

TREES FOR GOLF COURSES

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When selecting trees for golf courses or park conditions, we are basically discussing four types of trees: (1) trees that are vigorous in heavy clay--low oxygen soils which are poorly drained; (2) trees which flourish in relatively high water table soils if the upper 18 inches is well-drained; (3) trees that grow in well-drained, fertile soils that are adapted to large-area landscapes which receive intensive care; and (4) trees that are deep rooted and survive drought conditions while competing well with turf. When considering these different trees, we are trying to match their biology with existing conditions, or THE SITE. That match has been well developed by horticulturists and ecologists. The thing that we would like to note with the plant management approach is, in fact, different trees tolerate and thrive under difficult conditions while others either die or require intensive maintenance.

When considering trees that will flourish in low oxygen soils, we are looking at plants that will withstand some flooding, frequently growing in swamps and, yet, will flourish under the average golf course conditions. These trees are well suited for areas which have been developed along lake shores or streams. The plants that adapt well to low oxygen soils while requiring full sun include (GROUP 1):

Alnus glutinosa (European Alder)
Fraxinus americana (White Ash) (after it has passed the juvenile stage)
Fraxinus pennsylvanica (Green Ash)
Larix laricina (American Larch)
Plantanus acerifolia (London Planetree)
Quercus imbricaria (Shingle Oak)
Quercus palustris (Pin Oak)
Salix spp. (willow)
Sassafras albidum (Common Sassafras)
Taxodium distichum (Common Baldcypress)

These plants will take flooding and tolerate low oxygen soils but must receive full sun. These are essentially classified ecologically as intolerant species.

Trees which grow in low oxygen soils, yet will survive in shady conditions, are less numerous. They are frequently swamp plants that grow in either shade or full sun. The key is these understory or specimen plants will grow in heavier soils where other trees might require extensive drainage. These low oxygen-tolerant species include (GROUP 2):

Acer saccharinum (Silver Maple)
Aesculus hippocastanum (Common Horsechestnut)
Carpinus caroliniana (American Hornbeam)
Crataegus spp. (hawthorn)
Juniperus virginiana (Eastern Redbud)
Larix decidua (European Larch)
Ostrya virginiana (American Hophornbeam)

These two groups of trees will essentially grow under a wide range of soil conditions but THRIVE in low oxygen soils.

Another broad group of plants which are particularly important to golf course superintendents includes trees that grow in high water table soils but

require a well-drained upper 18 inches of the soil profile. These trees do not tolerate flooding but require moisture within several feet of the surface. They include (GROUP 3):

Acer negundo (boxelder)
Acer psuedoplatanus (Planetree Maple)
Acer rubrum (Red Maple)
Aesculus glabra (Ohio Buckeye)
Castanea dentata (American Chestnut)
Chionanthus virginicus (White Fringetree)
Fagus grandiflora (American Beech)
Fagus sylvatica (European Beech)
Gleditsia triacanthos (Thornless Common Honeylocust)
Juglans nigra (Black Walnut)
Magnolia acuminata (Cucumbertree Magnolia)
Ostrya virginiana (American Hophornbeam)
Pinus albicaulis (White Bark Pine)
Pinus flexilis (Limber Pine)
Pinus jeffreyi (Jeffrey Pine)
Pinus resinosa (Red Pine)
Platanus occidentalis (American Planetree)
Quercus coccinea (Scarlet Oak)
Quercus imbricaria (Shingle Oak)
Quercus palustris (Pin Oak)
Quercus robur (English Oak)
Tilia americana (American Linden)

It is particularly important to review this list of trees for their adaptation or need for a relatively high water table, that is water within the upper several feet. Many of these trees grow well along the shore of ponds, water hazards, and/or streams.

The next group of trees to be considered are quality trees for large-area -- intensively maintained landscapes. They require fertile, well-drained soils. These trees are, in fact, the most sensitive to a quality environment while being specific in their requirements. They include (GROUP 4):

Acer saccharum (Sugar Maple)
Carya ovata (Shagbark Hickory)
Celtis occidentalis (Common Hackberry)
Cercis canadensis (Eastern Redbud)
Cornus florida (Flowering Dogwood)
Liriodendron tulipifera (Tuliptree)
Malus spp. (crab apple)
Ostrya virginiana (American Hophornbeam)
Pinus strobus (Eastern White Pine)
Pinus sylvestris (Scotch Pine)
Platanus occidentalis (American Planetree)
Quercus coccinea (Scarlet Oak)
Quercus rubra (Red Oak)
Tsuga canadensis (Canadian Hemlock)

It is particularly important, at this point, to recognize that all of these groups of trees will grow under the most favorable conditions. As oxygen becomes more limiting, then few trees will tolerate adverse conditions and Groups 1 and 2 will grow under all conditions; group 3, fewer adverse conditions; and Group 4 will require the most favorable environmental

conditions.

