Biodiversity
And Urban Trees

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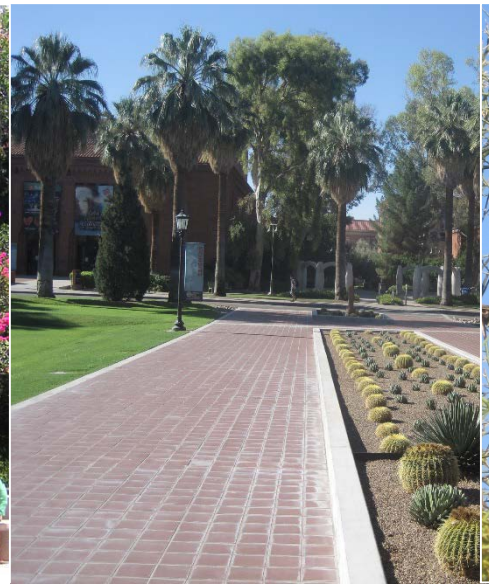


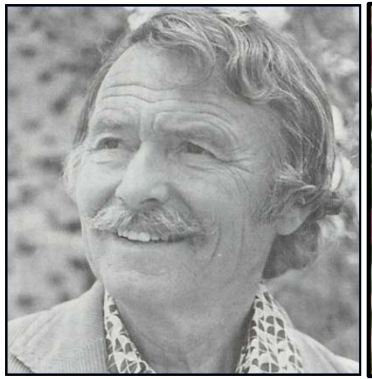
UA Trees Are Rooted in Land Grant Mission

The landscaped grounds of the University of Arizona, Tucson, are rooted in the research and educational missions of the land grant institution.

This mission is currently realized through Cooperative Extension.

UA Landscape Trees

Robert H. Forbes



Warren D. Jones

UA Campus Landscape History

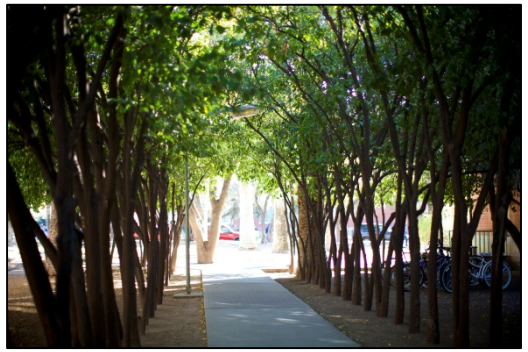
What have we done

Collect, test and introduce trees

What do we do

UA operations

Education



What have we learned

Criteria for selecting trees

COLLEGE OF AGRICULTURE & LIFE SCIENCES

CAMPUS ARBORETUM

Ms. Elizabeth Davison
Founding Director
2002-2010

- 385 Acres
- 8000 Plants
- 500 Taxa
- APGA Member
- Tree Campus USA

The University of Arizona Campus Arboretum is a living laboratory promoting stewardship and conservation of urban trees.

Campus Forest Facts

- Diversity:
  - 44% from 10 species
  - 66% includes 568 other species
- Plant types
  - 38% broadleaf evergreen
  - 33% deciduous
  - 20% palms
  - 9% conifers
- Age distribution:
  - 20% newly planted
  - 70% fully mature
- Canopy coverage: 12.9%

2012 Data for 6078 of the >8000 campus trees

Total Benefits of All UA Campus Trees (2012)

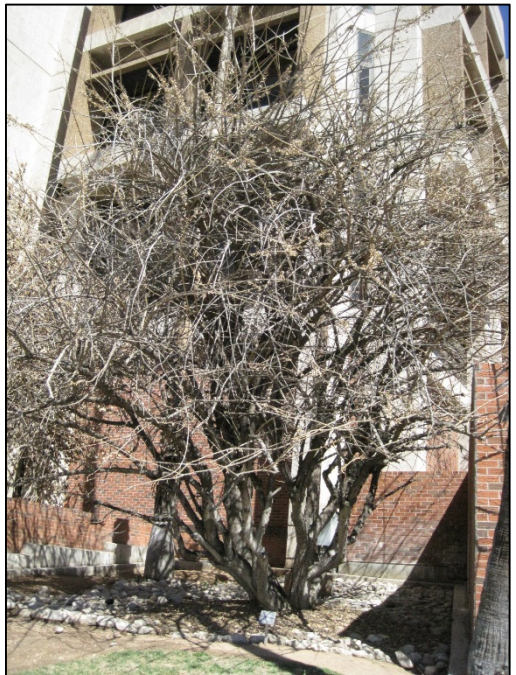
6078 Trees Measured:

Total CO2 stored	3, 890, 698 lbs
Total annual CO2 benefits	708,010lbs
Net removal of particulates & other GHG	632lb
Total energy savings	$55, 065
Total floodwater mitigation	2,867671 gal
Total replacement value	$28,217,339
Canopy coverage	12.90%

Collections Policy Guides Selection

Considers:

- Water use
- High and low temperature threshholds
- Salinity and pH limits



Water is Most Limiting Factor

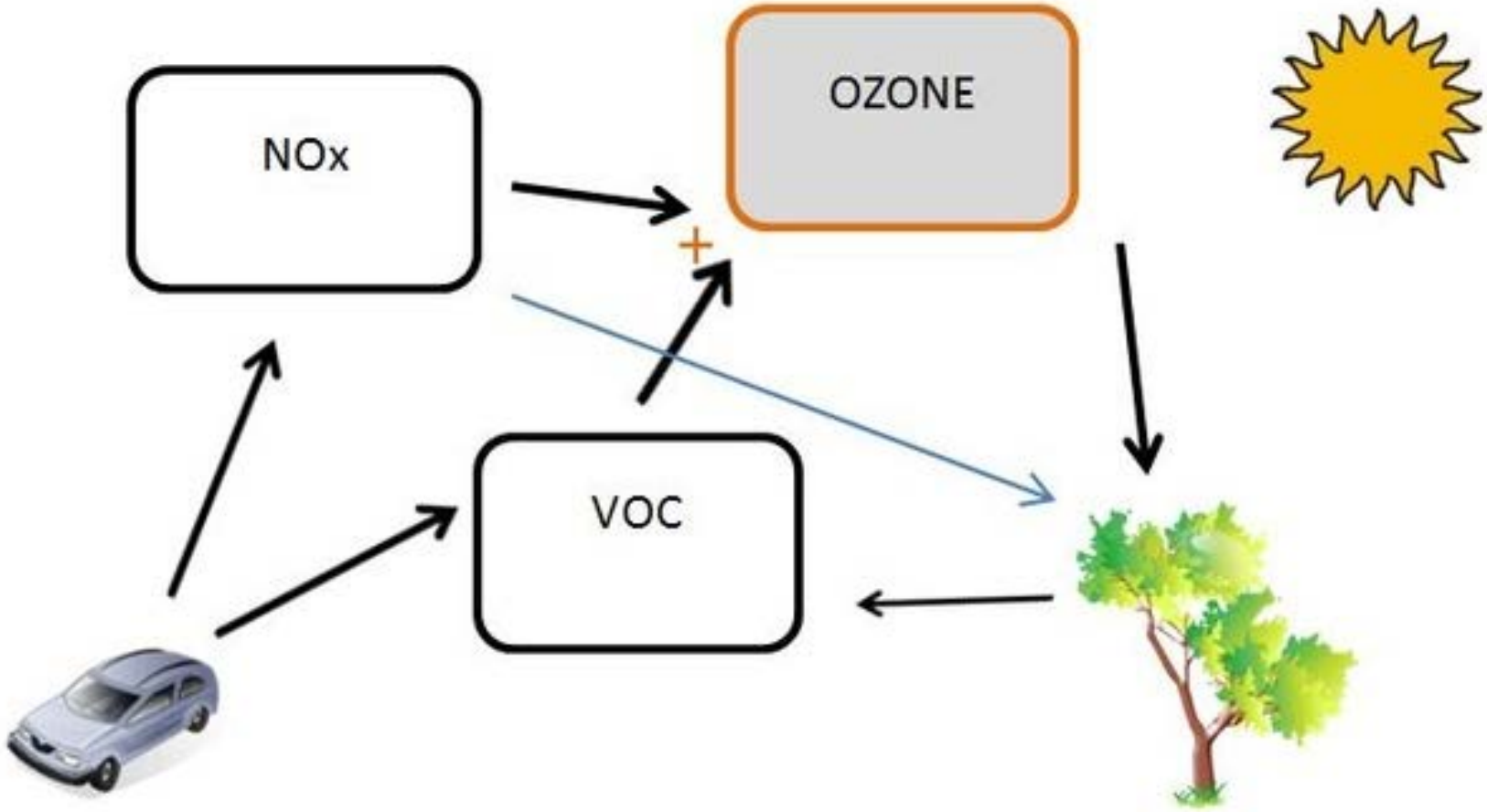
Arizona Department of Water Resources:

Active Management Areas – Low Water Use Plants

- Tucson
- Phoenix
- Prescott

Trees and Air Quality

- Generally a net gain in air quality
- Remove gaseous air pollutants



- BVOC emitted by some trees create ozone and carbon monoxide
- Trees reduce temperatures so that this reaction is slower forms
- VOCs absorb ozone when NOx is low

(2002, David Nowak USDA FS NY)

Selection For Air Quality

- Avoid a few of these common species near traffic:
  - Eucalyptus (70 micrograms C/g leaf DW/hr (std to 1000micromoles/m-2/s-1 light))
  - Liquidambar (70)
  - Oaks (70)
  - Casurina (70)
  - Platanus (70)
  - Callistemon (14.1)
  - Phoenix sp. (13.9)
- These have higher isoprene emission rates*.

