



# ***KENTUCKY TREE PLANTING MANUAL***

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## INTRODUCTION

The Kentucky Tree Planting Manual is designed as a technical guide to assist foresters, land managers, and landowners in the establishment of successful forest tree plantations. It is an attempt to condense and put in a useable format the extensive literature and research available on the subject.

No set guidelines can apply to the immense variety of situations encountered in the field. It is hoped, however, that the information, recommendations, and alternatives provided here can be used intelligently to develop silviculturally sound and economically productive planting programs.

We hope that use of this tree-planting manual will enhance the quality and productivity of Kentucky's forest resources through successful tree planting.

Leah W. MacSwords, Director  
Kentucky Division of Forestry

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**CHAPTER 1**

**PLANTING CONSIDERATIONS**

### ***Where to Plant***

Kentucky contains numerous areas that are not in productive use. Some are abandoned pasture or worn-out cropland. Some are eroded and are too steep to cultivate, or so wet that raising a crop is a sub-marginal proposition. Still others consist of small parcels cut off by creeks or ditches, making them uneconomical to farm or fence. There is even natural woodland that has been so badly mistreated by fire, livestock grazing, or mismanagement that it is no longer considered productive.

Where such conditions exist, it is recommended that tree planting be considered. Land such as this does not even pay its own taxes, and conversion to trees represents an excellent way to make economically productive use of idle or unproductive situations and to improve aesthetics, wildlife habitat and the environment as well.

### ***Planting Season***

Planting should be done during the dormant season that occurs after hardwoods have lost their leaves in the fall and before they begin to grow in the spring. The exact dates will vary with latitude and the weather of the individual year.

Spring planting is generally the most popular time to plant. Fall (actually early winter) planting is acceptable although disadvantages do exist. The ground is often frozen when seedlings become available for planting in the fall, and frost heaving is sometimes a serious problem during the winter for newly planted seedlings on bare ground or fine-textured soils. The possibility of winterkill also lessens the chances for plantation success from a fall planting.

### ***Bare root vs. containerized seedlings***

The seedlings grown by the Kentucky Division of Forestry are all classified bare rooted. They are grown in a nursery in seedling beds, lifted from the beds, counted, graded, and packed into bundles utilizing one of various forms of protection within the bundle to keep the roots moist.

Containerized seedlings, on the other hand, are grown in small containers and transplanted individually from the container to the ground using different sets of planting techniques. Because of the restrictions of the container, the root system is generally not as deep as bare-rooted seedlings, making them more susceptible to initial mortality during drought periods. Where drought does not occur, better growth and survival are the rule because the seedling retains all of its' fine roots (some of which are lost in lifting bare-rooted seedlings). Containerized seedlings, if available in

Kentucky from other sources besides the Division of Forestry will also be more expensive.

**From this point forward, all references in this manual to planting of seedlings will be for bare-rooted stock.**

### ***Care of planting stock***

The lack of proper care given to planting stock is a major cause of seedling mortality. The best planning and planting procedures are doomed to failure unless the seedlings are treated properly from the time they are lifted at the nursery until they are planted on the selected site.

If seedlings cannot be planted immediately, they should be held in cold storage. If this is not available, "heeling in" is recommended as shown on the back of the Planting Instruction Sheet (see Planting Methods). If necessary, most hardwood species can be left heeled-in over the winter. Conifers, however, should never be heeled-in more than five to six weeks.

During storage it is important that seedling roots be kept wet or damp at all times, but they must not be left in standing water. Seedlings also need to be kept cool. If temperatures are too warm, buds may break dormancy prematurely. Hard freezing of roots is also to be avoided, although experiments by the Virginia Division of Forestry have shown this may not significantly affect survival.

During transportation, seedlings should be protected from sun and wind. If transported in large trucks, the bundles should be completely covered with canvas or a similar material to prevent windburn or excessive drying. At the same time, bundles covered with canvas or other materials should be not be allowed to over-heat in the sun or during storage, as in addition to the possible pre-mature bud breakage mentioned above, "cooked" seedlings are just as dead as dried out ones.

During the actual planting operation, trees should be carried in a bucket, canvas bag, or planting box, and the roots should be kept moist with wet moss, sawdust, peat moss, or a similar material. Only brief exposure of bare roots to direct sunlight may be enough to cause dehydration and eventual seedling death. *Again, do not let seedlings over-heat in a bag left in the sun.*

### ***Where to obtain seedlings***

The Kentucky Division of Forestry operates two nurseries where a variety of low-cost seedlings are grown for reforestation and afforestation in the state.

Order blanks may be obtained from any of the Division of Forestry District Offices (see listing below) or **the Division of Forestry web site** and from the local Natural Resources Conservation Service, Farm Service Agency, and County Extension Offices.

**It is important to note that the Division of Forestry does not grow all species of trees mentioned in this manual.** Upon special request, however, the Division of Forestry may be able to obtain some of these species from another state. A commercial nursery may also present an alternative for obtaining those species not otherwise available.

## Guide To Kentucky Division of Forestry District Foresters' Offices

### **Northeastern District**

Kentucky Division of Forestry  
255 Rodburn Hollow Road  
Morehead, KY 40351  
Phone: (606) 784-7504

Bath	Fleming	Montgomery
Boyd	Greenup	Morgan
Carter	Lewis	Nicholas
Clark	Mason	Robertson
Elliott	Menifee	Rowan

### **Southeastern District**

Kentucky Division of Forestry  
P. O. Box 130  
Pineville, KY 40977  
Phone: (606) 337-3011

Bell	Jackson	McCreary
Clay	Knox	Rockcastle
Harlan	Laurel	Whitley
	Leslie	

### **Eastern District**

Kentucky Division of Forestry  
P. O. Box 189  
Betsy Layne, KY 41605  
Phone: (606) 478-4495

Floyd	Lawrence	Martin
Johnson	Magoffin	Pike

### **Kentucky River District**

Kentucky Division of Forestry  
P. O. Box 702  
Hazard, KY 41702  
Phone: (606) 435-6073

Breathitt	Lee	Perry
Estill	Letcher	Powell
Knott	Owsley	Wolfe

### **Bluegrass District**

Kentucky Division of Forestry  
P. O. Box 516  
Frankfort, KY 40602  
Phone: (502) 573-1085

Anderson	Gallatin	Oldham
Boone	Garrard	Owen
Bourbon	Grant	Pendleton
Bracken	Harrison	Scott
Campbell	Henry	Shelby

Carroll	Jessamine	Trimble
Fayette	Kenton	Woodford
Franklin	Madison	

### **Central District**

Kentucky Division of Forestry  
129 Howell Drive  
Elizabethtown, KY 42701  
Phone: (270) 766-5010

Allen	Grayson	Meade
Barren	Hancock	Nelson
Breckinridge	Hardin	Simpson
Bullitt	Hart	Spencer
Edmonson	Jefferson	Warren
	Larue	

### **South Central District**

Kentucky Division of Forestry  
120 Gaines Drive  
Campbellsville, KY 42718  
Phone: (270) 465-5071

Adair	Green	Pulaski
Boyle	Lincoln	Russell
Casey	Marion	Taylor
Clinton	Mercer	Washington
Cumberland	Metcalf	Wayne
	Monroe	

### **Green River District**

Kentucky Division of Forestry  
P. O. Box 465  
Madisonville, KY 42431  
Phone: (270) 824-7527

Butler	Hopkins	Ohio
Christian	Logan	Todd
Daviess	McLean	Union
Henderson	Muhlenberg	Webster

### **Western District**

Kentucky Division of Forestry  
P. O. Box 349  
Mayfield, KY 42066  
Phone: (270) 247-3913

Ballard	Crittenden	Lyon
Caldwell	Fulton	Marshall
Calloway	Graves	McCracken
Carlisle	Hickman	Trigg
	Livingston	

## ***Tree Spacing***

Optimum spacing for planted trees is now and always has been a controversial subject. Trees planted at wider spacing grow faster in diameter than trees planted at closer spacing. The total cubic volume of wood produced is generally greater in dense stands, but merchantable volume is usually greater in stands with wider spacing.

No spacing can be considered ideal or optimum for a given species. The decision must often be a compromise of a variety of factors. Below is a table listing average acceptable spacing recommendations for Kentucky. The table is to be used only as a reference since individual situations do not consistently fit into rigid guidelines. Following the table are listed eight points which were considered in the selection of the spacing shown in the table. It is recommended that these eight points be reviewed before choosing spacing.

### ***Spacing Recommendations for Forest Planting in Kentucky***

Rotation and Cutting Plan	Shortleaf, Loblolly and Virginia Pine*		White Pine		Hardwoods	
	Spacing	Trees/Ac	Spacing	Trees/Ac	Spacing	Trees/Ac
Short Rotation Crops – posts, pulpwood, fuel, etc.	6x8	908	6x8	908	8x8	681
	7x7	889	7x7	889	9x9	605
Long Rotation Crops – poles, sawtimber, veneer	8x8	681	7x7	889		
	9x9	538	8x8	681	9x9	538
	10x10	436	9x9	538	10x10	436

#### Additional Notes:

\*Virginia pine should not be planted wider than 8 x 8. For Christmas trees, the spacing chosen will depend on the type of equipment that will be used to maintain the planting.

\*Neither walnut nor cottonwood should be planted closer than 10 x 10.

### ***Points to Consider in Spacing Selection***

#### **Objectives of Planting**

The kind and quality of products desired should be considered when choosing spacing. For short rotation crops such as fence posts, Christmas trees, and pulpwood, a relatively close spacing is necessary to get maximum utilization of the site. Long rotation crops, such as sawtimber and veneer, generally dictate either

wider spacing or early precommercial thinning in order to grow more useable and quality volume per crop tree. Christmas trees (Reference #6) are usually planted closer than forest plantations, as are screens and barriers (Reference #9).

- **Growth Rate and Stand Density**

In extremely close spacing, growth reduction and even stagnation may occur before commercial thinning can be made. Maintenance of good diameter growth until trees attain merchantable size is therefore a factor to consider. Spacing recommendations on the spacing table are partially based on growth data taken from stand yield tables. The spacing given is the narrowest possible to maintain good growth until the first cutting.

- **Species**

Spacing recommendations will vary by species or groups of species because of individual differences in growth rate and shade tolerance.

Hardwoods will not generally maintain good diameter growth to merchantable size unless given plenty of room. If planted close together, they will need at least one precommercial thinning to maintain good growth. Extremely wide spacing, however, leads to heavy branch development on species such as walnut, oak, and sycamore.

When planting pine, white pine maintains good growth at a closer spacing than other pines commonly planted in Kentucky. Therefore, white pine is listed separately from the other pines in the table.

- **Thinning**

The expectation of intermediate thinning is important when deciding upon spacing. Generally, if a thinning will not pay for itself either in products removed or in increased growth of the remaining trees, it should not be considered. The local markets, the area's accessibility, and the species planted dictate the feasibility of a commercial thinning. Where commercial thinning is to be made, a closer spacing may be advisable.

- **Seedling Mortality**

Adverse site and weather conditions, planting stock quality, and actual planting operations may cause significant losses in initial seedling survival. Three to five hundred trees per acre evenly distributed are considered successful survival.

If survival is less than three hundred well-distributed trees per acre, then replanting failed portions is desirable.

- **Natural Pruning**

A wider spacing generally results in larger branches and may inhibit or delay natural pruning, particularly on more tolerant species. Close spacing, however, will not eliminate the need for artificial pruning on species such as walnut, nor will it significantly reduce its cost.

- **Maintenance of Site Preparation**

A major cause of plantation failure for some species is lack of early plantation care through maintenance of initial site preparation. When dealing with species that require periodic mowing or cultivating between rows, the spacing may need to be adjusted to allow the use of the equipment necessary to accomplish these tasks.

- **Planting Costs**

Since in most cases the reason for planting trees is to realize economic benefit, no more trees should be planted than are necessary to accomplish the desired objective. Obviously a lesser number of trees planted will result in lower overall cost of plantation establishment and more eventual economic gain.

**Consideration for cost should in no way be interpreted that plantings should only consist of the number of trees expected at maturity.** Planting more trees than are expected at final harvest is a generally recommended practice. This allows for the inevitable lack of survival that occurs in all plantings which, depending on circumstances, can be very significant. It is much more cost-effective and much less troublesome to plant more trees than you really need initially than to return and replant failed spots.

Planting more trees than are needed at final harvest also provides an opportunity to increase stand quality during subsequent thinning by providing a greater number of stems from which to choose the final "crop" trees. Thicker stands provide a "training" effect by pushing all stems to compete for sunlight and thereby creating a more branch free bole as well.

## Trees Per Acre by Spacing

<u>Spacing</u> <u>(Feet)</u>	<u>Trees</u> <u>(Number)</u>	<u>Spacing (Feet)</u>	<u>Trees</u> <u>(Number)</u>
2x2	10,890	10x10	436
3x3	4,840	10x12	363
4x4	2,722	10x15	290
4x5	2,178	10x18	242
4x6	1,815		
4x7	1,556	11x11	360
4x8	1,361	11x12	330
4x9	1,210	11x15	264
4x10	1,089	11x20	198
		11x25	158
5x5	1,742		
5x6	1,452	12x12	302
5x7	1,245	12x15	242
5x8	1,089	12x18	202
5x9	968	12x20	182
5x10	871	12x25	145
6x6	1,210	13x13	258
6x7	1,037	13x15	223
6x8	908	13x20	168
6x9	807	13x25	134
6x10	726		
6x12	605	14x14	222
6x15	484	14x15	205
		14x20	156
7x7	889	14x25	124
7x8	778		
7x9	691	15x15	194
7x10	622	15x20	121
7x12	519	15x25	97
7x15	415		
		16x16	170
8x8	681	16x20	136
8x9	605	16x25	109
8x10	544		
8x12	454	18x18	134
8x15	363	18x20	121
8x25	218	18x25	97
9x9	538	20x20	109
9x10	484	20x25	87
9x12	403		
9x15	323	25x25	70

# CHAPTER 2

## Types of Planting

## ***Mixed Plantings***

Although most recommendations for planting trees in Kentucky are for pure plantings of one species, mixed plantings of several species are an alternative in certain situations.

There is evidence that greater yields per acre may be obtained from mixed plantings, although pure plantings are easier and more economical to establish, manage, and maintain. Pure plantings are also easier to harvest and often result in higher stumpage values.

**For a mixed planting to be successful, all species involved should be selected with great care.** All species should be adapted to the site, and it is very important that the slower growing species be tolerant of shade.

Generally, hardwoods are more suitable for mixing than pines, and mixtures of hardwoods and pines are seldom satisfactory. Controversy exists as to what specific species mixtures will do well, but several are listed here for consideration:

- Eastern white pine, northern red oak, and white or green ash in random (no particular pattern) mixtures with yellow poplar on poplar sites.
- Random mixing of northern red oak, white or green ash, and sweetgum with walnut.
- Row-group or block mixing of walnut and yellow poplar.

**In any case, before a mixed species planting is seriously considered, planting objectives should be strongly weighed against planting benefits, and species and groupings should be analyzed and re-analyzed with care. Although it sounds intriguing, making a mixed planting a success is often a touchy business.**

The following are several possible planting patterns for consideration in mixed species plantations. Alternative patterns may be devised depending upon planting objectives.

***Planting Patterns for Mixed Species***

- A. Checkerboard pattern of mixing two or more species by blocks; minimum size block should be five rows of five trees.

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- C. Interplanted patterns for mixing two or more species.

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## *Interplanting*

Interplanting as used in this context denotes planting on areas already stocked with trees. It includes: (1) **under planting** beneath an already established stand; (2) **spot planting** in woodland openings; (3) **reinforcement planting** to bolster the stocking in an understocked area; (4) **sweetening** to introduce more valuable species in an understocked area; and (5) **conversion planting** to entirely change species composition.

The specific details of any interplanting will vary with the individual site, resident species, stocking of the area, and objectives to be accomplished. **Like mixed plantings, interplanting can be a very tricky business.** "Planting shock," which occurs when seedlings are lifted in the nursery and then transplanted, often initially stunts seedling growth and puts transplants at a severe disadvantage over naturally occurring seedlings. While the seedlings take the one to two years to recover the roots lost in the transplanting process, Mother Nature will be working to grow natural seedlings of her own, which may choke out the planted ones. Often intensive site preparation and/or release work are necessary to protect planted seedlings from natural competition. For this reason, interplanting should be done with great care and only if the planter is prepared to do what is necessary to care for the seedlings once planted. Interplanted seedlings cannot be planted and then left to fend for themselves if any degree of success is expected.

Where successful, interplanting can be a valuable tool to improve species composition and stocking. In any interplanting, the selection of species and a good understanding of their shade tolerance are important. Seedlings should not be planted in areas where they would be overtopped by other future crop trees that are already present.

Retention of adjacent non-crop trees may be temporarily desirable in some cases to protect planted seedlings or to give a "nurse-tree" effect to improve planted tree form. When retaining trees for these purposes, however, it is important that the planted seedlings be released before the competition from the non-crop trees becomes damaging.

## *Planting For Erosion Control*

Tree planting has always been recognized as an excellent method of soil stabilization on eroded areas. Even the best tree planting effort, however, will not effectively control erosion by itself until trees attain enough size to produce heavy ground litter and sufficient root system to hold the soil. This may take five

to ten years depending upon the species and site conditions. On unusually severe areas, trees may wash out before they can even get a good start.

