

FLORIDA SOLAR



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# Landscaping for Energy Conservation

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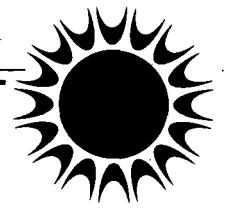
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# Landscaping for energy conservation

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Because of their long life, trees can give your environment a sense of permanence and stability. They can help keep your air supply fresh by trapping and filtering dust, removing carbon dioxide, and releasing oxygen. Trees can reduce noise pollution, lower temperatures around your home and reduce soil erosion. Furthermore, trees beautify our gardens, streets and parks, and please our senses with interesting shapes, patterns and colors. They can increase the property value of your home and generally enhance the quality of life in a community. Every homesite should include several ornamental trees.

## Trees for shading

Energy used to cool and heat your home could be greatly reduced if you properly employ vegetation in the landscape. In conjunction with other energy-conserving techniques, such as insulation and window caulking, vegetation may be effectively used in retrofitting existing houses. In typical concrete block structures, insulation may be easily added to an attic, but it is difficult and expensive to add to exterior walls. Therefore, the use of trees and shrubs near walls may be the most cost-effective method for providing that energy-saving feature.

For the landscape to be a practical energy-conservation measure, it should not only minimize the heat gain of a residence in summer, but it should meet the following criteria as well:

- a) The energy savings associated with the vegetation should begin to be significant within a five-year growth period even though the trees and, more important, their canopies are not yet very large.
- b) In order to keep the cost of landscaping within a reasonable budget, you should limit the number and size of the trees and shrubs you plant.

Shading the walls of a house is generally more sensible than shading the roof. During most of the cooling season, east and west walls receive about 50 percent more sunshine than walls facing north and south.

Research comparing avenues of heat gain to a residence has shown that windows are by far the most significant transfer agents (ref. 1). Although most of the heat gain attributed to windows arises through direct and diffuse solar radiation, significant amounts of heat transfer occur by air infiltration through the edges of windows if they are not properly sealed or caulked.

## Where to plant

You can figure out the best places to plant shade trees by observing which windows admit the most sunshine during peak load hours in a single day in the hottest months (June and August). For example, for a designated date of August 6, west-facing windows receive a significant amount of radiation during the afternoon hours. Trees should be planted at positions determined by lines from the centers of the windows on the west or east walls toward the position of the sun at the designated hour and date. (Trees planted on the south side of your home, unless they are deciduous, will prevent solar gain in the winter when you may need it.)

The precise distance you choose will depend on the space available in your yard and the size of the tree you select. A species that grows to 60 feet should be planted farther away than one that usually reaches 40 feet. However, the general rule is that trees should be located fairly close to a residence so that after a five-year growth period, the canopies will extend to within several feet of the roof. A tree planted close to your home is more effective than one planted at a distance from your home for the following reasons:

- 1) Although the trees will not be extremely tall after a five-year period, the windows and adjacent walls will be shaded during the peak load periods, even in the early afternoon when the sun's altitude is quite high. Since the sun's altitude is higher during the hours of large solar incidence on the south wall during the late summer, trees planted significantly away from the south wall would not provide shade to the residence during that period.
- 2) During the afternoon period, the windows and adjacent walls will be more completely shaded for several months of the cooling season even though the tree canopies are not yet very broad. For example, a tree planted 10 feet from the west wall will shade a west wall window about four times as long during the peak cooling season as a tree planted 20 feet from the wall.
- 3) The ambient temperature of the air directly adjacent to the wall will be cooler. A recent study (ref. 2) shows that temperatures under trees next to houses are typically 5°F to 6°F cooler than unshaded areas. This cooler microclimate immediately adjacent to the house results in less heat gain through conduction by the walls and windows.
- 4) The roof will be more extensively shaded during the

