN & COMMUNITY FORESTRY

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### Grants Will Grow Tree Canopy in Savannah, St. Marys

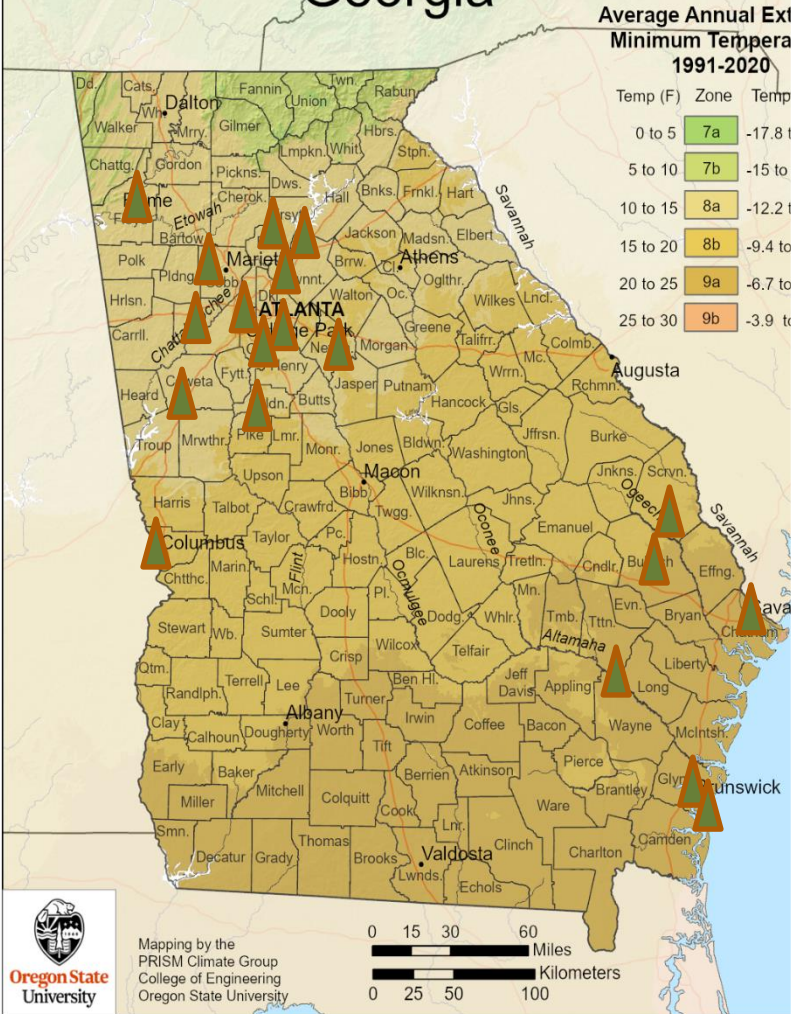
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The Current, Jan. 8, 2024

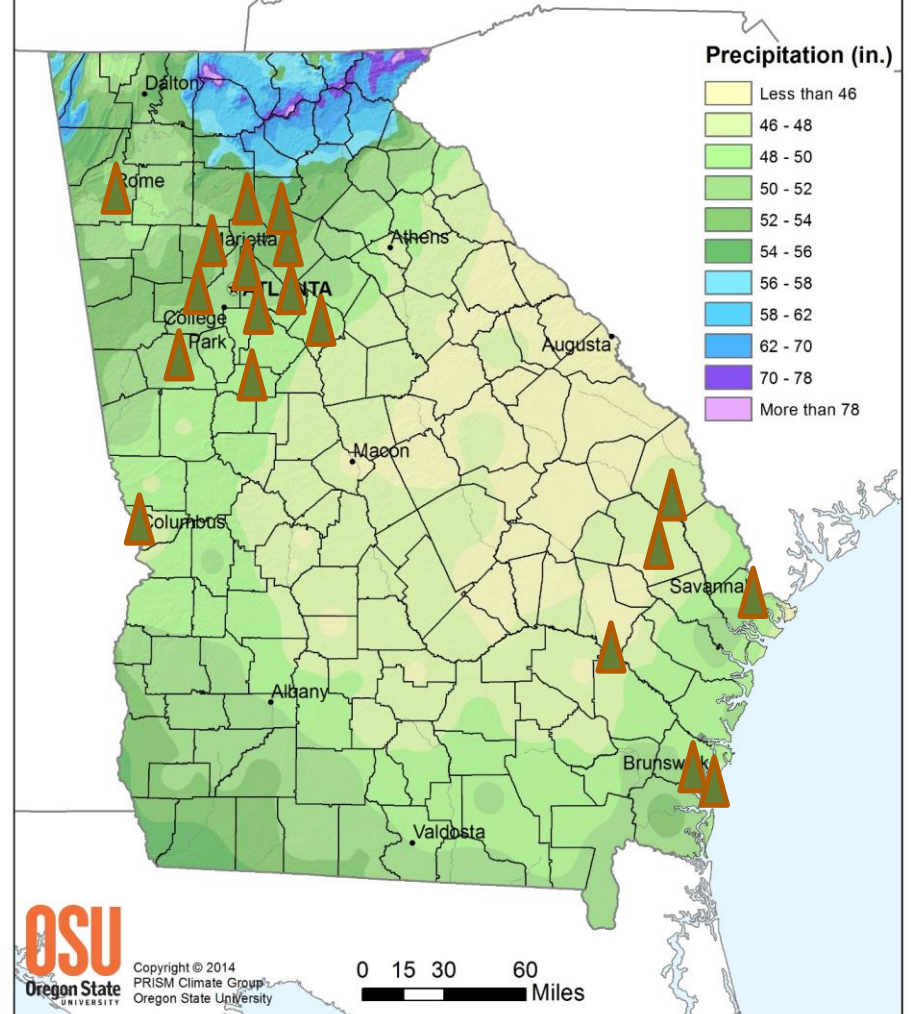
With graceful live oaks arching over its main arteries, Savannah has long been lauded for its trees. But as development heats up in and around Savannah and a large portion of the city's street trees are reaching the end of their natural life faster than they are being replaced, the urban canopy has suffered. [Read More](#)