Some recommendations have been to plant trees for erosion control at a closer spacing (4' x 4' or closer) than normally used in plantations in order to achieve ground coverage in a shorter period. This method will work, but as previously noted, it will require some time before satisfactory site stabilization is achieved. In addition, once trees become established, early stand stagnation often occurs from overcrowded conditions. In such situations the vigor of the stand and its potential for future forest products may become jeopardized or ruined.

Research favors the development of vegetative cover in conjunction with tree planting. Where this is done, trees may be planted at a more optimum growth spacing (6' x 10' to 8' x 8'), and the vegetative cover will afford immediate site stabilization until trees become sufficiently established to control erosion alone. This method has been proven and is recommended in preference to tree planting alone.

**One of three alternatives may be recommended for this.** These alternatives include: (1) Establishment of trees and vegetation at the same time; (2) Planting seedlings after establishment of vegetative cover; and (3) Establishing vegetation in strips, leaving a bare area two to four feet wide between strips in which to plant the trees.

Caution should be taken not to select herbaceous plants such as crown vetch, flatpea, or sericea lespedeza that may be too competitive for woody plants. It should also be noted that fertilization of herbaceous vegetation during establishment might reduce tree seedling survival if trees are planted at the same time. If fertilization is to be employed, it is recommended that either fertilization be delayed until seedlings become established, or that tree planting be delayed for one year after fertilizer is applied to the vegetation. If tree planting is delayed, it may be necessary to use herbicides to kill the vegetation in the area immediately around where the trees are to be planted in order to reduce competition and provide for optimum tree growth.

For obvious reasons it is preferable to plant the trees and establish vegetative cover at the same time. The following are specific options for establishment of vegetative cover, which will control erosion and allow tree planting at the same time as cover establishment:

- Mix 10 lbs. per acre of orchard grass with ONE of the following and seed during one of the indicated periods.

Appalow sericea lespedeza	20 lbs./acre	February 15-April 15
Kobe or Korean lespedeza	10 lbs./acre	February 15-May 15
Red clover	10 lbs./acre	February 1-April 15 August 1-September 15
Ladino clover	3 lbs./acre	February 1-April 15 August 1-September 15
Birdsfoot trefoil	10 lbs./acre	March 1-April 15 August 1-September 10

**No fertilizer is to be used with this option.**

- Seed 15 lbs./ acre of tall fescue (February 1-April 15, August 20-October 10) in strips along the contour. Strips should be 4 to 8 feet wide, depending on spacing of tree species, with a bare strip 2-4 feet wide left between the strips in which the trees will be planted.

The area planted with fescue **only** should be fertilized with 20 lbs. Nitrogen (N), 40 lbs. Phosphorous (P), 60 lbs. Potassium (K), and 2 tons/acre of lime. The bare area to be planted with trees should not be fertilized.

If the seeding dates for the above mixtures are missed but the site still is in need of immediate vegetation, plant a temporary cover to control erosion until the permanent cover listed above can be established. This temporary cover should consist of two bushels per acre of spring-sown oats; three bushels per acre of winter-sown oats or one bushel per acre of winter wheat. This temporary cover will need to be destroyed at such time as the permanent cover is established.

### ***Planting For Surface Mine Reclamation***

Planting for surface mine reclamation uses the same principles as listed above under "Planting for Erosion Control." As special note, however, it should be recognized that surface mine reclamation plantings should have soils loosely graded rather than compacted. Loose grading produces much superior results to planting on the compacted soils that are often the result of returning sites to their original contour. **Where possible or allowable, all surface mining reclamation jobs that**

**will be planted to trees should be loosely graded.** If a compacted site is to be planted, sub-soiling (see page 46) is highly recommended for plantation success. Also, be careful to choose species for planting which will tolerate the pH conditions relative to the site.

### ***Plant Cuttings***

Cuttings of cottonwood and hybrid poplar (not yellow or tulip poplar) are planted in many areas as an alternative to seedlings. This can be an excellent method of plantation establishment and often less expensive. The cuttings sprouts leaves and roots from dormant buds within the bark and produce a tree with identical genetic composition to the tree from which the cutting was taken.

Cuttings should be made during the dormant season, preferably just before planting time. Select vigorous sprouts that are usually found along creeks and other lowland areas. It is best to use portions of the previous year's growth where possible, although two-year-old stems are permissible. Cuttings should be at least 1/4 and preferably 3/8 to 3/4 inch in diameter. They should be at least 12 inches long and 15 to 20 inches where practical. The top of the cutting should be horizontal and the bottom should be beveled at a 45-degree angle. Cuttings should be made with sharp tools to prevent stripping or loosening the bark.

If cuttings are to be stored for long periods, they should be tied in bundles of convenient size and buried outdoors in moist, well-drained sand or sawdust. If they must be transported long distances, they should be packed in wet sawdust or moss, or cut ends coated in paraffin to prevent drying. Before planting, it is advisable to soak the cuttings in water for one to two days. For best results, the planting site should be cleared or disked before planting.

During the planting operation, cuttings should be set in the ground in a vertical position with the large end at the bottom. The smaller end should be flush with the ground or not more than two inches above the surface. A large circular rod with a footrest makes an excellent planting tool. In soft bottomland, a stick or broom handle may be sufficient.

Planted areas need to be cultivated at least twice during the first year and once during the second year to reduce plant competition and to enhance tree growth.

Cuttings may propagate other species of trees, with willow (all species) being the most prominent found in Kentucky. Principles remain the same regardless of

species. Using the same principles, planting cuttings of willow saplings is also a good method of streambank stabilization. Dig a shallow trench on along the area of eroding streambank parallel to the stream. Place the sapling lengthwise in the trench and cover with dirt. The sapling will sprout all along its length, putting down roots to hold the soil.

### ***Natural Seeding***

In some situations, natural seeding may be preferable to tree planting, both in economics and stand quality. This is particularly true with light-seeded, desirable species such as pine, yellow poplar, ash, maple, or cottonwood where sufficient seed trees are close enough to furnish large amounts of seed. Where this method is applicable, mechanical site preparation to expose mineral soil is generally all that is needed to produce establishment of a satisfactory forest.

This site preparation should be done just prior to seed fall. It is also important to choose a good seed year for the species to be used to ensure an adequate volume of seed.

Natural seeding is desirable not only because it is much less expensive than planting, but also because it usually produces a better quality, more vigorous stand. Trees raised in a nursery often require one to two years to recover from their ordeal of transplanting and to readjust themselves to their new environment. On the other hand, seedlings established from natural seeding do not suffer planting shock and continue steady growth from seed germination. Stands established by natural seeding, when the seed supply is adequate and the seedbed receptive, often result in too many stems per acre. **Steps to ensure natural seeding is highly recommended as an alternative to tree planting.**

### ***Direct Seeding***

Another alternative to planting tree seedlings is direct seeding. This consists of locally gathering seed or purchasing it from commercial seed houses, and then seeding the area by mechanical or hand methods, or even by aircraft.

This method has many of the advantages listed under "NATURAL SEEDING" and is generally much cheaper than planting seedlings. Research has shown pine, oak, yellow poplar, and walnut are particularly adapted for this on suitable sites. Best results can be expected on cutover or partially stocked land. Depending on the individual situation, some type of site preparation may be needed to achieve planting success.

There are also some factors to consider which may limit the success of this method. These include the possibility of drought, and also seed predation or pilferage by birds, rodents, squirrels, or other mammals. In areas likely to pose high risk for these conditions, direct seeding should not be considered.

### ***Planting For Wildlife***

Plantings of trees that are made primarily for wildlife food will generally have wider spacing than recommended for timber production. The object in planting for wildlife food is to produce some form of mast (acorns, berries, or other fruits). Excessively large-crowned trees do not produce the best timber, but they do grow fast and are excellent for wildlife. A wider spacing allows trees to grow a larger crown, thus producing more branches that will produce more mast. For timber production, it is best to have a smaller crown and with the extra wood grown onto the trunk rather than numerous branches.

Wildlife plantings are also made to provide cover for birds and animals as well as food. For specific information regarding wildlife plantings, a biologist of the Kentucky Department of Fish and Wildlife Resources should be contacted. The biologist will analyze the purpose of the planting together with the site, and recommend a species, or combination of species, and the proper spacing to accomplish the planting objectives. Beyond modifications to accomplish a specific planting purpose, the technical aspects of tree planting for wildlife remain the same as for timber production.

**CHAPTER 3**

**SELECTING THE RIGHT SPECIES**

## Planting Objectives

When selecting a tree species for planting, it is important to choose the best possible tree for the particular site that will accomplish specific objectives. The following table denotes the relative merits and uses of a variety of species. The **primary objectives** for planting are marked with an asterisk (\*) with possible secondary values also shown. The rating for each category is based on an overall evaluation of the different species. Ratings are on a score of 1 to 5 with 5 being the highest. A score of "0" should be interpreted as "not recommended for this purpose," and absence of a ranking interpreted as "not suitable for this purpose." A (T) indicates as "treated" fence posts only.

SPECIES	COMMERCIAL USE					STABILIZATION		WILDLIFE		AESTHETICS	
	Sawlog and Veneer	Pulpwood	Fence Posts	Firewood	Christmas Trees	Erosion Control	Surface Mine Reclamation	Wildlife Food	Wildlife Cover	Ornamental and Shade	Windbreaks and Screens
<b><u>Upland Hardwoods</u></b>											
Black Walnut	5*	-	0	5	-	0	1	5	0	2	1
White Oak	5*	2	4	5	-	0	2	5	0	4	1
Northern Red Oak	5*	2	0	5	-	0	3	5	0	4	2
Black Oak	4*	2	0	5	-	0	2	5	0	3	1
Shumard Oak	5*	2	0	5	-	0	2	5	0	4	1
Bur Oak	4*	2	4	5	-	0	3	5	0	3	1
Yellow (Tulip) Poplar	5*	3	0	2	-	1	3	1	0	4	2
White Ash	5*	2	0	5	-	0	2	2	0	5	2
Sugar Maple	5*	2	0	4	-	0	2	3	0	5	2
Black Locust	0	-	5*	5	-	5*	5*	2	0	2	0
Kentucky Coffeetree	4	1	0	4	-	0	2	1	0	2*	1
<b><u>Bottomland Hardwoods</u></b>											
Cherrybark Oak	5*	2	0	5	-	0	1	5	0	4	2
Pin Oak	5	2	0	5	-	0	2	5	0	4	2
Swamp White Oak	5*	2	4	5	-	0	1	5	0	4	1
Swamp Chestnut Oak	5*	2	4	5	-	0	1	5	0	3	1
Pecan	5	2	0	5	-	0	1	5	0	4	2
Green Ash	4*	2	0	5	-	0	2	2	0	5	2
Cottonwood	3	5*	0	1	-	4	4	0	0	0	2
Sycamore	3*	5*	0	1	-	2	2	2	0	2	2
Sweetgum	4*	3	0	1	-	0	1	2	0	3	1
Silver Maple	3*	4*	0	1	-	0	2	3	0	2	1

SPECIES	COMMERCIAL USE					STABILIZATION	WILDLIFE		AESTHETICS		
	Sawlog and Veneer	Pulpwood	Fence Posts	Firewood	Christmas Trees	Erosion Control	Surface Mine Reclamation	Wildlife Food	Wildlife Cover	Ornamental and Shade	Windbreaks and Screens
<b>Conifers (Softwoods)</b>											
White pine	4*	4	4(T)	1	5	4	4	2	5	5	5
Loblolly Pine	4	5*	4(T)	1	0	5	5	2	5	1	2
Virginia Pine	1	5*	4(T)	1	4	5	5	2	5	0	2
Shortleaf Pine	4	5*	4(T)	1	0	4	4	2	5	1	3
Scotch Pine	0	0	0	1	5*	0	0	1	5	0	5
Eastern Redcedar	2	-	5*	1	4	0	1	3	5	2	5
Baldcypress	2	1	3	1	0	0	1	2	2	4	2
<b>Other Species</b>											
Persimmon	4	1	0	5	-	0	1	5*	0	2	1
Chinese Chestnut	0	0	0	3	-	0	2	5*	0	1	1
Wild Plum	0	0	0	0	-	0	2	5*	2	0	1
Silky Dogwood	0	0	0	0	-	0	2	5*	4	2	2
Eastern Redbud	0	0	0	0	-	0	2	5*	2	4	2
Red Maple	2*	4	0	2	-	2	2	3	0	4	2

### ***Projected Production Time for Potential Forest Products***

An important consideration in choosing a tree species for planting is the amount of time required to produce a desired product and the possibility of secondary product production from intermediate cuttings or thinnings. Below is a table listing the commonly planted tree species and the average time required to produce various products from each on a favorable site.

<u>SPECIES</u>	<u>AVG. YEARS TO PRODUCE</u>	<u>SPECIES</u>	<u>AVG. YEARS TO PRODUCE</u>
<u>Ash, green and white</u>		<u>Walnut</u>	
Pulpwood*	30-50 yrs.	Logs (lumber and veneer)	40-80 yrs.
Logs (handle stock, lumber)	40-70 yrs.	Nuts	12+ yrs. (30-130 yrs. Best)
<u>Cottonwood</u>		<u>Yellow (tulip) Poplar</u>	
Pulpwood*	10-20 yrs.	Pulpwood*	20-30 yrs.
Logs (boxes, crates, lumber, veneer)	30-50 yrs.	Logs (lumber and veneer)	40-80 yrs.
<u>Locust, black</u>		<u>Loblolly pine</u>	
Posts	7-15 yrs.	Pulpwood* and posts	15-30 yrs
		Poles and piling	35-50 yrs.
		Logs	40-60 yrs.
<u>Maple, soft (includes silver and red)</u>		<u>Shortleaf pine</u>	
Pulpwood*	20-30 yrs.	Pulpwood* and posts	20-30 yrs.
Logs (lumber and veneer)	40-60 yrs.	Poles and pilings	40-50 yrs.
		Logs	40-70 yrs.
<u>Maple, hard (includes sugar)</u>		<u>Eastern white pine</u>	
Logs (lumber and veneer)	40-90 yrs.	Christmas trees	7-10 yrs.
		Pulpwood*	15-25 yrs.
<u>Oak, upland</u>		Logs	40-80 yrs.
Posts	20-30 yrs.		
Logs (lumber and veneer)	40-80 yrs.	<u>Virginia pine</u>	
		Christmas trees	8-15 yrs.
<u>Oak, bottomland</u>		Pulpwood* and posts	15-25 yrs.
Logs (lumber and veneer)	40-70 yrs.	Logs	40-60 yrs.
<u>Pecan</u>		<u>Eastern redcedar</u>	
Logs (lumber and veneer)	40-80 yrs.	Christmas trees	8-15 yrs.
Nuts	20+ yrs. (75-225 yrs. Best)	Posts	25-35 yrs.
		Logs	40-80 yrs.
<u>Sweetgum</u>		<u>Scotch pine</u>	
Pulpwood*	20-30 yrs.	Christmas trees	5-8 yrs.
Logs (lumber and veneer)	40-80 yrs.		
<u>Sycamore</u>			
Pulpwood*	20-30 yrs.		
Logs (lumber, boxes)	40-70 yrs.		

\*Markets do not exist in all areas of Kentucky.

### ***Species - Site Suitability***

Since tree growth and quality are largely dependent upon site and soil characteristics, it is a necessity that the right species is chosen for a given site in order to achieve any measure of tree planting success. The table listed below is designed to enable the land manager to select adapted tree species for the potential planting area that will accomplish the desired objectives.

The Soil Series listed in the table may be determined for any specific area by consulting a published soil survey for the area or by contacting the local Natural Resources Conservation Service office. Particular attention should be given to the "Special

Considerations" column at the far right of the table. These notations may limit the species recommendations of the general soil groupings for certain localized site conditions such as erosion, aspect, soil pH (or reaction), or drainage.

It is important to note that this information is general and meant only to be used as a guide. Where possible, specific situations should be discussed with the local soil scientist or district conservationist.

Soils Description	Soil Series			Species to Plant (not listed by preference)	Special Considerations
Deep, well and moderately well-drained soils on flood plains, stream terraces, and foot slopes.	Alder Allegheny Armour Ashton Barbourville Bardwell Bosket Britwater Brashear* Brookside Cascilla Center Chargrin Chavies Clifty Colins Colp Cotaco Cranston/ Cruze Cuba Dubbs Egam Elk	Ennis Epley Etowah Hamblem Holston Humphreys Huntington Iuka Kickapoo Licking* Lindside Markland* Morganfield Negley Nolichucky Nolin Ochlockonee Philo Pope Renox Rigley/ Robinsonville Sees Sensabaugh	Sequatchie Shelocta*/ Staser Steff Tate Uniontown Vicksburg Wheeling Whitley Whitwell Weilbur Woolfever Woolper	American sycamore Black locust Black walnut Cherrybark oak Eastern cottonwood Eastern redcedar Eastern white pine Green ash Loblolly pine Northern red oak Pecan Pin oak Scotch pine Shortleaf pine Sweetgum White ash White oak Virginia pine Yellow poplar	A. South and West facing slopes (/) (hot) over 15%, and severely eroded and/or gullied phases of these soils* are usually lower in productivity. Plant the more drought resistant species on these sites.

