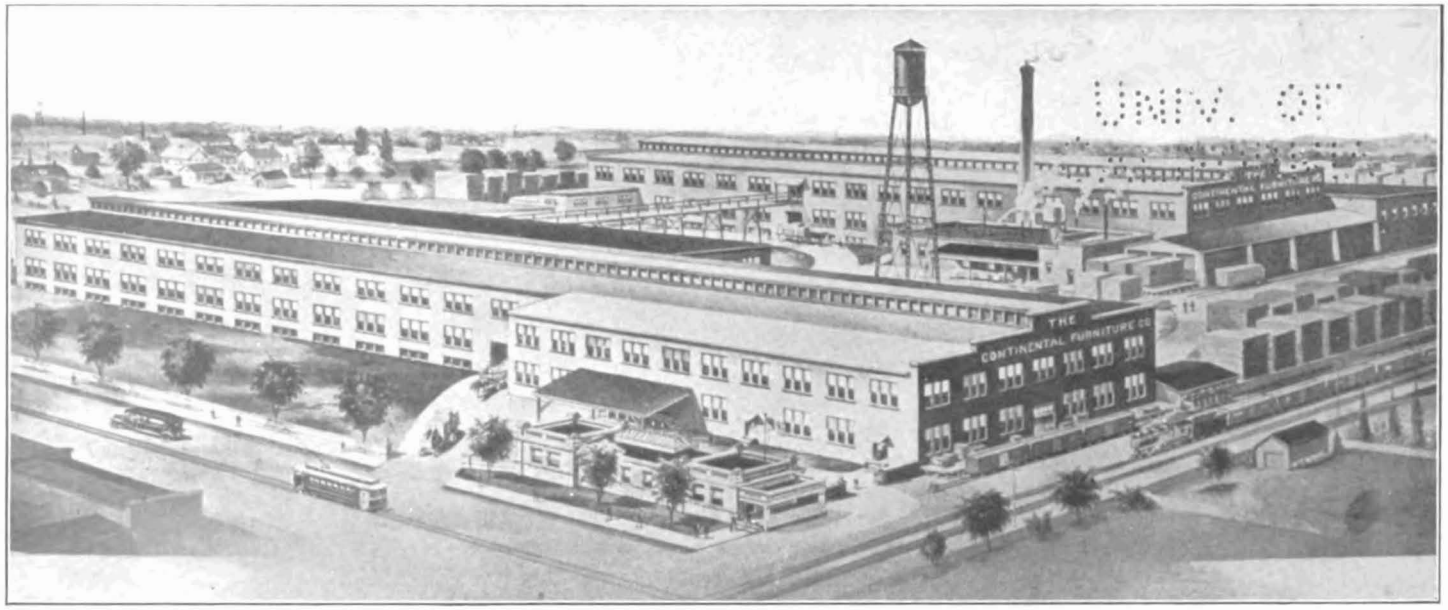
Frontispiece



A modern North Carolina furniture factory.

NORTH CAROLINA GEOLOGICAL AND ECONOMIC SURVEY
CHAPEL HILL, N. C.
JOSEPH HYDE PRATT, DIRECTOR
IN COOPERATION WITH THE
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
WILLIAM B. GREELEY, FORESTER

BULLETIN 30

WOOD-USING INDUSTRIES *of* NORTH CAROLINA

BY R. K. HELPHENSTINE, JR.
Statistician in Forest Products

RALEIGH
MITCHELL PRINTING COMPANY
STATE PRINTERS
1923

GEOLOGICAL BOARD

GOVERNOR CAMERON MORRISON, *ex officio Chairman*	Raleigh
FRANK R. HEWITT	Asheville
C. C. SMOOT, III	North Wilkesboro
HON. JOHN H. SMALL	Washington
DR. S. WESTRAY BATTLE	Asheville

JOSEPH HYDE PRATT, *Director*, Chapel Hill

LETTER OF TRANSMITTAL

CHAPEL HILL, N. C., January 1, 1923.

To His Excellency, HON. CAMERON MORRISON,
Governor of North Carolina.

SIR:—A report on "The Wood-using Industries of North Carolina," which has just been completed, was prepared jointly by the North Carolina Geological and Economic Survey and the United States Forest Service, and it is recommended that this be published as Bulletin 30 of the publications of the North Carolina Geological and Economic Survey. This report should be of interest and value to the timber owner, the sawmill operator, wood-using industries, merchants who handle the finished product, and all who are interested in trees and their uses.

Yours respectfully,

JOSEPH HYDE PRATT, *Director,*
N. C. Geological and Economic Survey.

PREFACE

In 1910 the Survey published in Economic Paper No. 20 a report on "The Wood-using Industries of North Carolina." This report was very favorably received by the industries, and there was a constant demand for it until the edition became exhausted. With the large increase in the number of wood-using plants and the great increase in the volume of business of our wood-using industries, and on account of the decided changes in the quantity and quality of raw material available for these industries, it was deemed advisable to prepare another report on the wood-using industries of the State which would consider not only the production of the plants, but their sources of supply of raw material. The statistics and information presented in this report cover the calendar year of 1919. In collecting material for the report some most interesting and instructive information regarding the timber used by these industries and its source of supply was obtained.