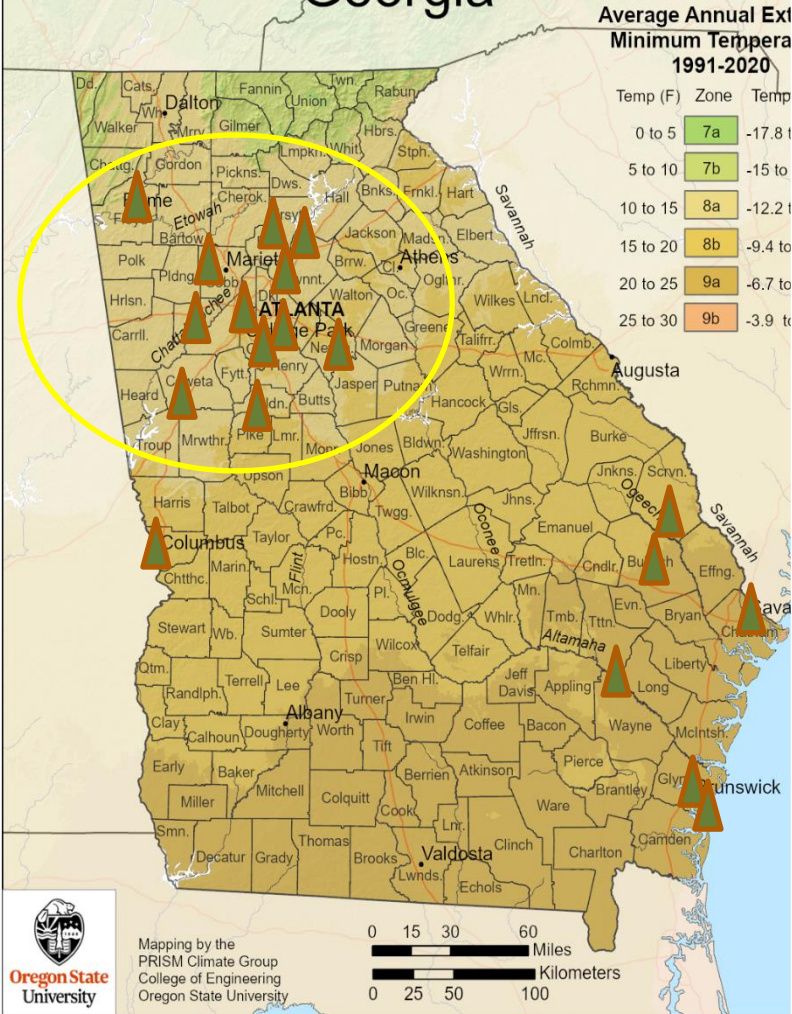
# 2023 USDA Plant Hardiness Zone Map Georgia



