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Ilex vomitoria Aiton, Yaupon. A large shrub to small tree of moderate growth rate that usually has a columnar habit and may reach a height of about 30 feet. Small, evergreen, elliptic leaves with crenate margins give this plant a fine texture. The inconspicuous bloom is followed by a noticeable fruit load that can be effective in the landscape in the autumn and early winter, but which does not rival the show produced by the selected clones of *I. opaca*. This is an easily cultured, small native tree that is very useful for hedges and large screens because of its fine texture and dense branch structure, and several dwarf clones are available with even finer texture and slower growth rate. It is a good substitute for the more difficult to culture boxwood, and in fact, the yaupon may even be superior to *I. crenata* for this purpose.

8. The conifers

In nature and in cultivation, the conifers range from prostrate shrubs to very large trees. Indeed, the species in this group represent some of the largest and longest-lived trees in the world. In cultivation, some of these species reach great size and longevity; however, the forest heights are almost never achieved under conditions of domestication. In central North Carolina the native pines are probably our most common shade trees, but a large number of less frequently grown conifers offer a variety of forms and textures in the local landscape.

Calocedrus decurrens (Torr.) Florin, Incense Cedar (*Libocedrus*). A large tree of narrowly pyramidal habit, broadening slightly with age, with a slow to moderate growth rate. The tallest tree of this species observed in North Carolina is about 70 feet, but it may reach heights of 200 feet in its native habitat. The evergreen leaves are tiny scales which remain appressed to the thin twigs, giving the tree a very fine texture. Tiny cones are visible in the autumn. The incense cedar is rarely grown in the East, but in good sites it develops into a large, narrowly pyramidal tree. It remains a deep green color in the winter which makes it a striking addition to the winter landscape. At middle elevations in the southern California and Sierra

Table 7. Parameters of cultivation of conifers grown in North Carolina

Species	Date brought into cultivation	Place of origin	Frequency of cultivation
<i>Calocedrus decurrens</i>	1853	Western U.S.A.	very rare
<i>Cedrus deodara</i>	1831	Himalayas	occasional
<i>Cephalotaxus harringtonia</i>	1830	Japan	rare
<i>Cryptomeria japonica</i>	1861	Japan	rare
<i>Cunninghamia lanceolata</i>	1804	China	occasional
<i>Juniperus horizontalis</i>	1836	N. North America	common
<i>J. virginiana</i>	native	East and Central U.S.A.	very common
<i>Metasequoia glyptostroboides</i>	1950	China	rare
<i>Pinus echinata</i>	native	Southeast U.S.A.	common
<i>P. palustris</i>	native	Southeast U.S.A.	occasional
<i>P. strobus</i>	native	East and Central U.S.A.	occasional
<i>P. taeda</i>	native	Southeast U.S.A.	very common
<i>P. virginiana</i>	native	Southeast U.S.A.	common
<i>Taxodium distichum</i>	native	Southeast U.S.A.	rare
<i>Tsuga canadensis</i>	native	Eastern U.S.A.	occasional

Nevada Mountains, specimens of this species reach mammoth proportions and develop thick, orange bark on great towering trunks that survive for centuries.

Cedrus deodara (Roxb.) Loud., Deodar Cedar. A large tree of moderately rapid growth rate that may reach a height of 80 feet or more. It is pyramidal in youth, but it becomes somewhat more flat-topped and spreading in age; however, it usually remains taller than broad in outline. The bluish-green, evergreen needles, 1 to 2 inches in length, are borne in clusters on short shoots, producing a fine texture. Large erect cones are borne occasionally on older specimens. The deodar is a grand specimen tree with its thick trunk and long, massive, downcurving branches which sweep to the ground. It seems to grow well in our area in sites that are not excessively wet or dry.

Cedrus atlantica is a similar species that often has somewhat bluer foliage, and distinctly bluer selections of the Atlantic cedar are available.

Cephalotaxus harringtonia K. Koch, Japanese Plum Yew. A widely spreading shrub to small tree of moderate growth rate that may reach a height of about 20 feet. The flattened, evergreen needles, 1 to 2 inches in length, give this plant a medium-fine texture. The purple-black reproductive structures are drupe-like in appearance but are of little ornamental importance. The heat tolerant plum yew is similar in appearance to, but coarser in texture than, the species of true yew (*Taxus*) which are widely grown in cooler areas. While *Taxus* species can be grown in our area with some difficulty, *Cephalotaxus* occasionally replaces it here. This full and easily grown large shrub deserves to be more widely cultivated.

