

PLANTING THE SEEDS OF SUCCESS.



Climate-Ready Trees

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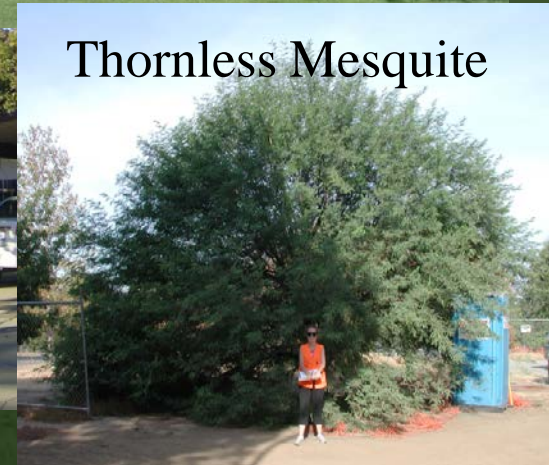
Texas Red Oak



Texas Live Oak



Thornless Mesquite



Goal: Stable, Healthy, Functional Landscapes



Background

- Risk of tree loss
 - Limited diversity
 - Poorly-adapted species
- Primary point of leverage
 - Tree selection



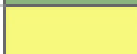





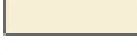
Goals

- Change tree palette to more resilient species
- 20-year study to test promising cultivars
 - Resilience to climate change
 - Other qualities
- Network of sites and collaborators
- Share performance information



Projected Climate

- Temperature
 - 1 zone change
- Precipitation
 - 110% increase
 - More winter, less summer

10F to 15F		8a
15F to 20F		8b
20F to 26F		9a
26F to 30F		9b
30F to 36F		10a
36F to 40F		10b
40F to 46F		11

Projected Changes in USDA Hardiness Zones				
City	2010-2019 Avg Min Temp (°F)	Current Hardiness Zone	2080-2089 Avg Min Temp (°F)	Predicted Hardiness Zone
Redding	34.1	9B ->10A	40.6	10A-> 11A
Sacramento	36.7	9B ->10B	42.4	10B-> 11A
Merced	33.6	9A ->10A	38.9	10A-> 10B
Fresno	34.6	9B ->10A	40.0	10A-> 11A
Bakersfield	36.3	9B ->10B	41.5	10B-> 11A

<http://cal-adapt.org/tools/>

Species Profiles

TRAIT	Source	Description
HABITAT SPECIFICITY		
Soil Moisture	Selec Tree	Soil moisture required by tree species for establishment.
Soil Texture and pH	Selec Tree	Trees species tolerance of a range of soil pH and textures.
Sunlight Exposure	Selec Tree	Tree species tolerance of full sun, shade, and filtered exposure.
PHYSIOLOGY		
Drought Tolerance	WUCOLS	Water needs of tree species: high, moderate, or low water needs.
Wind Tolerance	Selec Tree	Branch strength of tree species: strong, medium, weak.
Salt Tolerance	Selec Tree and Wu and Dodge 2005	Salinity tolerance
Cold Hardiness	USDA Cal-Adapt	Species tolerance of minimum temperatures in Central Valley.
BIOLOGICAL INTERACTIONS		
Invasiveness	Cal-IPC	Potential for species invasiveness: severe, moderate, minor.
Current Pest and Disease Threats	Pest Vulnerability Matrix (PVM)	Current pest and disease threats that pose risk to tree species.
Emerging Pest and Disease Threats	Pest Vulnerability Matrix (PVM)	Emerging pest and disease threats that could pose risk to tree species in the future.

12 Selected Cultivars

Scientific Name	Common Name
Australia	
<i>Acacia aneura</i>	Mulga
<i>Acacia stenophylla</i>	Shoestring Acacia
<i>Eucalyptus papuana</i>	Ghost Gum
Southwest US- Drought Tolerant	
<i>Chilopsis linearis</i>	Desert Willow
<i>Parkinsonia</i> x 'Desert Museum'	Desert Museum Palo Verde
<i>Prosopis glandulosa</i> x 'Maverick'	Thornless Honey Mesquite
Oklahoma-Texas US - Deciduous	
<i>Celtis reticulata</i>	Netleaf Hackberry
<i>Ebenopsis ebano</i>	Texas Ebony
<i>Maclura pomifera</i> 'White Shield'	White Shield Osage Orange
<i>Quercus canbyi</i>	Canby's Oak
Asia	
<i>Dalbergia sissoo</i>	Rosewood
<i>Ulmus propinqua</i>	Emerald Sunshine Elm

Southwest US



SelecTree

Desert Willow



Honey Mesquite



©Mountain States Wholesale Nursery

Palo Verde “Desert Museum”



Osage Orange 30'-50'



Texas Ebony (thorns)



Canby Oak – up to 50'



Netleaf Hackberry - up to 80'

Oklahoma West Texas

Australia



Shoestring acacia



Mulga (*Acacia aneura*)



Ghost gum (*Corymbia papuana*), 60' height

Asia



Elm 'Emerald Sunshine'
Ulmus davidiana v *japonica*
35'; DED, elm leaf
beetle resistance



Rosewood (*Dalbergia sissoo*; India)
60', full leafy crown, highly
decay resistant, few pests
(root suckers)

Experimental Design

- Control plot UCD (48)
- 4 Sacramento parks (24 at each)
- Measure
 - Tree size
 - Crown vigor
 - Pruning, pest, disease
 - Soil type, temp, moisture
 - Irr. water, ET, minimum temps
 - Leaf-out date
- Inland Empire & Coastal SoCal



Sacramento Tree Foundation



Thanks to Our Partners!

Tree Planting Volunteers:

- Sacramento Tree Foundation
- City of Sacramento Parks Department
- City of Sacramento Public Works - Tree Division
- UC Davis Grounds Division

Trees graciously donated by:

- Boething Treeland Farms, Inc.
- Mountain States Wholesale Nursery
 - JF Schmidt & Son Co.
- UC Cooperative Extension



- ISA Western Chapter
- LA Center for Urban Natural Resources Sustainability

Research Partnership



Questions?

http://www.fs.fed.us/psw/topics/urban_forestry/

