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

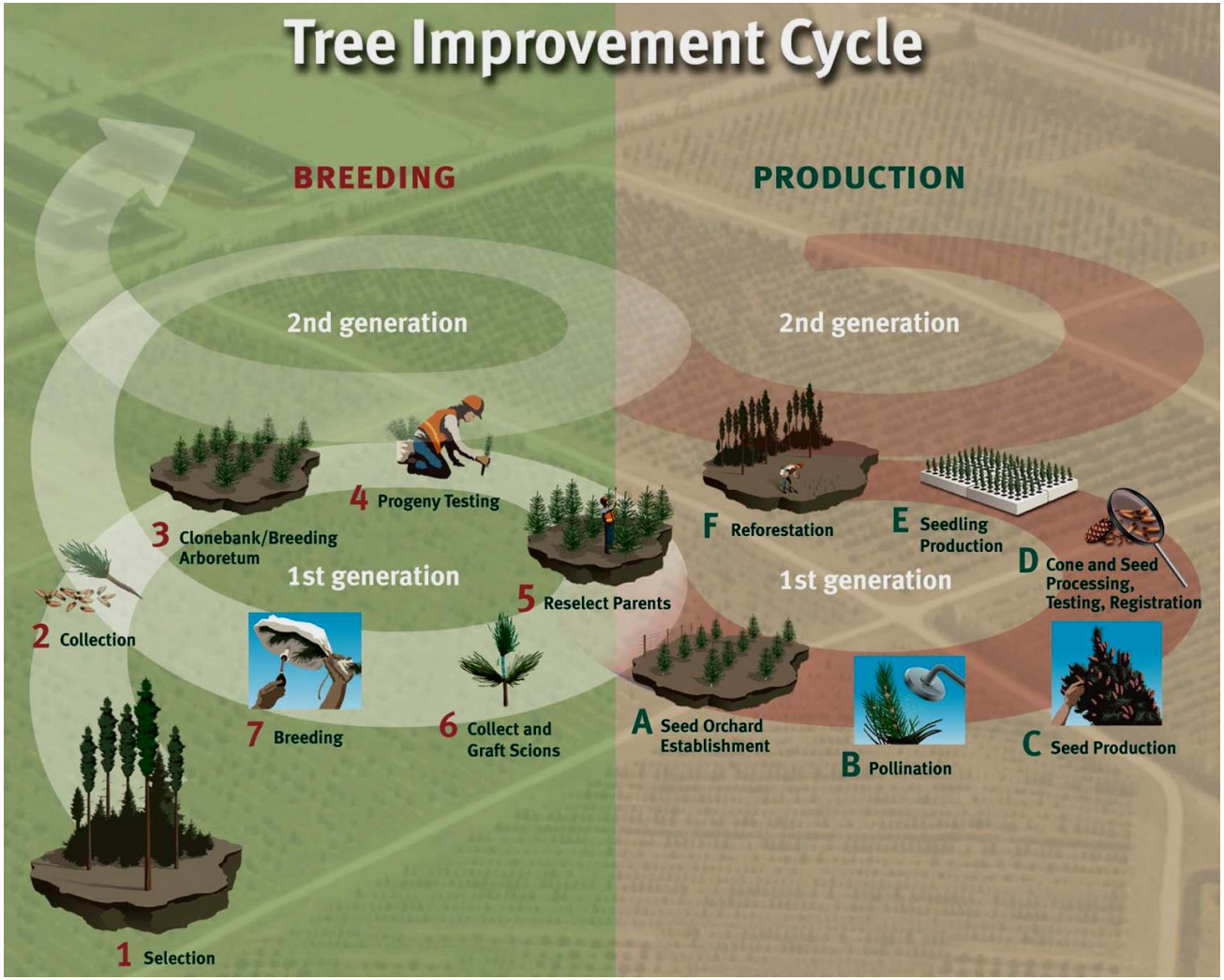
- Commercial Pine and Hardwood
- Virginia Pine – Christmas Tree
- Urban Tree Improvement
- West Texas Nursery (2024)

SAF Certified Forester
Texas Accredited Forester

Improving Urban Trees

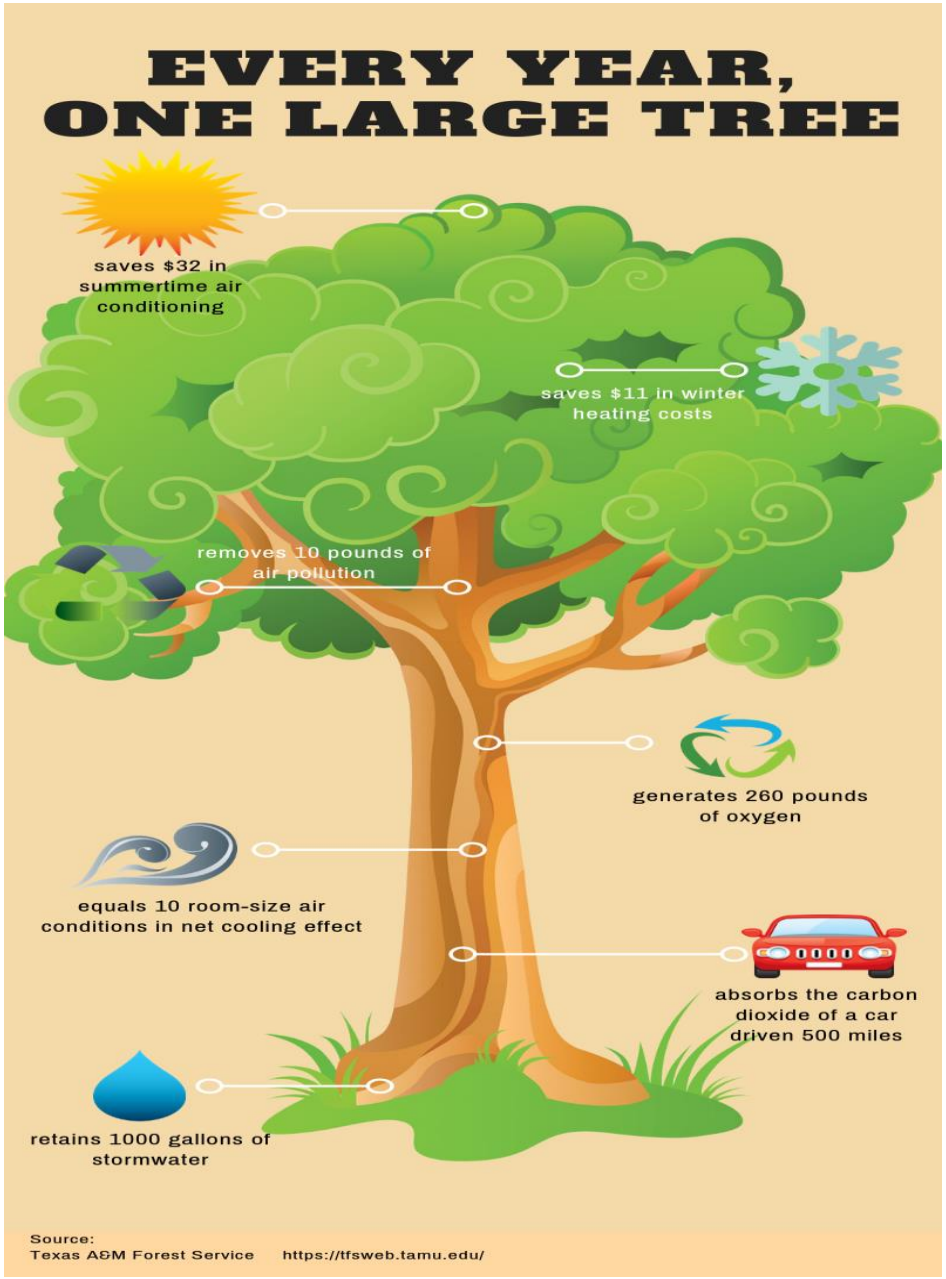
Photo courtesy of Woodland Tree Services

Improving Urban Trees



WHY IMPROVE URBAN TREES?

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

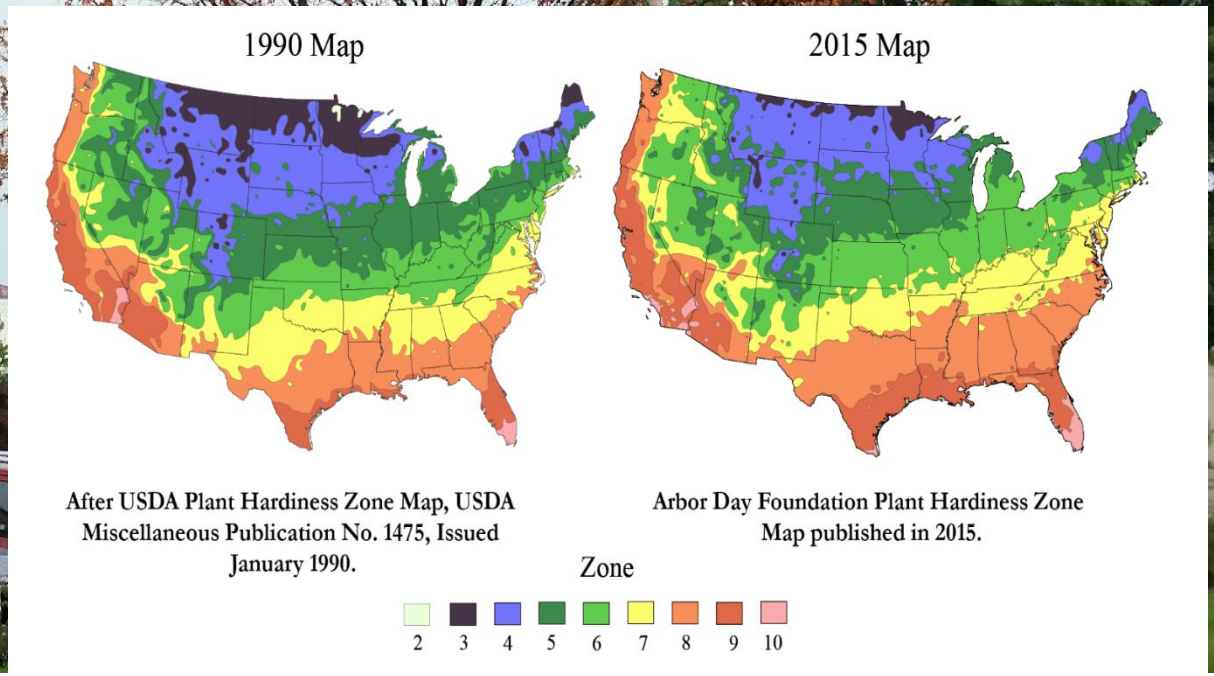


TEXAS A&M FOREST SERVICE

TEXAS A&M FOREST SERVICE


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.*

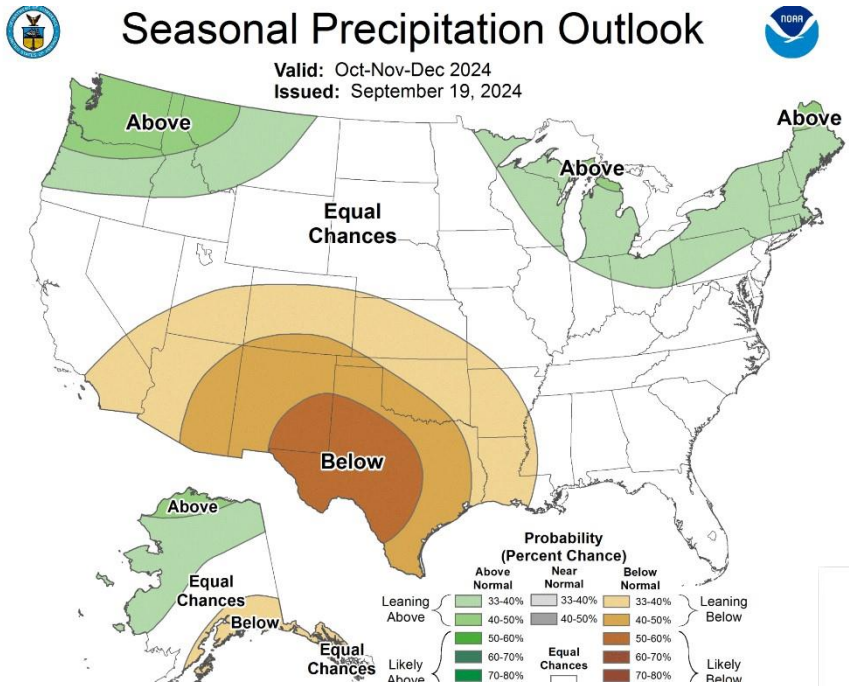
But our trees are in peril – especially in the urban environment!

