

A satellite image of a hurricane over the Gulf of Mexico. The hurricane's eye and spiral cloud bands are clearly visible. A blue rectangular text box is overlaid on the upper portion of the image.

Urban Forest Hurricane Recovery Program

<http://treesandhurricanes.ifas.ufl.edu>

Choosing the Right Tree: Site Evaluation and Species Selection



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Choosing the right tree

Getting started

- See what trees are growing in the area
- Visit a local garden and nurseries
- Use books or web programs

Site Evaluation

Assess site properties that affect tree growth before choosing a species to plant.



Getting started



See what is growing in the neighborhood:

Keep in mind there are many trees to pick from, and that soil types will vary throughout the area. This is a good way to get ideas but not to make a decision.

Getting started



Visit a local public garden or plant nursery:

A broad diversity of species is often displayed at these locations and knowledgeable staff can offer growing tips.

Getting started

Environment | General | Uses | Attributes | Size/Shape

Tree height (in feet)

Canopy symmetry: irregular symmetrical

Canopy density: open medium dense

Canopy texture: fine medium coarse

pyramidal rounded columnar oval palm

spreading upright/erect weeping vase

Tree spread (in feet): 6 - 10 | 10 - 15 | 15 - 25 | 25 - 35 | 35 - 50 | over 50

Submit Reset New search Main menu
Clear this panel Refine search

Use books or web software:

Get specific information about growing and selecting trees for your area.

<http://orb.at.ufl.edu/>

[FloridaTrees/index.html](http://orb.at.ufl.edu/FloridaTrees/index.html)

Site Evaluation

1. Above ground site attributes
2. Below ground site attributes
3. Potential site modifications
4. Maintenance practices
5. Desirable tree attributes



Above ground site characteristics

Environmental Factors:

- Light exposure
- Slope exposure
- Wind
- Salt
- Other trees

Urban Factors:

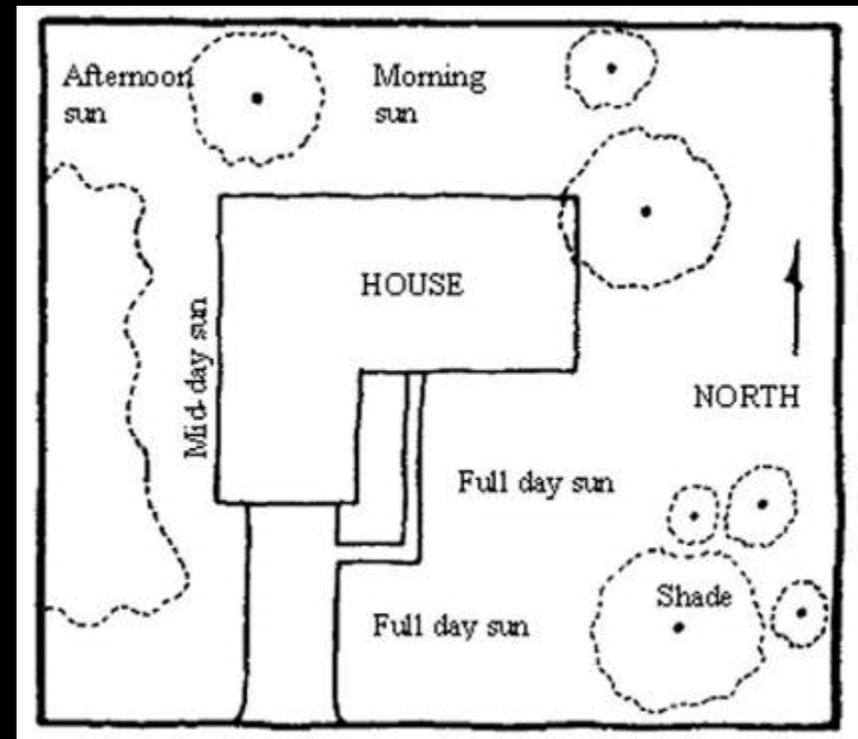
- Overhead wires
- Street and security lights
- Buildings
- Signs
- Vandalism
- Regulations



Light exposure

- ☀ **Full sun:** at least 6 hrs. of direct light (most large trees)
- ☀ **Partial sun:** 3 – 6 hrs. direct sun (some small trees)
- ☀ **Shade:** less than 3 hrs.