Soils Description	SOIL SERIES			Species to Plant (not listed by preference)	Special Considerations
Deep, somewhat poorly and poorly drained soils on floodplains, stream terraces, and footslopes.	Alligator Arkabutla Atkins Belknap Bibb Birds Blago Bonnie Bowdre Cavode Commerce Convert Dekoven Dowellton Dundee Dunning	Falaya Forestdale Henshaw Jacob Karnak Keyespoint Lanton Loudon Mantachie McGary Melvin Mhoon Montgomery Morehead Newark	Openlake Patton Peoga Roellen Routon Rosebloom Sharkey Stendal Stokly Tunica Tupelo Wakeland Waverly	American sycamore Baldcypress Cherrybark oak Eastern cottonwood Green ash Loblolly pine Pin oak Pecan Swamp white oak Sweetgum	B. (*) (/) See "Special Consideration A" above.
Deep, well and moderately well-drained soils on upland.	Aaron Allen Baxter* Bewleyville Bledsoe Brandon*/ Braxton Britwater Calest Carpenter Chenault Christian Clymer/ Crider* Cumberland* Cutshin Dewey Donerail	Epley Fedscreek Fredrick* Hagerstown Hammack Hampshire Hayter Heitt Hogmer Jefferson/ Kemper Lexington* Loradale Lowell* Maury* Memphis* Mountview Murrill	Muse Pembroke* Pickwick* Riney* Rosine Ruston Sharondale Shelbyville Sonora* Trimble upshur/ Vertrees* Waynesboro* Wellston*/ Westmoreland*/ Wharton	Black locust Black walnut Eastern redcedar Eastern white pine Loblolly pine Northern red oak Scotch pine Shortleaf pine White ash White oak Virginia pine Yellow poplar	C. (*) (/) See "Special Consideration A" above.  D. A high soil pH may be a problem for pine on Aaron, Bledsoe, Calest, Hagerstown, Loradale, Maury, Pembroke, and Vertrees soils.
Moderately deep, well and moderately well drained.	Alticrest Ashwood* Beasley* Berea Caneyville*/ Colbert* Culleoka Donahue Eden* Faywood* Fleming	Fredonia* Frondorf*/ Garmon*/ Gilpin*/ Hampshire* Hartsells Latham*/ Lenberg*/ Lily Linker Marrowbone	McAfee* Muskingum Needmore* Rarden*/ Salvisa* Steinsburg* Talbot* Trappist* Wernock	Black locust Eastern redcedar Eastern white pine Loblolly pine Northern red oak Scotch pine Shortleaf pine White ash White oak Virginia pine Yellow poplar	E. (*) (/) See "Special Consideration A" above.  F. A high soil pH may be a problems for pine on Faywood, McAfee, Salvisa, Eden, Beasley, and Ashwood soils.
Deep, somewhat excessively drained soils on floodplains and stream terraces with sandy or loamy and gravelly subsoils.	Beulah Boonesboro Bruno Combs Crevasse Lakin Molena Nelse Potomac Riverwash Skidmore Yeager			American sycamore Black walnut Cherrybark oak Eastern cottonwood Eastern white pine Green ash Loblolly pine Pecan Scotch pine Shortleaf pine Sweetgum White ash Virginia pine Yellow poplar	

Soils Description	SOIL SERIES	Species to Plant (not listed by preference)	Special Considerations
Somewhat poorly drained and poorly drained, nearly level to gently sloping soils on stream terraces having a fragipan that restricts root penetration and water movement.	Ginat Orville Purdy Robertsville Taft Tyler Weinback	American sycamore Baldcypress Cherrybark oak* Eastern cottonwood* Loblolly pine Pin oak Swamp white oak Sweetgum White ash* Yellow poplar*	H. *These species are better suited for planting on the somewhat poorly drained soils Tyler, Taft, Ginat, and Weinbach.
Somewhat poorly and poorly drained, nearly level to gently sloping soils on uplands with a fragipan that restricts root penetration and water movement.	Avongurg Calloway Guthrie Henry Johnsburg Lawrence Mullins	American sycamore* Baldcypress Eastern white pine* Loblolly pine Pin Oak Swamp white oak Sweetgum	I. *Plant these species only on somewhat poorly drained Avonburg, Calloway, Johnsburg, and Lawrence soils.
Moderately well drained nearly level to sloping soils with a fragipan that resists root penetration and water movement.	Bedford Captina* Dickson Gatton Grenada* Ladler Lax Loring Mercer Monongahela Nicholson Otwell Providence Russellville Sango Sciotoville Sonora* Tarklin Tilsit Zanesville	Eastern white pine Loblolly pine Northern red oak Scotch pine Shortleaf pine Sweetgum White ash White oak Virginia pine Yellow poplar	J. Severely eroded and/or gullied soils (*) are lower in productivity. Plant more drought resistant species on these sites.
Shallow, well to excessively drained droughtly soils on uplands.	Colyer*/ Corydon* Cynthiana* Dandridge* Fairmount*/ Montevallo Opequon Ramsey*/ Rockcastle* Shrouts* Weikert*	Eastern redcedar Loblolly pine Scotch pine Shortleaf pine Virginia pine	K. (*) (/) See "Special Consideration A" above. L. A high soil pH may be a problem for pine on Fairmount, Cynthiana, Corydon, Otway, Shrouts, and Dandridge soils.
Deep to moderatley deep, well to excessively drained droughtly soils that contain more than 15% rock fragments and have loamy or sandy subsoils.	Berks*/ Bodine*/ Brassfield Clarksville DeKalb Flomation Frankstown Guin Litz Saffel Steinsburg	Eastern redcedar Loblolly pine Scotch pine Shortleaf pine Virginia pine	M. (*) (/) See "Special Consideration A" above. N. Might consider planting yellow poplar and white pine on cool slopes for Frankstown and DeKalb soils. Brassfield has too high soil pH for pine.
Deep, well drained soils formed in materials from surface mining of coal.	Bethesda Fairpoint Moristown Myra	Loblolly pine Shortleaf pine Virginia pine Eastern white pine Black locust White oak	O. A high soil pH may be a problem for pine on Morristown, Myra, and Fairpoint soils.

## Soil Nomenclature

Soil Depth	Description
0" - 10"	very shallow
10" - 20"	shallow
20" - 40"	moderately deep
40" +	deep

Slope	Description
0% - 2%	nearly level
2% - 6%	gently sloping
6% - 12%	sloping
12% - 20%	moderately steep
20% - 30%	steep
30% +	very steep

Aspect	Description
North and East (cool slope)	Azimuth 0° - 120° and 330° to 360°
South and West (hot slope)	Azimuth 150° - 300°
Neutral Aspect	Azimuth 120° - 150° and 300° - 330°

On all slopes less than 15%, all aspects are considered neutral.

Drainage	Description
Excessively drained soil	Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. All are free of the mottling related to wetness.
Well drained	Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Soils are commonly medium textured and free of mottling.
Moderately well-drained	Water is removed from the soil somewhat slowly during some periods, and it is wet for only a short time during the growing season. These soils commonly have a slowly permeable layer within or directly below the solum.
Somewhat poorly drained	Water is removed slowly enough that the soil is wet for significant periods during the growing season. Soils commonly have a slowly permeable layer, a high water table, additional water from seepage, or a combination of these.
Poorly drained	Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Poor drainage results from high water table, a slowly permeable layer within the profile, seepage, or a combination of these.

Pans	Description
Fragipan	This is loamy, brittle subsoil horizon, low in porosity and content of organic matter, and low or moderate in clay, but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard and has a higher bulk density than the horizon or horizons above.

## *Species Suitable for Planting on Mine Spoil*

### **pH 3.6 to 5.5**

Ash, green  
Ash, white  
Birch, river  
Chestnut, Chinese  
Locust, black  
Oak, northern red  
Pine, loblolly  
Pine, pitch  
Pine, Scotch  
Pine, shortleaf  
Pine, eastern white  
Sweetgum  
Sycamore, American  
Redcedar, eastern  
Sweetgum  
Sycamore, American  
Walnut, black  
Poplar, yellow

### **pH 5.6 to 7.3**

Ash, green  
Ash, white  
Birch, river  
Chestnut, Chinese  
Cottonwood, eastern  
Locust, black  
Oak, northern red  
Pine, loblolly  
Pine, pitch  
Pine, Scotch  
Pine, Virginia  
Poplar, hybrid

### **pH above 7.3**

Ash, green  
Cottonwood, eastern  
Locust, black  
Poplar, hybrid  
Redcedar, eastern  
Sycamore, American  
Walnut, black

## Soil - Site Index

Total tree height at a given age is an excellent indicator of site potential for a particular tree species. The term site index is based on a tree's height when 50 years old and is used to evaluate site potential. A site index of 100 for yellow poplar means that dominant and co-dominant yellow poplar will average 100 feet in height on a particular site at age 50.

The following table is a listing of the average site index of a variety of species for each soil type in Kentucky for which information is available. These figures are compiled from the Natural Resources Conservation Service (NRCS) data and represent a good method of site productivity evaluation in the absence of other figures. It is recommended, however, that wherever possible, actual site index be taken in the field for a given area rather than to rely on this table, since there is sometimes a great deal of variance within the same general soil type.

An asterisk (\*) beside a number in the table indicates actual NRCS field data, whereas unmarked numbers generally indicate projections.

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Aaron	83											
Adler		94*						102*	120	110*	96*	95
Allegheny	82*	83*		77*	77*	94*	55*	95*			77*	
Allen	71*	89*		66*	73*		61*					
Alligator									90		80	70
Alticrest	70	95		70	70							
Arkabutla			105*					93*		88*	98*	88*
Armour	80	90	90	80								
Ashton	85	95						95*			87*	
Ashwood	55						44					
Atkins			83	82*				100	105		88*	
Avonburg	75	85						85			90*	
Barbourville	83	102*				94*						
Baxter	75*	93*		80	64*							
Beasley	62*	80*			70		38*					
Bedford	78*	99*								83*		
Belknap		90						90	100			
Berea	70	80										
Berks <sup>1</sup>	78*	98*				58*						
Berks <sup>2</sup>	64*					52*						
Bethesda	77*	94*		63*								
Beulah								90	100			
Bewleyville	77*	93*	80	79*	70		55*					

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Bibb			92					90			90	
Birds								90	98			
Blago								95				
Bledsoe <sup>1</sup>		104*										
Bledsoe <sup>2</sup>		84*										
Bodine <sup>1</sup>	77*	89*		56*								
Bodine <sup>2</sup>	62*			.								
Bonnie		90*						95*	100		101*	
Boonesboro	85											
Bosket								90	100		90	80
Brandon <sup>1</sup>	69*	80*	80	70	70							
Brandon <sup>2</sup>	60*		70	60	60							
Brashear	80*											
Brassfield	60*						40*					
Braxton	70		80				50					
Britwater	70		80	70			50					
Brookside <sup>1</sup>	80	99*		81*								
Brookside <sup>2</sup>	66				73							
Bruno		94*						103	80*		110	
Caleast	80	90										
Calloway	83*	100*	86*	80				90			90	
Caneyville <sup>1</sup>	67*	90*					46*					
Caneyville <sup>2</sup>	57*						36*					
Captina	65	90*		60			40					
Carpenter <sup>1</sup>	72*				74*							
Carpenter <sup>2</sup>	58*				64*							
Cascilla		115*	93					110*	110		110*	96*
Cavode <sup>3</sup>	83	95										
Chargin	85	81*										
Chavies	80	94*		76*				90				
Chenault	80	90										
Christian	74*	84*		63*	71*	82*	41*					
Clarksville	87*	104*										
Clifty	65*	72*		76*				95			95	
Clymer	87*	98*				90						
Colbert	60*		67*	60				45*				
Collins	100*	103*	95					101*	120*	95*	100*	87*
Colp	70											
Colyer <sup>1</sup>	62*				58*							
Colyer <sup>2</sup>	52*				53*							

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Combs	90	115										
Commerce								97	108*			80
Corydon	70*	85										
Cotaco	85*	99*			75*							
Cranston <sup>1</sup>	76*	90		63*								
Cranston <sup>2</sup>	68*											
Crevasse	90		90						83*		90	
Crider	80*	96*		80	76*							
Cruze <sup>1</sup>	80											
Cruze <sup>2</sup>	70											
Cuba		104*			77*							
Culleoka <sup>1</sup>	82*	93*	77	80			60					
Culleoka <sup>2</sup>	68*											
Cumberland	70	87*	80	70*								
Cutshin	82*	106*		85	85							
Cynthiana							41*					
Dandridge	60				55		40					
DeKalb <sup>1</sup>	74*	94*										
DeKalb <sup>2</sup>	62*			67	72*							
DeKoven								100			95	
Dewey	98*	91			86*		50*					
Dickson	73*	98*	72*	57*								
Donahue	70				70	70						
Donerail	80											
Dowellton			80					90			80	
Dubbs								96	100		95	80
Dundee								100	100		100	
Dunning								95	100		95	
Eden	70*	84*			76*		42*					
Egam	90	100	90					100*			95*	
Elk	80	91*		80	90	90		97*				
Ennis	77*	100*	90									
Epley	70										80	
Etowah	80	90	90	84*	90*							
Fairmount	63*				55		41*					
Fairpoint			78*			91*						
Falaya		106*	93*	75*				105*	107*		101*	92
Faywood	66*				70	76*		87*				
Feds creek	64*											
Fleming	64											
Flomaton			70	60								
Forestdale								94	95		95	80

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Frankstown	78*	84*		65	70		40*					
Frederick <sup>1</sup>	79*	95*			68*							
Frederick <sup>2</sup>	67*											
Fredonia	70						59					
Frondorf <sup>1</sup>	76*				72*						82*	
Frondorf <sup>2</sup>	70*											
Garmon <sup>1</sup>	71*	99*	67*		65*							
Garmon <sup>2</sup>	62*					38*						
Gatton	70	85		70							85	
Gilpin <sup>1</sup>	80*	89*		70	71*	96*						
Gilpin <sup>2</sup>	69*			60		82*						
Ginat								90*			88*	
Grenada	70*	94*	87*	64*							90*	
Grigsby	85	110										
Guthrie	100	97*	79*	62				100*			85	
Hagerstown	85	95										
Hamblen	80	100	90									
Hammack	80*	88*										
Hampshire	70		80				50					
Hartsells			70	62*	72*							
Haymond	90	100			87*							
Hayter <sup>1</sup>	85	107*										
Hayter <sup>2</sup>	80	90										
Heitt	70*				70		50					
Henry	67*		85*					101*			84*	
Henshaw		95						91*			95	
Hollywood			90						100		90	
Holston	78	86	85	69	73							
Hosmer	85	100	90	70	70							
Humphreys	70	100	90									
Huntington	85	95		73*								
Iuka			100					100	105		100	
Jacob								80				
Jefferson <sup>1</sup>	71*	102*		76*	76*	73*						
Jefferson <sup>2</sup>	66*			59*	64*							
Johnsburg	80*	94*		76*				85*			80	
Karnak								96*				82*
Kickapoo												
Kimper	76*	115*										
Lakin	60				60							
Lanton			90						100		90	

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Latham <sup>1</sup>	70*			73*	71*	67*						
Latham <sup>2</sup>	65*			58*	59							
Lawrence	80*	86*		69				76*			87*	
Lax	56*	90	79*	64*								
Lenberg	63*				59*							
Lexington	75	90	87	57*				83			90*	
Licking	77	90										
Lily	73*	89*		62*	72*						70*	
Lindsay	85	95										
Linker	60*		65	62*	79*	66*	40					
Litz <sup>1</sup>	80	95		72	65							
Litz <sup>2</sup>	70			65	64							
Loradale	80	90										
Loring	64*	84*	88*	70*	75*			97*			90	
Loudon	68											
Lowell	83*	90		80	78*							
Mantachie		95	98					100	90		95	80
Markland	62*	107*										
Marrowbone <sup>1</sup>		95										
Marrowbone <sup>2</sup>				75								
Maury	80											
McAfee	79	85			65*		50					
McGary	65*							79*			90	
Melvin								98*	101*		90*	
Memphis	87*	102*	93*	68*				90*			88*	75*
Mercer	70										80	
Mhoon									110		100	90
Molena	77		80									
Monongahela	70*	98*	82	88*	82*						83*	
Montevello			70	65*	72*							
Montgomery	75							88			90	
Morehead	97*	80*		84*								
Morganfield		118*						112*	117*	118*	115*	90
Morristown			68*									
Mountview	69*	92*	80	65*	64*							
Mullins	62*	95		76*	59*			95			90	
Murrill	72	85		76	75							
Muse	63*	110*		81*	64*							
Muskingum <sup>1</sup>	78*	89*		80	73	73						
Muskingum <sup>2</sup>	62*											
Myra	70	94*		70	70		50					
Needmore	70	94*		70	70							