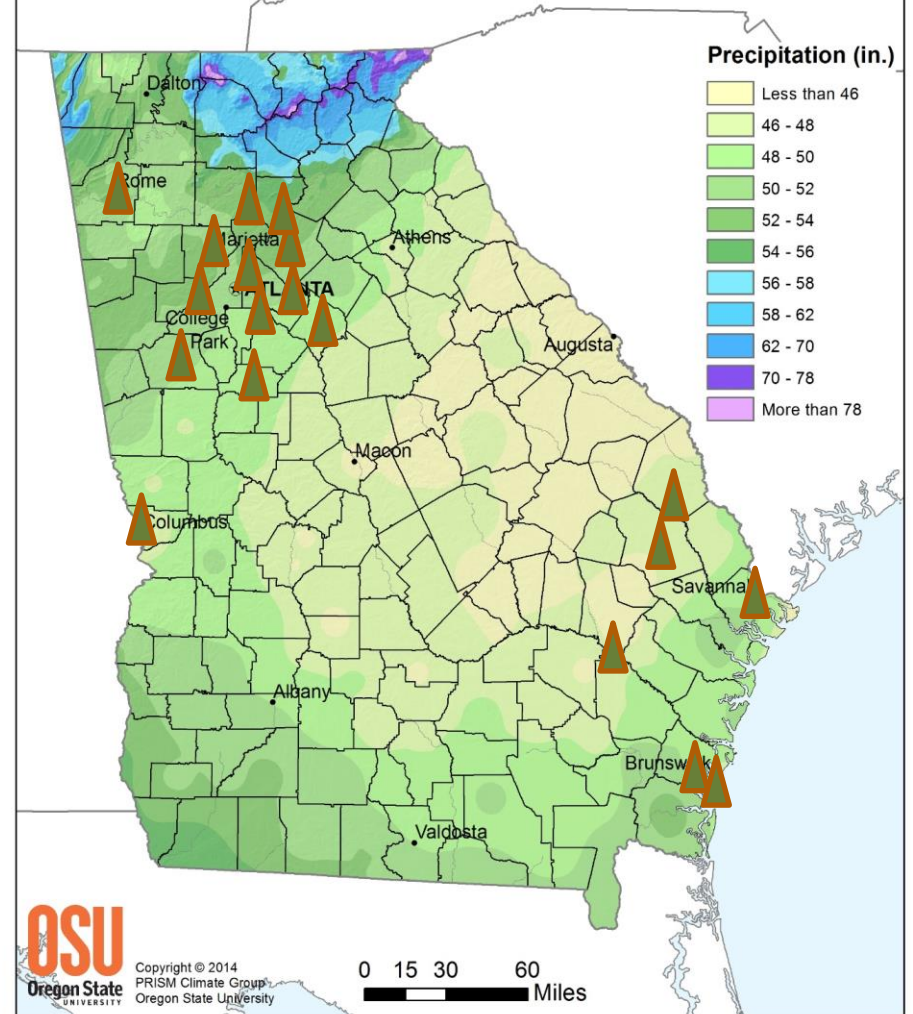
# Average Annual Precipitation (1981-2010) Georgia