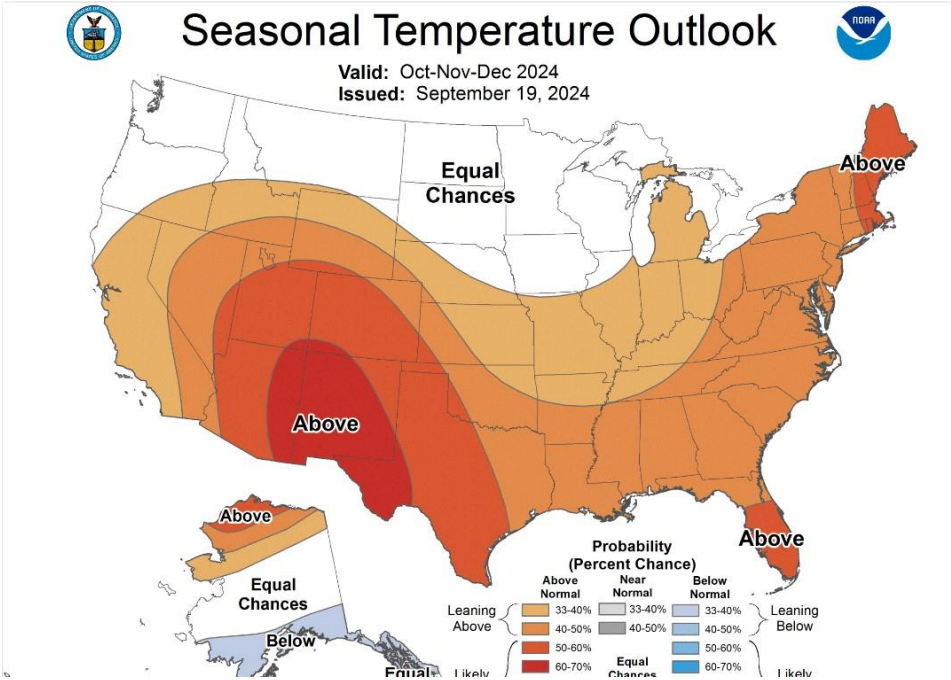


After USDA Plant Hardiness Zone Map, USDA Miscellaneous Publication No. 1475, Issued January 1990.

Arbor Day Foundation Plant Hardiness Zone Map published in 2015.

TEXAS A&M FOREST SERVICE





TEXAS A&M FOREST SERVICE

SMART NEWS

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

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

JESSE KLEIN SCIENCE APR 6, 2021 8:00 AM

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?

American Forests™

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

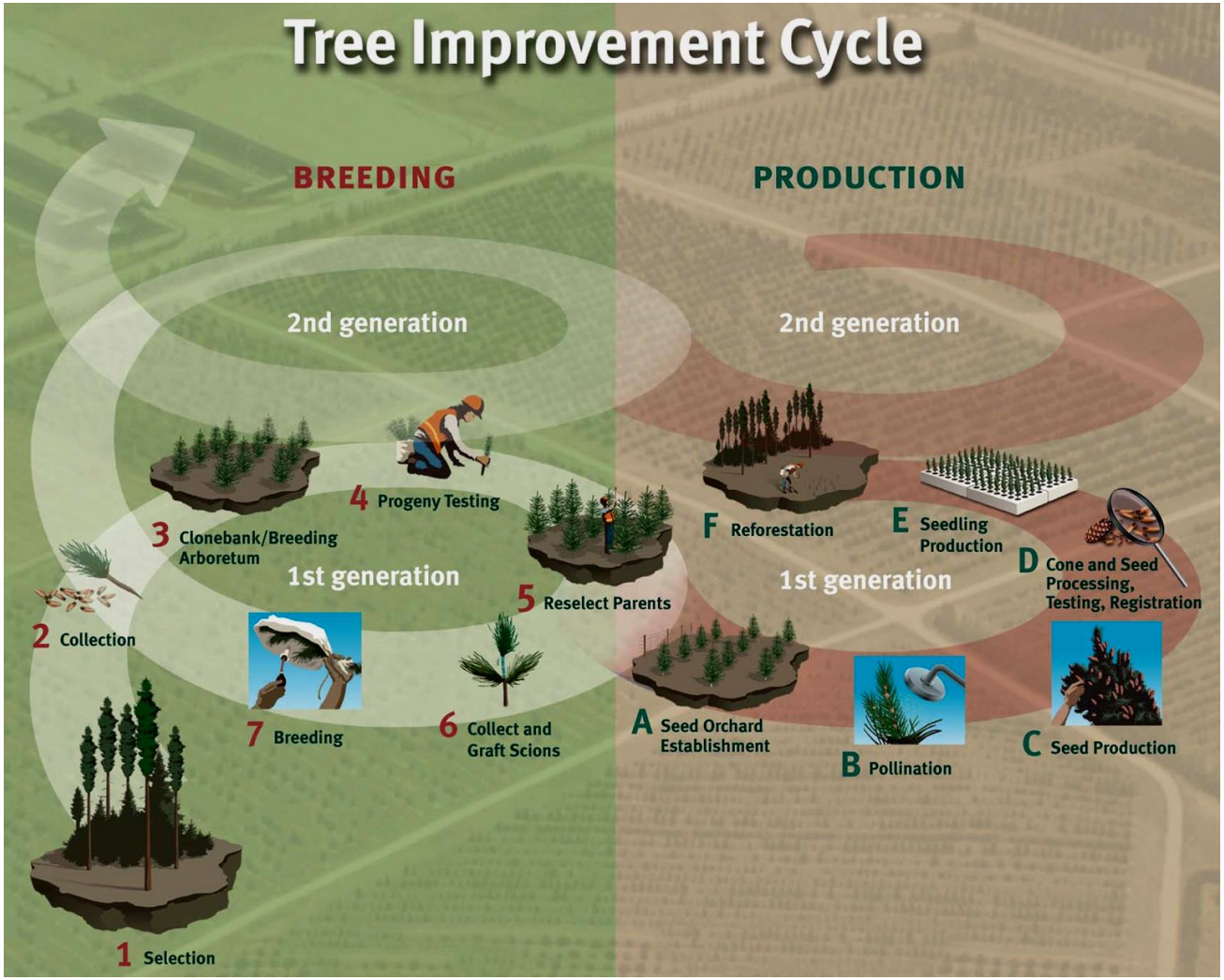
Cooperative Model

- ✓ Municipalities
- ✓ Commercial growers

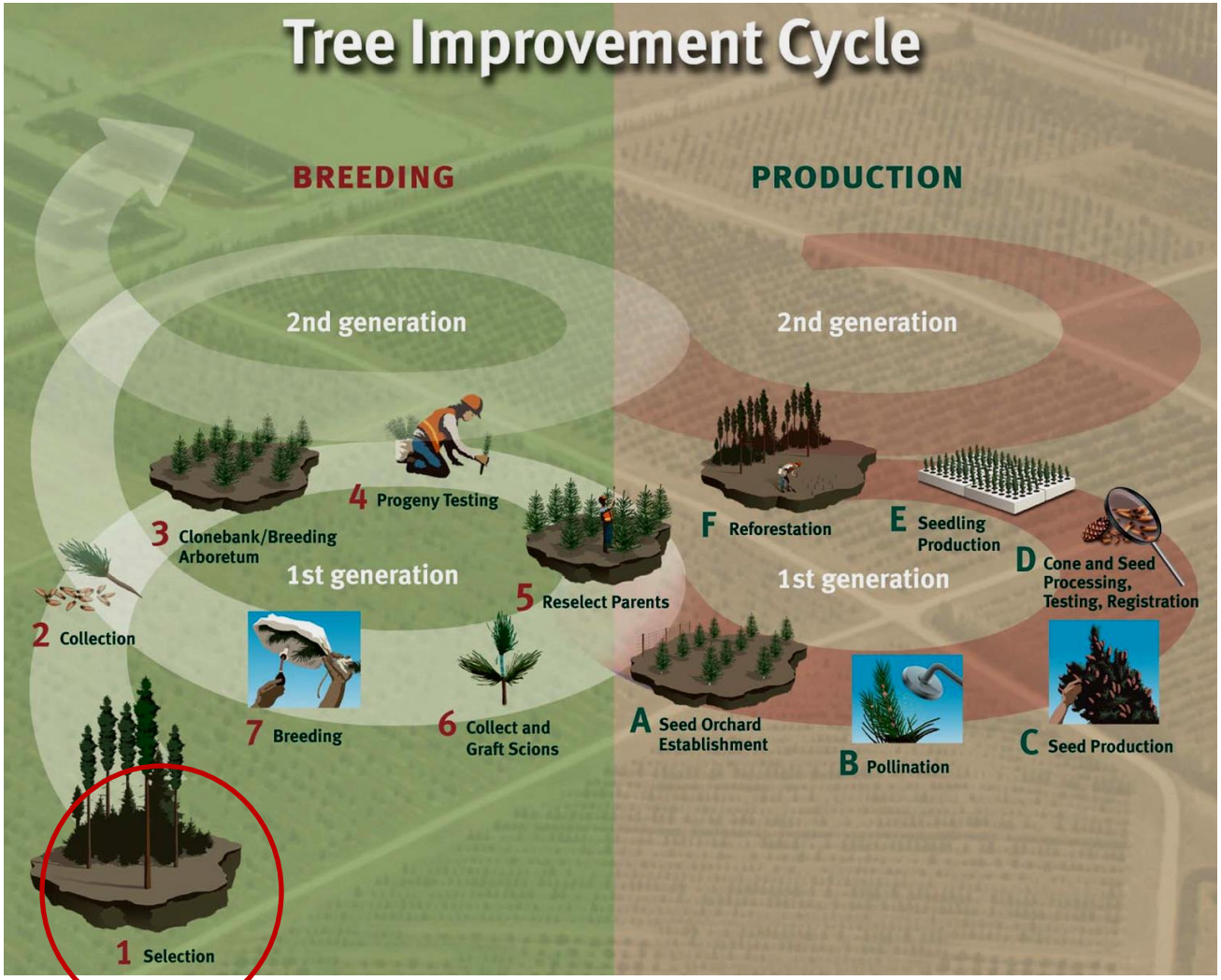
– Select and prioritize species to work with

- 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

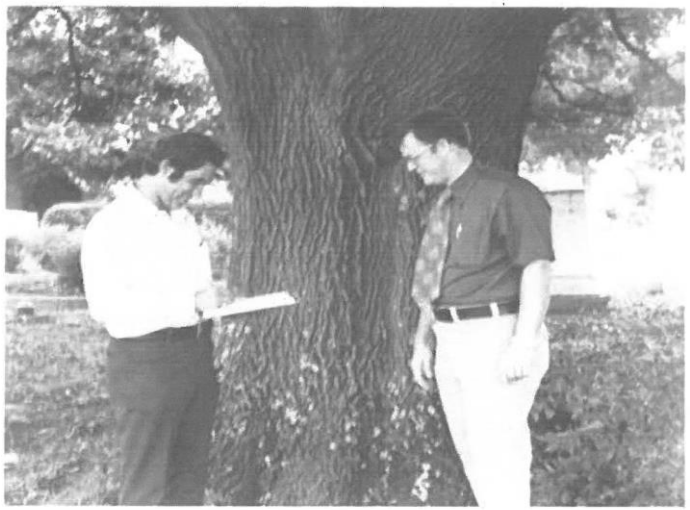


Figure 37. Jack Summers, superintendent of parks, City of Garland, Texas, and Dallas Urban Forester Bobby Young score an outstanding specimen of shumard oak located in Garland.