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Negley	94	99*										
Nelse										100	98	95
Newark	85	95						100*	94*		85*	
Nicholson	75*	107*									85*	
Nolichucky <sup>1</sup>	76	90	80	70	70	85						
Nolichucky <sup>2</sup>	65			65	65							
Nolin		105*						98*			92*	
Nolin Variant											85	
Ochlockonee		110	77						100		90	
Okaw	58							70				
Opequon <sup>1</sup>	60	80										
Opequon <sup>2</sup>	50											
Orrville	85	90										
Otway	55						38*					
Otwell	80*	95*										
Patton	75							85	84*		80	
Pembroke	85	94*		85	85							
Peoga								90			90	
Philo	74*	101*		85	80	70					90	
Pickwick	58*	95	80	70	70							
Pope	80*	97*			74	89						
Potomac	70			70	70	80						
Providence			84*	64*							90	
Purdy		90		75	75			85			85	
Ramsey 1	72*											
Ramsey 2	64*	92*	73	57*	56*	70						
Rarden <sup>1</sup>	80*				67*							
Rarden <sup>2</sup>	65*				54*							
Rayne	80	90		75	75							
Renox	75	94		75	80							
Rigley <sup>1</sup>	74*	90										
Rigley <sup>2</sup>	63*											
Riney	79*	93*		80								
Robertsville	87*	100*						87*			96*	
Robinsonville									110*	115	105	85
Rockcastle	59*			55	63*							
Roellen								90	100		90	
Rosebloom								95	100	80	95	95

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Rosine <sup>1</sup>	80	90										
Rosine <sup>2</sup>	70											
Rossmoyne	88*	90*			80							
Rowdy		100										
Ruston	68*	100*	84	75								
Ryker	90	98									76	
Sadler	70	85			70							
Saffell	50*		70*	60								
Salvisa	70											
Sango	70	85*	80	65*								
Sciotoville	80	90				90						
Sees	85											
Sensabaugh	80	100		80	75							
Sequatchie	66*	100	90									
Sharkey								88	100		89*	85
Sharondale		107*										
Shelbyville	80											
Shelocta <sup>1</sup>	79*	102*		77*	78*	87*						
Shelocta <sup>2</sup>	68*	92*										
Shrouts	60				60		45					
Skidmore	85	108*										
Sonora	80	90		80								
Staser	80	100	90									
Steff	80	106*									100*	
Steinsburg	70*			61*	63*							
Stendal		103*			90			95*			91*	
Stokly		90			85			90			90	
Taft	60*	98*	85	60*							80	
Talbott	65		80	72*	76*		46*					
Tarklin	75*	80	80	70*	70		41*					
Tate	80	95	90	75	80	90						
Tilsit	69*	92*		71*	77*	85*						
Trappist	60*				64*							
Trimble	66	95*		75	75		50					
Tunica								97	100		90	100
Tupelo	70	90	80								80	
Tygart												
Tyler	80	90						90				
Uniontown	81*	91*			80			83			80*	
Upshur	63*	82			58*	82						

Soil Series	Upland Oak	Yellow Poplar	Loblolly Pine	Shortleaf Pine	Virginia Pine	White Pine	E. Red Cedar	Bottom-land Oaks	Cotton-wood	Sycamore	Sweetgum	Green Ash
Vandalia <sup>1</sup>	77	90			80							
Vandalia <sup>2</sup>	68	75			70							
Vertrees	80	90										
Vicksburg		102*	81*					104*	110*		100*	90
Wakeland		98*			90*			90			85	
Waverly			95					103*	94*		105*	
Waynesboro	75*	85*	80	78*	76*							
Weikert <sup>1</sup>	73*	84*										
Weikert <sup>2</sup>	55*			56*	52*							
Weinbach	75	90*						85			88*	
Wellston <sup>1</sup>	80*	93*		75*	68*							
Wellston <sup>2</sup>	75*				60							
Wernock	72*	75		68*	70							
Westmoreland <sup>1</sup>	81	90				75						
Westmoreland <sup>2</sup>	70	80				65						
Wharton <sup>1</sup>	76	90										
Wharton <sup>2</sup>	70	85										
Wheeling	80	90										
Whitley	80	75		74*	69*							
Whitwell	75	95	90			90					90	
Wilbur		106*								82*		
Wolfever	70	90	80					80			80	
Woolper	73	90		80								
Yeager	80	90*									90*	
Zanesville	75*	88*	90*	67*	66*	81*						
Zipp	75							97*			90	

<sup>1</sup> North Aspect

<sup>2</sup> South Aspect

<sup>3</sup> Stony

**CHAPTER 4**

**PLANTING METHODS  
FOR BARE ROOT SEEDLINGS**

## ***PLANTING METHODS FOR BARE ROOT SEEDLINGS***

There are generally two planting methods used in tree planting: planting by hand and planting by machine. Whatever method of planting is used, certain basic requirements must be satisfied. The tree must be planted at the same depth it grew in the nursery, the hole must be closed completely, and the roots must be straight. The last factor is extremely important because a bent or doubled root (called J-rooting) will cause the tree to either die or fail to properly develop.

Machine planting is the cheapest and fastest method where the size of the job, site terrain, and ground cover permit its use. Hand planting is adapted to all conditions, but it is used most often on small areas, or where the site is too steep, rocky, or gullied to allow equipment use. It is also necessary to use this method where seedlings are too large to be planted by mechanical means.

### ***Machine Planting***

Machine planting is a fast, effective, and economical way to plant trees on large areas where the soils and topography are suitable. Large seedlings such as walnut, cottonwood, or sycamore are not generally well adapted to this method unless a specialized machine for planting large hardwood seedlings is used.

Most planting machines consist of a rolling coulter that cuts through the ground surface, an adjustable trencher that creates a slit for inserting the tree, and a set of packing wheels that firm the soil after planting. A farm tractor or crawler with a three-point hitch is necessary to pull the machine.

Tree planters are available on a loan basis from the local Division of Forestry offices. Other agencies in each county, such as the local conservation districts, may also have one.

A three-person crew is generally used for machine planting. This includes a tractor or crawler operator, someone to ride the machine and insert the trees in the ground, and a person to follow the planter to insure proper furrow closure and machine operation.

Depending upon the species planted and topography, five to eight thousand trees per day may be planted by an experienced crew.



F-502357, 465203

**Figure 26.**—Three types of tree-planting machines in common use: *A*, Floating type, *B*, semifloating type, and *C*, the trailer type (photo courtesy of Ohio Power Co.).

## ***Hand Planting***

There are two types of hand planting for traditional bare root seedlings: the dibble method and the hole (side or center) method.

The ***dibble method*** is faster than the hole method. It consists of making a slit in the ground, inserting the tree roots, and closing the slit at both the top and bottom. It may be done with a planting bar (dibble bar), mattock, spade, shovel, or grub hoe. The planting bar is the best tool for this if available. **One experienced person can plant 500 to 1000 seedlings in an eight-hour day by this method.**

The ***side-hole (mattock) method*** consists of digging a hole deep enough to hold the seedling's roots, with one side of the hole vertical and the other diagonal. The seedling is held against the vertical side, and soil is pushed in to cover the lower roots. The hole is then filled, with dirt packed tight around the seedling with the foot.

The ***center-hole method*** is similar to the side-hole method except the hole is larger and deeper, and both sides are vertical. It is particularly useful for seedlings with large or wide-spreading root systems. While a mattock, shovel, or grub hoe can be used on both of the hole methods, a post-hole digger is particularly good for the center-hole type.

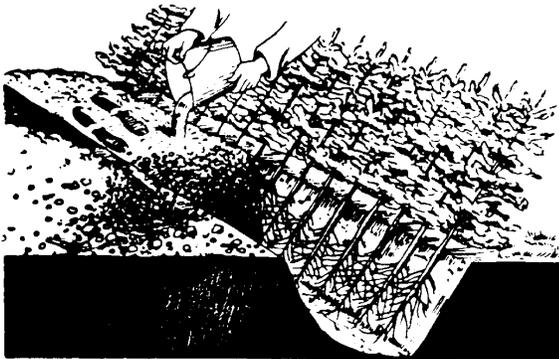
These methods are further illustrated on the following Planting Instructions Sheet. Again, when planting by hand, it is important to keep the roots straight (not J-rooted).

Planting bars are available on a loan basis from the Division of Forestry or may be purchased from forestry supply dealers.

# PLANTING INSTRUCTIONS

## I OPEN BUNDLES IMMEDIATELY ● Inspect Seedlings and Dampen Roots Only

II If seedlings can be planted in two days after receiving, re-tie bundle, store in a cool place and plant from the bundle. If seedlings cannot be planted within two days after receiving, PLACE IN GROUND -- "HEELING-IN"



"Heel-in" Bed.

- Dig trench in loose, moist soil.
- Spread seedlings individually and evenly.
- Pack soil firmly and water

## III WHEN READY TO PLANT SEEDLINGS:



CORRECT

In bucket with sufficient water to cover roots.



INCORRECT

In hand -- roots dry out.

Remove seedlings from bundle or heeling-in bed.

Place seedlings in bucket. Keep roots covered with thin mud or water at all times.

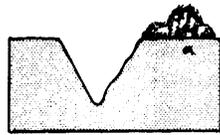
Carry bucket of seedlings to planting site.

Remove and plant one at a time.

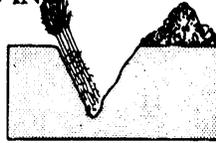
## IV PLANT SOON AS POSSIBLE

Delay reduces chance of survival

## HEELING IN



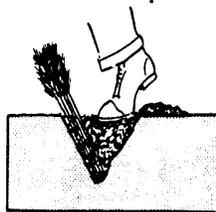
1. Dig V-shaped trench in moist shady place.



2. Break bundles and spread out evenly.



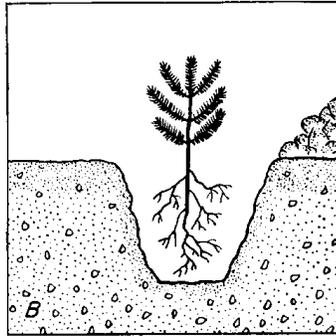
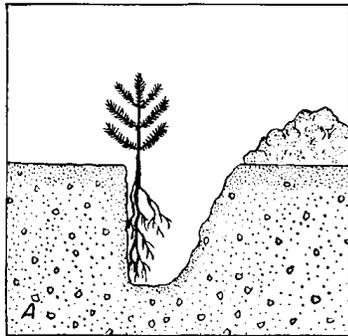
3. Fill in loose soil and water well.



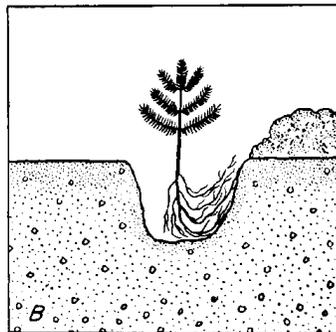
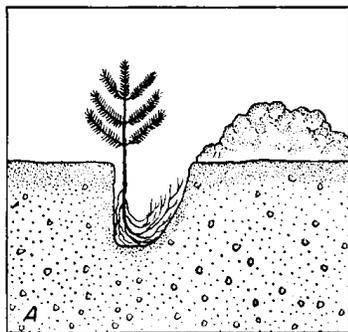
4. Complete filling in soil and firm with feet.

## PLANTING TECHNIQUE

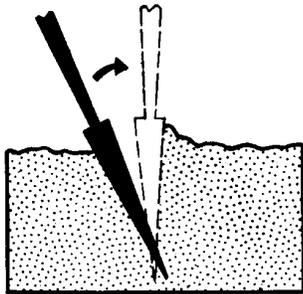
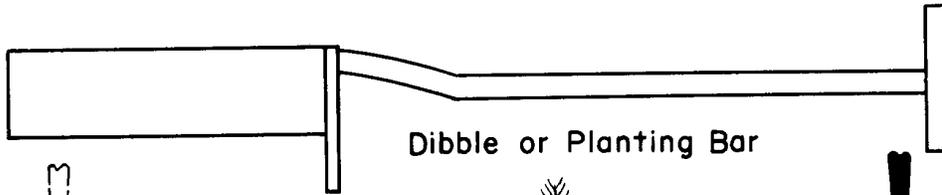
RIGHT



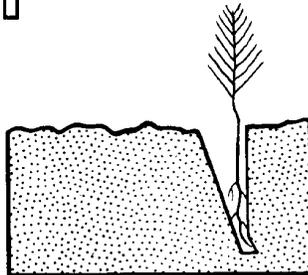
WRONG



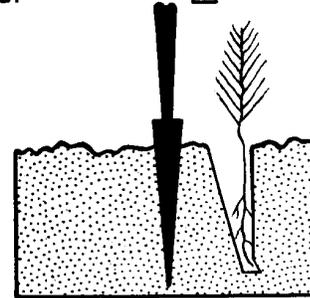
## PLANTING WITH A DIBBLE BAR



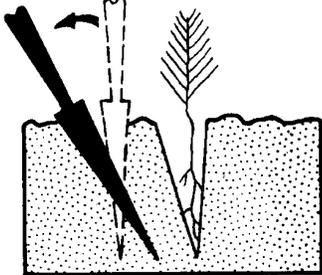
1. Insert dibble at angle shown and push forward to upright position.



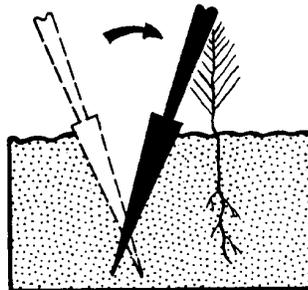
2. Remove dibble and place seedling at *correct* depth.



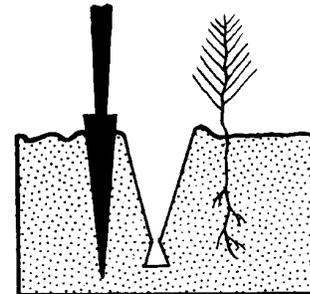
3. Insert dibble 2 inches toward planter from seedling.



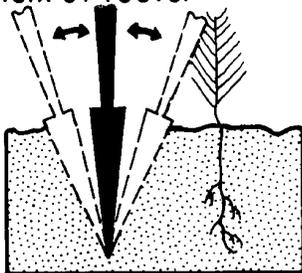
4. Pull handle of dibble toward planter firming soil at bottom of roots.



5. Push handle of dibble forward from planter firming soil at top of roots.



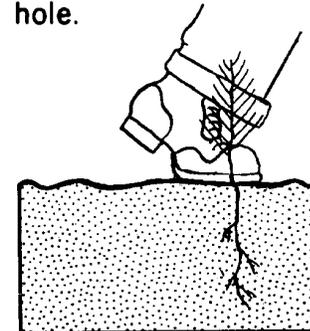
6. Insert dibble 2 inches from last hole.



7. Push forward then pull backward filling hole.

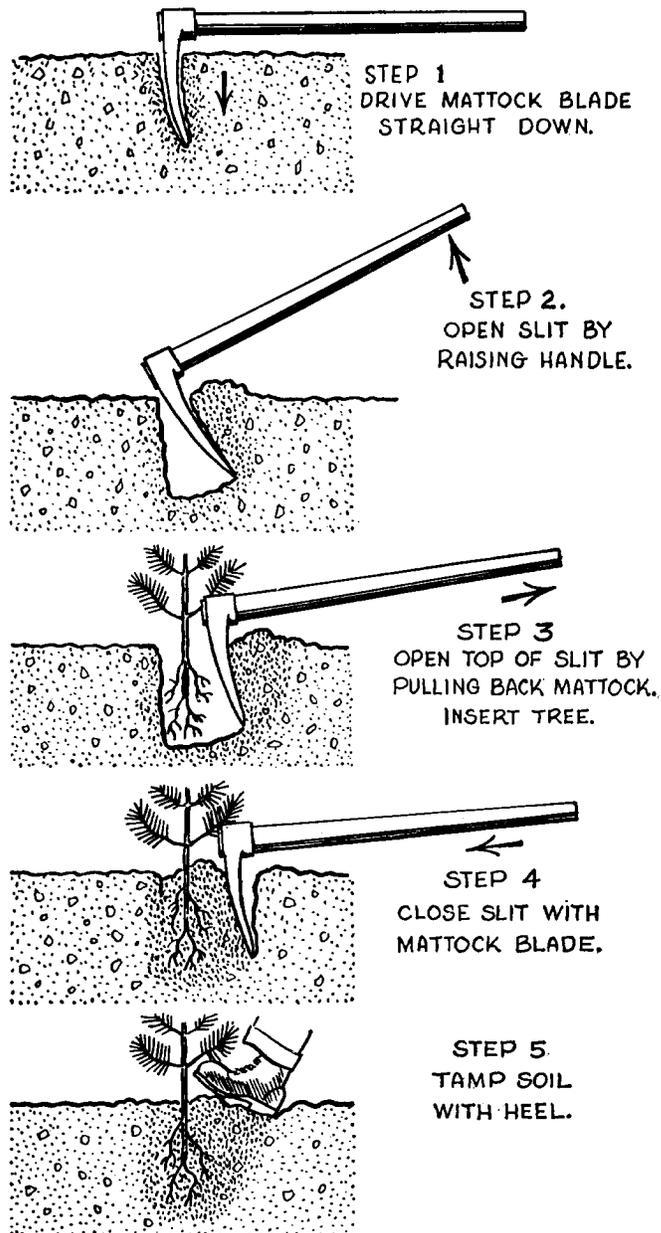


8. Fill in last hole by stamping with heel.



9. Firm soil around seedling with feet.

## PLANTING WITH A MATTOCK



**CHAPTER 5**  
**SITE PREPARATION**

## ***SITE PREPARATION***

Site preparation is an important factor to consider in tree planting. To survive and grow, a planted tree needs light, adequate soil moisture, and specific mineral elements from the soil. Available soil moisture and light can be manipulated to a certain extent by controlling vegetation. On many areas, vegetation control boosts growth, and on others it is a necessity for survival. The degree of control needed will vary with the species to be planted, soil type, type of vegetation, topography, and local climate. Proper site preparation can often make the difference between plantation success and failure. Since this is expensive, it is important to use only the amount necessary to accomplish the objective.