Sunlight reflects from glass and white walls, often exposing trees to intense heat when located near buildings.



Remember to account for seasonal change in the sun angle

Other environmental factors

- **Slope**
Southern and western slopes have direct sun exposure and can increase desiccation.
- **Wind**
Wind exposure increases water loss and deforms the canopy.
- **Salt**
Trees planted within 1/4 mile of salt water coastlines should be salt tolerant.



Planting near other trees

Plant shade tolerant species when planting near established trees.



Allelopathy: When chemicals produced in the leaves, trunk, roots and fruit of trees slows or prevents growth of other plants (i.e. walnuts)

Urban factors to consider

- Overhead wires

Utility companies and their customers pay over 1 billion dollars each year to trim trees away from power lines (1995 dollars).



Poor planning



Good planning

Urban factors to consider

- Street/security lights

Do not plant large maturing trees within 30 feet of a security light unless there is a maintenance budget that can afford several pruning visits.

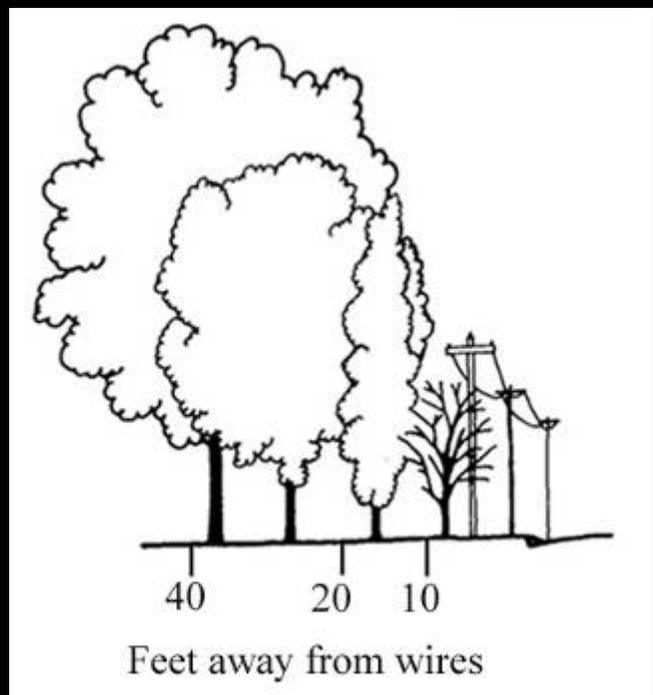


Poor planning



Good planning

Overhead wires and security lights



Distance from wire/light*	Tree size at maturity
0 – 6 feet	Planting is not recommended
6 – 40 feet	10 ft. less than wire/light OR Canopy diameter is less than twice the distance to wire/light

* When more than 40 feet any tree can be planted

Urban factors to consider



- Signs

Plant large trees near low signs and small trees near tall signs.



Urban factors to consider



- Buildings

Small trees and trees with a narrow canopy can be planted within 10 feet of a building.

Urban factors to consider



- Vandalism

Some landscape architects choose trees at least 4 inches in trunk diameter in areas prone to vandalism.

- Regulations

These typically regulate tree planting along rights-of-way and other property controlled by a government.

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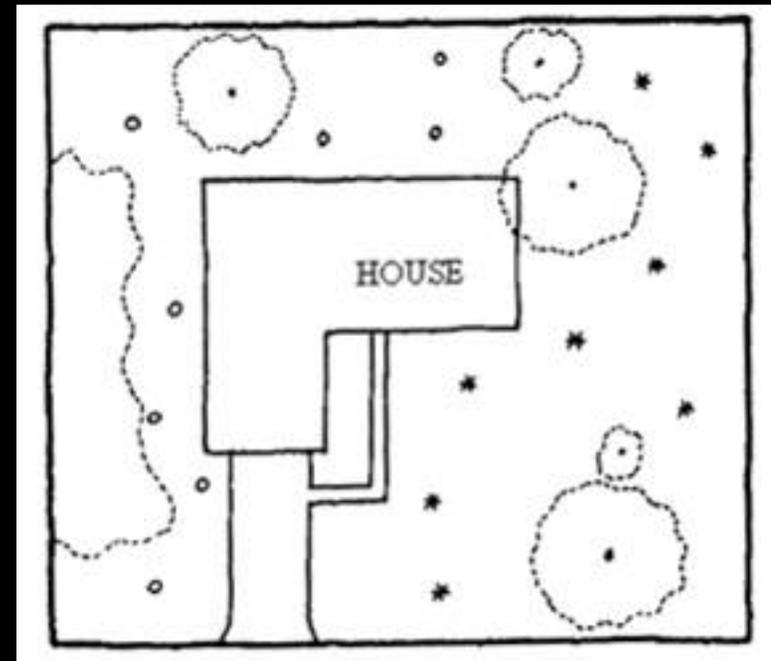
Below ground site attributes



