HARDWOOD TREE IMPROVEMENT IN REGION 8

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Region 8 of the U. S. Forest Service, as most of you know, administers National Forest lands from Texas to the Atlantic Ocean and from Kentucky to the Gulf of Mexico. This area contains several hundred hardwood species, ranging from wetland to mountain types.

SOURCES OF HIGH QUALITY HARDWOODS

Analysis of timber management plans, special reports, and surveys showed that National Forests in the Region have about 239 thousand acres of bottomland hardwoods and 3.1 million acres of upland hardwoods growing on site index 60 or better. Site 60 was the selected cut-off point because this is about the lowest productivity class which will give an economic return to investment at the present time.

The bottomland hardwood types are on swamp lands or on lands subject to annual flooding. The upland hardwood types grow in both Piedmont and mountain areas.

In our pine selection work, we had to survey an area of at least 50 thousand acres to find the number of high quality trees needed for a Tree Improvement Program. On this experience and by using available data, we separated the Region into 11 geographic sources of hardwoods. Due to the acreage and values involved, we decided to select from the mountain sources first. The mountain sources of hardwoods are:

Arkansas - Ouachita and Ozark National Forests

Kentucky - Daniel Boone National Forest

Northern Appalachians - George Washington and Jefferson National Forests, except the Clinch and Holston Districts

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Central Appalachians - Clinch and Holston Districts of the Jefferson National Forest, Cherokee National Forest north of the Little Tennessee River, and the Pisgah National Forest north of Asheville

Southern Appalachians - Nantahala and Chattahooche National Forests, and the Pickens District of the Sumter National Forest

The remainder of the Region was divided into six sources of hardwoods, of which five would provide bottomland types. We plan no selections from these sources at present:

North Alabama Mississippi - Talladega, Bankhead, Holly Springs, Tombigbee, Bienville, and St. Francis National Forests

West Gulf - Sabine, Angelina, Sam Houston, Davy Crockett, Kisatchie, Homochitto, and Desoto National Forests

East Gulf - Conecuh, Apalachicola, Osceola, and Ocala National Forests

Delta - Delta National Forest

Piedmont - Oconee, Sumter (excluding Andrew Pickens), and Uwharrie National Forests

East Coast - Francis Marion and Croatan National Forests.