Generally on the better sites, such as bottomland or good agricultural land, site preparation is mandatory for all species planted. Lush weed growth and dense sod are unusually heavy here and choke out all but the hardiest of seedlings. On poorer sites, particularly where pine is planted, plant competition is usually not as severe, and the faster growing pines can often overcome it with little or no help. Hardwoods, however, are generally more sensitive to plant competition than pine and are planted on better sites. This makes some type of site preparation for them usually mandatory to ensure survival and to maintain good growth.

Maintenance of initial site preparation for the first two to three growing seasons is also needed for competition-sensitive species or where competition is severe. Failure to do this often results in plantation failure even though initial treatment may be good.

There are generally two major types of site preparation: chemical and mechanical. The method recommended depends upon the individual situation. Following is a detailed discussion of these two types and their applicability.

### ***CHEMICAL CONTROL***

Research has shown that, where applicable, chemicals are the most effective method of controlling vegetation and often the most economical. A variety of chemicals are on the market for nearly every situation.

Chemicals may be applied to the foliage, the base of stems (basal treatment), open wounds created by girdling, or to the soil. Some chemicals are non-selective and can be used to control many species of plants, while others are so selective that they can be used only for a single species or species group. The effectiveness of all chemicals depends on a variety of factors, the most important of which are: the species, season, method of application, dosage, weather, size and age of plants, and kind of carrier used. Before deciding on a specific chemical or method of application, each situation needs to

be evaluated. A good herbicide reference should be consulted before choosing a chemical. No one chemical or method is suited for or applicable to every situation. Application for each purpose should be done in accordance with directions on the label of the individual product.

It is important to note that the Federal Environmental Pesticide Control Act of 1972 requires certification to use or supervise the use of "restricted-use" chemicals. For information on certification and use restrictions of specific chemicals, contact the Kentucky Department of Agriculture, Division of Pesticides, Frankfort, Kentucky.

### ***MECHANICAL CONTROL***

These methods include the use of heavy equipment (such as a bulldozer or tractor with plow or disc), and hand tools (such as chain saw, ax, and mattock). This method generally needs maintenance more often than chemical measures, and overall may be more costly. Where large areas are stripped of vegetation and soil is disturbed by heavy equipment, erosion may occur. Excessive natural seeding of undesirable species on exposed mineral soil is another factor to consider. Below is a listing of several different types of mechanical control and a discussion of their application.

#### **Plowing**

Plowing works well in heavy sod or dense grassland. It should be done several months before planting. Except for poorly drained sites, shallow, wide furrows are best. On slopes it should be done on the contour with furrow slices on the downhill side. Furrows are usually six to ten feet apart with trees planted in the bottom of the furrow. On wet sites planting should be in the top of the furrow. It should be noted before deciding on this method, furrows may inhibit site preparation maintenance where this may be required.

#### **Disking**

Disking, by itself, is of limited value in tree planting. An exception to this is in conversion of already open, agricultural land where trees are to be cultivated. Disking is often used in conjunction with plowing when the wish is to create an agricultural crop-like seedbed.

#### **Clearing and Grading**

Clearing and grading is very expensive and should be used only when other methods are not practical. Examples would be conversion of thickets of rhododendron, multi-flora rose, or thorny honeylocust.

### **Felling and Girdling**

Cutting or girdling of bush and trees is a good method in conjunction with chemicals. A double girdle without herbicides is also effective on larger trees.

### **Mowing**

Mowing may be desirable to reduce immediate competition before planting. It must be maintained several times a year, however, to be of any long-term value. It may not be as effective as other methods because it has no value in reducing root competition to seedlings.

### **Scalping**

Scalping consists of scraping away heavy surface vegetation from spots one to two feet square, usually in conjunction with the planting operation itself. It is usually done by hand with a hoe or mattock, with the tree then planted in the middle of the scalped area. This should only be used where other methods are impractical.

### **Sub-soiling**

Where "hardpan" or "fragipan" conditions exist, or the soil compacting required in some surface-mine reclamation activities, tree seedling roots cannot develop properly due to the soil conditions existing in the rooting zone. In such cases, it is necessary to break up the "pan" or compacted soil in the immediate area close to the seedlings. This may be done by sub-soiling. Sub-soiling consists of pulling a ripper bar behind a bulldozer or heavy tractor. The bar rips the soil to a specified depth, shattering "pans" and compacted soil conditions and allowing root development. It is not necessary to rip the entire site but only the area in the immediate vicinity of the seedling row.

### ***EARLY PLANTATION CARE***

On good sites where plant competition is particularly severe, maintenance of the plantation for the first several seasons is often necessary to insure success. Even the best initial site preparation may soon be overcome by new growth, and seedlings can often become stunted or overcome unless preventative measures are taken. Early plantation care can be costly, ranging as high as 1/3 to 1/2 of initial planting costs; however; it may be the difference between success and failure.

Most plantation maintenance (where proper initial work was done) consists of control of grass, weeds, and brush. This type of maintenance is commonly done by mowing, cultivating, or applying chemicals similar to that listed under site preparation. As in initial treatment, chemical control has proven to be the most effective and economical method.

In the case of interplanting, overtopping trees may need to be removed after seedlings become established. For such situations, treatment of each individual stem is usually necessary to prevent damage to planted trees.

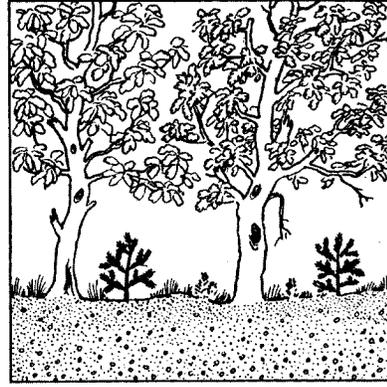
It should be emphasized that a thorough job of initial site preparation before planting is highly recommended. Maintenance is no substitute for this, and it makes maintenance much easier and less costly, and it minimizes the danger of possible damage to planted trees.

Another factor to emphasize is that the plantation must be protected from fire and livestock. Fencing is a necessity if livestock are present, and fire lanes should be constructed in high-risk areas. Insect, disease, or rodent problems must also be dealt with in localized situations, as these can limit plantation success or even destroy the plantation completely.

RELEASE NEEDED

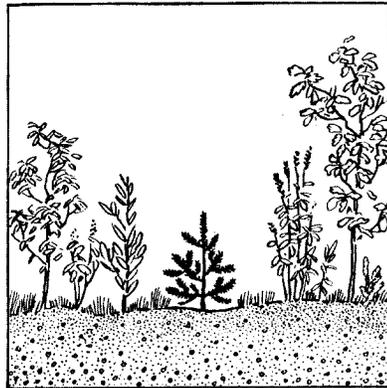


Brush 3 to 4 feet high suppressing pine or spruce 2 to 4 years after planting.

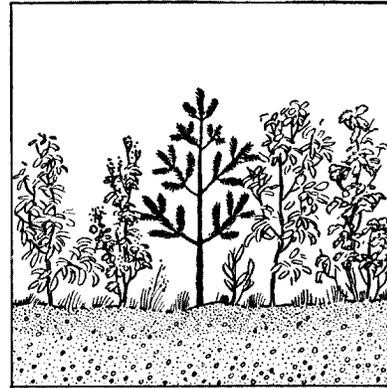


Rough, undesirable "wolf" trees suppressing 5-to-10-year old planted pine or spruce

RELEASE NOT NEEDED



Planted pine or spruce in opening in low brush and weeds.



Planted pine or spruce emerging from low brush, weeds, or briars.

Figure 30.—Conditions under which release of planted trees is and is not needed.

**CHAPTER 6**  
**SPECIES DESCRIPTIONS**

## UPLAND HARDWOODS

## BLACK WALNUT (*Juglans nigra*)

Black walnut is Kentucky's most valuable hardwood tree and is distributed throughout the state. It is not uncommon for high quality specimens to bring more than \$3,000 per tree. It has large, heavy twigs and pinnately compound leaves 12-24 inches long, with 15-23 sharply oval, toothed leaflets. Crushed foliage and the fleshy, green seed covering give a characteristic sharp "walnut" odor. On good sites walnut will reach 2-3 feet in diameter and 70-100 feet in height. Open grown trees tend to be less tall with wide-spreading branches. Young walnuts are especially sensitive to plant competition. Initial site preparation and maintenance are a necessity for successful plantations. Cultural work, particularly pruning, is usually needed to produce high quality logs; this may increase mature tree value four to five-fold.

Walnut requires deep, fertile soil that is moist and well drained. Deep loams, fertile alluvial soils, and good agricultural soils are the best sites. Walnut should not be planted on shallow soils, soils with fragipans, or eroded or worn-out land.

As an alternative to planting seedlings, some people contend that planting the nuts will produce an adequate stand of walnut with less time, money, and trouble. Areas with a high rodent population, however, will pose a high risk to the success of this method. It should also be noted that walnut is incompatible with certain trees and plants and the chemical Juglone, found in all portions of the tree, may cause decline or death to susceptible species. This becomes most apparent when plants come in direct contact with walnut roots. Susceptible plants include pine, alfalfa, blackberry, broomsedge, poverty grass, tomatoes, potatoes, apple, and rhododendron.

Walnut wood is heavy, hard, strong, and durable with high shock resistance. Its dark brown heartwood makes it highly coveted for furniture, paneling, and gunstocks, and the nuts are widely used in cakes, candies, and other confections. Walnut is also a good wildlife tree, particularly for squirrels.



## WHITE OAK (Quercus alba)

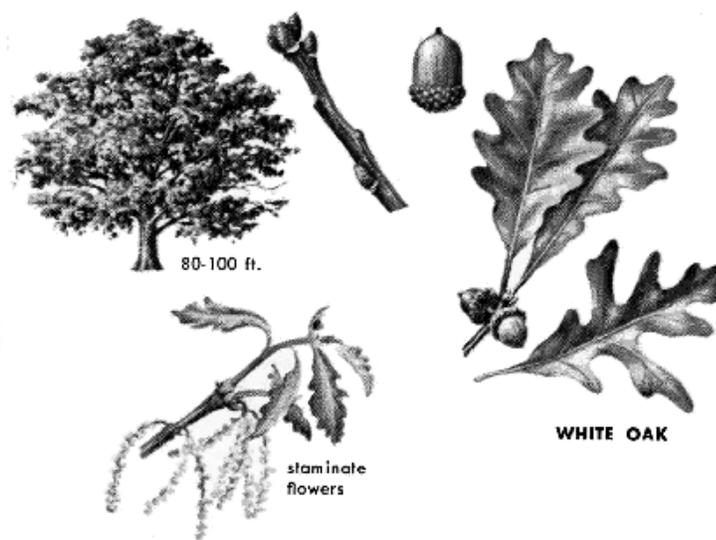
White oak is one of Kentucky's major timber species and is highly prized for its beauty and superior wood characteristics. It has simple leaves, 5-9 inches in length, with 7-9 round lobes. On good sites it will reach 4 feet in diameter and 100 feet in height. Trees 150 feet tall, 8 feet in diameter, and 600 years old have been found in old growth, natural stands.

The tree is generally intermediate in shade tolerance, decreasing toward intolerant, as it grows older. Natural pruning is generally good in heavy shade, but epicormic branching (waterspouts) may occur on suddenly released trees.

The species develops best on deep, well-drained, loamy soils; however, growth is good on all except the driest shallow soils.

White oak wood is heavy, very hard and strong, and the heartwood is relatively decay resistant. It is in demand for veneer, furniture, hardwood flooring, and boat construction. White oak is also the wood used in the manufacture of barrels for the storage and aging of Kentucky bourbon because the pores of the heartwood are impervious to liquids.

White oak acorns also provide an excellent source of food for wildlife.



## NORTHERN RED OAK (*Quercus rubra*)

Northern red oak is native to most upland areas of Kentucky. The leaves are simple, 5-8 inches long, and have 7-11 lobes. Each lobe is usually 3-toothed and sharply pointed, with bristles on the points. It usually grows 2-3 feet in diameter and 70-90 feet tall. Under forest conditions, it develops a tall, straight, columnar bole with excellent natural pruning. It is classed as intermediate in shade tolerance and responds well to release. Epicormic branching is generally not a problem.

The best sites for this species are characterized by fine-textured, deep soil with plentiful moisture.

Red oak wood is heavy, hard, and stiff, with high shock resistance. It is extremely porous, however, and decay resistance is low. The wood is used for veneer and furniture, and its natural beauty and resistance to wear make it preferred for flooring in residences. When treated with preservatives, it is used extensively for railroad ties and mine timbers.

Red oak acorns also provide an excellent food source for wildlife.

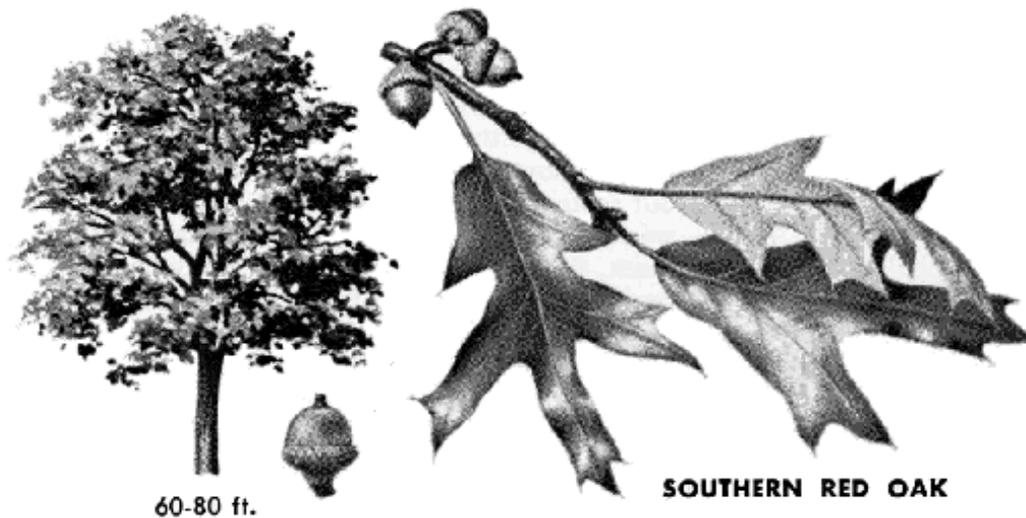


## SOUTHERN RED OAK (Quercus falcata)

Southern red oak is native to all of Kentucky with the exception of the Bluegrass area and the far Eastern mountains. It is characteristic of drier, poorer soils, however, the largest specimens are found along stream bottoms.

Leaves are 5 to 9 inches long and 4 to 5 inches wide. It is also often called "turkey foot oak" due to the characteristic three-lobed shape of many of its leaves although leaves with more than 3 lobes generally occur on the same tree. At maturity trees usually reach 60-80 feet in height and 2 to 3 feet in diameter. Maximum age is about 150 years.

Southern Red Oak is similar in many features to Black Oak. Cherrybark Oak, which is the best of Kentucky's bottomland oaks, is a variety of Southern Red Oak. Southern Red Oak is a major timber species where it occurs and the wood is marketed together with other species of red oak as "red oak." As with all the oaks, Southern Red Oak acorns provide a good wildlife food source.

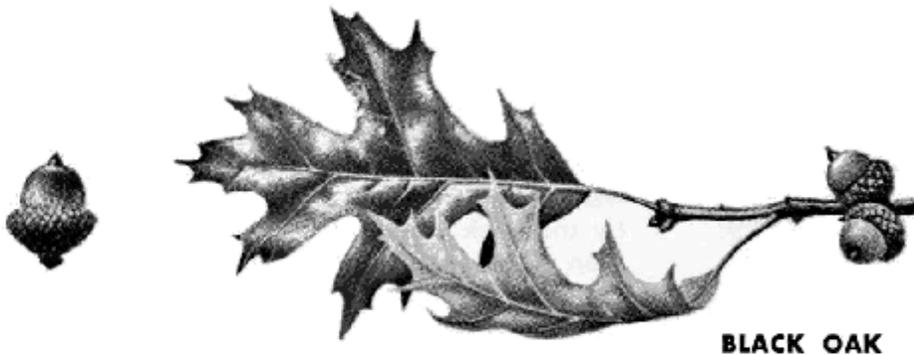


## BLACK OAK (Quercus velutina)

Black oak is a member of the red oak group (sometimes also referred to as the black oak group) and is one of the most common of the eastern upland oaks. It is native throughout Kentucky. Black oak commonly grows 60 to 80 feet in height and 2 to 3 feet in diameter though some specimens grow much larger. Leaves are 5 to 7 inches long with 5 to 7 toothed lobes each tipped by a spine and separated by sinuses or indentations of various depths. Physiological maturity is at about 100 years with some individuals living 150 to 200.