- Evaluation procedures
- Soil attributes

Evaluation procedures

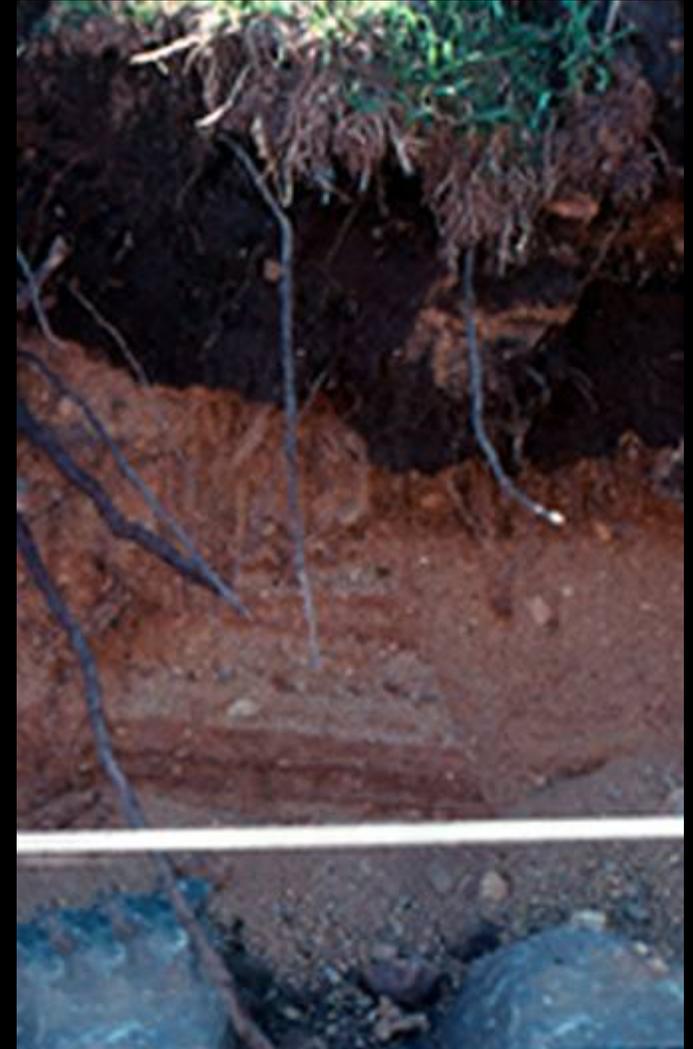
- Collect soil samples for testing
- Identify and save good soil
- Prevent soil compaction



Combine soil from similarly marked areas into one composite sample.

Soil Attributes

- Soil texture and pH
- Compaction, poor drainage, and low oxygen
- Subsurface compacted layers
- Artificial soil horizons
- Soil salinity
- Contaminants
- Depth/distance to water table
- Underground utilities
- Rooting space restrictions



Soil texture and pH

Texture: an indicator of other soil attributes that influence tree growth more so than a growth limiting factor itself

- Clay soils: Poor drainage. Choose wet-tolerant species.
- Sand: Drains quickly and leaches nutrients. Choose drought tolerant species. Consider native species adapted to low nutrient levels.

pH: governs availability of nutrients to plants and also affects activity of soil microorganisms

- 4.8 to 7.2 is the range for most trees
- < 4.8 – select trees tolerant of acidic soils
- >7.2 – select trees tolerant of alkaline soils

Compaction, poor drainage, and low oxygen



Many urban soils are compacted and have poor drainage.

Many trees die or grow poorly because roots need oxygen to grow.

DO plant wet-tolerant trees.

DO plant small or medium sized trees.

DO NOT choose trees with aggressive root systems.

