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Trees for Hot Sites

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Hot landscape sites require special consideration before trees are planted. Trees can survive, and even thrive, in hot sites if the site is prepared correctly, if heat-tolerant species are selected, and if the trees are properly maintained. A variety of different locations and situations qualify as hot landscape sites.

Hot site locations

- Because of large masses of asphalt and concrete that absorb and reflect heat, urban areas tend to be an average of 9° F to 12° F warmer than surrounding wooded areas. Buildings and roads cool slowly, so heat continues to radiate even after sunset — an effect called the "urban heat island."

The foremost Norway maple is nearest the paving and as a result has scorched leaves.

- Areas adjacent to buildings also tend to be hot. Buildings reflect heat onto trees, especially along southern and western walls.

Heat reflected from the building has scorched the leaves of this linden.

- Sites near roads and parking lots are hot. The temperature of automobile surfaces can exceed 122° F during the summer. When combined with the heat from car fumes and the temperature of asphalt and concrete, these sites can be lethal for trees.

The foreground tree is dying because it is planted in a small volume of hot, dry soil in a parking lot.

- Underground utilities can also create hot sites. Soils around certain utilities, such as steam lines, can be significantly hotter than adjacent soils.

- Containers and raised beds become hotter than in-ground planting areas. Where soil is above ground level and uninsulated by surrounding soil, sites are subject to greater extremes of heat and cold.

- Open areas, such as fields and parks, are typically hotter than wooded areas where trees provide shade for each other and the surrounding soil. Leaf litter on the ground in wooded areas keeps the soil cooler, as does mulch in open, unshaded landscapes.

Dogwoods planted in hot, unshaded areas are more likely to suffer heat damage than…

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…dogwoods planted in their natural habitat – shaded, wooded areas.

Why heat is a problem for trees

High temperatures have a detrimental effect on tree leaves and roots. Increased leaf temperatures cause trees to cool themselves through the process of transpiration. As temperatures rise, water vapor is released through small pores (stomata) in the leaf surface, thereby cooling the tree. On a hot day, a large deciduous tree can transpire as much as 100 gallons of water into the surrounding air. This volume of water is not always available to trees on hot sites because of inadequate moisture in the soil. A lack of available water to trees in hot sites often results in scorched (dried) leaf margins or dead leaves.

Scorched leaves on a flowering dogwood grown in full sun.

Preparing hot sites for planting

To help trees adjust to hot sites, preparation prior to tree planting is important. If large planting beds will be used, organic matter such as compost can be incorporated into the soil to improve soil structure, air movement and water retention. Incorporation of organic matter into the backfill soil for individual planting holes is not recommended. Installation of an irrigation system may be beneficial because irrigation can supply water for transpirational cooling.

Selecting trees for hot sites

Trees that are genetically capable of tolerating high temperatures should be selected for hot sites. Some species of trees are naturally heat-resistant, and many cultivars are available that have been developed for their ability to withstand high temperatures. Consideration should be given to site moisture levels because some trees can withstand heat only when adequate moisture is available.

Maintaining trees on hot sites

After heat-tolerant trees have been planted, additional maintenance is needed to ensure long-term tree health. Irrigation can be critical. Trees should receive 1" of water per week during the growing season to replace water lost through transpiration. Water deeply and include areas beyond the tree's dripline (crown spread) where small absorbing roots are located.

Mulching is also very important. Maintain a 2 - 4" layer of mulch over as much of the tree's root zone as possible. Mulching will help keep the soil surrounding the roots cooler, prevent moisture evaporation and water runoff, minimize competing weed growth, and reduce the amount of light and heat that reflects onto leaf and stem surfaces. Remove competing vegetation (weeds, grass) frequently to improve tree survival.

Fertilize trees in hot sites only as needed. Nitrogen causes trees to grow quickly, and an extra flush of new leaves may wilt and die due to heat stress. Do soil testing and observe plant health to determine if and when supplemental fertilization is needed.

Prune trees as necessary to remove broken, diseased, damaged or leggy growth. Pruning improves overall tree health, reduces water demand, and decreases the amount of water that is lost due to transpiration.