Black oak's best growth is on moist, rich, well-drained soils, where it approaches northern red oak in stature, however, it is more often found on poorer, drier sites because of its inability to naturally compete on the better ones. It is intermediate in shade tolerance

Black oak is an important tree in Kentucky, both for timber and wildlife food, although its quality ranks behind northern red oak within the upland red oak group.



## BUR OAK (*Quercus macrocarpa*)

Bur Oak is a medium-sized to large tree with a massive trunk and broad crown of stout branches. Mature trees are 80 to 100 feet tall and three to four feet in diameter. As a member of the white oak family, it has rounded lobes with leaves 6 to 12 inches long and 5 to 9 lobes. The distinguishing characteristic of the leaves is that the two middle sinuses or indentations between lobes reach nearly to the midrib of the leaf.

Bur oak is classed as intermediate in shade tolerance and is tolerant of a wide range of soil and moisture conditions. Its most common natural occurrence in Kentucky is in the Bluegrass Region, and it is a common large shade tree found growing in the pasture fields of the central part of the state.

It is known for its very large fringed acorns that commonly reach the size of a golf ball. This obviously makes bur oak an excellent tree for wildlife. Bur oak wood is marketed as white oak and the tree frequently sees use as an ornamental.



## YELLOW POPLAR (*Liriodendron tulipifera*)

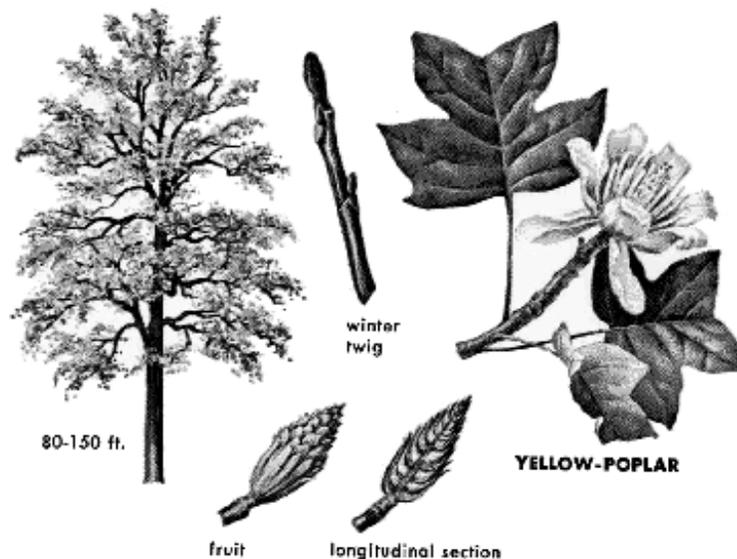
Yellow (tulip) poplar is one of the most plentiful trees of Kentucky's forests and is Kentucky's official state tree. Good sites will produce trees of 18-24 inches in diameter and 120+ feet in height in 50 to 60 years.

The tree is noted for its tulip-shaped leaf, fast growth, tall, straight bole, and excellent wood characteristics. The name poplar is a misnomer, however, since the tree actually isn't a poplar at all, but a member of the magnolia family.

Yellow poplar is shade intolerant, but its fast growth enables it to outgrow much of its competition once it becomes established. Natural seeding on scarified mineral soil is much superior to planting of seedlings when an adequate seed source is present. It grows best in moderately moist, well-drained, loose-textured soils. It rarely grows well in very dry or wet situations. Stream bottoms with good drainage, coves, and moist north and east slopes are ideal sites.

Yellow poplar wood is used for construction, furniture, and rotary veneer. The heartwood has a certain natural resistance to decay and a reputation for being termite resistant.

It also makes a good shade tree and is desirable for ornamental purposes.



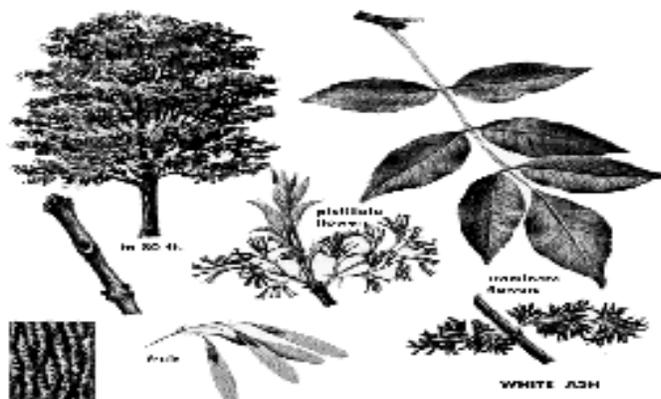
## WHITE ASH (*Fraxinus americana*)

White ash is one of Kentucky's most valuable timber species and is found naturally on a variety of sites throughout the state. It has pinnately compound leaves, 8-12 inches long, with 5-9 leaflets (usually seven) per leaf. It has opposite branching, and the bark is deeply divided by narrow ridges into net-like patterns. The bole is long, straight, clear, and cylindrical, with good natural pruning characteristics.

White ash trees normally reach 70-80 feet in height and 3 feet in diameter, although trees 120 feet tall and 6 feet in diameter have been found in Ohio River bottomlands. Depending upon the amount of root competition, a tree in full sunlight may take 3 to 15 years to reach breast height. Once it has reached this height, its root system is normally well established, and it is able to grow rapidly in spite of surrounding weeds. When young, it is a shade tolerant tree, able to survive under a forest canopy and make significant growth with less than 3% full sunlight. Tolerance decreases with age, however, and it is generally ranked as intermediate to intolerant in most lists.

Soil moisture is an important limiting factor in the tree's local distribution. It grows best on moderately well drained, fertile soils with high nitrogen content and a moderate to high calcium content. It is rarely found naturally in swamps, but it is comparatively tolerant to temporary flooding. It does not do well on oak-pine ridge tops or in bottom areas with poor drainage.

White ash wood is heavy, hard, strong, and stiff with good shock resistance and bending qualities. It is the standard handle material used for hoes, rakes, and shovels. It is commonly used in baseball bats, oars, and other sporting goods and is also sought for veneer and furniture. Ash seed also provide a good wildlife food source.



## SUGAR MAPLE (*Acer saccharum*)

Sugar maple is a common upland hardwood species and is found throughout Kentucky.

The leaves are simple with distinct lobes separated by rounded shallow sinuses. Mature trees may reach 300-400 years old with 70-110 foot heights and 2-3 foot diameters. The tree is very tolerant of shade and is able to endure long periods of complete suppression. Under natural conditions in most upland areas of the state, it is considered a climax species.

It thrives on fertile, moist, well-drained soils. It will grow on poor, dry, shallow soils but does not do well there. It will endure a wide range of soil pH ranging from strongly acid (pH 3.7) to slightly alkaline (pH 7.3).

Sugar maple is a hard maple and has heavy, strong, stiff wood with high shock resistance. It is used for furniture, veneer, and lumber, with 90% of the lumber being re-manufactured into bowling alleys, cabinets, handles, woodenware, and novelties. The sap is used for maple syrup and maple sugar, and the tree is also popular for shade and ornamental use.



## BLACK LOCUST (Robinia pseudoacacia)

Black locust is a nitrogen-fixing legume found naturally in most areas of the state.

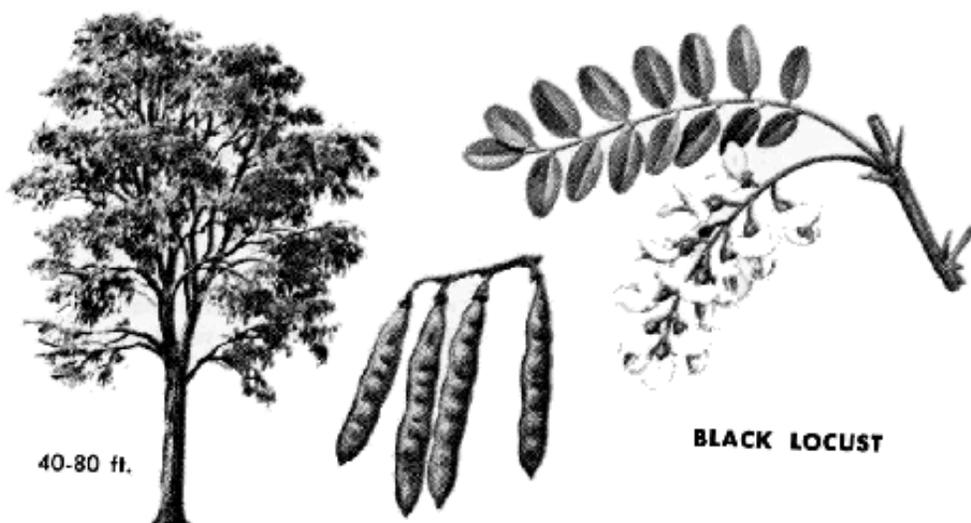
It has pinnately compound leaves 8-14 inches long with thorns, 1/2 to 3/4 inches long, at each twig node. Generally a medium tree, it may attain 1-3 feet in diameter and 40-100 feet in height, depending upon the site. It is a fast growing species and is classed as shade intolerant. It will also root sucker and reproduce itself in this manner.

Limestone base soils produce best development, though it will grow nearly anywhere except swamps, hardpan areas, and excessively dry places. Its survival is exceptional on acid strip mined banks, and it is widely used for erosion control on such areas.

The wood is hard, strong, and extremely durable with high nail holding qualities and excellent decay resistance. It is used extensively for fence posts, poles, mine timbers, and stakes. Long straight pieces are prized for pole-type barns. Black locust also makes excellent firewood with very high heat content and easy splitting characteristics.

On the best sites post size trees can be produced in 15-20 years with eight-inch bolts in 30 years. Stump sprouts may produce posts in less time.

Black locust is also considered a good tree for wildlife.



## KENTUCKY COFFEETREE (*Gymnocladus dioica*)

Kentucky Coffeetree was for a time Kentucky's official state tree but is now listed by state statute as the Kentucky Heritage Tree. At least scattered trees of this species are found in nearly every area of the state.

It is generally a medium tree, sometimes reaching 100 feet in height and 3 feet in diameter. It has a very large and easily distinguishable bipinnately compound leaf that is unique among Kentucky trees. The bark is dark gray with scaly, projecting ridges, and the small twigs are exceptionally stout, often giving the appearance during the winter months that the tree is dead. The tree also produces heavy, dark brown seedpods, 4-10 inches in length and 1-2 inches wide.

The name coffeetree was acquired because pioneers used the seeds as a substitute for coffee. In no section of the state could the tree be characterized as numerous. This sparse distribution is partly due to an extremely heavy seed coat that is so hard to penetrate that germination is often prevented. The tree will root sucker and this sometimes accounts for localized groupings of the trees.

The coffeetree will survive under a variety of soil conditions and is most commonly found in limestone areas and on deep, rich bottomland alluvial soils. It is widely planted as an ornamental, but the wood is not plentiful enough to have a large commercial market. The wood is handsomely figured, however, and listed as tough and durable.



## **BOTTOMLAND HARDWOODS**

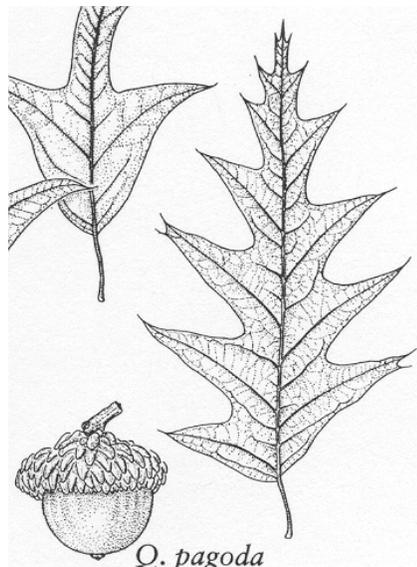
CHERRYBARK OAK (*Quercus falcata* var. *pagodaefolia*)

Cherrybark oak is a bottomland tree of the red oak group, native to the lowland areas of the western parts of Kentucky. It is not a separate tree species, but a variety of southern red oak. The leaves are simple, 5-9 inches long, with 5-9 lobes. Each lobe is tipped with a bristle, and the two leaf edges meet unevenly at the base.

The tree is one of the hardiest and fastest growing of all the oaks and one of the largest of the southern red oaks. It often attains 3-5 feet in diameter and 100-130 feet in height. Its name is derived from a bark pattern that often strongly resembles that of black cherry. The tree is classed as shade intolerant with a long, branch-free bole. On good sites, 1/2 inch per year diameter growth is common.

This species is widely distributed on the best sites in first bottoms, well-drained terraces, and colluvial and alluvial areas along both large and small streams. Best development is on loamy, well-drained soil. Although a lowland tree, it does not do well where drainage is poor or in wet or swampy soil.

Cherrybark wood is used for veneer, furniture, and flooring along with the other common uses of red oak. Cherrybark, however, is generally a higher quality tree than many other species of the red oak group and is therefore highly preferred by the wood industry. The acorns also provide a valuable source of food for wildlife.



## PIN OAK (*Quercus palustris*)

Pin oak is a member of the red oak group native to the bottomlands of the western two-thirds of the state.

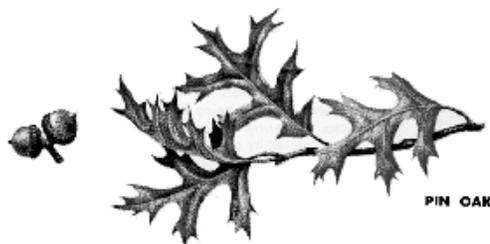
It has a simple leaf, divided into 5-7 lobes by wide, deep sinuses. As in all red oaks, the lobes are tipped with a bristle. On good sites the tree may reach 3 feet in diameter and 120 feet in height, although 2 feet in diameter and 70-90 feet in height is the average on wet areas. Under forest conditions, it grows tall and straight with a narrow crown. This species is noted for producing a large amount of limbs that, upon death, are tough and persistent. This leads to formation of pin knots in the lumber that not only gives the tree its common name, but also makes lumber from the species very low in quality.

Pin oak is intolerant of shade and reaches physiological maturity in 80-100 years. It grows fast with 1/2 inch per year diameter growth common. Periodic flooding will not harm the trees, but permanent flooding will kill them in 2-3 years.

It makes good growth on wet sites and heavy soils with poor internal drainage. Though it will do fine on deep, well drained bottomland soil, it is the only tree which grows well on upland flats which are characterized by excessive surface wetness during winter and spring and excessive dryness in the summer. Often such areas are even referred to as "pin oak flats." Stands that receive shallow flooding in fall and winter are valuable for wildlife, since the small and abundant acorns are an important source of food for waterfowl, particularly diving ducks.

Pin oak wood is heavy, hard, strong, and close-grained, but it warps and checks badly during seasoning. It is principally used for cheap construction lumber, railroad ties, pallets, and pulpwood.

Pin oak is also extensively used as an ornamental because of its rapid growth, autumnal color, pyramidal form, and adaptability to a wide range of conditions.



## SHUMARD OAK (Quercus shumardii)

Shumard oak is one of the largest of the southern red oaks, and often attains heights of 100 to 125 feet and diameters of 4 to 5 feet. Leaves are 6 to 8 inches long and 4 to 5 inches wide with 5 to 9 lobes, each tipped with a bristle. Lobes are conspicuously longer and thicker toward the end of the leaves giving them a unique appearance among the red oak group. Shumard oak also has a long, clear, symmetrical bole and a slightly buttressed root system.

The species is generally considered a bottomland species although it grows well on a variety of sites and is common on some upland sites in Kentucky where it is often mistaken for northern red oak. It is classified as intolerant of shade, and its acorns provide a valuable wildlife food source. The wood of Shumard oak is commercially marketed with other red oaks, though it may be of a higher quality than some other associated species.



## SWAMP WHITE OAK (Quercus bicolor)

Swamp white oak is a bottomland tree found throughout most of the north central states and principally found in Kentucky in the western part of the state along the main drainages of the Ohio and Mississippi Rivers.

It has simple leaves, 5-6 inches long with margins that have bluntly pointed lobes of varying size and depth. On good sites it grows rapidly reaching 60-70 feet in height and 2-3 feet in trunk diameter. Trees 100 feet tall and 7 feet in diameter have been reported. It is intermediate in shade tolerance, and under forest conditions, it has a straight bole with ascending branches and a narrow crown.

It is commonly found naturally in wet places having a hardpan and in areas subject to flooding. It can withstand conditions of poor soil aeration and will do well in areas where drainage is poor. It is commonly associated with pin oak since they both do well on similar sites.

Swamp white oak wood is very similar to that of white oak and is used for a variety of purposes including veneer, furniture, and barrel staves. The acorns also provide an excellent source of food for wildlife.



## SWAMP CHESTNUT OAK (*Quercus michauxii*)

Swamp Chestnut Oak, is also known as "basket oak" for the baskets made from its wood or as "cow oak" for its large acorns often eaten by cows. It is a member of the white oak group and the wood is second only to that of the best white oaks. The leaves tend to be broad toward the end and characterized by a shallowly lobed margin. Leaves average 5 to 8 inches long and 3 to 4 1/2 inches wide.