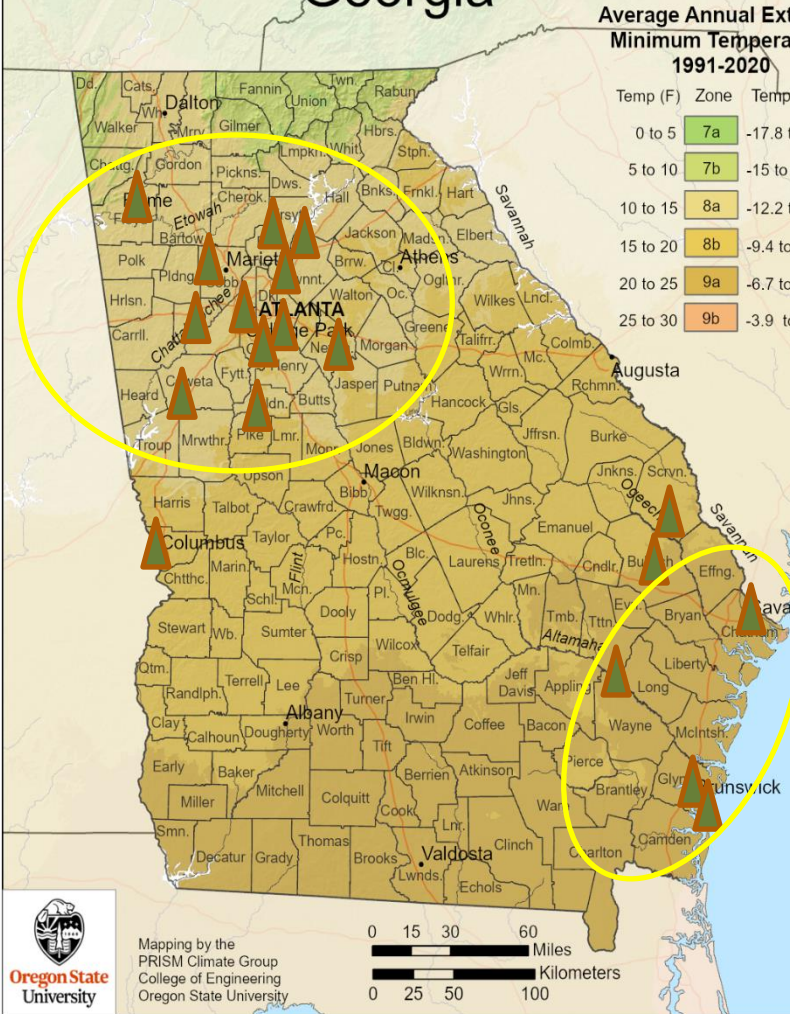
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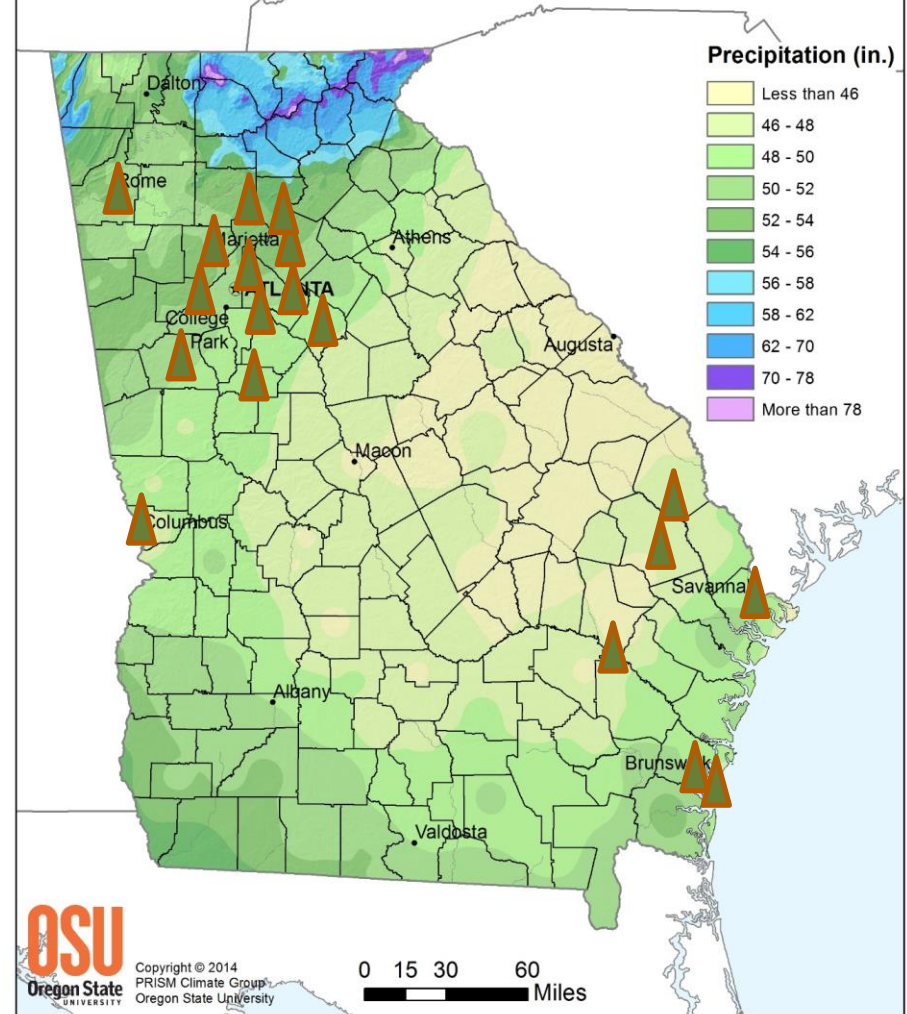
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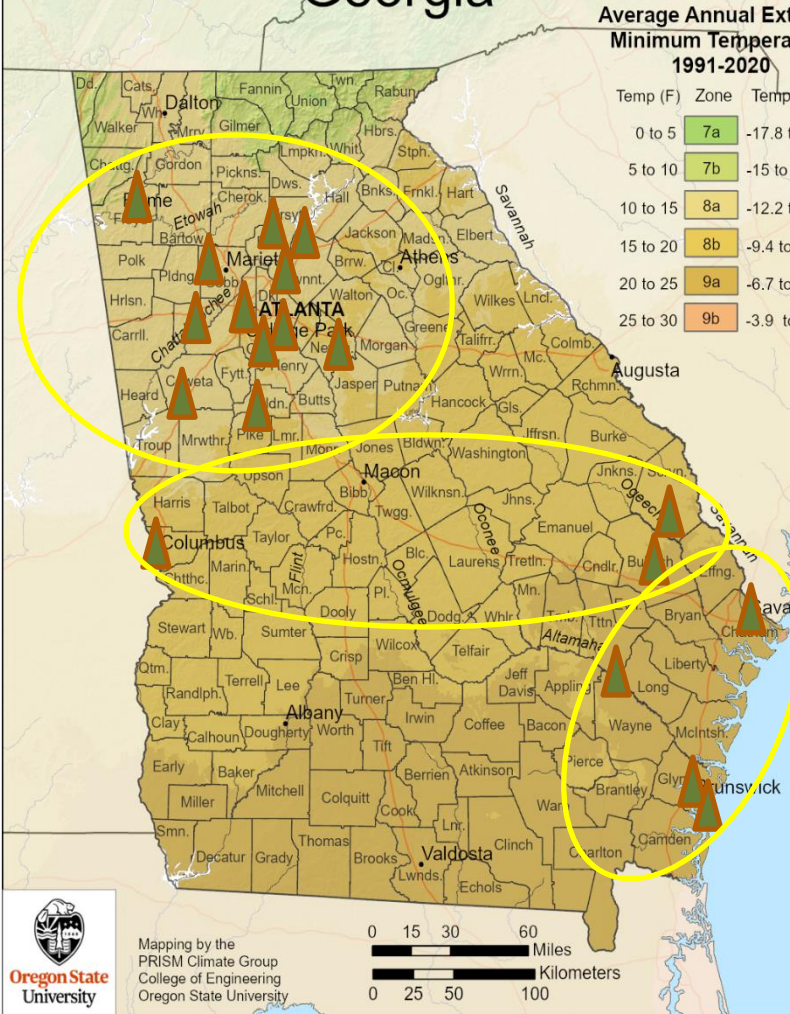