There are a reasonable number of trees that grow on droughty sites. They include (GROUP 5):

Abies concolor (White Fir)
Betula papyrifera (Paper Birch)
Catalpa spp. (catalpa)
Elaeagnus angustifolia (Russian Olive)
Ginkgo biloba (Ginkgo)
Gleditsia triacanthos (Thornless Common Honeylocust)
Gymnocladus dioicus (Kentucky Coffeetree)
Malus spp. (crab apple) (to a lesser extent)
Nyssa sylvatica (Black Tupelo)
Pinus ponderosa (Ponderosa Pine)
Quercus macrocarpa (Bur Oak)
Quercus velutina (Black Oak)
Robinia pseudoacacia (Black Locust)

These plants will thrive as companions with turf while tolerating shady, extremely well-drained -- droughty sites. This is not to conclude they won't grow when given additional moisture but seem to tolerate droughty sites through the mechanism of a deep root system or as efficient extractors of water.

There are a few genera that are particularly important to discuss as they contain species with contrasting environmental requirements. These genera would include the maples, beech, larch, ash, pine, and oak.

The maple site requirement ranges from trees that require well-drained, fertile soils to trees that survive heavy--low oxygen soils with a relatively high water table. Acer saccharum, a Sugar Maple, requires a slightly acid soil, being partially well-drained and fertile. It does not tolerate salt or air pollutants, but is a regal specimen. Silver Maple and/or boxelders grow in a wide range of soils, thrive in a high water table site, tolerate flooding for various periods of time, and exist in low oxygen situations. Contrastingly, Red, Sycamore, and Norway Maples will grow in a wide range of soils, from fertile to heavy clays yet prefer frequent rains normally received throughout the Great Lakes and Northeast areas.

American and European Beech are similar yet have dramatically different pH requirements. American Beech prefers a slightly acid, well-drained soil, tolerating high water tables, where European Beech grows best in a slightly alkaline soil but on a broad range of soil types. American Beech transplants very difficultly and grows best in the Northeast on acid soils, where European Beech transplants quite readily and has a much broader soil range it will tolerate. Further, all of the cultivars, such as weeping (Pendula), copper leaf ('Riversii'), and fern leaf ('Asplenifolia') forms, are of European Beech. There are no cultivars of American Beech.

European and American Larch are particularly interesting in that they grow in a wide range of soils and particularly flourish in high water tables. Further, European Larch is less sensitive to air pollutants yet will not tolerate chlorides. American Larch is extremely sensitive to many air pollutants.

White and Green Ash differ in one key soil requirement -- pH. They both thrive on a wide range of soils, tolerate some flooding, and prefer a relatively high water table, but White Ash grows on acid soils (Northeast U.S.), where Green Ash prefers alkaline pH requirements.

Pines are a particularly interesting group in that many of them require extremely well-drained soils with high water tables. Scotch and White Pines

grow on a wide range of soil conditions as long as the upper 24 inches are reasonably well drained. White Bark, Jack, Limber, Jeffrey, and Red Pines grow on sandy, infertile soil with a perched water table. In fact, they grow better in infertile than fertile soils, e.g. beachhead sand. Ponderosa Pine is unique in that it grows on well-drained soils and is extremely drought tolerant. Further, it's native range is the Western U.S., yet adapts to other areas, (e.g. Midwest, Central, and Northeast) as long as the soil is extremely well drained. One should take advantage of the unique characteristic -- extreme drought tolerance.

The oaks are as varied as the maples. They grow in a wide range of soil conditions from fertile, well-drained soils that one would expect White Oak to grow on, to heavy, lower oxygen soils that English, Red, Scarlet, and Pin Oak thrive under. Further, Bur Oak (a good companion with turf) has a deep root system while being extremely chloride tolerant. In fact, Bur Oak, crab apple spp., catalpa, Honey Locust, hickory, and Kentucky Coffee tree are several of the trees to grow in companion with turf as they compete well while not damaging the grass growth.

One must again ask, "What is a prime tree for a golf course?" A prime tree for a golf course is something that grows well along a water hazard (willow, European Beech, Red Maple), flourishes in competition with turf (Kentucky Coffeetree, crab apple, Bur Oak), or just adapts well to high maintenance, adequate moisture, and good drainage frequently found near tees and greens. It is up to the golf course architect and superintendent to select trees that match the site and maintenance budget, but one must remember there is no such thing as a BAD TREE. When matching biology with environment, each tree species can be best for those conditions.