It is a well-formed tree with a straight, massive trunk and narrow crown, averaging 60-80 feet in height and 2 to 3 feet in diameter. It is medium in size and native in Kentucky west of the Green River in Western Kentucky and along the Ohio River. There are also isolated pockets in the south central and southeastern parts of the state.

It is generally classified as intolerant of shade and is found naturally on the best, relatively well-drained loamy ridges and silty clay and loamy terraces in bottomlands. Cherrybark oak is often a common associate. The large, sweet acorns are an important wildlife food source.



**SWAMP CHESTNUT OAK**

## PECAN (*Carya illinoensis*)

Pecan is a species of hickory growing naturally along the major river drainages of the western part of the state.

It has pinnately compound leaves, 12-20 inches long, with 9-17 characteristically curved leaflets. It is the largest of the hickories, attaining heights of 100-180 feet and 6-7 feet in diameter. It is intolerant of competition and prunes itself well in natural stands.

Its most common natural occurrence is on well-drained loam soils not subject to prolonged flooding. It does not do well on heavy-textured soils, and best development is on riverfront ridges and well-drained flats.

Pecan is highly prized for veneer and furniture, and the nuts are also of high commercial value. It is a good wildlife food tree and is also used frequently for ornamental purposes. For nut production, there are improved varieties suitable for northern areas. Some of these varieties include Majors, Peruque, Posey, Indiana, and Green River.



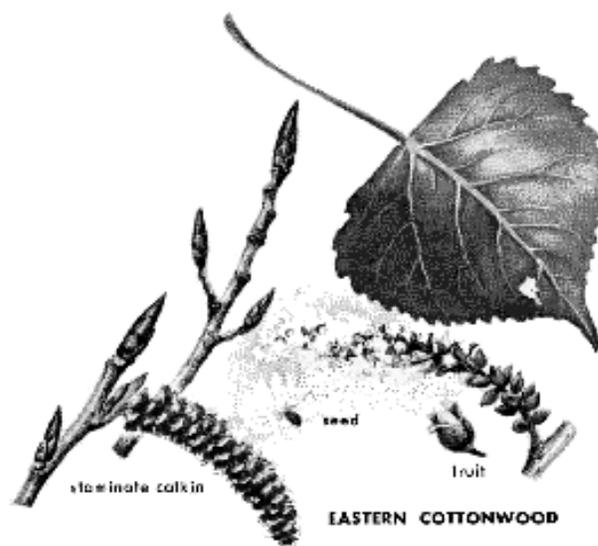
## EASTERN COTTONWOOD (Populus deltoides)

Cottonwood is a bottomland tree found along streams throughout the state.

It has a triangular-shaped leaf with a flat petiole. It is a tall, extremely fast growing species, with diameter growth of an inch per year not uncommon on good sites. Well-stocked natural stands in the Mississippi Valley average 20 inches in diameter and 130 feet tall at 35 years of age. Planted trees on favorable sites may grow 5 feet in height annually for the first 25 years. It is a short-lived tree with peak growth culminating in about 45 years. Cottonwood is classed as intolerant of shade and requires full sunlight for proper development. The tree will readily sprout from cuttings and is often reproduced this way in preference to planting seedlings. The superior cottonwood offered for sale by the Division of Forestry are cuttings made from cottonwood stock proven to have superior growth characteristics. They are not seedlings.

The species will survive on a variety of soils, but best growth is on moist, well-drained, fine sandy loams close to streams. Abundant and continuous moisture is a necessity, and trees will not do well more than 15-20 feet above the average level of streams. Coarse sands and heavy clay soils are not satisfactory sites.

The wood is light, soft, and moderately weak in stress qualities. It is used for pulpwood, furniture, and box and basket veneer. It is one of the few hardwood species that is planted and grown specifically for pulpwood.



SYCAMORE (Platanus occidentalis)

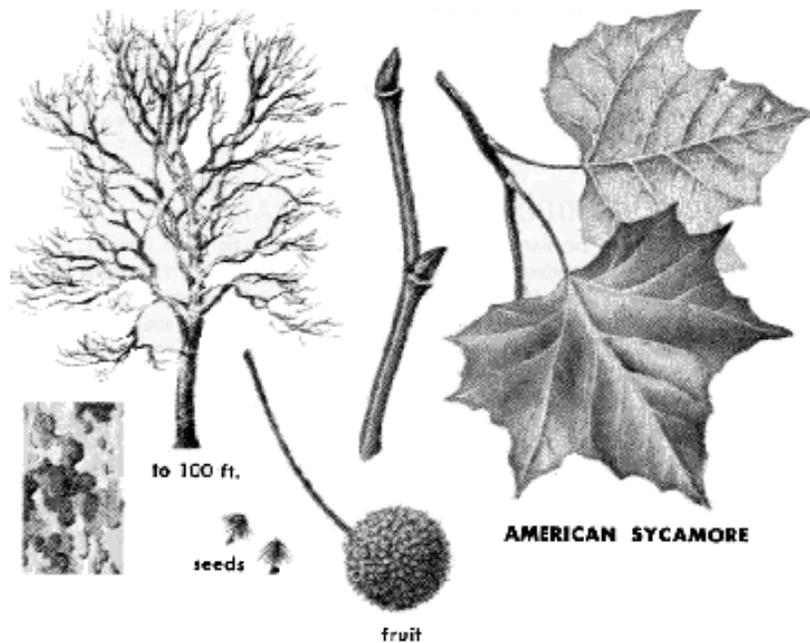
Sycamore is commonly found along streams and bottomlands throughout Kentucky.

It is easily recognized by its brown and white mottled bark, which often becomes totally white on the upper trunk and branch surfaces. The simple leaves are usually 3-7 lobed, divided by broad, shallow sinuses, and generally 4-7 inches long and broad.

It is a large, fast growing tree which has been known to exceed 10 feet in diameter and 160 feet in height, though 3-5 feet in diameter and 100 feet in height is more nearly average. Under forest conditions, it has a relatively small crown and a long, slightly tapered bole that may be clear of branches for 70 or 80 feet. It is generally considered intermediate in shade tolerance.

Sycamore reaches its largest size on alluvial soils along streams and in bottomlands. It seems to develop best in wet situations where the summer water table drops enough to permit good soil aeration during the growing season. It will only survive flooded conditions when inundated for less than 25% of the growing season.

Sycamore wood is close-textured and has an interlocking grain. It is used for lumber, veneer, furniture, railroad ties, and butcher's blocks.



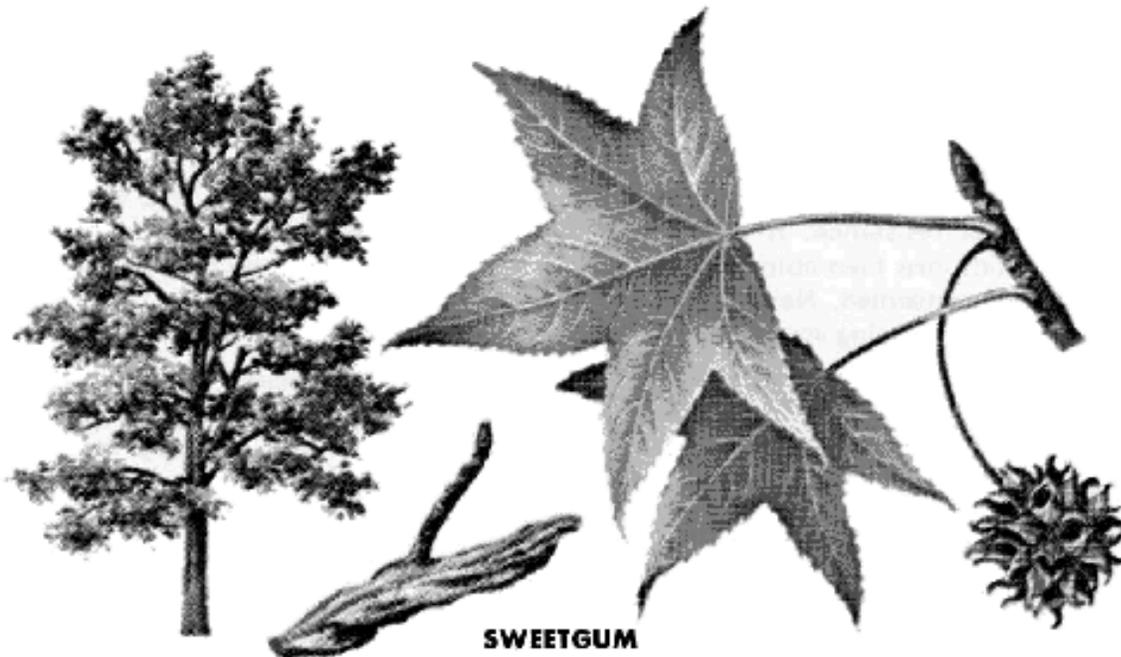
## SWEETGUM (Liquidambar styraciflua)

Sweetgum, or redgum, is native to most of Kentucky with best growth taking place on rich bottomlands.

It has a characteristic five-pointed leaf, and seeds are borne in hard, ball-like fruit called gumballs. On ideal bottomland sites it may reach four feet in diameter and 120 feet in height. It is classed as intolerant but can endure some shade and crowding when young, decreasing with age.

Sweetgum is very adaptable to different soils and sites but grows best on the rich, moist, alluvial clay and loam soils of river bottoms. While it is common on clay or gravelly clay uplands, it does not grow well there.

Sweetgum wood is moderate in heaviness and strength but low in decay resistance. It is used for interior parts of furniture, boxes and baskets, and railroad ties.



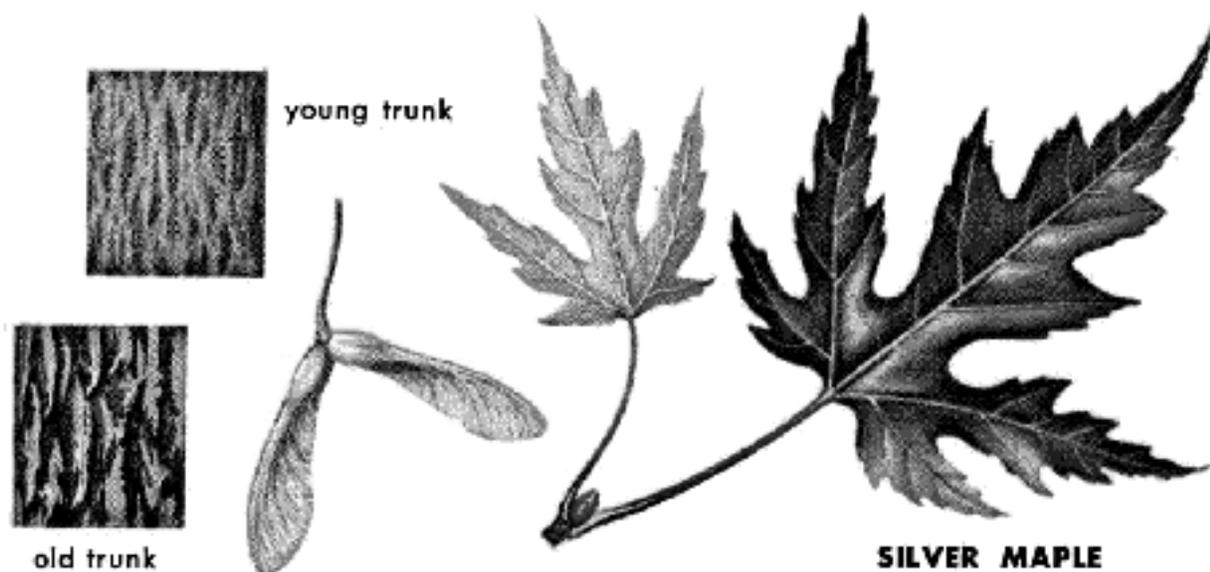
## SILVER MAPLE (*Acer saccharinum*)

Silver maple, often-called water maple, is a bottomland species found naturally throughout the state and is also widely used as an ornamental.

The leaves are simple, bright green above and silvery white below, divided into five deeply separated lobes. It may reach 2-4 feet in diameter and 75-120 feet in height. It is a fast growing, short-lived tree, with diameter growth often reaching 1/2 inch per year over the first 50 years. Tree life seldom exceeds 125 years. Shade tolerance varies from moderately tolerant to very intolerant depending on site quality and location.

In natural stands it develops best on well-drained, moist sites along major streams but will do well on most any moist site. Available moisture, rather than soil texture, is usually the limiting factor in tree growth.

Silver maple is considered a soft maple, and the wood is used for cabinets, furniture, and railroad ties. It is also one of the most commonly used ornamental trees, chiefly because of its fast growth. It has undesirable characteristics such as surface roots, short life, brittle wood, and low decay resistance; therefore, it is not to be recommended for this purpose.



GREEN ASH (*Fraxinus pennsylvanica*)

Green ash is the most widely distributed of the American ashes and is easily confused with white ash.

It has pinnately compound leaves that are somewhat smaller than white ash, with 7-9 leaflets per leaf. It is usually characterized by a bole which is not as straight as white ash, and its opposite branches are usually more numerous.

Green ash is a medium tree, reaching 50-60 feet in height and 1 1/2 to 2 feet in diameter. It has an extensive root system, and its shade tolerance varies from intolerant to moderately tolerant. It is exceedingly hardy of climatic extremes and widely planted for ornamental uses, windbreaks, and strip mine reclamation. Natural stands are usually confined to bottomlands, but it will grow well when planted on moist upland soils. It is highly tolerant of water and will remain healthy even when flooded up to 40% of the growing season.

The wood is similar to white ash in use and properties.



**GREEN ASH**

# CONIFERS

## EASTERN WHITE PINE (*Pinus strobus*)

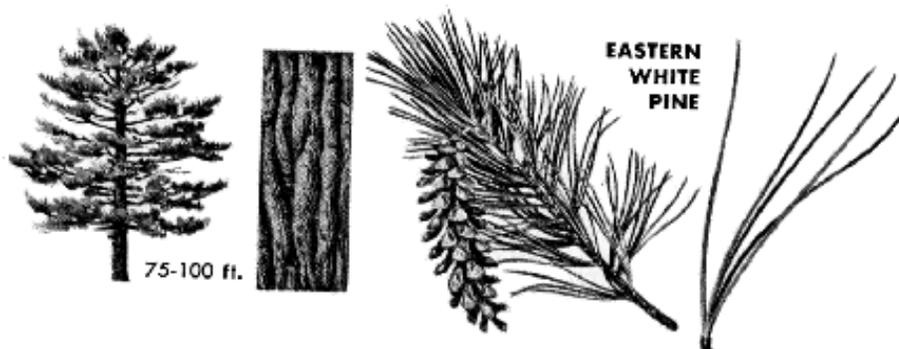
White pine is generally a northern tree that occurs naturally in the mountainous areas of eastern Kentucky and the southern Appalachians into Georgia.

The needles are soft, flexible, and blue-green, clustered in bundles of five. The cones are 4-8 inches long and are narrow with a slight curve. The tree may eventually attain 3-4 feet in diameter and 100 feet in height, although 200-foot specimens have been known. White pine has a picturesque, symmetrical bole, with long, upward sweeping branches. It also produces a whorl of branches each year, giving it a characteristic pyramidal shape. It is classed as intermediate in shade tolerance and will endure some shade.

This species does well on a variety of soils, ranging from light and sandy to heavy textured. In a comparison of site index and growth of 10 species in the southern Appalachians, white pine's growth exceeded all species except on the best sites where yellow poplar outranked it in height only. The tree's northern adaptation also keeps the tree hardy under the worst of Kentucky's winter conditions.

White pine wood is light, durable, and easy to work. Nationally, it is in demand for interior trim, furniture, matches, wood carving, and similar items; however, there isn't currently enough volume in Kentucky to establish a strong market.

White pine's beauty also makes it highly desirable for ornamental purposes and it is one of the species commonly cultured for Christmas trees. It is also frequently used for windbreaks, screens, barriers, and landscaping. Its poor natural pruning characteristics enhance its value for these purposes and for wildlife cover but necessitates artificial pruning in forest plantations in order to produce high quality, knot-free wood.



## LOBLOLLY PINE (Pinus taeda)

Loblolly pine is one of the mainstays of the southern pine industry of the Deep South. It is one of the fastest growing of the southern pines and for this reason has been introduced into Kentucky.

Because of its southern background, it is generally not adapted to the severe extremes of Kentucky winter weather. Ice damage is frequent, and dehydration of needles during prolonged periods of abnormally cold weather makes its desirability questionable in some areas. These factors limit planting recommendations to protected sites in the more southern and western areas of the state although some strains used in recent years are from more northern seed sources and may improve on this somewhat.

Loblolly pine has long, pale green needles, generally 6-9 inches in length, borne in clusters of three. On good sites, it will reach a trunk diameter of 2-3 feet and a height of 100 feet. It is intolerant of shade and must have 95% full sunlight to survive and grow.

It grows on a wide variety of soils but does best on deep soils with poor surface drainage and on those with high acid content.

The wood is used for lumber and pulpwood. It is useful for posts and poles when pressure treated. It is also excellent for erosion control plantings because of its fast growth and the large amount of needle litter it leaves on the ground.



## VIRGINIA PINE (Pinus virginiana)

Virginia pine is native to most areas of Kentucky and may be known locally as "scrub pine," "black pine," or some other local nickname.