In summer, shade newly planted trees with netting or boards until their roots become established and capable of absorbing adequate water for transpiration. Leaves on trees transplanted during summer heat, or into hot sites, are sometimes sprayed with antitranspirants to prevent excessive water loss. In extreme heat, leaves are even stripped from trees to combat desiccation.

Trees for hot sites

Common Name	Latin Name	Cultivars and Comments
Trident maple	*Acer buergeranum*	Tough, pest-resistant
Hedge maple	*Acer campestre*	Tolerates drought
Norway maple	*Acer platanoides*	'Summer Shade'
Red maple	*Acer rubrum*	Tolerates urban conditions
Sugar maple	*Acer saccharum*	'Green Mountain' and 'Legacy', but not for Southeastern Virginia
Freeman maple	*Acer x freemanii*	'Armstrong Two'
Red horsechestnut	*Aesculus x carnea*	'Briotii'
River birch	*Betula nigra*	Provide irrigation
White birch	*Betula platyphylla*	'Whitespire' resists borers
Shagbark hickory	*Carya ovata*	Very adaptable
Common hackberry	*Celtis occidentalis*	Tough, wind-tolerant
Cockspur hawthorn	*Crataegus crusgalli*	Tolerates drought
Washington hawthorn	*Crataegus phaenopyrum*	Tough, thorny
Japanese cryptomeria	*Cryptomeria japonica*	Evergreen
Leyland cypress	*x Cupressocyparis leylandii*	Evergreen; avoid wet areas
Hardy rubber tree	*Eucommia ulmoides*	Tolerates urban conditions
White ash	*Fraxinus americana*	Tolerates drought
Green ash	*Fraxinus pennsylvanica*	Tough, wind-tolerant
Ginkgo	*Ginkgo biloba*	Select male trees
Honey locust	*Gleditsia triacanthos*	Tough, tolerates poor soil; 'Shademaster' is thornless
Chinese juniper	*Juniperus chinensis*	Evergreen; 'Spartan'
Rocky mountain juniper	*Juniperus scopulorum*	Evergreen; 'Skyrocket'
Eastern redcedar	*Juniperus virginiana*	Evergreen; 'Glauca'
Goldenraintree	*Koelreuteria paniculata*	Very tough summer bloomer
Crape myrtle	*Lagerstroemia* spp.	Tough summer bloomer
Sweetgum	*Liquidambar styraciflua*	Fruitless 'Rotundiloba'
Waxmyrtle	*Myrica cerifera*	Tolerates sandy soil
Colorado spruce	*Picea pungens*	Monitor for spider mites
Chinese pistache	*Pistacia chinensis*	Adaptable, pest-resistant
London planetree	*Platanus x acerifolia*	Tolerates drought
Chinese podocarpus	*Podocarpus macrophyllus*	Pest-resistant
Pissard plum	*Prunus ceracifera*	'Atropurpurea'
Yoshino cherry	*Prunus x yedoensis*	Monitor for borers
Callery pear (cultivars)	*Pyrus calleryana*	Avoid 'Bradford'
Laurel oak	*Quercus hemisphaerica*	'Darlington' for coastal areas only
Willow oak	*Quercus phellos*	Tolerates urban conditions
English oak	*Quercus robur*	Tolerates drought
Red oak	*Quercus rubra*	Tolerates urban conditions
Live oak	*Quercus virginiana*	Good coastal selection
Japanese pagodatree	*Sophora japonica*	Tolerates urban conditions
American arborvitae	*Thuja occidentalis*	'Pyramidalis' for form
Oriental arborvitae	*Thuja orientalis*	Tolerates poor soil
Littleleaf linden	*Tilia cordata*	'Greenspire'
Silver linden	*Tilia tomentosa*	Tolerates drought
Lacebark elm	*Ulmus parvifolia*	Tolerates poor soil, urban conditions
Chastetree	*Vitex agnus-castus*	Tough summer bloomer
Japanese zelkova	*Zelkova serrata*	Tolerates poor soil

Some trees, such as Box Elder (*Acer negundo*), Tree-of-Heaven (*Ailanthus altissima*), and Black Locust (*Robinia pseudoacacia*) are heat tolerant and, if found growing on a site, should be considered for use, but otherwise are not considered to be desirable landscape trees due to insect problems and/or invasive growth.