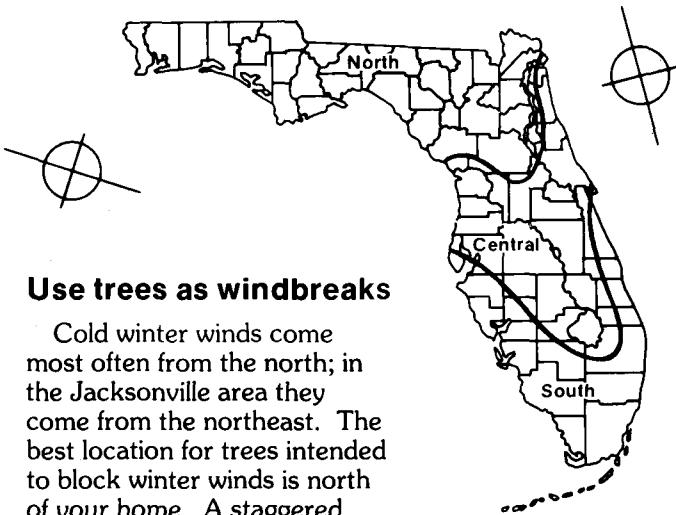
afternoon, further reducing heat gain during the peak-load period.

Trees selected for this peak-load landscaping should be large evergreens with extensive canopies in order to maximize the cumulative amount of shading of the windows, walls and roofs. Since they will be located near the house, trees with strong branches and wind resistance should be selected to prevent damage during periods of strong wind.

### Shade your air conditioner

A tree should be planted fairly close to the air conditioning unit or units, so that after a five-year growth period its canopy will extend to the roof of the residence. In addition, shrubs should be placed on each side of the air conditioner. They should be positioned and pruned so that leaves and branches do not interfere with the air flow of the air conditioner. This arrangement should ensure that the air conditioner is completely shaded during mornings and afternoons of the entire cooling season.

### Climate zone map



### Use trees as windbreaks

Cold winter winds come most often from the north; in the Jacksonville area they come from the northeast. The best location for trees intended to block winter winds is north of your home. A staggered row of dense evergreens, such as Eastern Red Cedar or American Holly, can effectively provide this kind of protection. Care must be taken not to interfere with summer ventilation; warm-weather breezes usually come from the south or southeast. Plants not only slow down or deflect the wind for cold protection, but they can also guide the wind in a desired direction to provide a degree of coolness during the summer. For example, plants placed on the northwest side of your home may protect it from cold winter winds and also direct summer breezes around it.

### Use native trees

The most appropriate plants for good landscape design are those native to the area and therefore accustomed to local conditions. You should avoid planting vegetation dependent on careful maintenance for survival. A number of common trees and shrubs native to Florida are noted in Tables 1, 2 and 3.

### Salt can be a problem

Salt in the soil or salt spray seriously compounds soil problems. Many trees will not survive saline conditions. Trees suitable for planting at or near the coast have been assigned three categories of salt tolerance in Tables 1, 2 and 3: **a) High salt tolerance:** trees in this group are highly salt tolerant and will grow along the beach within reach of wind and spray. **b) Medium salt tolerance:** trees in this category will grow in areas subject to salt drift but not direct spray. They require better growing conditions and more protection than high salt species. **c) Low salt tolerance:** trees in this category may be expected to withstand some light salt drift, but are suited to growing well back from the beach, or behind an intervening barrier where growing conditions are less harsh than those for high or medium salt species.

### Evergreen versus deciduous

In Miami and other hot, humid areas with extremely short heating seasons, deciduous trees are not required. The cooling effect of shade provided by evergreens in December or March is probably more effective in reducing total energy costs for space conditioning. There are typically many more days in March requiring cooling in Miami than there are days requiring heating in January and February combined.

In north Florida, there are many more days requiring heating than in south Florida, so the deciduous characteristic is more important. The optimum location in Florida for deciduous plants is southeast of the building. Lower canopy trees and shrubs located where they might block low-altitude solar radiation from east or south walls and windows during the mornings could be deciduous.

### Planting trees

Nursery-grown trees are easier to transplant and grow more successfully than those taken from the woods; without an adequate root system trees may die after transplanting. The best place to purchase a tree is from a reputable nursery. Bare-root seedling trees, especially those that are deciduous, should be planted in their dormant season. Some tropical species grow all year, so this does not apply to them. Container-grown trees can be planted any time of the year. As a rule, small trees (trunk not more than two inches in diameter) have a better chance of survival than large trees. The nursery will be able to provide information on tree selection.