It is generally a poor tree from a timber standpoint, but its virtue is its ability to grow on nearly any upland site. It is especially good in gullied areas, or where soil is thin and close to bedrock. It is shade intolerant and needs full sunlight to develop properly.

Needles are 2-3 inches long, borne in bundles of two. Growth is good on good sites, with trees reaching 2 feet in diameter and 70-80 feet at maturity.

Natural pruning ability is poor, thus limiting its value for forest products. This same characteristic, however, enhances its desirability for wildlife, particularly in young stands.

Virginia pine will not respond to thinning past age 15, and older stands are subject to windthrow and ice damage if opened up by thinning or partial cutting.

The wood is used for structural material and pulpwood. It is also suitable for posts and poles when pressure treated.



## SHORTLEAF PINE (Pinus echinata)

Shortleaf pine is native to the eastern third of Kentucky. It has much better form than Virginia pine and is more tolerant of severe weather than loblolly, though growth is slower than both.

It is generally a tall, straight tree, 80-100 feet tall and reaching 2-3 feet in diameter. Needles are in clusters of twos or threes and are 3-5 inches long. It is classed as intolerant of shade, needing full sunlight to survive.

Nationally, shortleaf has the widest natural range of any of the southern pines, partly due to its adaptability to a great variety of sites. Best development occurs on well-drained, sandy loams and silt loams, but it will grow adequately on poor soil and dry ridges. Acid soils are preferred, and a high calcium content may inhibit growth. The wood is used for interior and exterior finish, construction and pulpwood. It is widely used for poles, posts, and mine props when pressure treated.



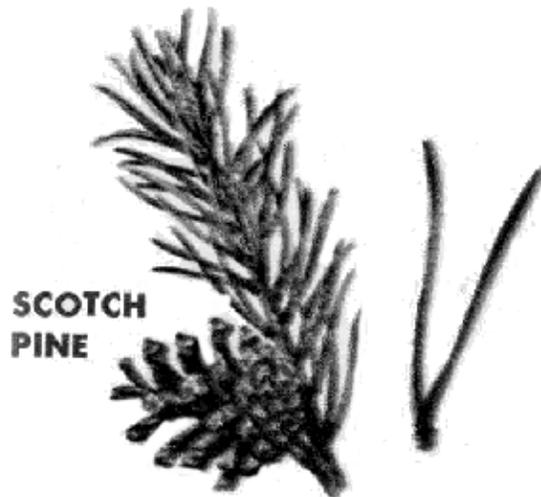
### SCOTCH PINE (Pinus sylvestris)

Scotch pine is a native of Europe that has been naturalized in this country. It is primarily planted for Christmas trees and ornamental use. For Christmas tree use, there are a number of varieties of this species available.

The needles are stiff, yellow-green, and 1 1/2 to 3 inches long. Needles are clustered in bundles of two, and mature trees may attain 1 1/2 feet in diameter and 50 feet in height.

Scotch pine is tolerant of a wide range of soil and moisture conditions and will grow on poor soil. Slow growth produces the best Christmas trees.

The tree's growth and form make it unsuitable for timber purposes, with Christmas tree production being its major use. Christmas trees may be grown on an 8-10 year rotation with mowing, pruning, and shaping necessary to produce high quality trees. Scotch pine also makes an excellent screen and windbreak.



## EASTERN REDCEDAR (*Juniperus virginiana*)

Eastern redcedar is the most widely distributed conifer of tree size in the eastern United States and is found naturally in every area in Kentucky.

It is a small to medium size tree generally reaching 40-50 feet in height and 1-2 feet in trunk diameter. The evergreen leaves are awl-shaped, about 1/2 inch long on juvenile foliage, and are scale-like on older foliage. The fruit is a berry-like cone, bluish or purplish in color, and about 1/4 inch in diameter. It has ascending branches that give it a conical appearance, and the tree is fairly tolerant of shade in its early years, becoming intolerant as it grows older. Pure stands do not thin themselves naturally, and persistent limbs pruned close to the trunk will not heal.

Redcedar will grow on a variety of soils, ranging from dry, rock outcrops to swampy land. It grows best on deep, moist, well-drained alluvial sites. It is frequently found naturally, however, on thin soils with limestone or dolomite outcrops because of lack of competition from faster growing species. It has been found where the pH values range from 4.7 to 7.8, but it is not particularly alkali tolerant.

The wood is moderately heavy, hard, aromatic, and very resistant to decay. It is widely used for fence posts and novelties, and the odor of the wood repels insects, making it ideal for cedar chest and closet lining. It is also used as an ornamental and is popular in some areas as a Christmas tree.



## BALDCYPRESS (Taxodium distichum)

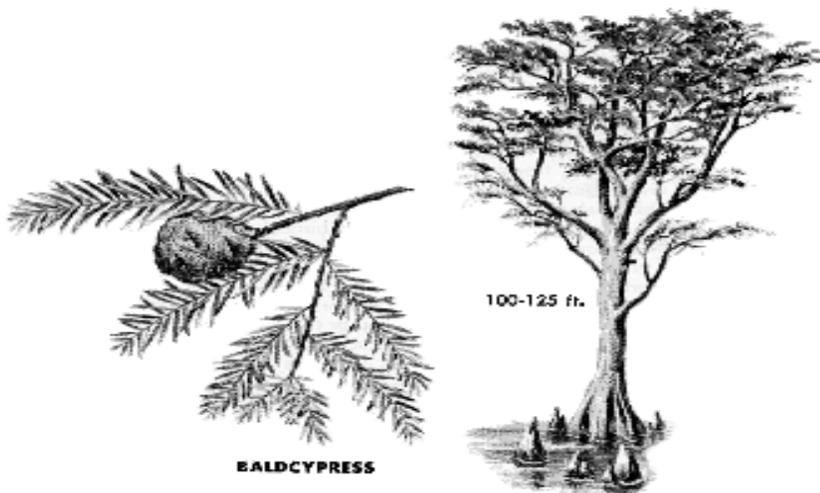
Baldcypress is a deciduous conifer native to the swamps and wet areas of the westernmost areas of Kentucky.

It is a large, long-lived tree reaching 150 feet tall and 8 feet in diameter in old-growth natural stands, though 100-120 feet tall and 3-5 feet in diameter is more nearly average.

It characteristically puts on false growth rings making age determination difficult and growth much faster than usually credited to the species. Cypress is known for its swollen, deeply lobed base and characteristic "cypress knees" extending from the ground some distance from the tree. In natural stands it has a clean, smooth stem and small crown with excellent pruning characteristics. It is generally considered intermediate in shade tolerance, though this may vary geographically.

This species is usually restricted to very wet soils where moisture is abundant and fairly permanent, such as mucks, clays, or the finer sands. It grows best on deep, moist, fine sandy loams with moderately good drainage, but it rarely occurs on such sites naturally, possibly because of competition from tolerant hardwood species. It cannot grow in poor, dry, sandy soils.

Baldcypress wood is moderately heavy, hard, strong, and stiff with outstanding durability under conditions favorable to decay. It is used extensively in construction where decay resistance is required and is also used for doors, interior trim, boats, river pilings, and fencing.

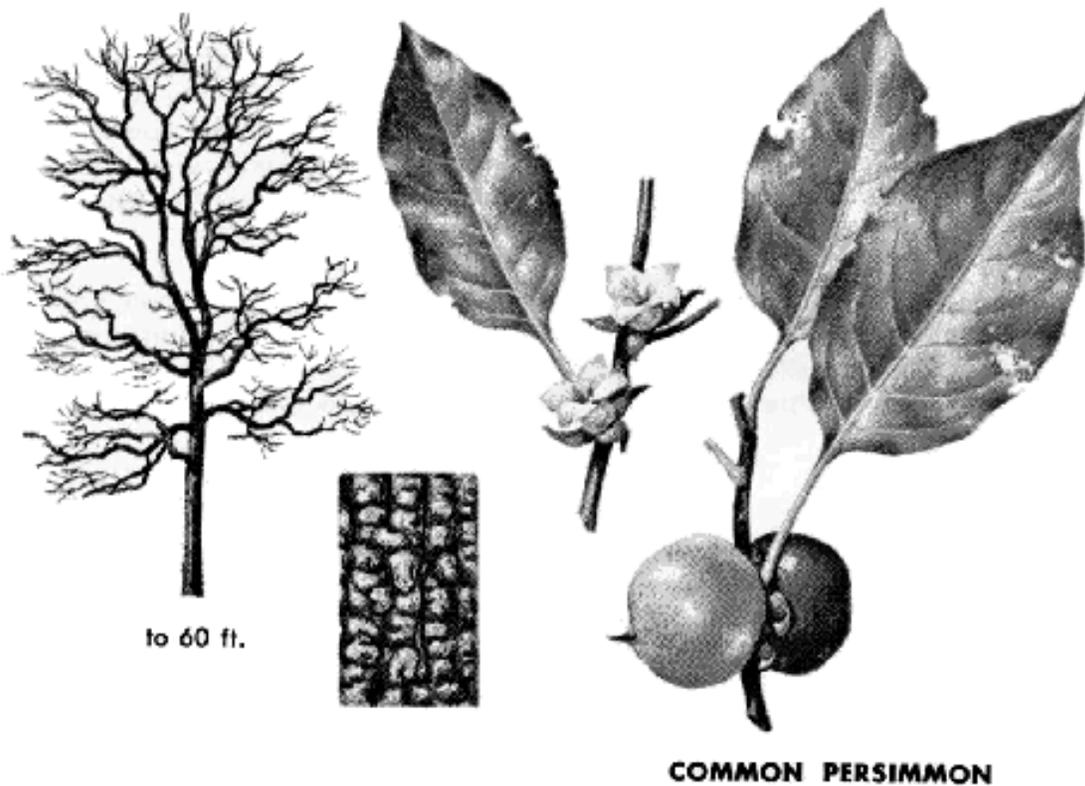


## **OTHER SPECIES**

PERSIMMON (*Diospyros virginiana*)

Common persimmon is a small to medium-sized tree averaging 30-60 feet in height and one foot in diameter. Leaves are elliptical or oval with a somewhat metallic luster. The Dark brown to black bark is broken into small, conspicuous blocks. It is adaptable to a wide variety of sites and will thrive almost anywhere. Best growth is in bottomland, alluvial soils, however.

Persimmon is shade tolerant and may also be propagated by root cuttings. The fruit is extremely astringent when green, but edible when ripe and consumed locally. It is an important wildlife food. The wood is close-grained and straight and sometimes used for special products requiring hardness and strength such as golf club heads or piano keys.



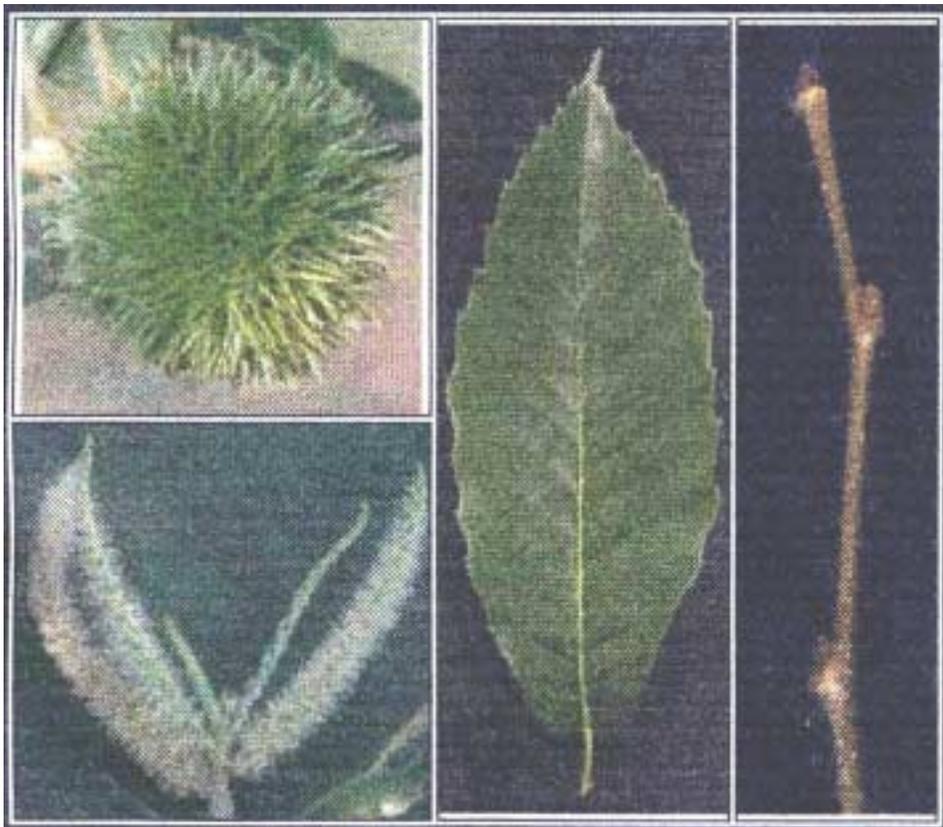
### CHINESE CHESTNUT (*Castanea mollissima*)

Chinese chestnut is a native of China and Korea and has been introduced into Kentucky for nut production as a blight-resistant replacement for the once Native American chestnut.

It is a small to medium tree, reaching 60 feet in height, with a characteristic broad spreading crown. The leaves are alternate, simple, and oblong, with a very coarsely serrate margin. The fruit is encased in a 1 to 1 1/2 inch prickly husk, with 1-5 large, edible brown nuts inside.

Chinese chestnut prefers a fertile, well-drained soil, but it grows well in fairly dry, rocky, poor soils. It does not do well in wet or alkaline situations, however, and needs full sunlight for proper development.

The tree is primarily used as an ornamental, and the nuts make it a good tree for wildlife as well as man. It is of small size and poor form. The wood has no commercial use.



## WILD PLUM (*Prunus americana*)

American wild plum is a small tree, 10 to 30 feet in height with a trunk diameter of from 5 to 10 inches. The trunk is typically short, dividing a few feet above the ground into many slender, spreading or slightly drooping, spiny branches. Leaves are typically oval and 2 to 4 inches long and up to one and a half inches broad.

Wild plum prefers deep, rich, and moist soils and is most commonly found naturally in bottomlands where it often forms thickets. The wood has no commercial value. Several varieties of cultivated plums have been derived from this native wild species. The fruits are succulent but almost too sour to be eaten raw. They do, however, make excellent jelly and preserves.

Because of the fruits and the thick, low, growing nature of this species, it is excellent for wildlife.



SILKY DOGWOOD (*Cornus ammonum*)

Silky Dogwood is a small to medium-sized shrub with broadly egg-shaped leaves, 2 to 4 inches long and up to 10 feet in height. It occurs naturally in marshes, swamps and alluvial woods. Berries are dark blue in umbrella-shaped clusters. The tree commonly grows in thickets.

Silky Dogwood was called Kinnikinnik by Midwestern Indian tribes. The name refers to a mixture of tobacco and bearberry leaves and silky dogwood bark that members of tribes smoked for reputed tonic effect.

Fruits attract a wide variety of birds. Primary use is for windbreaks and wildlife borders.



## EASTERN REDBUD (*Cercus canadensis*)

Eastern Redbud is a small, short-lived tree found throughout Kentucky and the Eastern United States. It is sometimes referred to as a Judas-tree as legend has it Judas Iscariot hanged himself from a branch of its cousin European species. It has a heart-shaped leaf and often a multi-stemmed trunk. Under normal conditions, tree height will not exceed 25 feet.

Redbud is a strikingly conspicuous tree in the spring because of the bright pink flowers that emerge before the leaves. For this reason it is widely planted as an ornamental, but due to its small size and irregular shape, its wood has no commercial value.

Redbud will grow on a wide variety of sites but does best on moist, well-drained sites. It naturally occurs most abundantly on south-facing slopes where sunlight is more intense, and there is less plant competition. It is characteristically an understory tree and is generally classed as tolerant of shade becoming less tolerant with age.

The fruits are flat, reddish-brown pods half inch wide and 2 to 4 inches long containing compressed beanlike seeds. The fruits remain on the tree until after leaf fall, and some persist throughout the winter, making them a good wildlife food.



**EASTERN REDBUD**

## RED MAPLE (*Acer rubrum*)

Red maple is one of the most abundant and widespread trees in eastern North America, growing from Nova Scotia south to the tip of Florida and west to the prairies. The species may thrive on a wider range of soil conditions than any other forest species in North America, ranging from dry ridges to peat bogs and swamps. Its best development, however, is on moderately well-drained, moist sites at low to intermediate elevations.

Red maple is a medium-sized tree, 50 to 70 feet tall and 1 to 2 feet in diameter. It has a long, fairly clear bole, with an irregular crown and a shallow root system. Leaves are 2 to 6 inches in diameter and 3 to 5 lobed although three lobes is the most common. The bark on young trees is smooth and light gray, eventually breaking up into long, narrow, scaly plates on older trunks. Over most of its range, it is rated intermediate in shade tolerance.

It is widely used as a shade tree and in fall, its foliage provides a brilliant scarlet color. It is also an excellent tree for wildlife. Like silver maple, red maple is considered a soft maple, and the wood is used for cabinets, furniture, and railroad ties.



**CHAPTER 7**  
**BIBLIOGRAPHY**

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