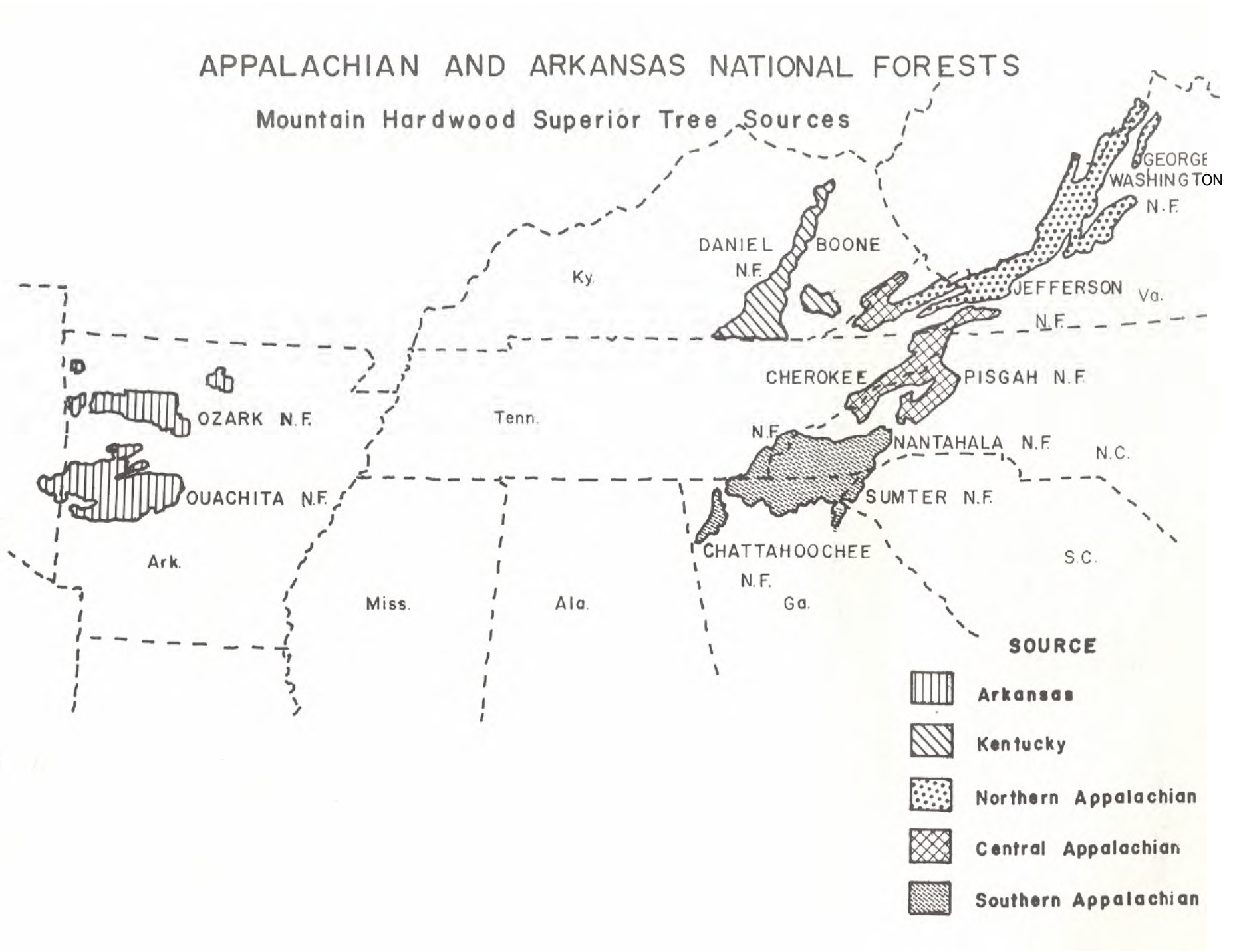
SPECIES SELECTION

The selection of a species to be included in the program was based on three factors: (1) Acreage occupied by the species; (2) present value; and, (3) opportunity to make selections of high quality trees of that species. All factors were considered in every selection.

Black walnut, is a high value species with a wide range but with a limited possibility for providing high quality selecting in National Forest lands.

This species will be part of future stands, but we are not including it in our present Tree Improvement Program.

The present program is concerned with the selection of white oak (Quercus alba L.),—red oak (Q. rubra L.), black oak (Q. velutina Lam.), chestnut oak (Q. orinus L.), yellow-poplar (Liriodendron tulipifera L.),__and blacK cherry (Prunus serotina Fhrh.)


APPALACHIAN AND ARKANSAS NATIONAL FORESTS
Mountain Hardwood Superior Tree Sources
GEORGE WASHINGTON N.F.
DANIEL BOONE N.F.
Ky.
JEFFERSON N.F.
Va.
CHEROKEE
PISGAH N.F.
OZARK N.F.
Tenn.
N.F.
NANTAHALA N.F.
N.C.
OUACHITA N.F.
SUMTER N.F.
CHATTAHOOCHEE N.F.
S.C.
Ark.
Miss.
Ala.
Ga.
SOURCE
Arkansas
Kentucky
Northern Appalachian
Central Appalachian
Southern Appalachian

The species by sources are as follows:

Arkansas - black oak, red oak, and white oak

Kentucky - black oak, chestnut oak, red oak, white oak, and yellow-poplar

Northern Appalachians - black oak, chestnut oak, red oak, white oak, black cherry, yellow-poplar

Central Appalachians - black oak, chestnut oak, red oak, white oak, black cherry, yellow-poplar

Southern Appalachians - black oak, chestnut oak, red oak, white oak, black cherry, yellow-poplar

INDIVIDUAL TREE SELECTION

Selection procedures require recording the growth rate of all trees by 10-year increments, measuring the basal area of the stand with the selected tree as the plot center, and recordin g the elevation, aspect, and slope of each selected tree.

