

The trick to selecting trees for golf courses is matching their biology with existing conditions on the course. That match has been well developed by horticulturists and ecologists.

A plant management approach would stress that certain trees tolerate and even thrive under difficult conditions while others either die or require intensive maintenance.

Four groups of trees are well-suited for use on golf courses. It is particularly important to recognize that all of these groups of trees will

grow under the most favorable conditions but, as oxygen becomes more limiting, fewer trees will tolerate adverse conditions. Groups 1 and 2 will grow under all conditions; Group 3, fewer adverse conditions; and Group 4 will require the most favorable environmental conditions.

Group One: Low Oxygen, Wet Soils

Trees under average golf course conditions must often tolerate low oxygen soils and some flooding. In nature, they frequently grow in swamps and along lake shores or streams.

These trees are best separated into

two subgroups; those requiring full sun and those preferring shade.

Full sun trees will take flooding and tolerate low oxygen soils but must receive full sun. These are essentially classified ecologically as intolerant species. (See Tables)

Trees which grow in low oxygen soils, yet perform best 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 drain-

continued on page 84

A little planning and research on appropriate trees for your golf course can offer big time and money dividends in the long run.

Trees for Golf Courses

by Douglas Chapman, horticulturist-administrator, Dow Gardens, Midland, MI



Celtis occidentalis, common hackberry, is a tree that requires well drained, fertile soil and is good for intensely maintained areas.

GROUP 1 —Low oxygen tolerant trees which require full sun

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

GROUP 1A —Low oxygen-tolerant species preferring shade

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

GROUP 2 —High water table trees

Acer negundo (boxelder)
Acer pseudoplatanus (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 (Cucumber tree Magnolia)
Ostrya virginiana (American Hophornbeam)
Pinus albicaulis (White Bark Pine)
Pinus flexilis (Limber Pine)
Pinus jeffreyi (Jeffrey Pine)
Pinus resinosa (Red Pine)
Platanus occidentalis (Am. Planetree)
Quercus coccinea (Scarlet Oak)
Quercus imbricaria (Shingle Oak)
Quercus palustris (Pin Oak)
Quercus robur (English Oak)
Tilia americana (American Linden)

GROUP 3 —Well-drained fertile soil trees

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 (Am. Hophornbeam)
Pinus strobus (Eastern White Pine)
Pinus sylvestris (Scotch Pine)
Platanus occidentalis (Am. Planetree)
Quercus coccinea (Scarlet Oak)
Quercus rubra (Red Oak)
Tsuga canadensis (Canadian Hemlock).

GROUP 4 —Droughty site trees

Abies concolor (White Fir)
Betula papyrifera (Paper Birch)
Catalpa spp. (catalpa)
Elaeagnus angustifolia (Russian Olive)
Ginkgo biloba (Ginkgo)
Gleditsia triacanthos (Thornless Common Honeylocust)
Gymnocladus dioica (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).

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

Group 2: High Water Table

Another broad group of plants of particular importance to golf course superintendents are 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.

It is particularly important to

Ponderosa pine is extremely drought tolerant and adapts well to much of the United States.

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.

Group 3: Well-Drained Fertile Soils

The next group of trees are quality trees for large-area, intensely maintained landscapes. They require fertile, well-drained soils. These trees are the most sensitive to a quality environment while being specific in their requirements.

Group 4: Droughty, Sandy Sites

There are a reasonable number of trees that grow on droughty sites. These plants will thrive as companions with turf while tolerating sandy, extremely well-drained, droughty sites.

This doesn't mean they won't tolerate additional moisture, but they do seem to tolerate droughty sites through a deep root system or as efficient extractors of water.

Other golf course trees

A few types of trees are particularly important because they have contrasting environmental requirements. These include the maples, beech, larch, ash, pine, and oak.

The maple site requirement ranges from trees requiring well-drained, fertile soils to those that survive heavy, low oxygen soils with a relatively high water table.

Acer saccharum, 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. European Beech grows best in a slightly alkaline soil but on a broad range of soil types. American Beech transplants with great difficulty and grows best in the Northeast on acid soils, where European Beech transplants quite readily and will tolerate a much broader soil range.

Further, all of the improved beech 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 grow in a wide range of soils and flourish in high water tables. 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.

Many pines 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 but is extremely drought tolerant. Its native range is the Western U.S., yet it 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.

Oaks are as varied as the maples. They grow in a wide range of soil conditions from fertile, well-drained soils (White Oak), to heavy, lower oxygen soils (English, Red, Scarlet, and Pin

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Ostrya virginiana, American hophornbeam, grows well in a high water table, but requires a well-drained upper 18 inches of the soil profile.

Oak). 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

Bur Oak, crab apples, catalpa, Honey Locust, hickory, and Kentucky Coffeetree compete well with turf without damaging it.

Kentucky Coffeetree are several of the trees to grow in companion with turf as they compete well while not damaging the grass growth.

So, "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, remember there is no such thing as a bad tree. When matching biology with environment, each tree species can be best for those conditions.

WT&T

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