### Fertilize

Trees often may not get all the proper nutrients they need from the soil. Healthy, vigorous trees will not only grow faster, but they are more beautiful, produce better shade, and are better able to resist the attacks of insects, diseases, and severe weather.

Fertilizers should be applied in late fall after the trees are dormant or inactive, or in the early spring before they begin to grow or bud. The annual amount can be split into two or three applications made in spring and fall or in spring, summer and fall. Fertilizers should be distributed

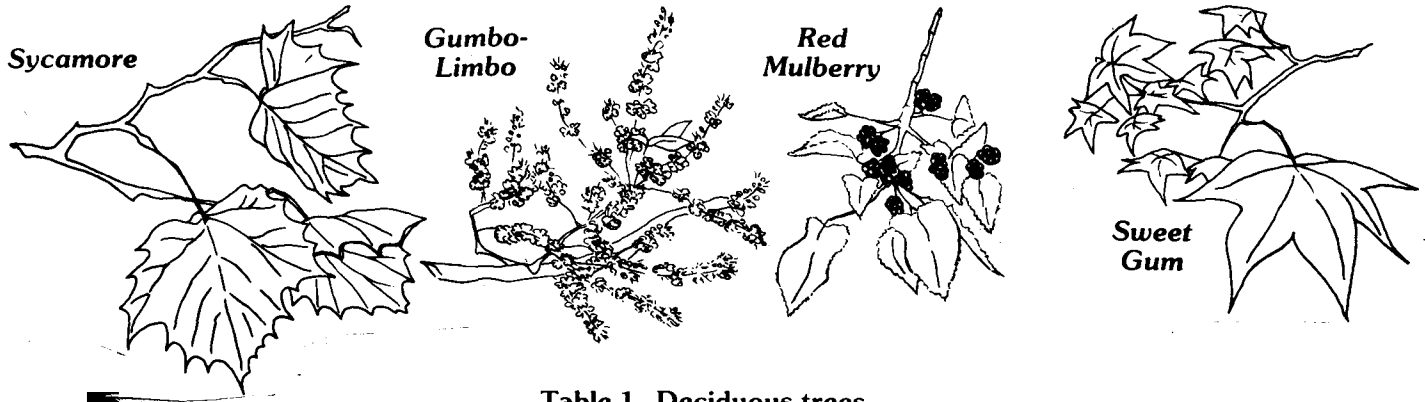


Table 1. Deciduous trees

Common name	Uses	Ultimate height (ft)	Colored foliage	Flowering season	Climate zone	Salt tolerance
Florida Elm	S	50			N,C	low
Gumbo-Limbo	A	30-50	blue-purple flowers	spring	C,S	none
Hackberry	S,R	60-80			N,C	low
Laurel Oak	R,S	60-80			N,C,S	none
Red Mulberry	S	40-50			N,C,S	none
Sweet Gum	S	80	red-brown	fall	N,C,S	low
Sycamore	S	100	yellow	fall	N,C,S	medium