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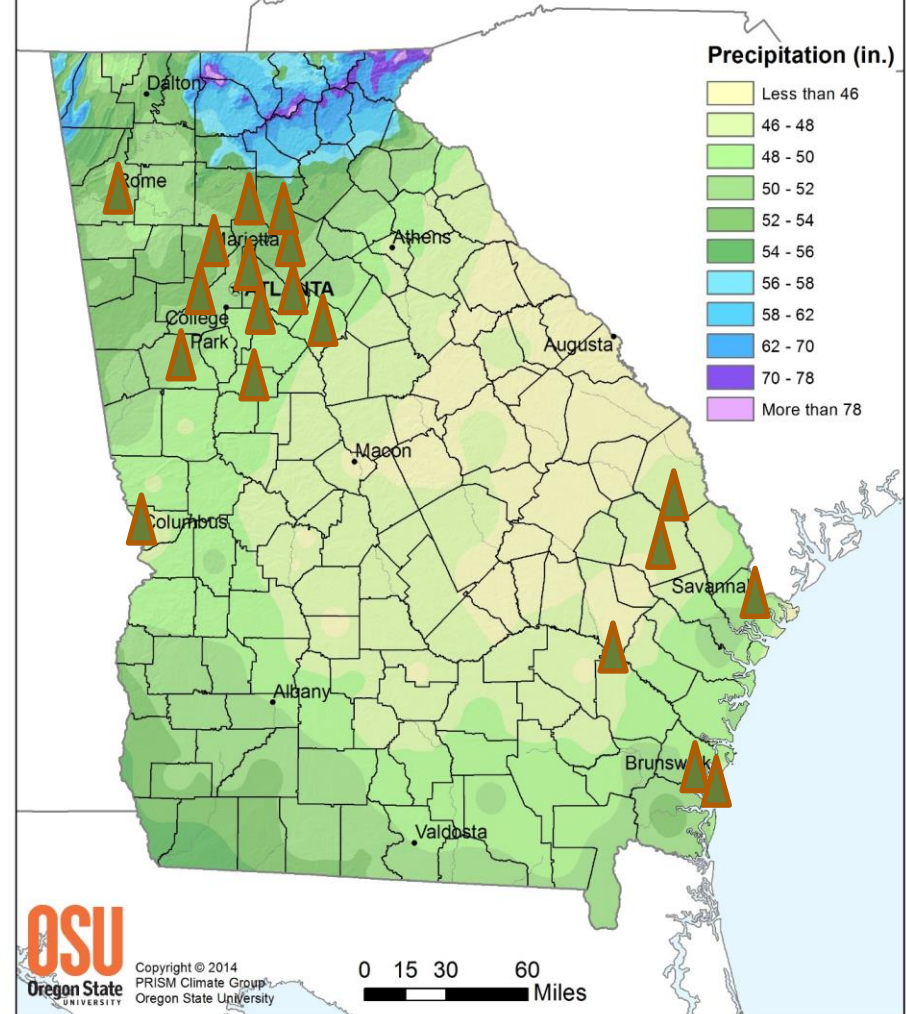
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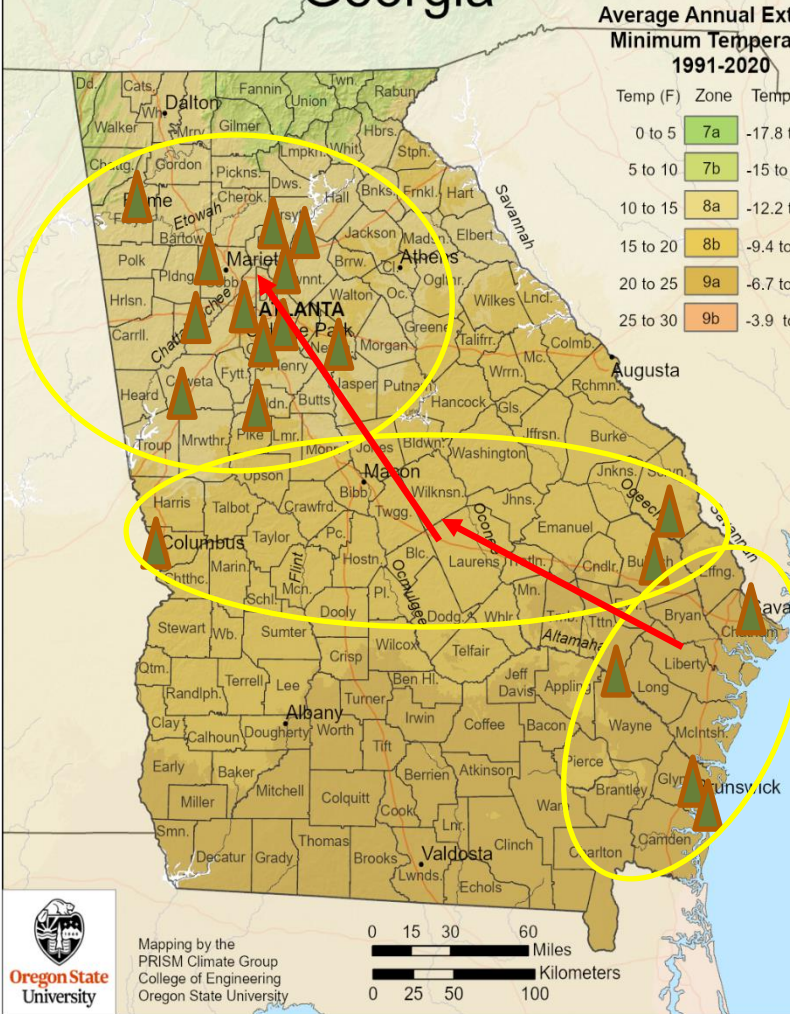