Cryptomeria japonica (L. f.) D. Don., Cryptomeria. A tree of moderate to moderately rapid growth rate that has been observed to reach about 50 feet in height in our area, but is known to be three times that height in Japan. Since all specimens observed in North Carolina are relatively young, our trees may grow the greater heights in time. This tree has an erect columnar habit in youth that becomes somewhat more spreading to pyramidal with maturity. Small, spine-like needles are densely arranged on the closely clustered twigs, and they impart a fine texture. Small cones with long-pointed bracts have a spiny appearance. *Cryptomeria* is a striking, erect-growing and very fine-textured tree. In good, well drained soils it develops into a large, handsome tree, but in poorer sites it is less attractive. It tolerates the shade of taller trees and there takes on a more open habit. It is surprising that this conifer is not more widely grown, in fact, it is not even listed in some landscape materials books. It has long been cultivated by the Japanese who have selected a great diversity of forms of this species, including a number of extremely dwarf types.

Cunninghamia lanceolata (Lamb.) Hook., Chinese Fir. A tree of erect pyramidal habit and moderate growth rate that may reach a height of about 75 feet in our area. The stiff, flattened needles are 1 1/2 to 2 1/2 inches in length, linear-lanceolate in shape and marked with two white bands on the underside. The texture of this tree is medium-fine. The small cones are persistent after the release of the seeds. The China fir is a slightly coarse evergreen that matures into a large tree with conspicuously orange-colored

bark. It is not difficult to grow, but better specimens are produced in good soils. It, like *Cryptomeria*, is not widely grown, but it deserves a wider landscape usage.

Juniperus horizontalis Moench., Creeping Juniper. A spreading ground cover of moderate to moderately rapid growth rate that may attain a height of 18 inches and reach out 3 to 5 feet. The tiny, spiny leaves are evergreen and bluish, closely arranged on small, much-branched twigs and turn purplish during the winter season. The texture is very fine. The tiny bluish cones are nearly berry-like in appearance. This low shrubby conifer is widely used as a ground cover since it is resistant to a variety of conditions including drought and most pests. A variety of cultivars with a range of foliar colors and textures are available.

Low spreading clones from several other *Juniperus* species are occasionally grown. Spreading forms of the needle-bearing common juniper, *J. communis* L., are occasionally used in central North Carolina.

Juniperus virginiana L., Red Cedar. A medium to large tree that grows at a moderate to moderately rapid rate in youth but much more slowly in age, and may reach a height of about 80 feet, often less. It is usually narrowly columnar in youth, becoming more pyramidal or broadly columnar in time. In habit the red cedar is highly variable, and numerous spreading and other variously dwarf selections are in cultivation. The very fine texture of this tree is produced by tiny scale leaves arranged on closely spaced twigs. The cones are very small, bluish and berry-like. The red cedar is a widely distributed native tree in eastern North America where it is widely planted as a shade or specimen tree. In time it becomes very twisted and picturesque, and it is capable of great longevity.

The Chinese juniper, *J. chinensis* L., is a superficially similar tree that is best known for its spreading forms in our area. The most commonly planted one is the large spreading "Pfitzer" juniper which reaches about 10 feet in height and spreads extensively. The foliage of the "Pfitzer" is bluish, but *J. chinensis* has many foliar color and growth forms.

Metasequoia glyptostroboides Hu and Cheng, Dawn Redwood. A tree of narrowly pyramidal habit and moderately rapid growth rate that probably

reaches about 150 in height in the wild state, but has not been cultivated long enough for us to know its height potential here. The small, flattened, hemlock-like needles are borne on deciduous short shoots that give this tree a very fine texture. The foliage has some effectiveness in the landscape as it turns yellow-brown in the autumn. The cones are small. The dawn redwood was first known from fossil specimens, but living specimens were discovered in remote canyons in southwestern China about 30 years ago. Since that time this species has been widely planted in many countries. It seems to be easily cultivated, but it may be damaged in our area by poorly drained soils. It makes a striking specimen in a planting with its erect growth pattern and feathery foliage.

Pinus palustris Miller, Long-leaf Pine. A moderately coarse-textured pine that grows rapidly and reaches a maximum height of 80 feet or more. Initially, it develops a grass-like phase, but it becomes pyramidal in habit after lateral branches develop, and finally becomes broadly columnar in age. The needles are very long, 10 to 15 inches in length, and the large cones are more than 6 inches in length. The clusters of very long needles create an interesting effect in the landscape.

Pinus strobus L., White Pine. A large tree of moderately rapid growth rate that may reach a height of 150 feet, but usually much less in cultivation. The habit is pyramidal in youth, but it becomes broadly columnar with age. The greenish gray needles are about four inches in length and occur in groups of five. Despite the length of the needles the textural appearance of the tree is fine. The long, slender cones are 4 to 6 inches in length. While white pine is the most widely grown pine species in the North Carolina mountains, where the species is native, it is only occasionally cultivated in the piedmont area. It is potentially a large, well-formed tree in either locality, but in the warmer lowland zones it can only be grown successfully in well-drained soils since the roots are susceptible to fungal attack when grown in soils saturated with water for long periods.