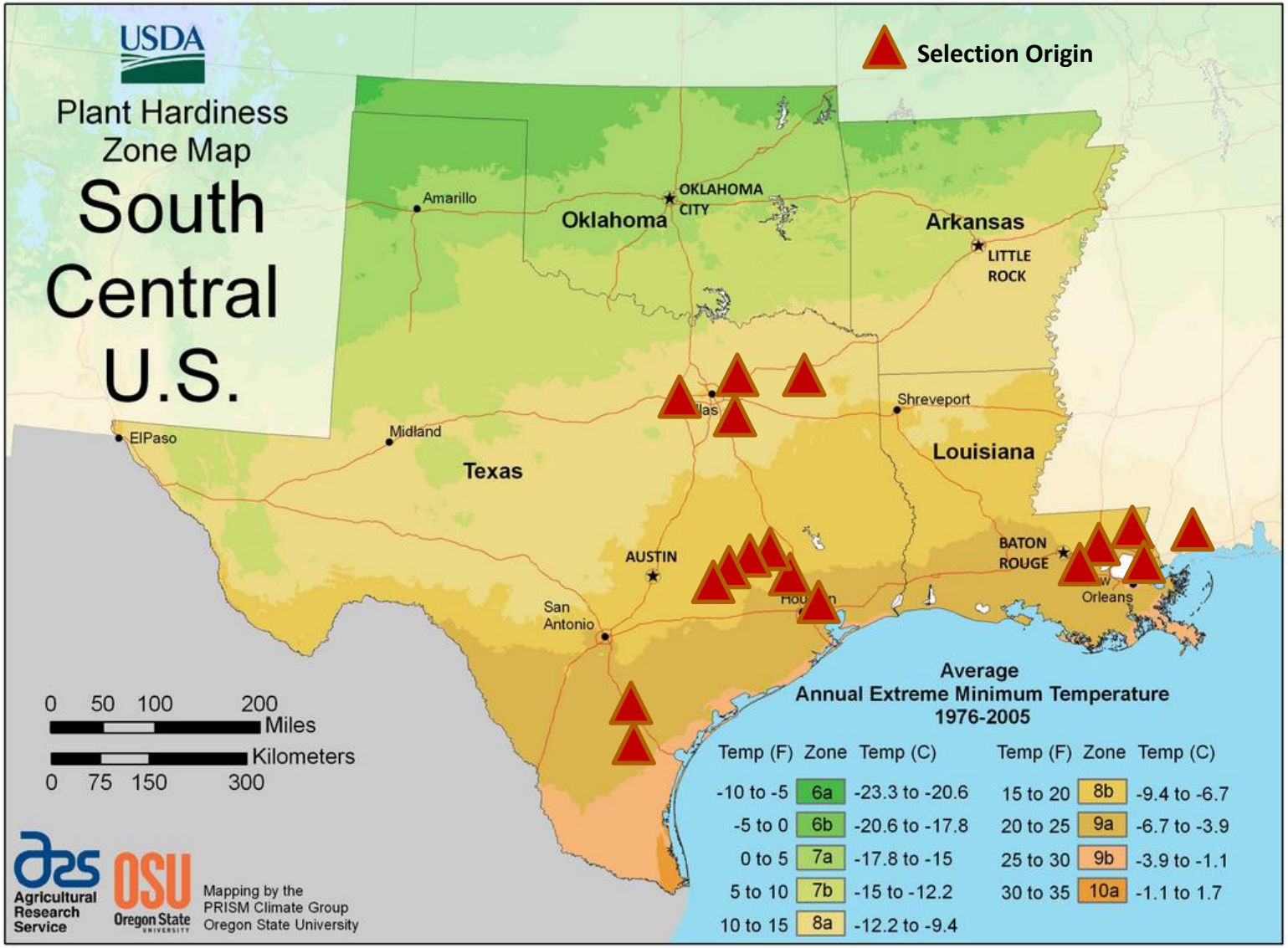
TFS Urban Tree Improvement Program - Selection

Cooperative Model

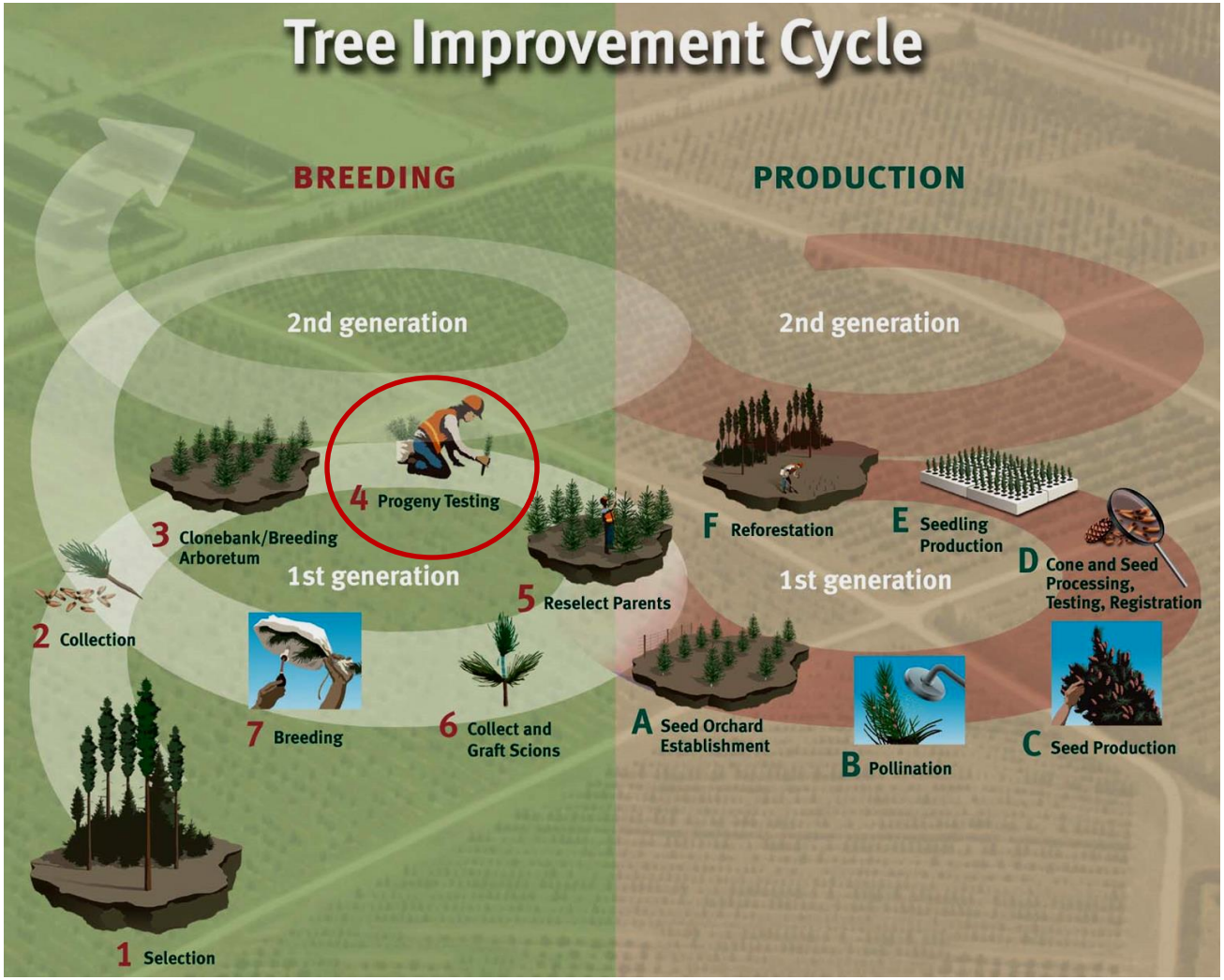
- ✓ Municipalities
- ✓ Commercial growers

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

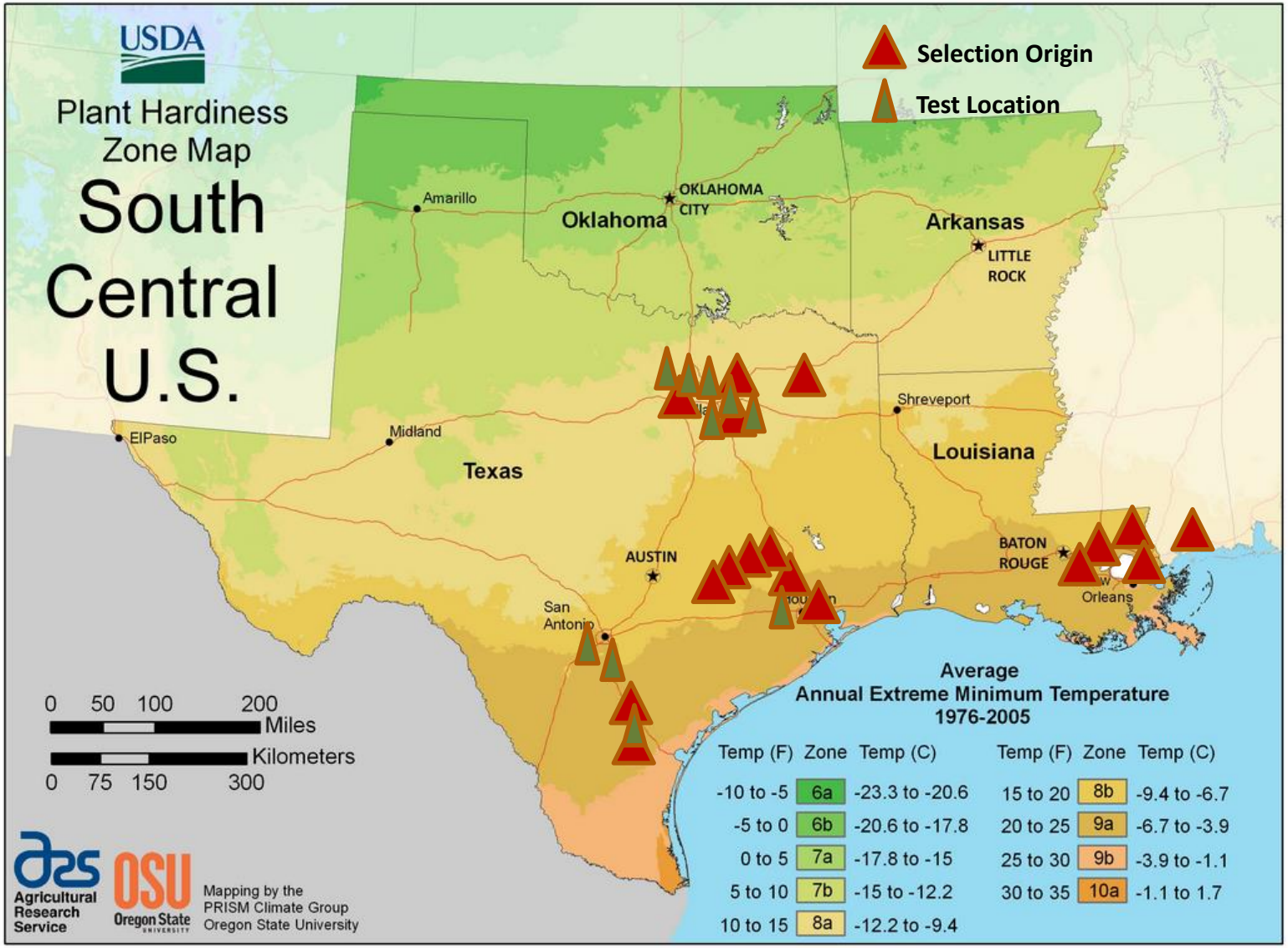
Member Responsibilities:

- 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

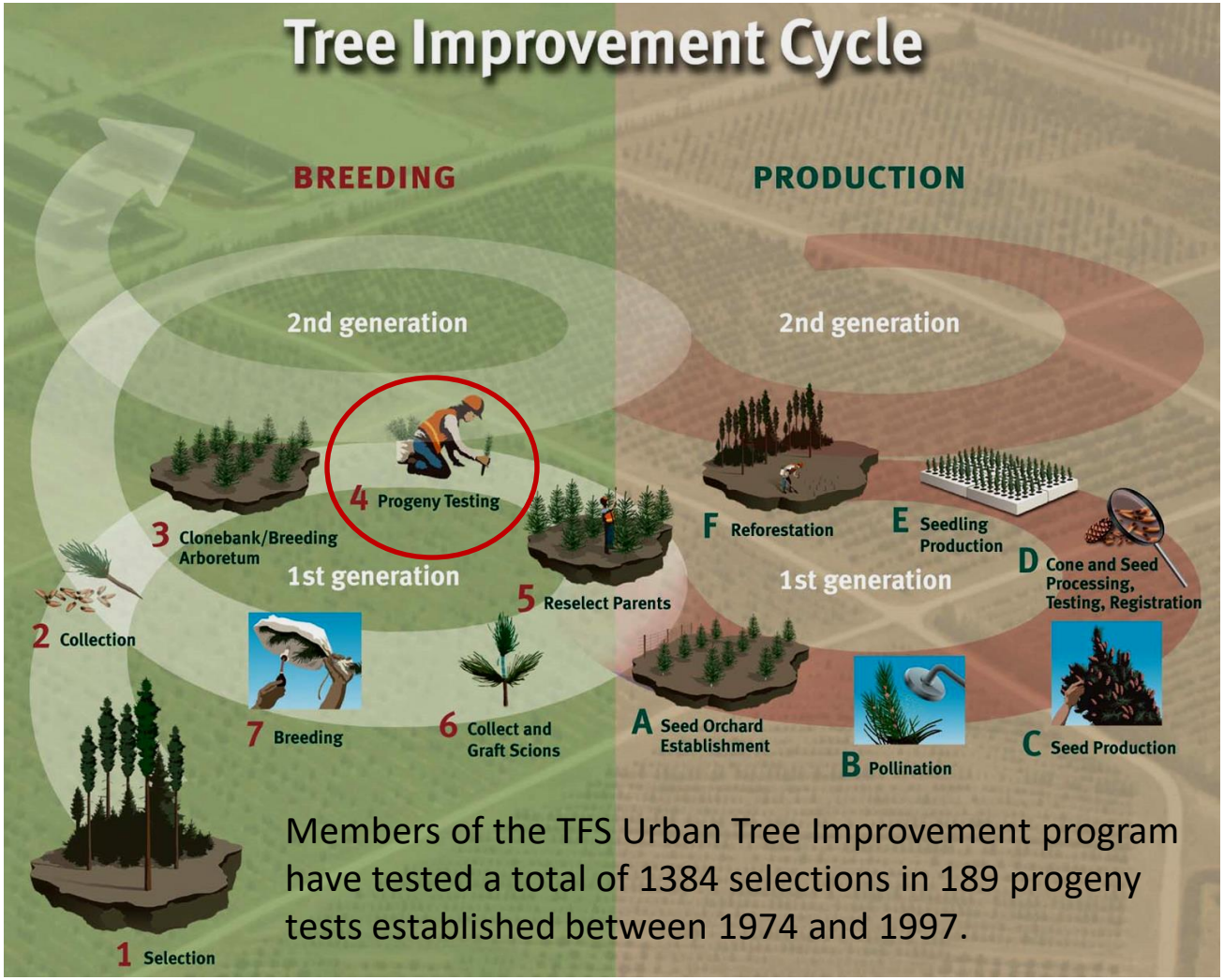
	Orchard Acres			Average % Improvement		
Species	Hudson	Weeping Mary	TOTAL	Survival	Height	Diameter
Shumard oak	2.1	2.5	4.6	12.1	20.8	23.3
Live oak	4.3	1.8	6.1	4.4	20.3	19.5
Baldcypress	1.3	1.5	2.8	0.7	18.3	7.1
Bur oak	1.6		1.6	3.9	23.4	23.9
Cedar elm	1.2	0.8	2.0	7.8	21.6	13.6
Chinkapin oak	0.7	0.9	1.6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

TFS Urban Tree Improvement Program - History

Benefits of Progeny Testing:

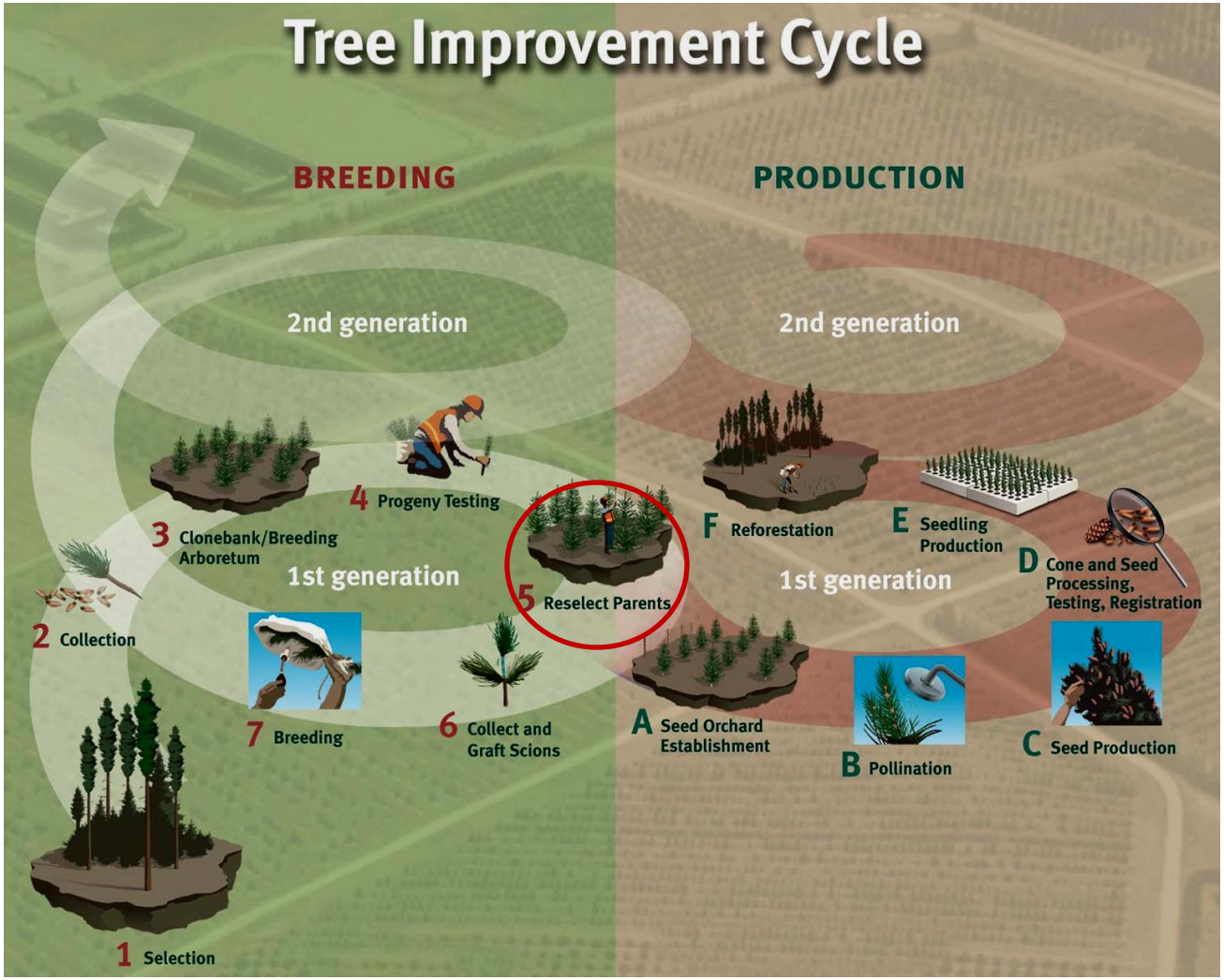
- Superior families to be identified in tests at age 3.
- Seed to be collected from all selections identified as superior after age-5 evaluation and made available to the membership directly or as seedlings for a fee established by the members.

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

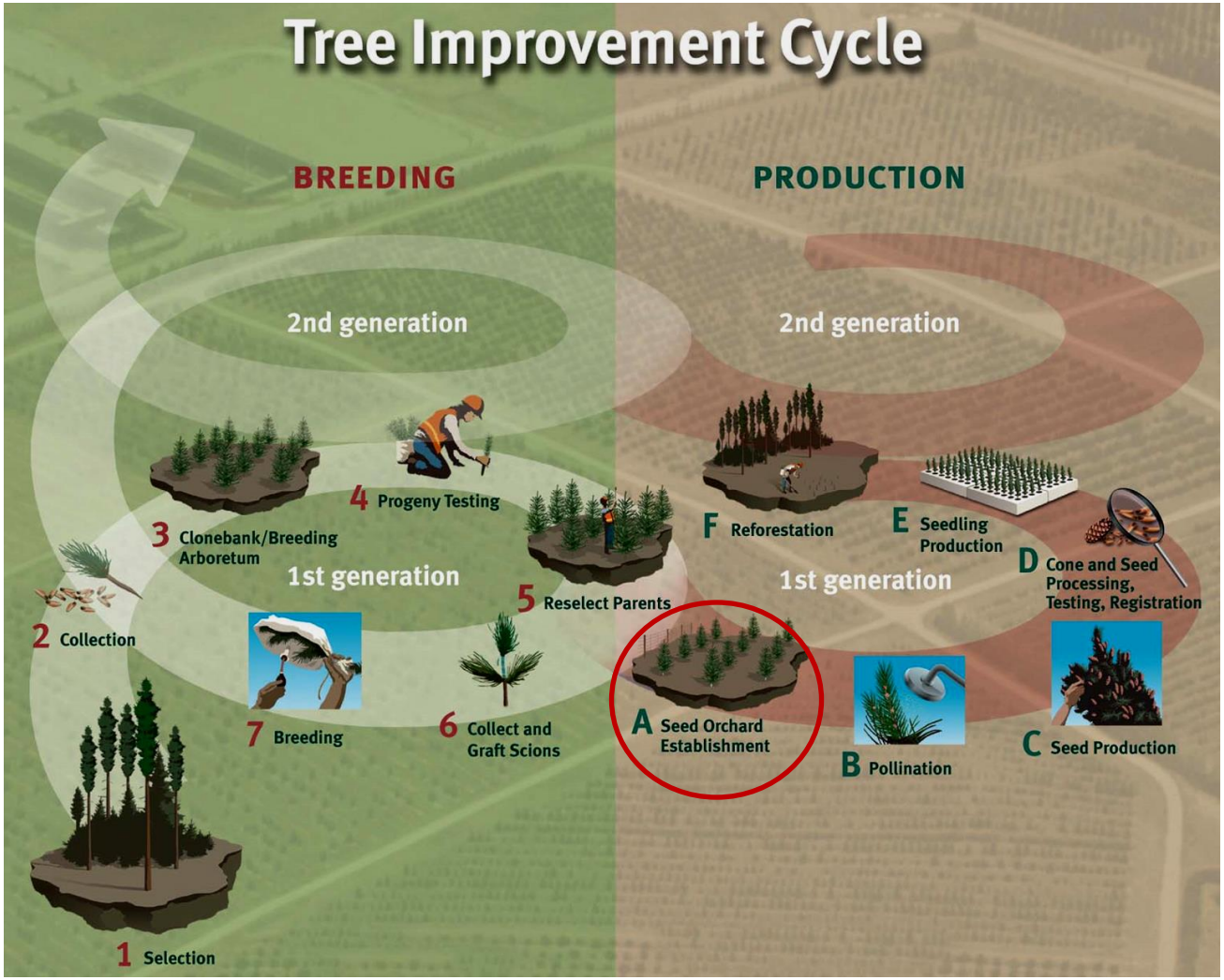


TFS Urban Tree Improvement Program

Number of Selections in the TFS Urban Tree Improvement Program

Species	# Families Tested	# Selections
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	125	17
	TOTALS: 1384	**304**

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

Species	Age	Survival	Height	Diameter
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	**19**	11 - 22 (**24**)	7 - 26 (**38**)
Bur oak	3	-	13 - 19	11 - 18
Bur oak	5	-	6 - 18 (**16**)	6 - 19 (**21**)
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

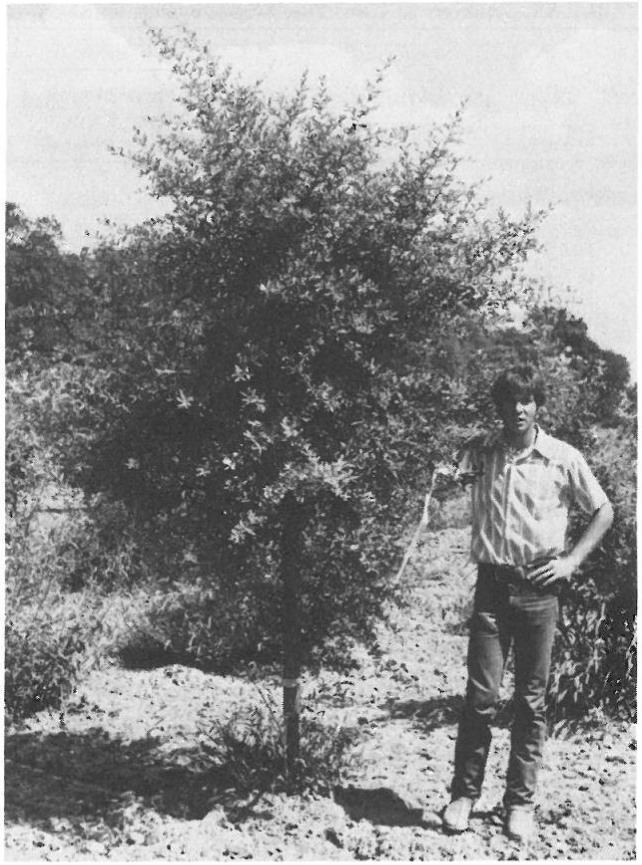


Figure 17. Live oak second-generation selection at Fort Worth for the Urban Tree Improvement Program.

