Storm-Resistant Trees for Mississippi Landscapes

Mississippi has a humid, subtropical climate. Summers are long and hot, but winters are relatively mild. Much of the year, prevailing southerly winds bring warm, humid air from the Gulf of Mexico across the state. Precipitation is distributed fairly well throughout the year, but seasonal droughts typically occur each year. Mississippi also has its share of stormy weather. This includes high winds from thunderstorms, hurricanes, or tornadoes; flooding from hurricanes or torrential rains; and the occasional ice storm during winter.

Severe winds from thunderstorms are common in Mississippi, occurring an average of 55 days per year in northern counties and 75 days per year in southern counties. Storms occurring in late autumn and early spring may be associated with fronts having very high winds. Indeed, tornadoes often accompany these frontal systems crossing the state. In the frequency of tornadoes per 10,000 square miles, Mississippi ranks eighth nationally. Moreover, hurricanes bring very high winds; Mississippi has experienced eight in the state since 1895.

Flash flooding from torrential rain can become a problem when drainage is blocked in low areas and water stands on the soil for weeks at time. Flooding can also damage trees; extended periods of flooding, as from hurricane activity in the summer, is particularly harmful to trees. In August 2015, Hurricane Katrina was one of the deadliest and most damaging hurricanes on record. Although the eye of the hurricane made landfall over Louisiana, the storm surge inundated the Gulf Coast from Mississippi to the Florida panhandle. Moreover, New Orleans was flooded by 20 feet of water after several levees broke. Damage from Louisiana to west Florida was estimated to exceed $100 billion.

Occasional ice storms in Mississippi can be devastating to trees. Such storms occur when the polar jet stream dips south in the winter; this is known as the "Siberian Express," which brings arctic air and prolonged freezing temperatures to the state. If a wet warm front follows, then freezing rain and ice damage may result. In February 1994, a slow-moving front caused a severe ice storm in the Deep South. This front moved across Arkansas, Tennessee, Mississippi, and Alabama. Damage was estimated at over $3 billion, and a million customers were without power, some over a month.

While native vegetation has adapted to a wide variety of environmental conditions, some species are better able to survive storm events than others. Choosing to plant tree species in the landscape that can withstand these natural events makes sense. Storm-resistant trees will make your property safer and reduce future tree maintenance costs. This publication provides an overview of those tree species capable of surviving high wind, extensive flooding, or winter icing, as shown in **Table 1**.

Wind Resistance

Tree species vary widely in their ability to tolerate high winds, and the ability of any individual tree to survive windstorms will also depend on its health. Nevertheless, there are some characteristics that enable trees to adapt to high wind. For instance, some tree species will defoliate during extreme winds, which can help them survive. Some of these adaptable species include live oak (**Figure 1)**, flowering dogwood, and crape myrtle. Wood characteristics can also enable certain species to resist high wind. These characteristics include high wood density or elasticity. Examples of trees with these characteristics are live oak and longleaf pine. Some species with open crowns survive high winds well, such as the Eastern red cedar or wax myrtle.

Durea, Kampf, and Littell (2007) reported on wind damage to trees. Tree damage was assessed through

Figure 1. Live oak (*Quericus virginiana*) is highly wind-resistant. It has a unique form (left), with a spreading canopy that grows wider than tall. Its foliage (right) is evergreen and has a thick, waxy epidermis.

surveys after nine hurricanes hit Florida and Puerto Rico. The hurricanes occurred between 1992 and 2004, with sustained winds between 85 and 165 miles per hour. Arborists, urban foresters, and forest scientists participated in the surveys for the later eight hurricanes, whereas homeowners were surveyed regarding tree damage after Hurricane Andrew, the first storm in 1992. Their findings are summarized in **Table 1**.

Flood Tolerance

Tree species vary in their tolerance to flooding, especially during the growing season. Tree roots need oxygen, and most tree species will not tolerate flooding during this time. In addition, individual trees can vary in their tolerance to flooding depending on their age. Tree seedlings are small enough to be covered with siltation from river flooding, making it difficult to survive. Mature, vigorously growing trees of tolerant species are best able to abide flooding. Baldcypress (**Figure 2**) is an example of a flood-tolerant tree.

Bratkovich et. al. (1993) published an assessment of flooding effects on trees along the Mississippi and Missouri Rivers. Flood tolerance shown in **Table 1** included tree species able to survive standing water through at least one growing season.

Ice Resistance

Tree species vary in their tolerance to ice accumulation. Those species most resistant to breakage from ice generally have strong branch attachment, flexible branches, low branch surface area, and excurrent form (having a single, main trunk). Ice-tolerant species having one or more of these characteristics include bald cypress, black walnut, and Eastern redcedar (**Figure 3**).

Hauer, Dawson, and Werner (2006) published a summary of their research on tree resistance to ice damage in urban forests. Their findings in **Table 1** included assessments on the age and form of the tree, and particularly the ability of tree branch junctures to withstand ice loads.