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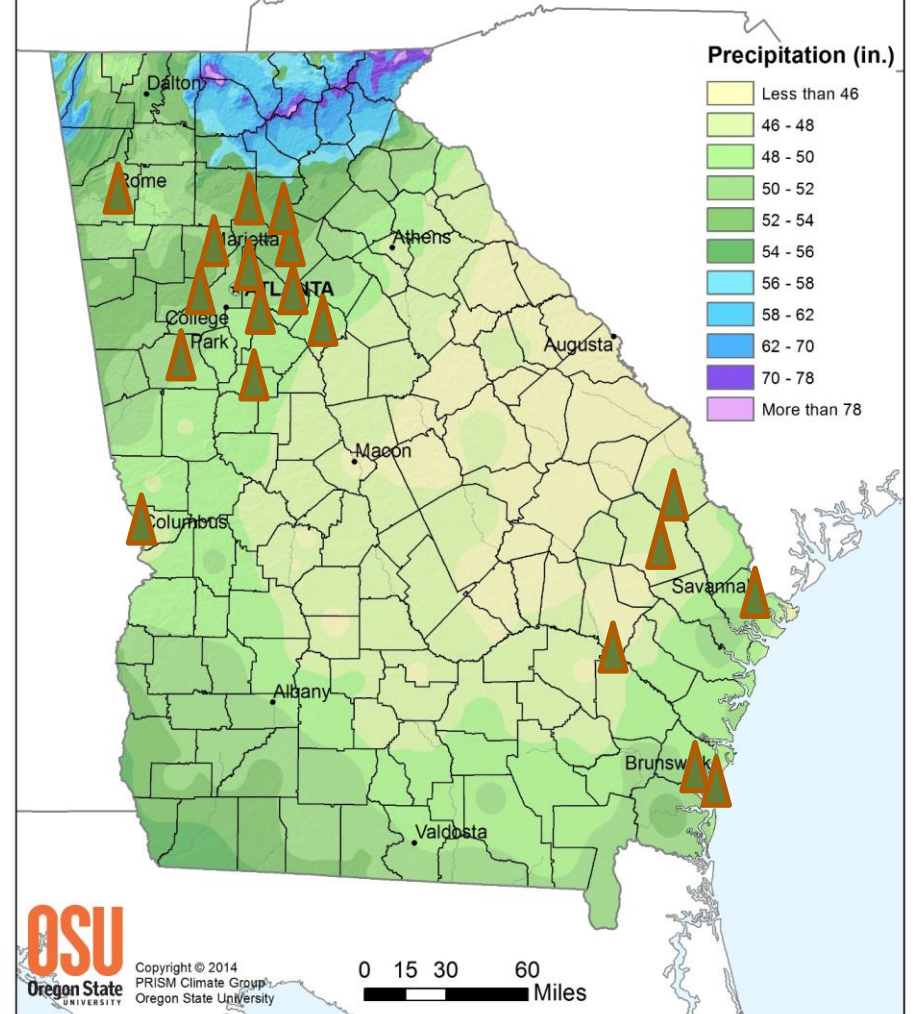
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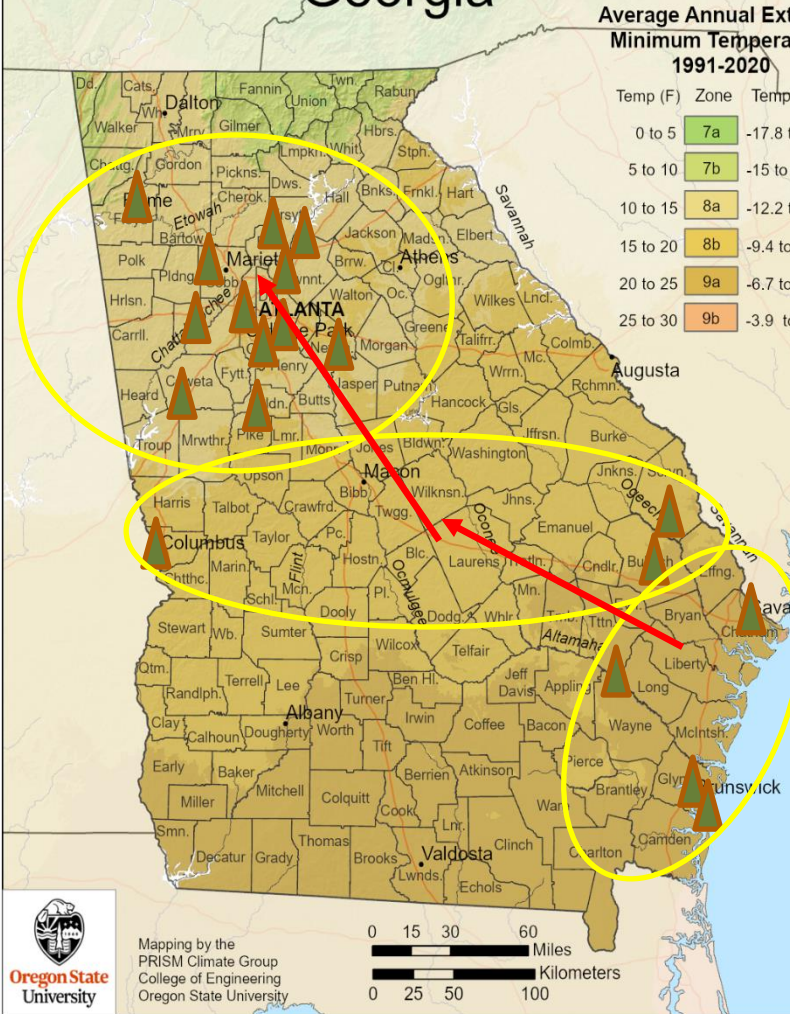
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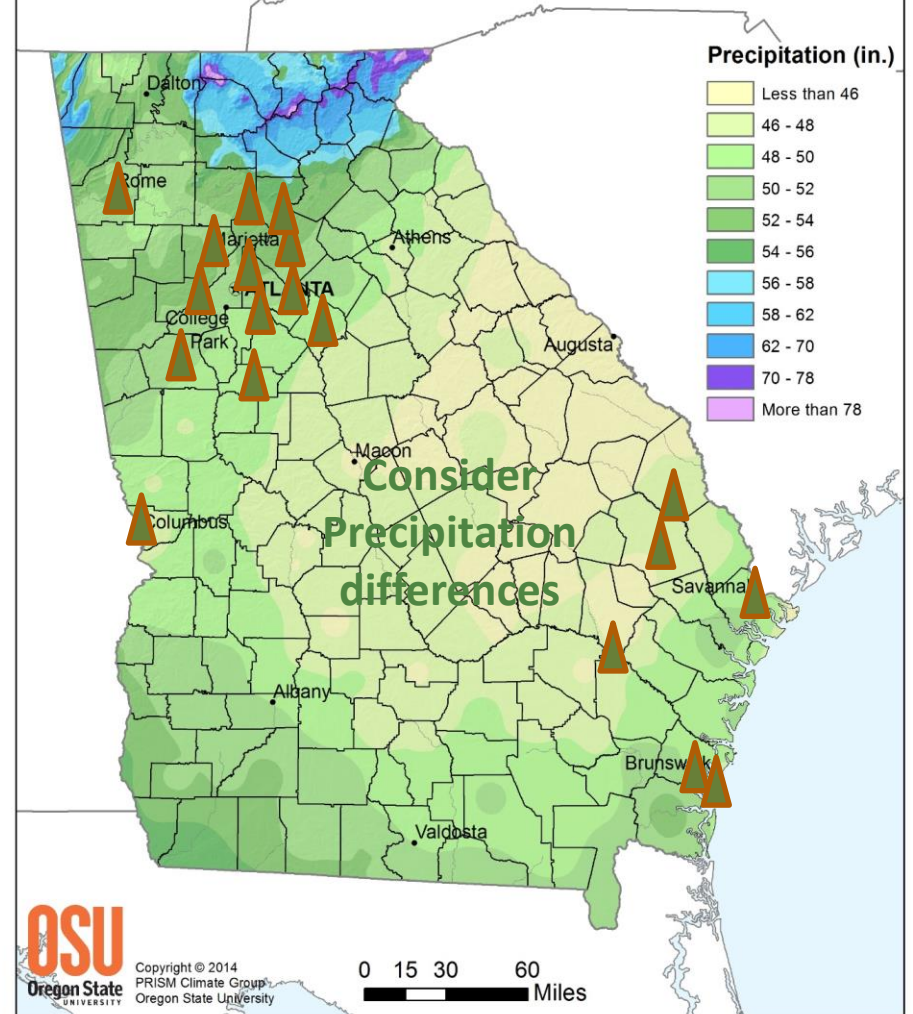