Wet tolerant trees



Red maple, Pond apple, River birch, Paurotis palm, Dahoon holly, Buttonwood, Sweetgum, Sweetbay, Baldcypress, Blackgum, Overcup oak, Swamp chestnut oak, Royal palm
...and many more!

Visit the website Florida Trees:

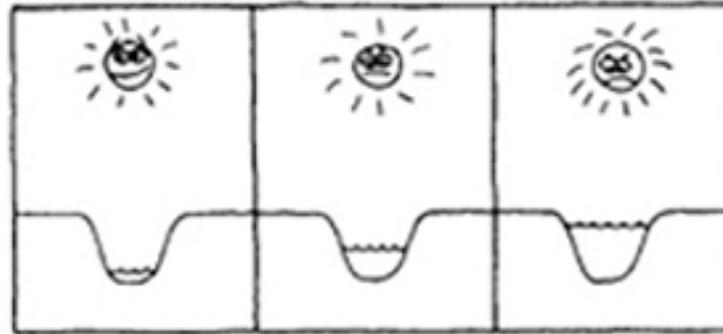
<http://orb.at.ufl.edu/FloridaTrees/index.html>

Use the Tree Selector tool to find other wet tolerant trees.

Checking soil drainage



**Dig hole 18
inches deep
and fill with
water**



Good

Fair

Poor

Drainage after one hour

Subsurface compacted layers

Only small and medium sized trees are recommended if less than 2 feet of loose soil will be spread over a compacted subsoil.



Notice how new roots are formed in the loose topsoil, not the compacted subsoil.

Artificial soil horizons

Construction debris and disturbance from heavy machinery can cause layering of dissimilar soil types. This keeps soil unusually wet by disrupting the natural percolation of water.



Sharp boundaries in the soil may indicate a water drainage problem. Note how roots often grow best in the top layer.

Soil salinity

Salts dry out roots making it difficult or impossible for some trees to establish and grow.

Choose trees that have good tolerance to soil salts, or modify the site. Leach the salts with water (if possible), or replace the soil with good quality material.



Soils in coastal areas, or in regions of the country receiving less than 30 inches of rainfall have a high soil salt content.

Contaminants

- Petroleum waste products
- Heavy metals
- Potentially hazardous residues
- Construction debris such as bricks, concrete or other materials



Consult a soil scientist if the soil is suspected to contain contaminants.

These can be harmful to people as well as to the tree.

Sift out construction debris, as this takes up valuable soil space needed for tree roots.

Depth/distance to water table

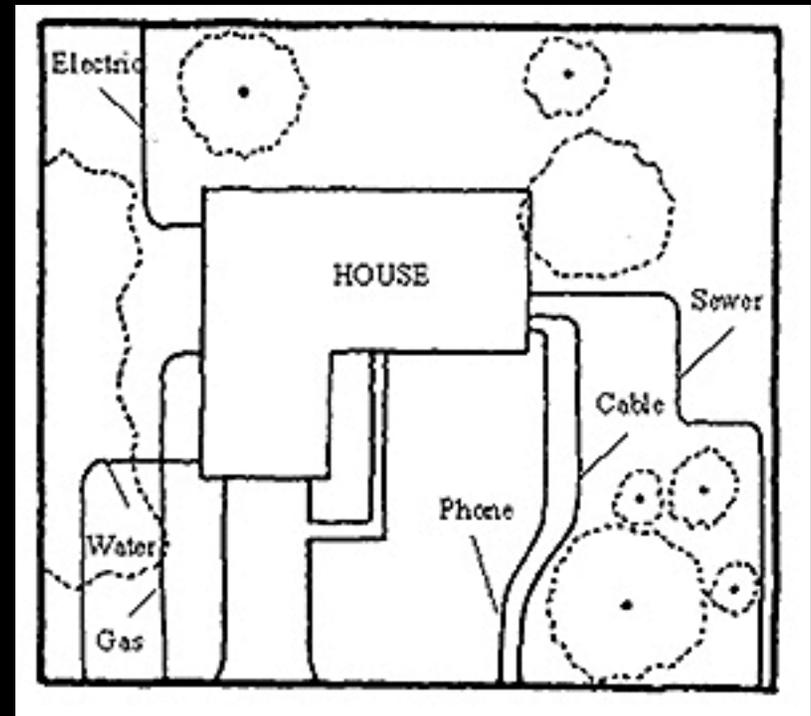


- Large-maturing trees in soil less than two feet thick could topple over in storms as they grow older because they lack deep roots.
- If distance to water table is less than 18 inches, plant small - medium sized trees. Possible exceptions: Baldcypress, Tupelos (i.e. Blackgum)

Underground utilities

Consult cable company, water/sewer departments, electric utility, telephone, and gas companies before digging.