Exceptions

Several tree species resistant to storm stresses are still not suitable to plant for other reasons. Among these are green ash (*Fraxinus pennsylvatica*), white ash (*Fraxinus americana*), and fringe tree (*Chionanthus virginicus*). These trees are susceptible to an invasive pest, the emerald ash borer (*Agrilus planipennis*). While Eastern cottonwood (*Populus deltoides*) and silver maple (*Acer saccharinum*) are flood-tolerant, they have brittle wood. The black willow (*Salix nigra*) and box elder (*Acer negundo*) also tolerate flooding, but their shallow root systems often damage septic or sewer lines. Avoid planting any of these tree species in an urban setting.

Figure 2. Baldcypress (*Taxodium distichum*) tolerates flooding and is also ice- and wind-resistant. It is a relatively slow-growing tree (left), most commonly found on wet sites near flowing streams. The foliage is a frond (right), which drops in the autumn.

Figure 3. Eastern redcedar (*Juniperus virginiana)* is ice-resistant. This tree (left) can grow on a wide variety of sites, including alkaline soils. It is evergreen, and its needles (right) form overlapping scales. The species is also dioecious, having separate male or female trees.

Table 1. Storm-resistant trees for Mississippi.

Tree	Species	Wind Resistant[a]	Flood Tolerant[b]	Ice Resistant[c]
American Holly	*Ilex opaca*	X		
American Hornbeam	*Carpinus caroliniana*	X		X
American Sycamore	*Platanus occidentalis*		X	
Baldcypress	*Taxodium distichum*	X	X	X
Bitternut Hickory	*Carya cordiformis*			X
Blackgum	*Nyssa sylvatica*	X		X
Black Walnut	*Juglans nigra*			X
Bur Oak	*Qurecus macrocarpa*			X
Buttonbush	*Cephalanthus occidentalis*		X	
Chickasaw Plum	*Prunus augustifolia*	X		
Common Persimmon	*Diospyros viginiana*	X	X	
Common Witch-hazel	*Hamamelis virginiana*			X
Crape Myrtle	*Lagerstroemia indica*	X		
Dahoon Holly	*Ilex cassine*	X		
Deciduous Holly	*Ilex decidua*		X	

Tree	Species	Wind Resistant[a]	Flood Tolerant[b]	Ice Resistant[c]
Eastern Hophornbeam	*Ostrya viginiana*	X		X
Eastern Redbud	*Cercus canadensis*	X		
Eastern Redcedar	*Juniperus viginiana*			X
Eastern Swamp Privet	*Forestiera acuminata*		X	
Florida Maple	*Acer saccharum* subsp. *floridanum*	X		
Flowering Dogwood	*Cornums florida*	X		
Gallberry	*Ilex glabra*	X		
Ginko	*Ginko biloba*			X
Japanese Maple	*Acer palmatum*	X		
Live Oak	*Quercus viginiana*	X		
Mockernut Hickory	*Carya tomentosa*	X		
Myrtle Oak	*Quercus myrtifolia*	X		
Nuttall Oak	*Quercus nuttalli*		X	
Overcup Oak	*Quercus lyrata*		X	
Pecan	*Carya illinoiensis*		X	
Pignut Hickory	*Carya glabra*	X		X
Pin Oak	*Quercus palustris*		X	
Pondcypress	*Taxodium ascendens*	X	X	
Post Oak	*Quercus stellata*	X		
Red Maple	*Acer rubrum*		X	
River Birch	*Betula nigra*	X		
Sand Live Oak	*Quercus geminata*	X		
Saucer Magnolia	*Magnolia x soulangiana*	X		
Shagbark Hickory	*Carya ovata*			X
Sugarberry	*Celtis laevigata*		X	
Shumard Oak	*Quercus shumardii*	X		
Southern Magnolia	*Magnolia grandiflora*	X		
Sparkleberry	*Vaccinium arboretum*	X		
Swamp Chestnut Oak	*Quercus michauxii*	X		
Swamp White Oak	*Quercus bicolor*			X
Sweetbay Magnolia	*Magnolia virginiana*	X		
Sweetgum	*Liquidambar styraciflua*	X	X	X
Turkey Oak	*Quercus laevis*	X		
Water Elm	*Planera aquatica*		X	
Water Hickory	*Carya aquatica*		X	
Water Locust	*Gleditsia aquatica*		X	
Water Tupelo	*Nyssa aquatica*	X	X	
White Oak	*Quercus alba*			X
Winged Elm	*Ulmus alata*	X		
Yaupon Holly	*Ilex vomitoria*	X		

[a]Source online: http://treesarecool.com/Trees_pdfs/TreeSpecies.pdf
[b]Source online: https://www.na.fs.fed.us/spfo/pubs/n_resource/flood/cover.htm
[c]Source online: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1074&context=nebforestpubs

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