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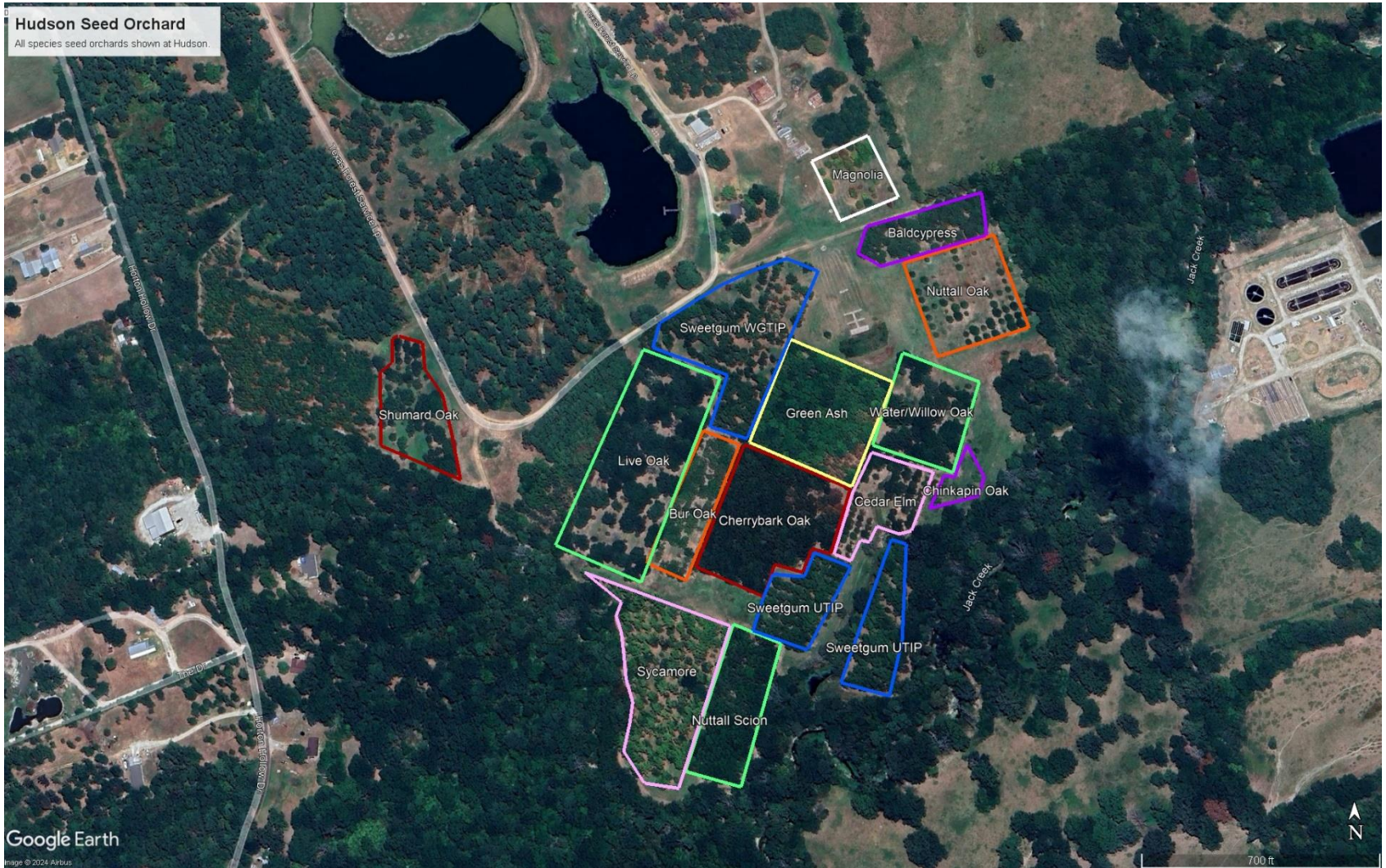
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# Average Annual Precipitation (1981-2010) Georgia