Pinus taeda L., Loblolly Pine. A large, rapidly growing tree that may reach a height of about 100 feet. The tree is broadly pyramidal in youth (with adequate space) and becomes more rounded to broadly columnar with age.

The six inch needles are borne in clusters of three, and the texture of the tree is moderately coarse compared to other conifers. The large cones are 4 to 5 inches in length. The loblolly pine is a large, fast-growing and somewhat weedy tree, and locally, it is one of the most abundant shade and lumber species. It grows anywhere. Old stands, particularly those damaged by human disturbance, are often susceptible to the ravages of the southern pine-bark beetle.

The short-leaf pine, *P. echinata* Miller, is like the loblolly pine in most respects except that the leaves are shorter (3 to 4 inches in length) and the cones are smaller (2 to 3 inches in length). The size, habit and requirements are similar to loblolly, but the texture of the tree is somewhat less coarse. While the two species occur naturally in our area, the short-leaf pine has a more westerly distribution on the piedmont region while the loblolly is more abundant on the eastern piedmont and coastal plain.

Another similar pine, Walter's Pine, *P. glabra* Walter, is native to the coastal plain of South Carolina, but is only planted rarely in our area.

Pinus virginiana Miller, Virginia or Scrub Pine. A tree of medium size and rapid growth rate that may reach a height of 80 feet, but it is often much smaller. In good sites it develops into a form similar to *P. taeda*, but in poorer sites its habit is stunted and variably rounded to columnar. A fine texture is produced by the small needles that are about 1 1/2 inches in length and arranged in pairs. The small cones are also about 1 1/2 inches in length. This is a fast-growing and somewhat weedy tree that is considered by many to be less attractive than the native pines with longer needles; however, in favorable sites the Virginia pine can develop into a large, well formed tree. Apparently, this species is bothered less by the bark beetle than

Figure 7. Typical leaves of conifers listed in chapter 8.

1. <i>Calocedrus decurrens</i> (twig)	9. <i>Pinus echinata</i>
2. <i>Cedrus deodara</i>	10. <i>P. palustris</i>
3. <i>Cephalotaxus harringtonia</i>	11. <i>P. strobus</i>
4. <i>Cryptomeria japonica</i> (twig)	12. <i>P. taeda</i>
5. <i>Cunninghamia lanceolata</i>	13. <i>P. virginiana</i>
6. <i>Juniperus horizontalis</i> (twig)	14. <i>Taxodium distichum</i> (twig)
7. <i>J. virginiana</i> (twig)	15. <i>Tsuga canadensis</i>
8. <i>Metasequoia glyptostroboides</i> (twig)	



either the short-leaf or the loblolly pine.

Taxodium distichum (L.) Richard, Bald Cypress. A tree of moderately rapid growth rate that may reach a height of 150 feet, probably much less in cultivation. It is pyramidal in youth and becomes columnar and round-headed with age. A fine texture is produced by the small, flattened needles that are arranged on short, deciduous twigs. The yellow-brown deciduous foliage is somewhat effective in the autumn. The small cones are nearly round in shape. This grand, long-lived tree is associated with the swamps of the southeastern coastal plain but grows very well (minus its "knees") in upland sites. The bald cypress is a fine, large shade tree with few pests that deserves to be planted much more widely.

Another member of this family of conifers that is rarely seen in our area is the coast redwood of California, *Sequoia sempervirens* (Lamb.) Endl. The tree is easy to propagate and grow in our area, but specimens vary in winter hardiness with some large individuals remaining in good health and vigor while others decline at an early age from cold injury. Obviously, fully hardy selections can be made.

Tsuga canadensis (L.) Carr., Canada or Eastern Hemlock. An ultimately very large tree of moderately slow growth rate that may finally reach a height of 150 feet, but usually less in cultivation. It is always pyramidal to columnar in habit, but specimens developing in open areas can spread considerably. A very fine texture is produced by the evergreen, small flattened needles that are mostly arranged in a single plane on finely branched twigs. The small, persistent cones are less than one inch in length. It is a very commonly cultivated tree, particularly in the mountain region. Except in excessively dry localities, it is easily cultivated on the piedmont, and since it can be controlled by pruning, it has many uses in the landscape.

A similar, rarely cultivated, species, *T. caroliniana* Engelm., has non-planar leaf arrangement and cones that are more than one inch in length.