*Nowak, David J et al. (2002) Estimated Biogenic VOC Emission Rates for Common US Trees and Shrubs. USFS NE Research Station

Create Stringent Selection Criteria

Assume:

- 100F for >30days
- Full sun
- Low temp threshhold 15F
  - **Residential scale**
- Variable soil
- Few nutritional problems
- Little mess, invasive potential
- Little known or less often used
- No BVOC emissions
    - **Hard working underdogs…**

Examples of

Trees

Fool Proof Trees

Acacia aneura (Mulga)

Evergreen: yes
Thorns: no
Size: 15-25 ft high x 15-20 ft wide
Origin: Australia
Pruning: remove lower branches
Growth: slow to moderate
Flowers: golden yellow spikes Sp
silvery phyllodes
taproot = very low rainfall
‘leaves’ may drop

Fool Proof Trees

Mariosousa willardiana (Palo Blanco)

Size: 15 x 20
Landscape Use: shade
Water: low
Evergreen: no
Thorns: no
Growth: moderate
Flowers: light yellow
Pruning: none
Hardy: 20F

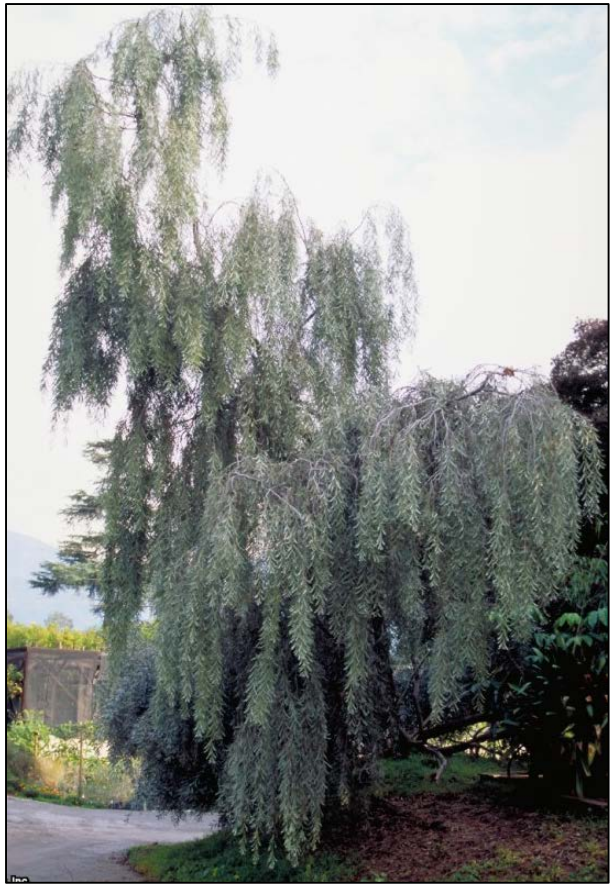
Fool Proof Trees

Senegalia berlandieri (Guajillo)

Size: 15 x 20
Landscape Use: accent
Water: low
Evergreen: semi
Thorns: no
Growth: moderate
Flowers: light yellow
Pruning: none
Hardy: 10F
Native: Texas

Fool Proof Trees

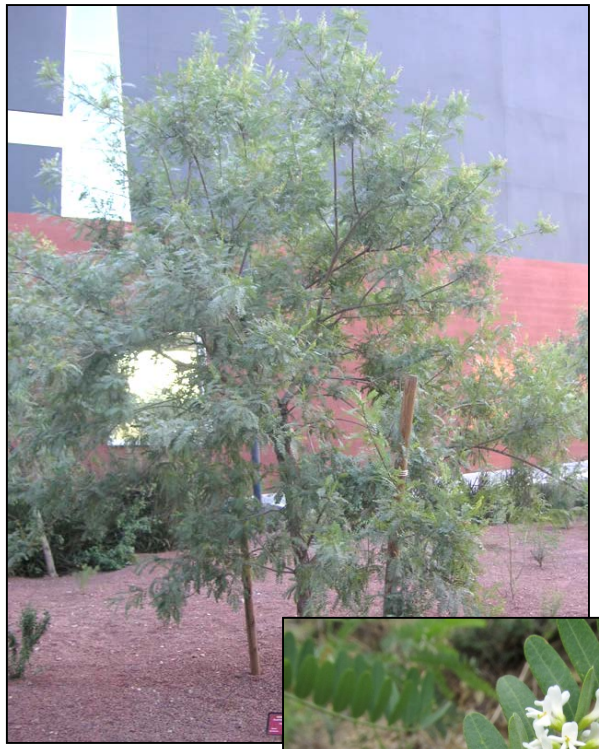
Acacia pendula (Weeping Myall)