Roots of large trees may be damaged when utilities need to be serviced if planted within 10 feet of area.



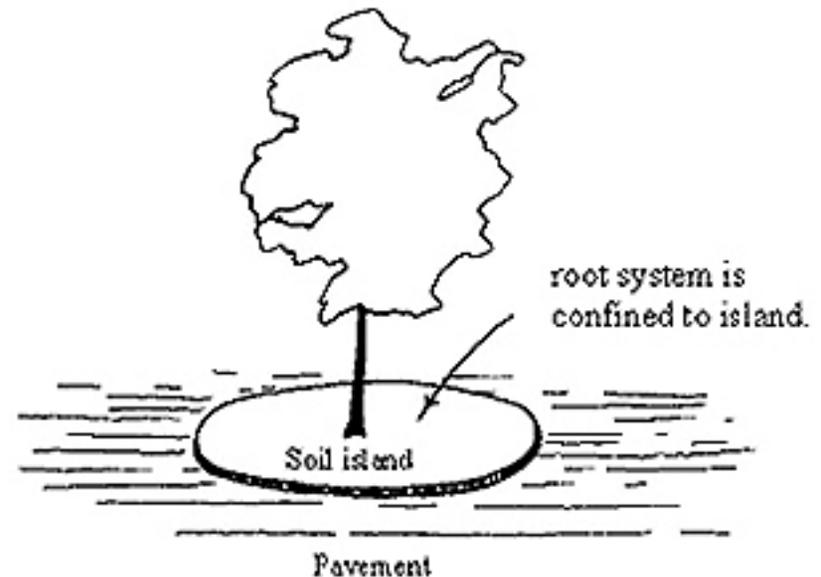
Locate underground utility lines before digging deep planting holes.

Rooting space restrictions

Match ultimate tree size to size of the planting space to keep trees healthy and prevent damage to surrounding sidewalks, curbs and pavement.



If aeration is poor under pavement,



Trees with roots restricted to an island of soil become more stressed than those that can expand roots under pavement.

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Site modifications: aboveground

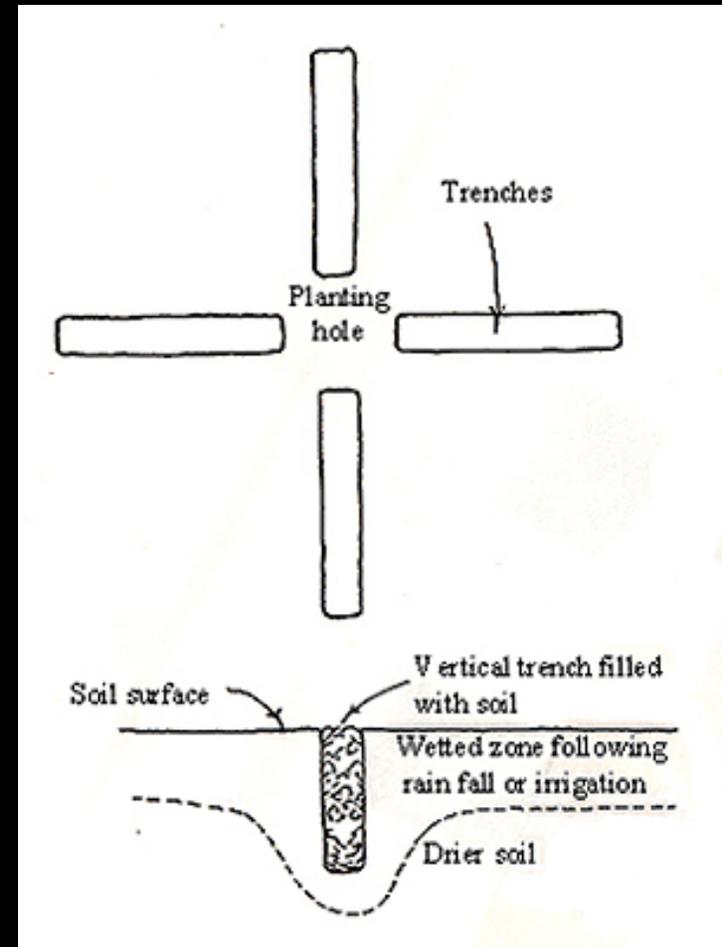
- Move lights and wires
Some communities design utility corridors, which contain utilities within a specific area and allow trees to be planted away from the corridor without interference.