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

Figure 17. Live oak second-generatio
the Urban Tree Improvement Progra

for the Urban Tree

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

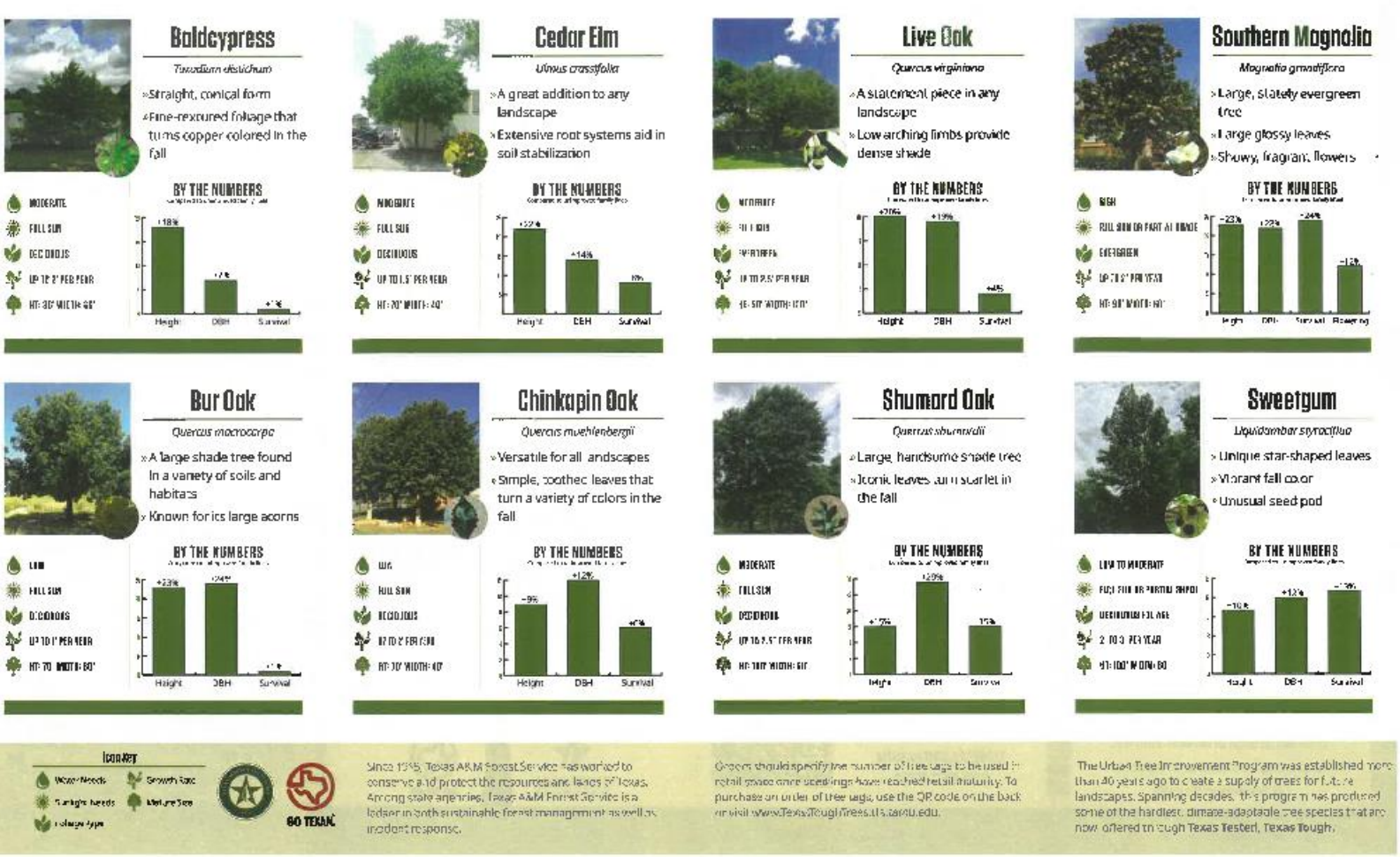
- Since 1983, the TFS Urban Tree Improvement Program has made available to its members more than 68,000 seedlings and 1.8 tons of seed.

TFS Greenhouse – College Station, TX

TFS Indian Mound Nursery Alto, TX

Texas Tested Texas Tough

Texas Tested Texas Tough



KEY

Water Needs
Growth Rate
Sunlight Needs
Mature Size
Foliage Type

GO TEXAN

Since 1915, 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.

Growers should specify the number of tree tags to be used in retail spaces once seedlings have reached retail maturity. To purchase an order of tree tags, use the QR code on the back or visit www.TexasToughTrees.tfs.tamu.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 hardiest, climate-adaptable tree species that are now offered through Texas Tested, Texas Tough.

TEXAS A&M FOREST SERVICE

Improving Urban Trees in Georgia

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

Improving Urban Trees in Georgia

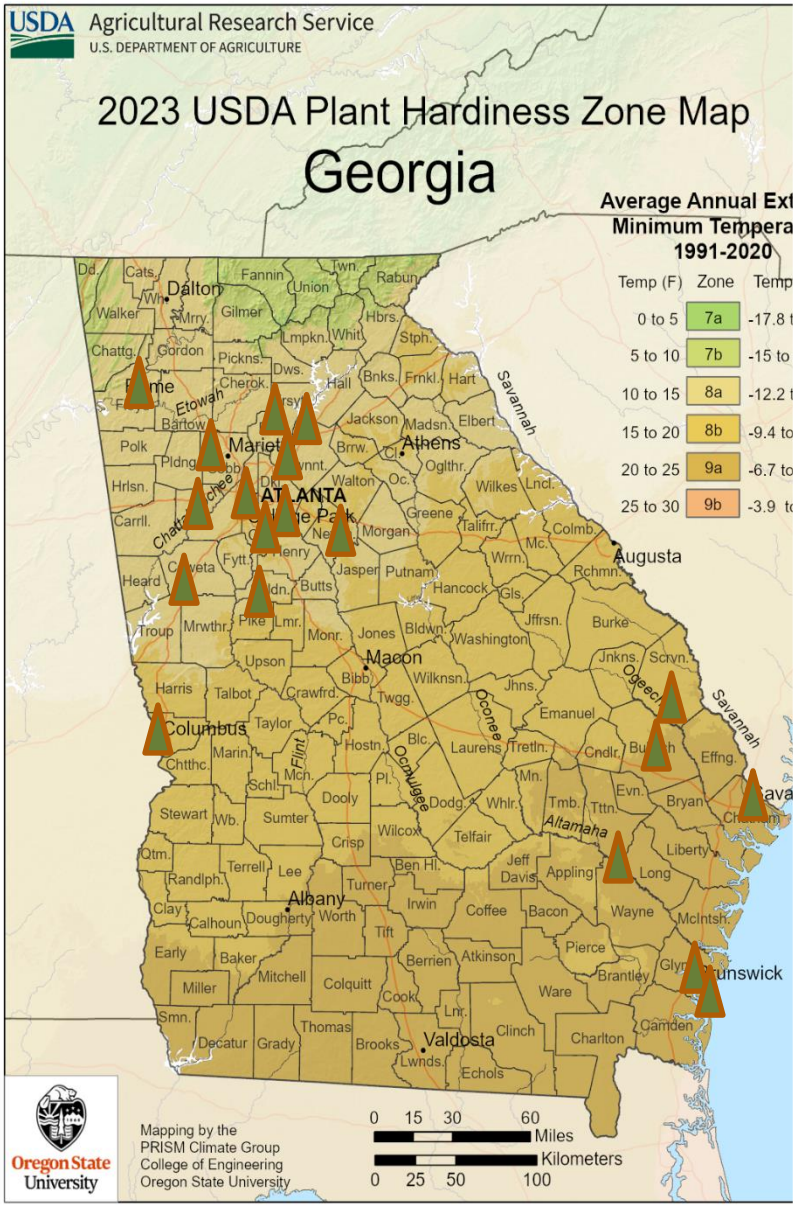
- Partnerships/Collaboration/Grants
  - Sharing the workload (seedling production, testing, seed orchards)
  - and the wealth