Size: 20 x 25
Landscape Use: shade
Water: low
Evergreen: no
Thorns: no
Growth: moderate
Flowers: light yellow
Pruning: none
Hardy: 15F

Fool Proof Trees

Eysenhardtia orthocarpa (Kidneywood)



Size: 5 – 20 feet tall x 3-10 feet
Landscape Use: small multi-trunk tree
Soil: any with good drainage
Water: every two weeks for tree form
Evergreen: semi
Thorns: no
Growth: moderate
Flowers: white spikes all summer
Pruning: prune to tree- staking
Origin: Sonoran Desert
Hardy: - 6.5 C

Fool Proof Trees

Olneya tesota (Desert Ironwood)

Size: 15 x 25
Landscape Use: shade
Water: low
Evergreen: semi
Thorns: yes
Growth: slow
Flowers: purple
Pruning: minimal
Hardy: 20F (tip dieback in teens)

Fool Proof Trees

Chilopsis linearis (Desert Willow Cultivars)

Size: 20 x 30
Landscape Use: shade, accent
Water: low
Evergreen: no
Thorns: no
Growth: moderate
Flowers: pink, purple, red, white
Pruning: train for structure
Hardy: <0F
Origin: Mexico, SW US
Bird habitat

Fool Proof Trees

Ungnadia speciosa (Mexican buckeye)

Size: 11-15 x 11-15
Landscape Use: seasonal accent
Soil: good drainage
Water: monthly soaking with heat
Evergreen: no
Thorns: no
Growth: moderate to fast
Flowers: pink, showy, fragrant Sp
Pruning: train into patio tree
Origin: Mexico
Wildlife Attractive: unknown

Fool Proof Trees

Cordia boissieri (Texas Olive)

Size: 15 x 25
Landscape Use: specimen
Water: low
Evergreen: semi
Thorns: no
Growth: moderate
Flowers: white all year
Pruning: shrub or tree form
Hardy: 20F tip dieback

Fool Proof Trees

Sophora secundiflora (Texas Mountain Laurel)

Size: 15 x 15
Landscape Use: specimen
Water: low
Evergreen: **yes**
Thorns: no
Growth: very slow
Flowers: purple
Pruning: minimal
Hardy: 10F

Fool Proof Trees

Pistacia x ‘Red Push’ (Red Push Pistache)

Size: 40 x 40
Landscape Use: shade
Soil:
Water: moderate
Evergreen: no
Thorns: no
Growth: moderate
Flowers: red
Pruning: train for structure
Hardy: 0F
Spring Fall and Summer color

Fool Proof Trees

Pistacia lentiscus (Mastic Tree)

Size: 15-25 x 20-30
Landscape Use: clean (pool tree)
Soil: tolerate moderate salt
Water: soak monthly
Evergreen: yes
Thorns: no
Growth: slow grower
Flowers: inconspicuous
Pruning: train to tree
Origin: Mediterranean to Mid-east

Resources

Books

- **Plants For Dry Climates** M. Duffield & W. Jones. 2001.
- **Trees and Shrubs for the Southwest** M. Irish. 2008.
- **Landscape Plants For Dry Regions** W. Jones & C. Sacamano. 2000.
- **Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines** R.W. Harris, J.R. Clark, N.P. Matheny, & V.M. Harris. 2004.

Publications

- **Desert Southwest Community Tree Guide: "Benefits, Costs, and Strategic Planting"** E. G. McPherson. 2004.
- **The effects of urban trees on air quality.** D. Nowak USDA FS. 2002.
- **The tree BVOC index.** J.R. Simpson & E.G. McPherson. 2011.
- **J. Karlik & D. Pittenger.** Urban Trees and Ozone. UC/ANR. 2012

Websites

- **Arizona Water Resources- Low Water Use Plant List** http://azwater.gov
- **University of Arizona Campus Arboretum:** **http://arboretum.Arizona.edu**
- **A Selection of Landscape Plants** http://ag.arizona.edu/maricopa/garden/html/plants/plants-a.htm#p
- **Arizona Master Gardener Manual** Chapter 13 Arboriculture – Selecting Plants. 1998. http://ag.arizona.edu/pubs/garden/mg/

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Questions?

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