Site modifications: belowground

Use a trencher to dig four or more trenches out from the planting hole. Loosely backfill with the soil from the trench.

- Provides channels for root growth in a compacted site.
- Improves drainage.
- Increases water percolation and reduces runoff.



Site modifications: belowground

To successfully use these techniques, a consulting arborist can provide guidance.

- Mitigate soil salt contamination
- Change soil pH



Raising the beds may help prevent salt from washing into the soil and reduce contamination.

Site modifications: belowground

There is no evidence that amending the soil in small areas benefits trees, though professionals have used these techniques.

- Adding fill soil
- Soil replacement
- Other soil improvements
i.e. colloidal phosphate,
organic matter, expanded slate



Solutions to tree/sidewalk conflicts



- Root barriers
- Increase distance
- Alternative sub-base material
- Tree grates
- Channeling roots
- Cluster planting
- Elevated sidewalks
- Street light/wire location
- Alternate surface materials

Visit the website Trees and Hurricanes:
<http://treesandhurricanes.ifas.ufl.edu>

See the presentation on Wind Resistant Design for more information.

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Evaluate maintenance practices

- Irrigation
- Pruning
- Fertilization
- Pest control
- Cleanup



Maintenance practices: Irrigation



- Frequency of irrigation impacts species selection, recommended size for planting, and the tree production method best suited for the site.

Irrigation: Species selection

- Irrigation only until tree is established
 - Choose drought tolerant trees
- Irrigation regularly during the life of the tree
 - Any species regardless of drought tolerance

Drought tolerant trees

Geiger tree	Mahogany
Gumbo limbo	Live oak
Yaupon holly	Baldcypress
Pines	Sabal palm
Canary Island date palm	Thatch palm

Drought sensitive species

Magnolia	Hollies
Orchid tree	Red maple
Cassia	

Irrigation: size of tree

Size of nursery stock	Irrigation schedule for vigor	Irrigation schedule for survival
< 2 inch caliper	Daily: 2 weeks Every other day: 2 months Weekly: until established	Twice weekly for 2-3 months
2 – 4 inch caliper	Daily: 1 month Every other day: 3 months Weekly: until established	Twice weekly for 3 – 4 months
> 4 inch caliper	Daily: 6 weeks Every other day: 5 months Weekly: until established	Twice weekly for 4 – 5 months

Months of irrigation to provide based on climate and tree size at planting

	USDA Hardiness Zone					
Max. trunk diameter at planting	5	6	7	8	9	10
1 inch	12 months	10 months	7 months	5 months	3 months	3 months
2''	24	20	15	10	6	6
3''	36	30	23	16	9	9
4''	48	39	30	21	12	12

Production method

- Frequent irrigation
Trees grown by any production method perform equally well.
- Infrequent irrigation
Hardened-off B&B trees survive better than container trees.



Maintenance practices: Pruning



- Infrequent to no pruning

DO NOT plant large trees if there is a structure (i.e. streetlight) that they could grow into.

DO plant trees with a naturally good structure

Trees with good structure

Baldcypress

Southern magnolia

Maintenance practices: Fertilization



This is mostly an issue in alkaline soils that cause micronutrient deficiencies.

Alkaline tolerant trees

Sugar maple, Pecan,
Hackberry, Red bud,
Ficus, Coconut palm

Visit the website Florida Trees:

<http://orb.at.ufl.edu/FloridaTrees/index.html>

Use the Tree Selector tool to find other trees that tolerate alkaline soil.

Maintenance practices: Pest control



Determine whether a tree is rated to be pest sensitive.

Before planting, check with local tree specialists as to the severity of these pests in your area.



Maintenance practices: Cleanup



When planting near sidewalks, do not select trees with large, hard, or fleshy fruit.

If there is not a budget for cleanup, fruit litter on the sidewalk can be hazardous to pedestrians.