# Improving Urban Trees



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# Improving Urban Trees



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U.S. DEPARTMENT OF AGRICULTURE

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ScienceX

**Urban Forest Connections**

First Friday All Climate Change Talks

Videos

Photos

## Urban Forest Connections

This webinar series creates a stage for experts to share the latest science, practice, and policy on urban and community forestry. Topics include issues affecting the health of people and the health of the trees and forests that communities depend on to moderate local climate extremes, and provide food, shelter, water, wildlife habitat, environmental justice, artistic expression and spiritual healing.

While focused primarily on the needs of local advocates and practitioners, our participants range from state and federal government to nonprofit, municipal, university, private industry and public health leaders. Please join us!

Tune in every other month on second Wednesdays from 1:00pm - 2:15pm ET.

If you have questions or comments about this webinar series or wish to present your science and innovative practice or policy on our stage, please [email](#) us!

Microsoft Teams Meeting: [Link](#)



Photo Credit: Texas A&M Forest Service

# Improving Urban Trees

Thank You !



TEXAS A&M  
FOREST SERVICE



*BREEDING FOR PRODUCTIVITY, RESILIENCE, SUSTAINABILITY*

# Improving Urban Trees

Thank You !

Questions?



TEXAS A&M  
FOREST SERVICE



*BREEDING FOR PRODUCTIVITY, RESILIENCE, SUSTAINABILITY*