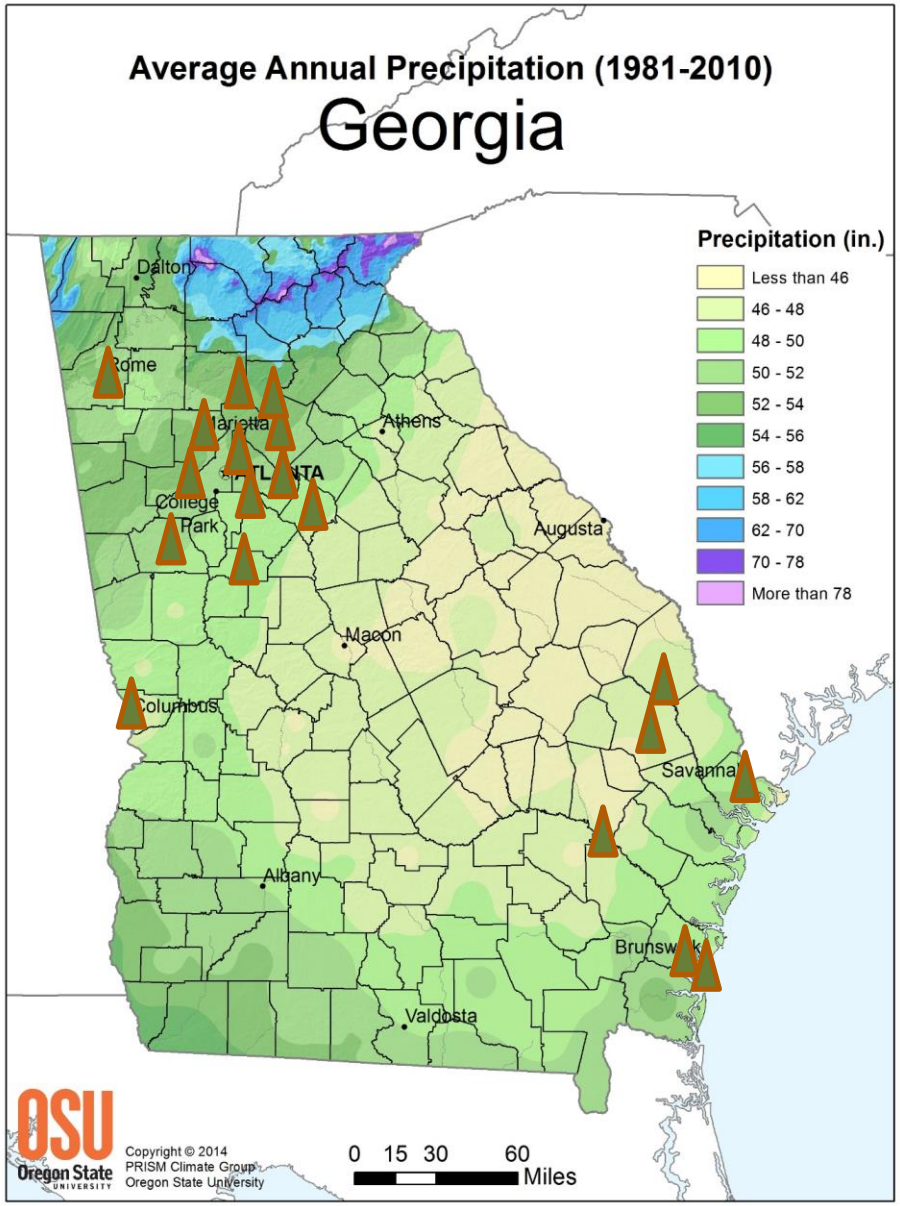
URBAN & COMMUNITY FORESTRY

Grants Will Grow Tree Canopy in Savannah, St. Marys

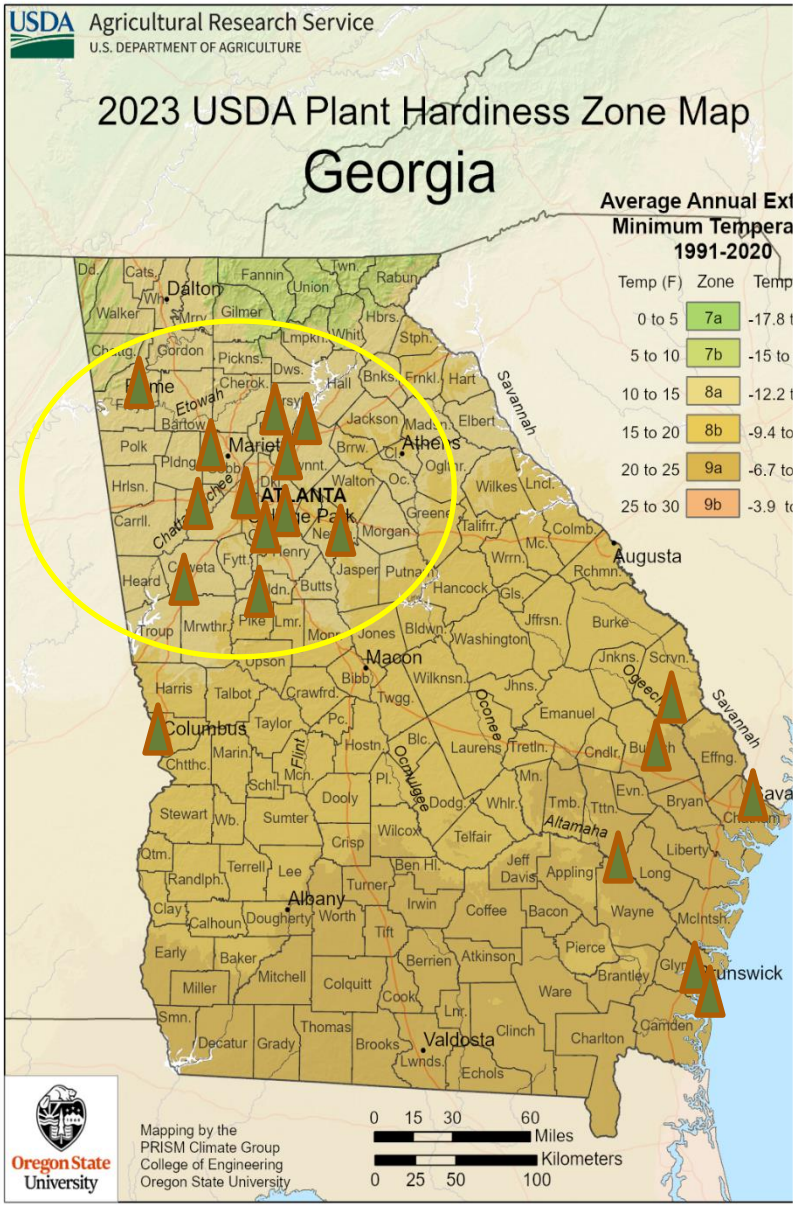
The Current, Jan. 8, 2024

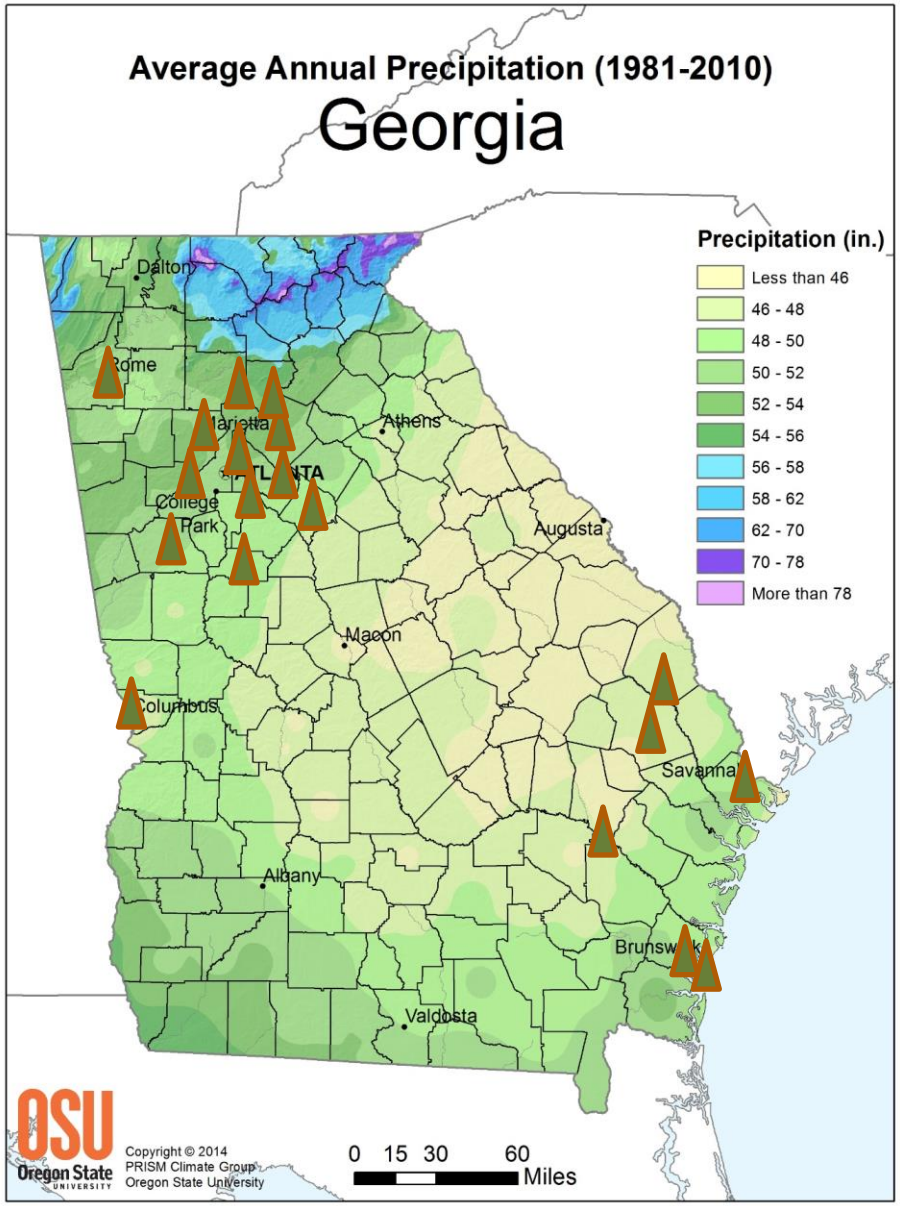
With graceful live oaks arching over its main arteries, Savannah has long been lauded for its trees. But as development heats up in and around Savannah and a large portion of the city's street trees are reaching the end of their natural life faster than they are being replaced, the urban canopy has suffered.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