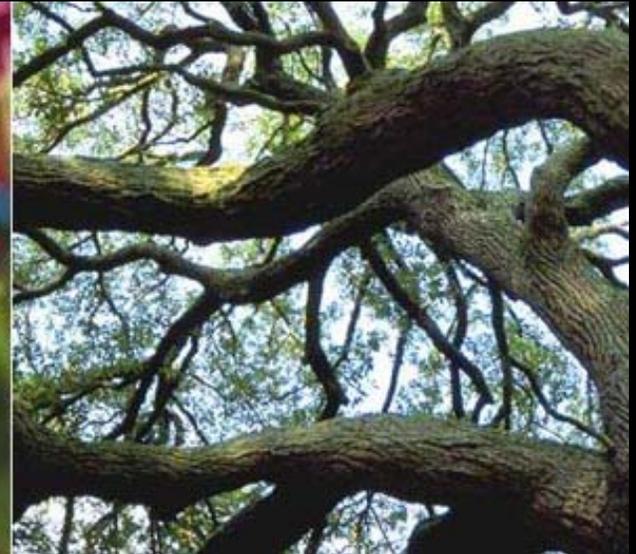
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Desirable tree attributes

- Function
- Mature size
- Form
- Longevity
- Ornamental traits
- Canopy density
- Deciduous vs. evergreen
- Growth rate
- Wood strength



Desirable attributes: Function

- Shade
- Erosion control
- Stream bank stabilization
- Wildlife support



Desirable attributes: Mature size

Small (< 30 ft. at mature height)

- Ornamental features: showy flowers, fruit, foliage, or bark
- Nice as specimen plant near deck or patio
- Good for small soil spaces



Large (> 50 ft. at mature height)

- Provide shade
- Can reduce air conditioning bills when placed properly



Desirable attributes: Form

Form → Function

Wide spreading canopy
(i.e. live oak, sugar maple)

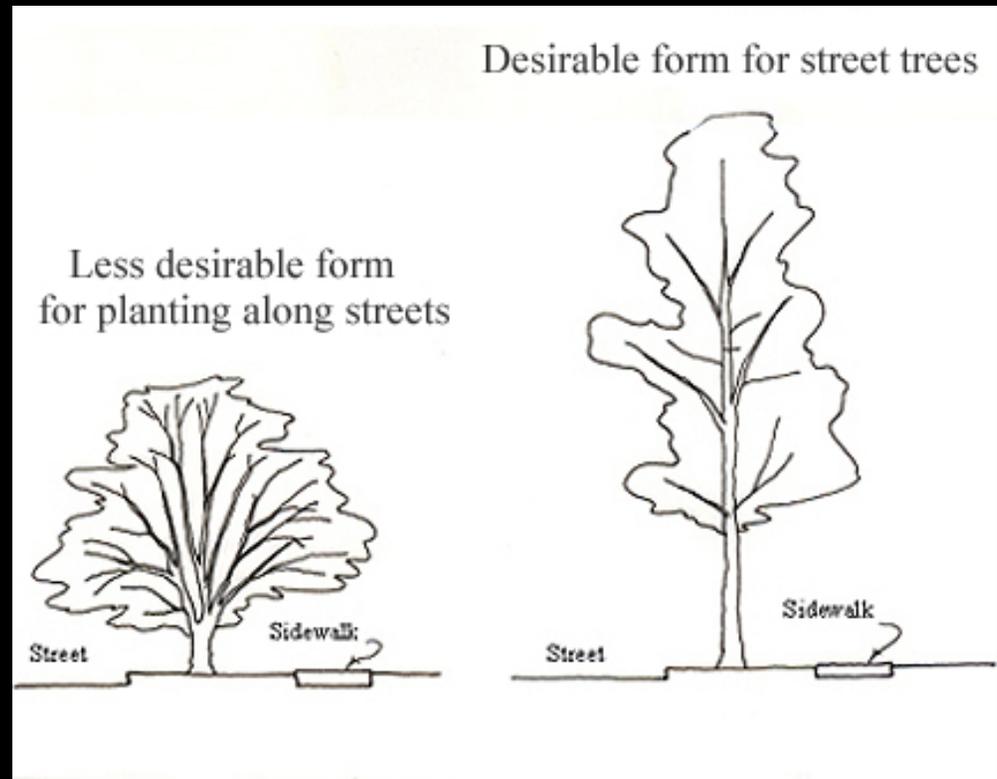
Erosion control, shade

Tall and narrow canopy
(i.e. Italian cypress)

Location near power lines

Upright, vase shape
(i.e. zelkova)

Location along street or sidewalk



Desirable attributes: Longevity

- Highly urbanized site
 - Life span is less of a concern as most trees are short-lived in this setting.
- Open spaces like parks, residential, or commercial landscapes
 - Large maturing trees usually live longer than small trees.