The selection of individual trees is based on criteria developed from research and observations. To be acceptable, each candidate tree must meet the following basic requirements:

Straightness - A straight line from the center of the merchantable top to the edge of the stump, throu gh the inside of the sweep, must stay within the bole. Crooks which are mechanical may be disregarded.

Grade - A grade I first log and at least a grade II second log must be available.

Damage - Trees must be free from insects or disease; fire or mechanical damage will be allowed.

Grain - Spiral or interlocking grain cannot be in evidence.

Flowers - Ability to produce fruit must be proved.

After the above requirements are met, each species must undergo specific comparisons within its genera, as follows:

Yellow-poplar is compared to the 3-5 closest dominant yellow-poplar trees on the same site. The candidate tree must be free from epicormic branches in all but the last 16 feet of the merchantable bole. Volume of the candidate tree must be equal to or greater than the volume of the average comparison tree. The comparison trees cannot be less than one year younger, or if possible, not more than three years older than the candidate tree. Pruning of the candidate tree is compared to the adjacent stand, and total height of the candidate tree is compared with total height of the average comparison tree; point ratings are given for each characteristics.

Oak Species are compared with the 3-5 closest dominant oak trees on the same site. The comparison trees cannot be less than five years younger or generally not more than five years older than the candidate tree. Using the methods of Doolittle (1958) and Olsen and Della-Bianca (1959) it is possible to compare the heights of different oak species. Site index of the candidate tree is compared to the average site index of the 3-5 comparison trees and a point rating is then given. The candidate tree must have an apical dominance equal to 60 percent of the site index for the tree. No trees are accepted which have epicormic branches on the first log, but they may be present above the first log.

Eighty percent of the merchantable bole must be free from dead branch stubbs. From methods by Trimble (1960), a comparison of the annual diameter growth rate for the last 20 years is made between the average comparison tree and the candidate tree. This is done by converting all growth rates to the red oak growth rate and giving a point score.

Black Cherry. No comparison trees are used in rating black cherry. To be acceptable, the tree must have an apical dominance equal to 60 percent of the site index for that tree. The average annual diameter growth rate is taken for the past 20 years, compared to a growth rate table, and a point score given. As with the oak species, no epicormic branches are allowed on the first log, but they may be present on the remainder of the bole.

CLONAL BANK

All approved superior trees will be incorporated into a clonal bank to prevent loss of the clone. We do not plan to establish a hardwood seed orchard at the present time, because we haven't solved the problem of converting hardwood stands of one species to stands of another hardwood species.

In the establishment of the clonal bank, we hope to grow hardwoods on their own roots, by rooting cuttings. Work by McAlpine (1964), Kormanik and Porterfield (1966), and Farmer2 indicates that rooting of cherry and yellow-poplar cuttings is possible. With the oaks it may take longer to develop a process for rooting cuttings.

From my grafting work with white oak, red oak, and chestnut oak, I believe that if we cannot root oak cuttings we can establish a grafted clonal bank for them.

These clonal banks will be established in Arkansas and North Carolina. The Ouachita Seed orchard, presently a pine orchard, will be used to establish the hardwood clonal bank for the Arkansas source. The Beech Creek Seed orchard, also a pine orchard, will be used for the hardwood clonal banks for the Appalachians and Kentucky.

In establishing the clonal banks, we will have 30 clones of each species from each geographic source. This will be 90 clones for Arkansas, 150 for Kentucky, and 540 for the Appalachians, a total of 780 clones.

The clonal bank will be established at 20 by 20-foot spacings. This will give enough room for ramet development and will be an excellent source of vegetative material for seed orchard establishment, when needed.

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2 Farmer, R. E., Jr., and Nall, G. C. Mist Propagation of Black Cherry Cuttings. Unpublished manuscript, 1970.

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