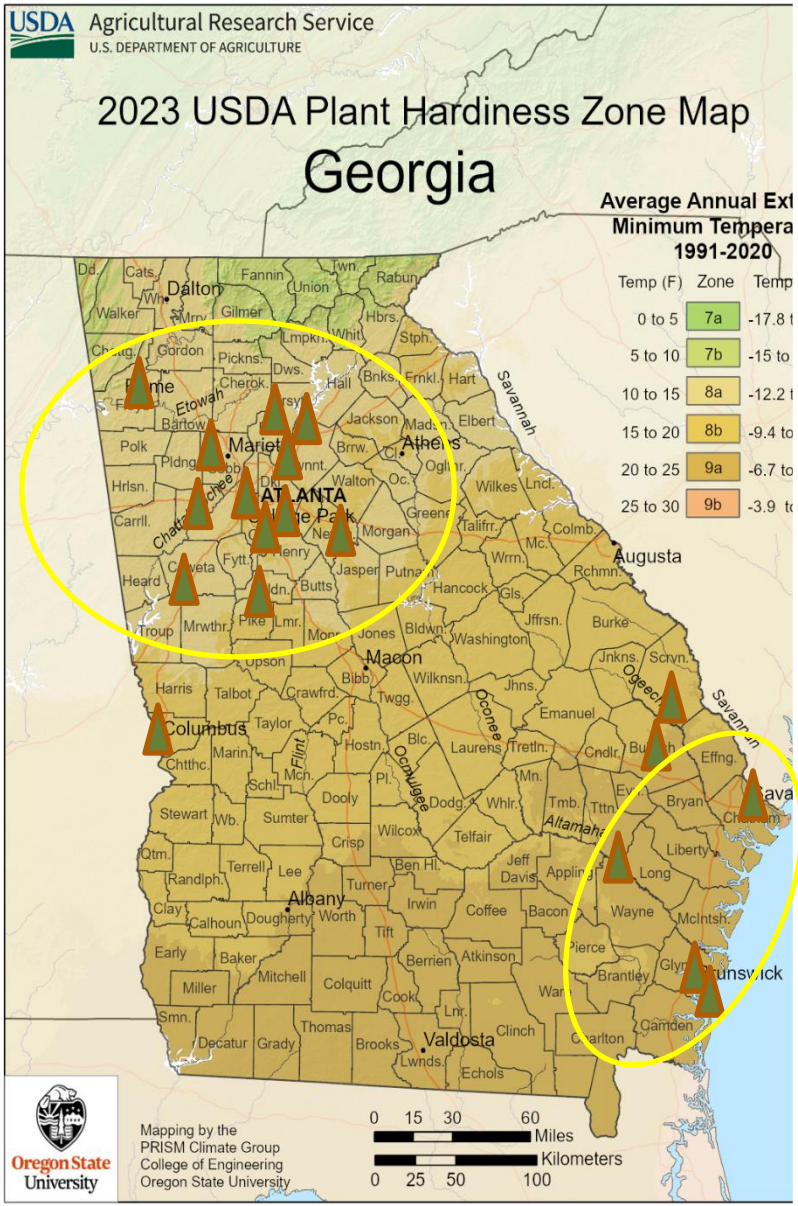


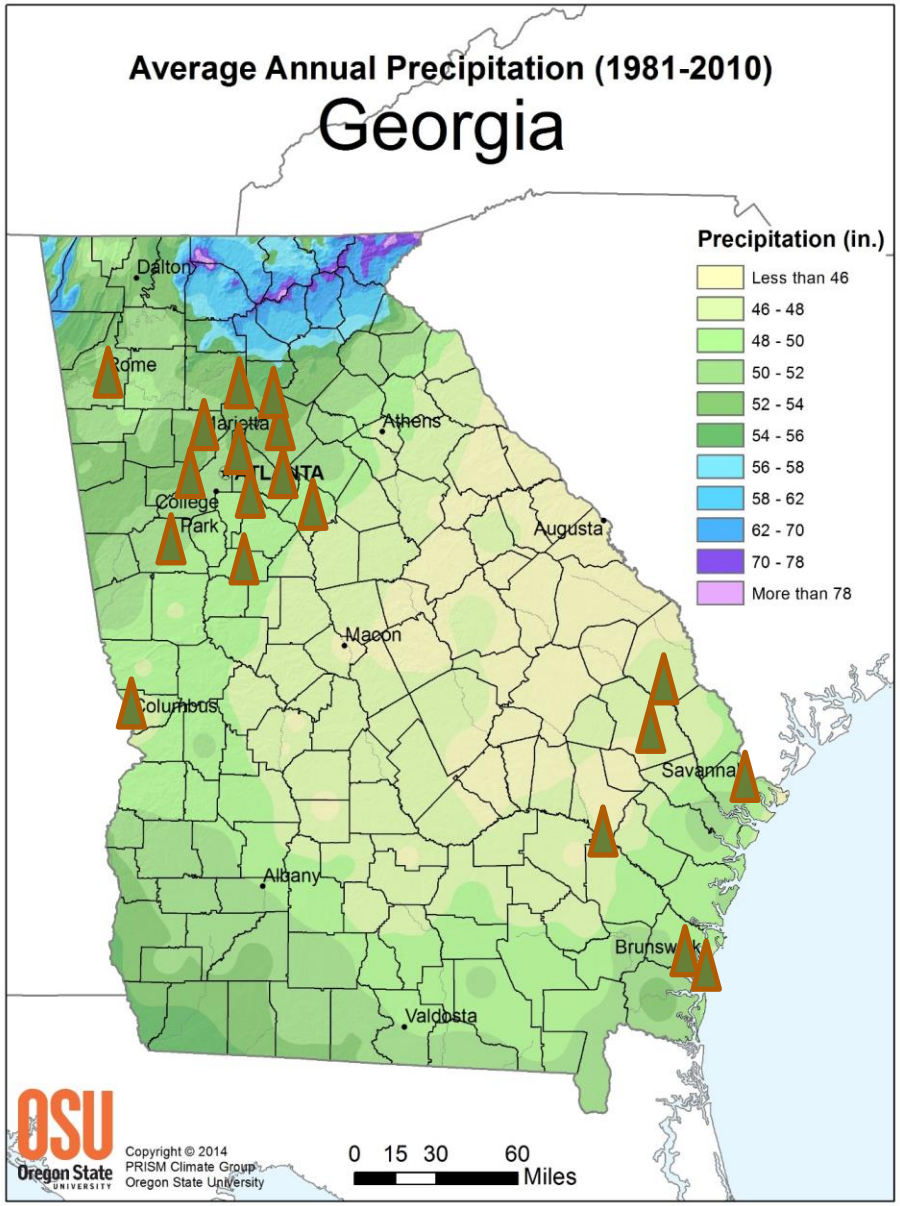
TEXAS A&M FOREST SERVICE



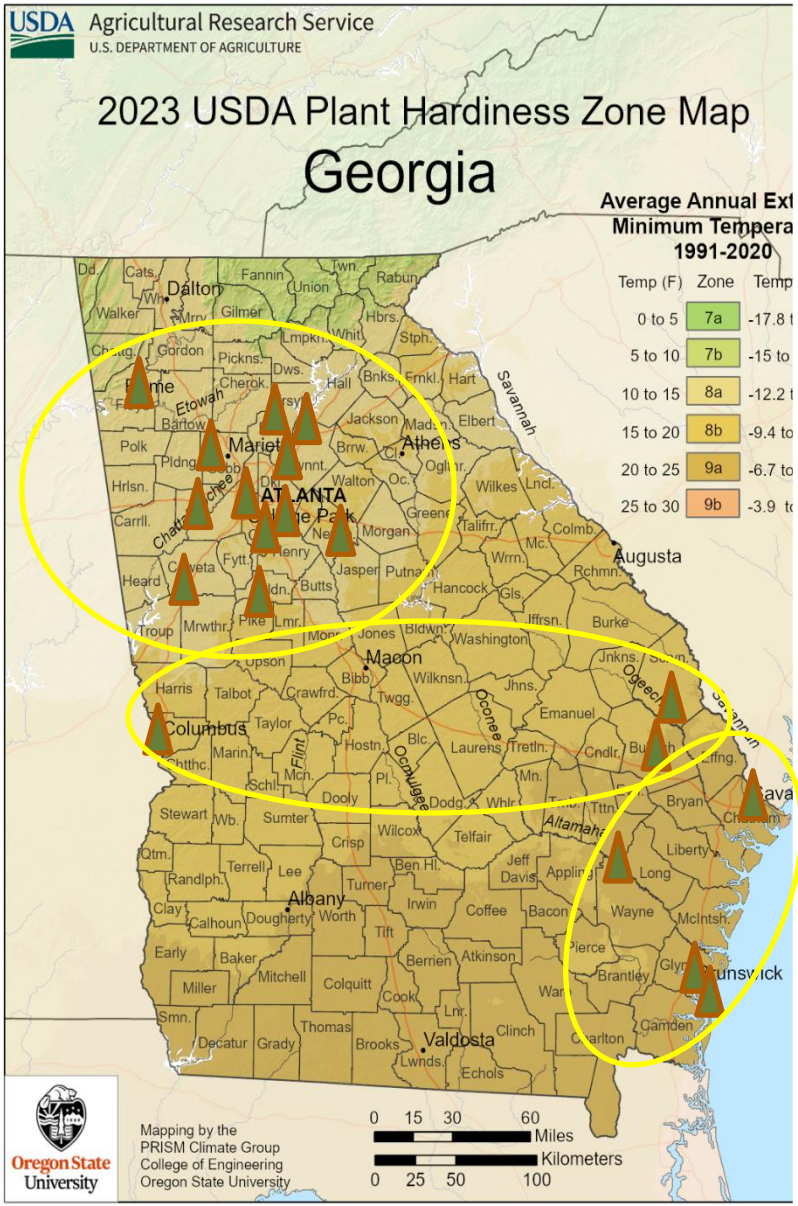


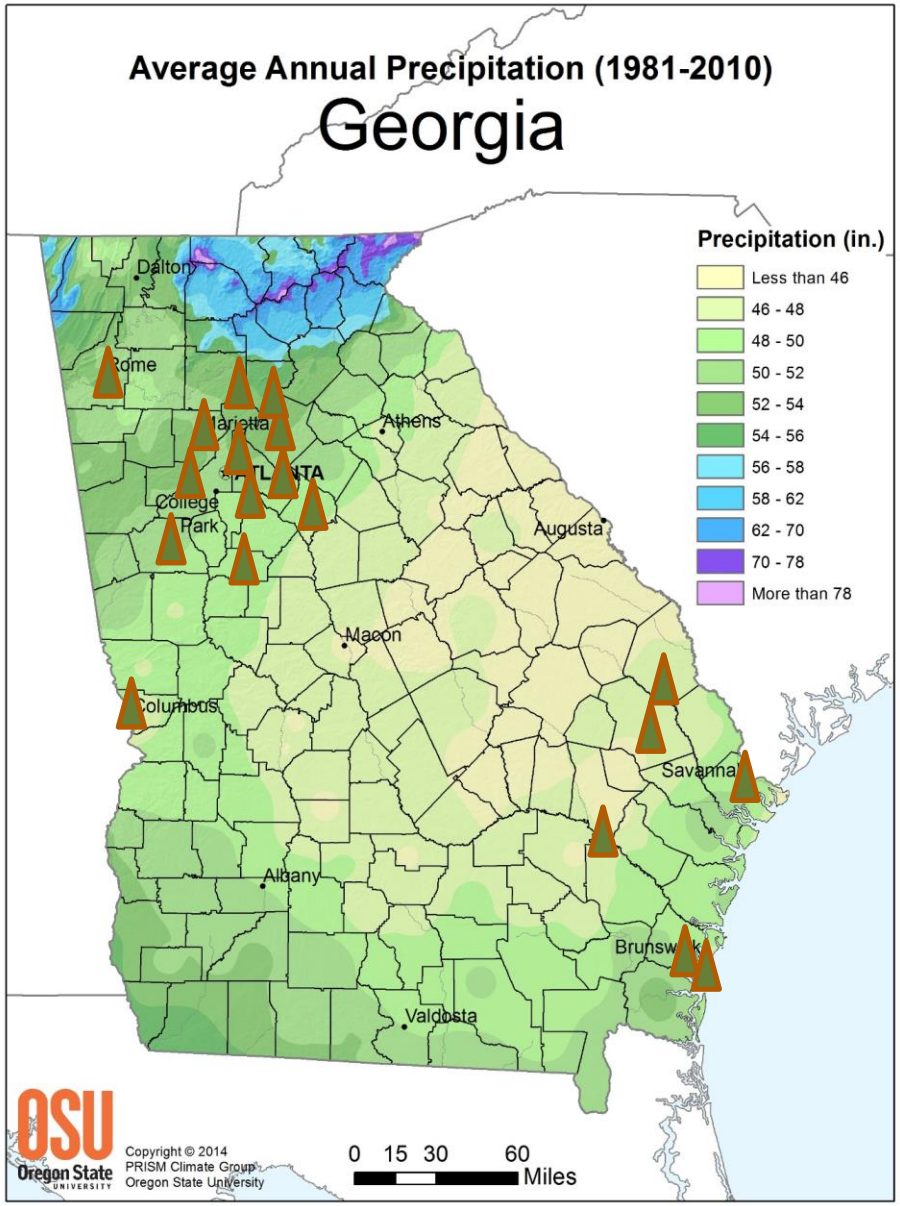
TEXAS A&M FOREST SERVICE



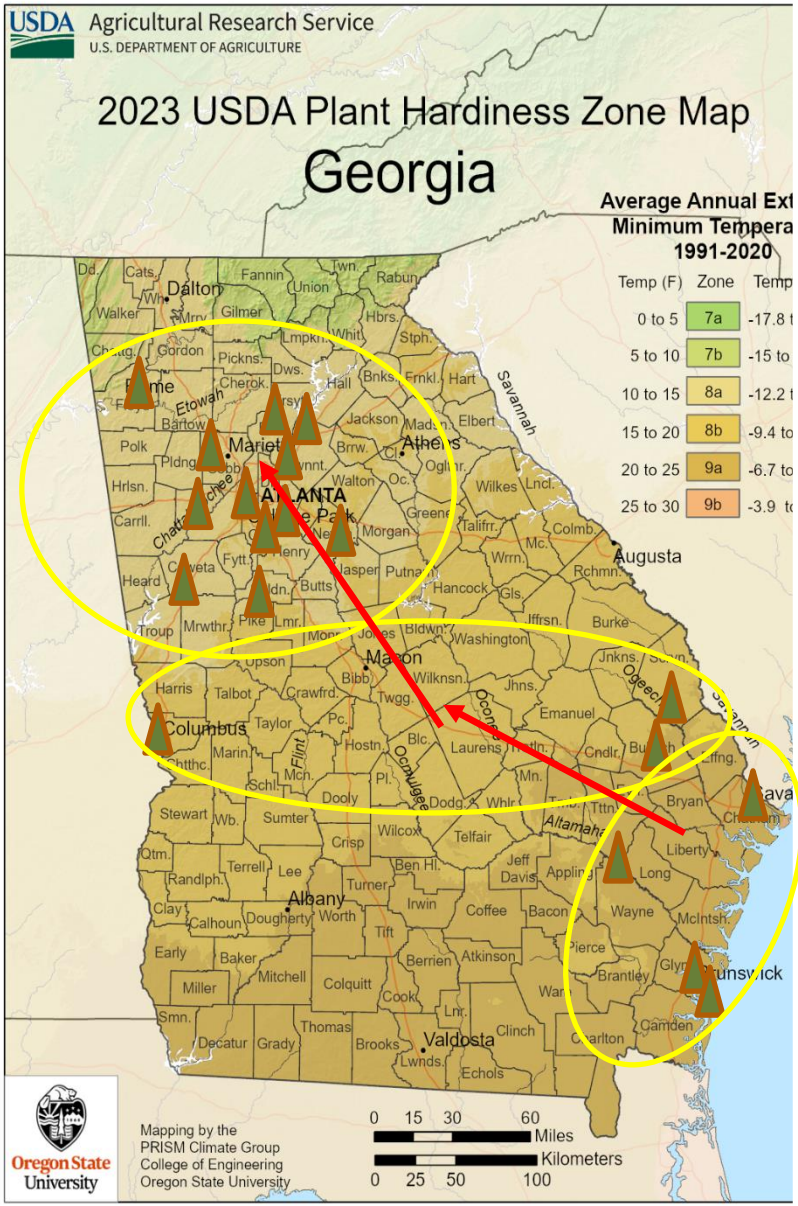


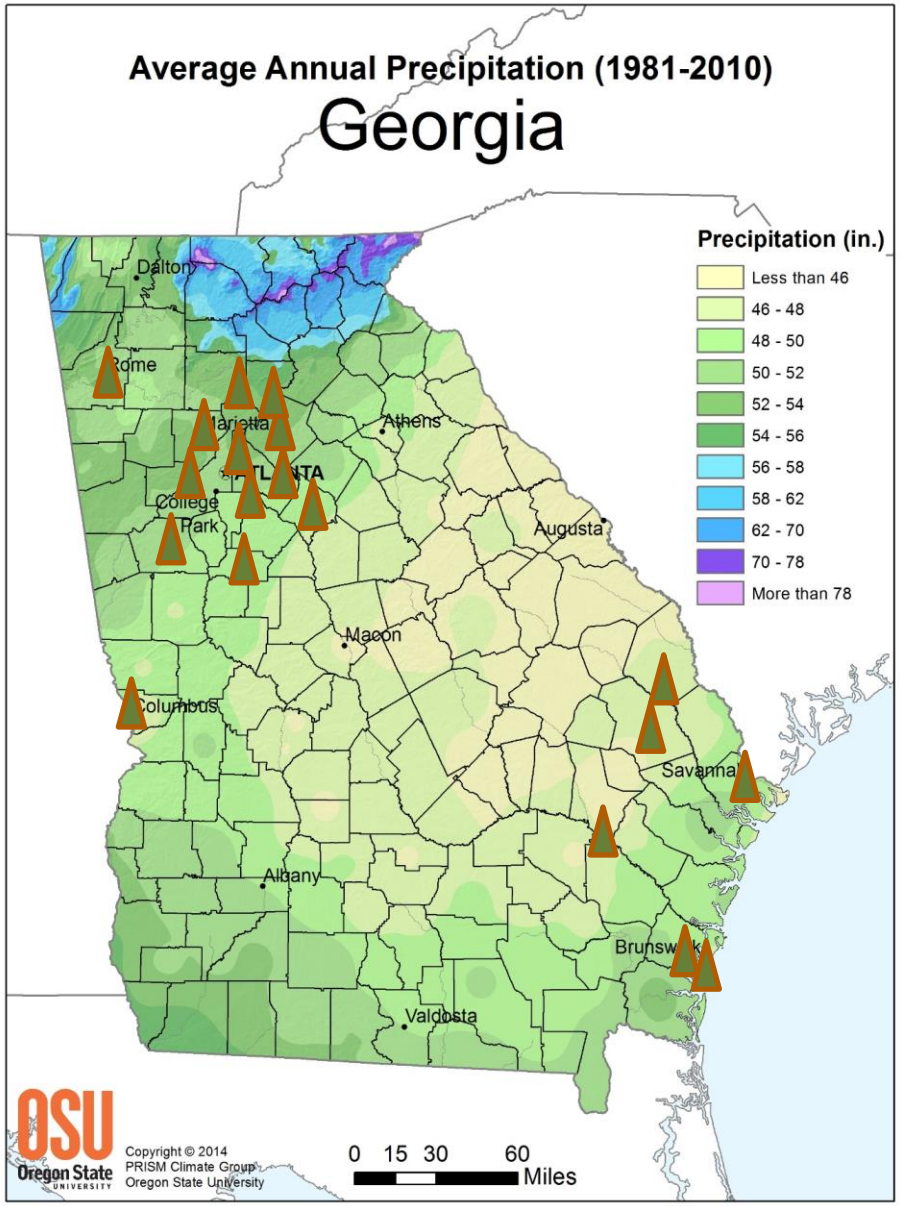
TEXAS A&M FOREST SERVICE



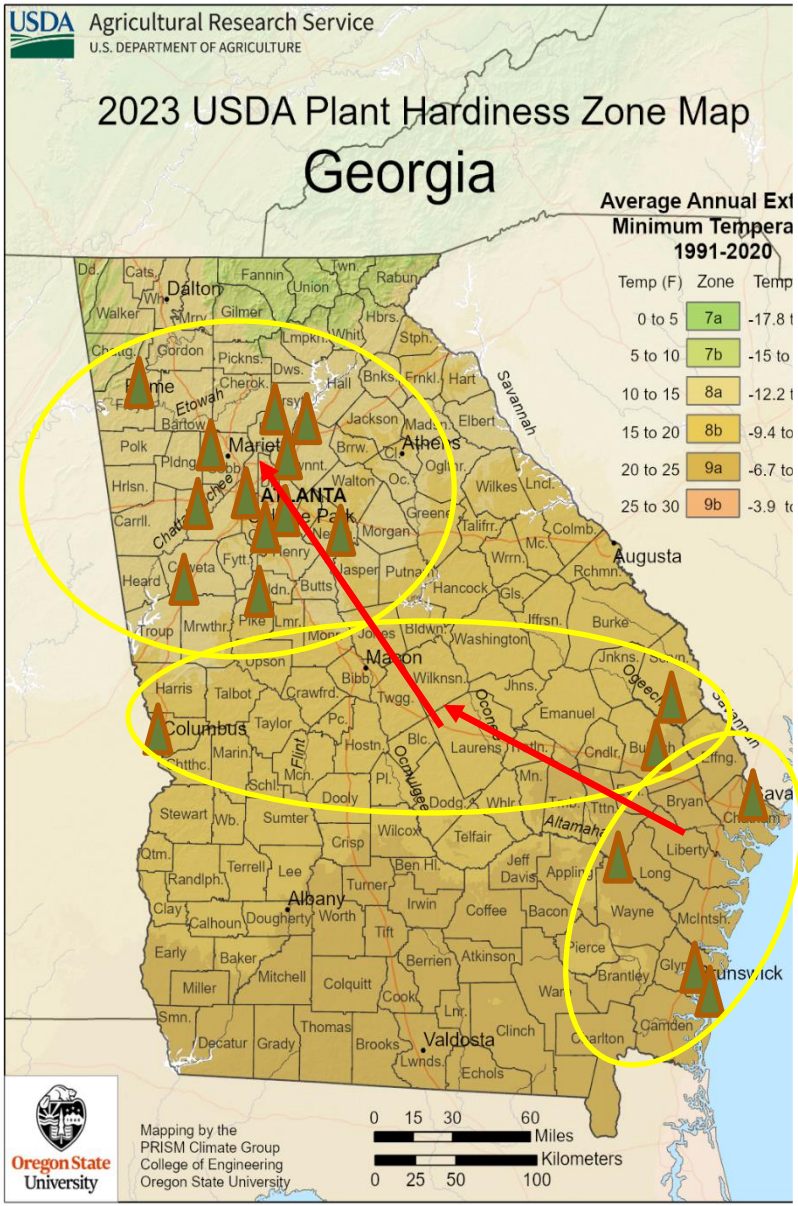


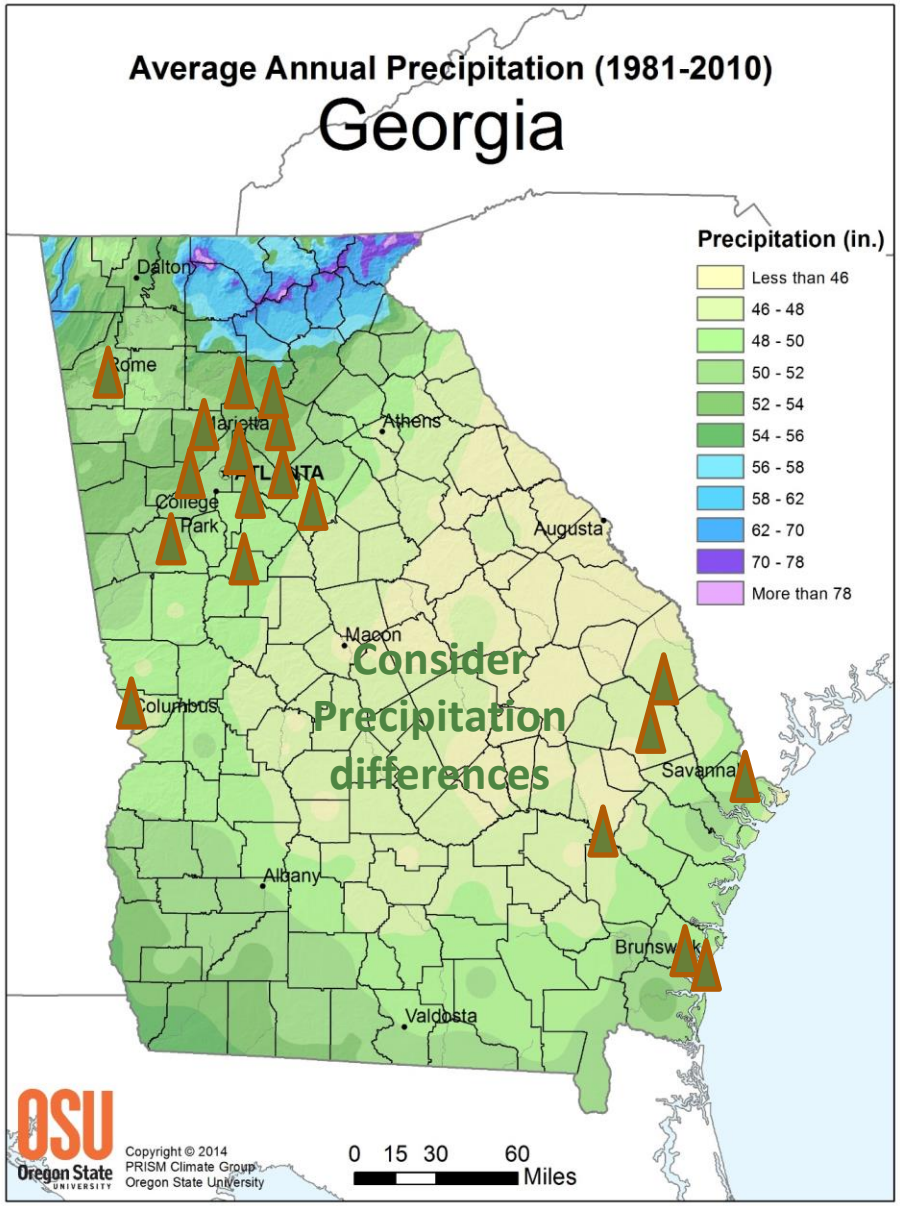
TEXAS A&M FOREST SERVICE





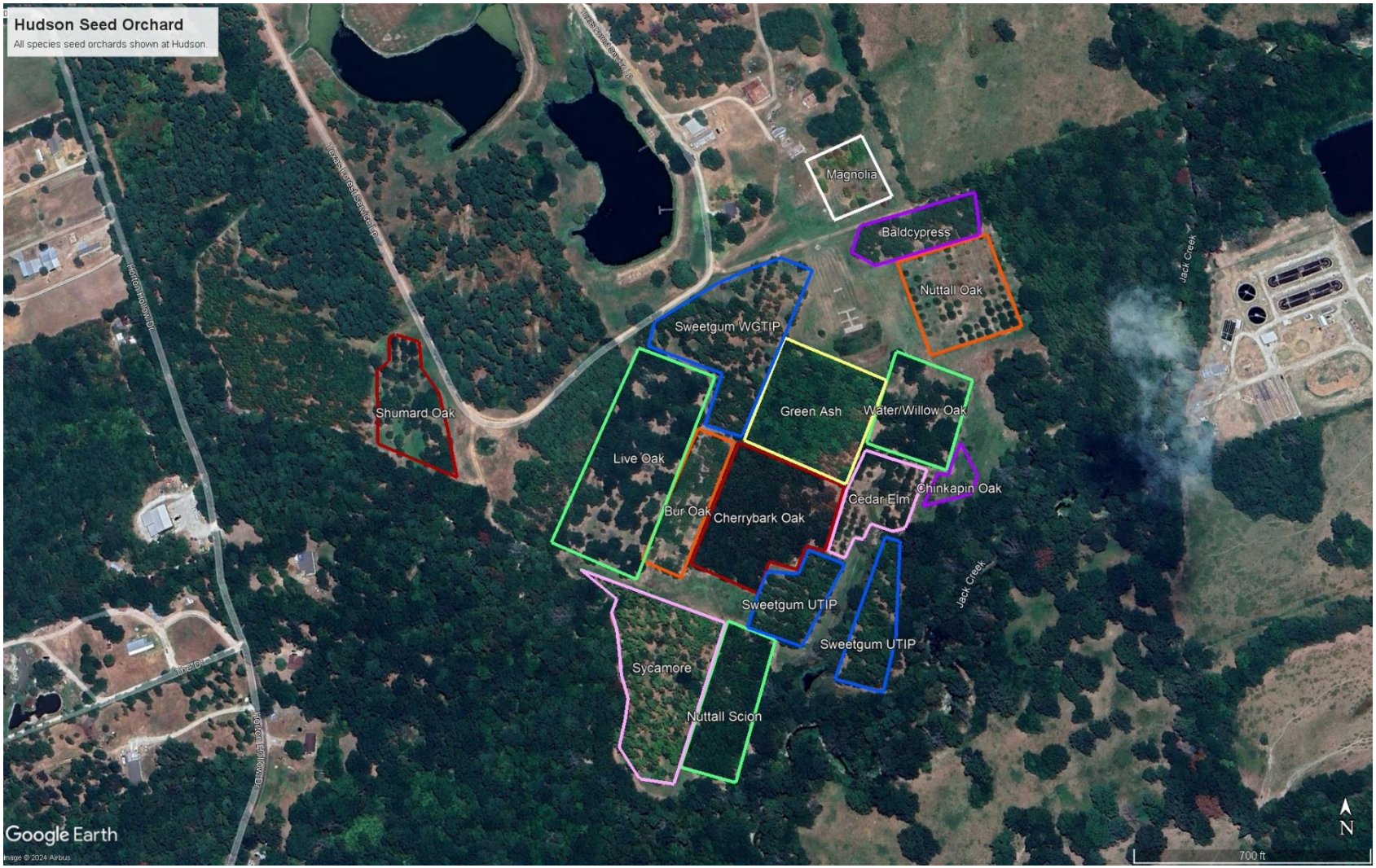
TEXAS A&M FOREST SERVICE





TEXAS A&M FOREST SERVICE

Improving Urban Trees



Improving Urban Trees

Improving Urban Trees

Improving Urban Trees

Improving Urban Trees

Improving Urban Trees

USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

RESEARCH & DEVELOPMENT
Forest Service Home | Inside the Forest Service | About the Agency

Home | Research | Products | News | About | Keyword Search

Home > Multimedia > Webinars > Urban Forest Connections

T T T

- Data and Tools
- Publications
- **Multimedia**
  - Forestcast Podcast
  - **Webinars**
    - 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.

Photo Credit: *Texas A&M Forest Service*

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

TEXAS A&M FOREST SERVICE

Improving Urban Trees

Improving Urban Trees