Desirable attributes: Canopy density

- Dense canopy
 - Provides shade for pedestrians and buildings
- Open canopy
 - Allows light to penetrate so that grass can grow beneath



Desirable attributes: Deciduous vs. Evergreen

Northern climates

Deciduous is preferred for urban sites because it allows warm sunlight to heat sidewalks in winter.



Warm climates

Evergreen is preferred as a street tree because it provides shade from year-round sunlight.



Desirable attributes: Growth rate and wood strength

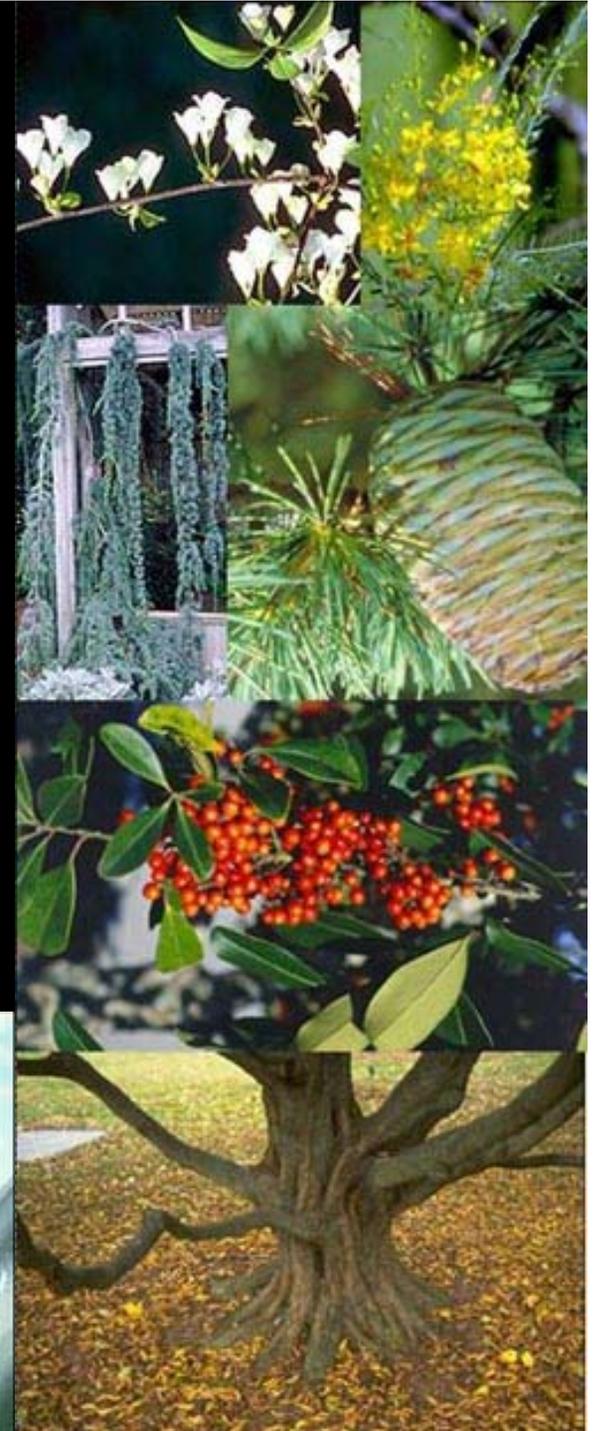
Fast growing species can (but not always) have brittle wood that is susceptible to breakage.



Notice the broken limb hanging in the tree.

Desirable attributes: Ornamental traits

After evaluating the site and coming up with a list of trees that can thrive in those conditions, now comes the fun part!



Tree Selection

Visit these websites for your final tree selection:

Northern Trees (zones 2 – 7)

<http://orb.at.ufl.edu/TREES/index.html>

Florida Trees (zones 8 – 9)

<http://orb.at.ufl.edu/FloridaTrees/index.html>

Enter the site attributes
and get a list of species to
choose from.