Uses: A, accent R, roadside and street plantings S, shade

Climate Zone: N, North C, Central S, South

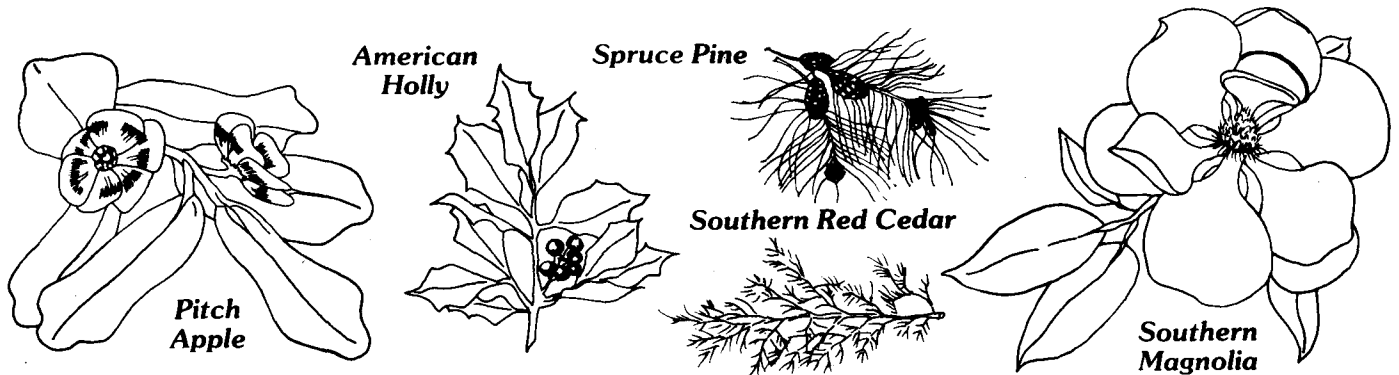


Table 2. Evergreen trees

Common name	Uses	Ultimate height (ft)	Colored foliage	Flowering season	Climate zone	Salt tolerance
American Holly	A	40-50	red berries	winter	N,C	medium
Cherry Laurel	A	25-30	white flowers	spring	N,C,S	medium
Dahoon Holly	A,R	20-40	red berries	winter	N,C,S	medium
Loblolly Bay	A,S	40-50	white flowers	summer	N,C	low
Pitch Apple	A	30	pink & white flowers	all year	S	high
Red Mangrove	S	to 75	yellow flowers	spring, summer	C,S	high
Southern Magnolia	A, S	60-80	white flowers	spring, summer	N,C	medium
Southern Red Cedar	A	30			N,C	medium
Spruce Pine	A	100			N	medium

evenly under the tree canopy beginning about 1 foot from the trunk of a small tree (3 feet for a large tree) to the edge of the canopy. For specific recommendations on tree fertilization and pest control, contact your nearest County Extension Office.

The enclosed tables show recommended trees and shrubs native to Florida. Table 1 lists deciduous trees; Table 2 lists evergreens; Table 3 shows native shrubs.

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This document was promulgated at a cost of \$296, or 12¢ per copy, to inform the public about energy conservation.

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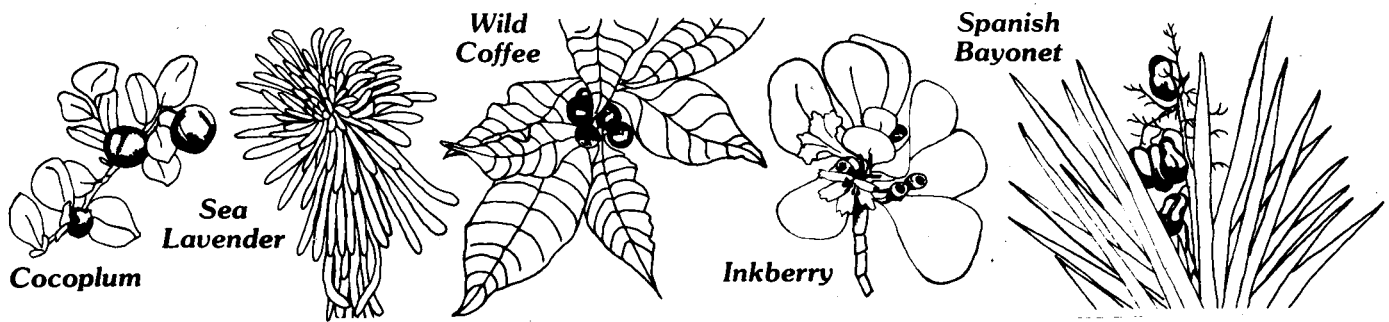


Table 3. Evergreen shrubs

Common name	Uses	Ultimate height (ft)	Colored foliage	Flowering season	Climate zone	Salt tolerance
Cocoplum	S	20	white flowers	spring	C,S	medium
Gallberry	H	10	black fruit	winter	N,C,S	medium
Inkberry	C	6	white flowers	spring and summer	S	high
Marlberry	S	20	white flowers, black fruit	all year	S	high
Sea Lavender	C	6	white flowers, black fruit	all year	S	high
Spanish Bayonet	B	20-25	white flowers	spring	N,C,S	medium
Wild Coffee	H	8	white flower, red fruit	spring summer	S	

Uses: B, barriers C, coastal locations H, hedges S, screens

Climate Zone: N, North C, Central S, South



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