During the investigation 155 of the more important wood-using plants of the State were visited and, according to statements obtained from a majority of these industries, their greatest need at present is a supply of suitable timber to be used in their plants, and the manufacturers are now considerably worried over their future supply. The statement was made at nearly all of the industries visited that the quality of their wood supply was not nearly as good as it was ten years ago, and that they were having to go constantly further away for what they did obtain. Representatives of at least one-third of these industries made the statement that their available supply of timber will be exhausted in ten or fifteen years.

With the shortage of timber there is a corresponding increase in price, and seven manufacturers, representing Eastern, Central, and Western North Carolina, state that the cost of their lumber supply has more than doubled during the past ten years, and that the quality is not nearly as good as it formerly was. These conditions have caused those interested in our wood-using industries to begin to consider seriously the question of a future supply of timber, and they are now beginning to coöperate with the Survey in its endeavor to protect and conserve our timber supply; and they are realizing that the conservation of our forests and timber supply does not mean the nonutilization of the timber, but does mean maintaining a future supply of timber by maintaining good trees in our forests and bringing into timber cultivation land especially adapted for this purpose. It is believed that North Carolina can main-

tain sufficient forests to produce and provide perpetually a sufficient timber suppply for its manufacturing industries, but the first prerequisite to accomplishing this is the protection of our forests and timber lands from fire.

The present report takes up in detail the various kinds of wood grown in North Carolina and their distribution and the purposes for which they are now being used, with suggestions of other uses. There is also given a list of the commercial trees of North Carolina.

The investigation upon which this report is based was carried on under the joint direction of J. S. Holmes, State Forester of the North Carolina Geological and Economic Survey, and H. S. Betts of the Office of Forest Products, U. S. Forest Service. Mr. Holmes prepared largely the chapter on "Forest Conditions," and compiled the list of commercial trees of North Carolina.

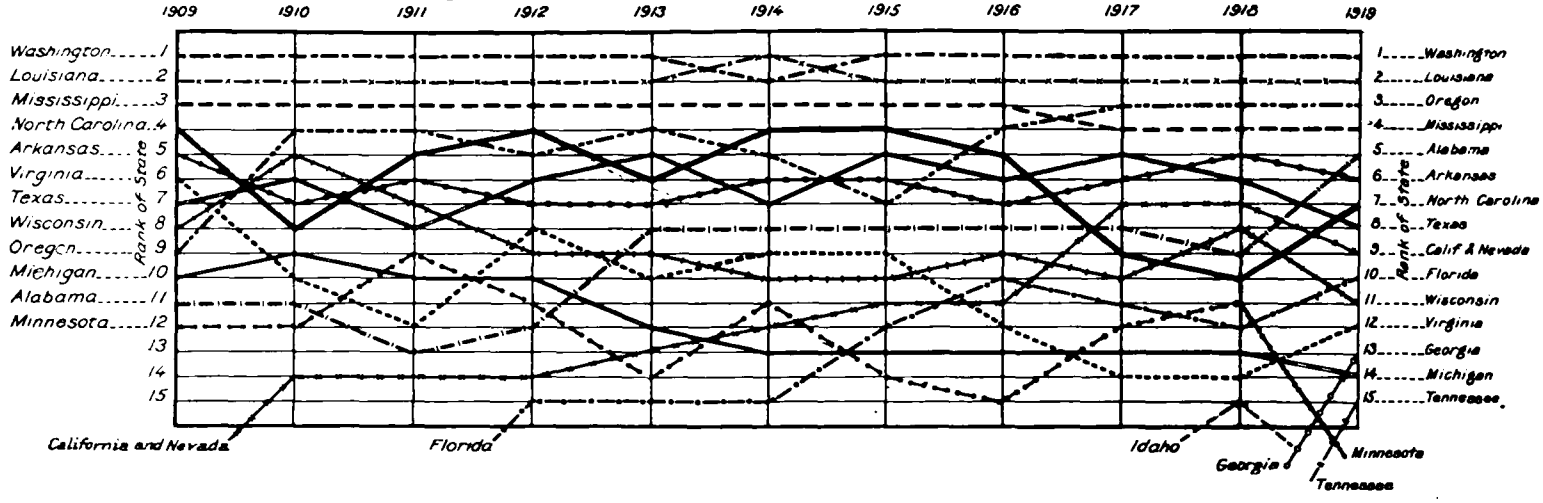
It is hoped that this report will be an incentive to still greater cooperation between the wood-using industries, the timber growers, and the State in conserving and perpetuating our timber supply.

JOSEPH HYDE PRATT,
Director.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

RELATIVE RANK OF THE STATES LEADING IN THE PRODUCTION OF LUMBER—1909 TO 1919 INCLUSIVE



Wood-Using Industries of North Carolina

By R. K. HELPHENSTINE, JR., *Statistician in Forest Products*

PART I

INTRODUCTION

Important among the many valuable natural resources of North Carolina are her forests. The total area of the State is 31 million acres, of which 21 million acres, or two-thirds of all the land embraced within its boundaries, support a timber crop. These forests produce practically all of the commercially valuable hardwoods native to the United States and most of the eastern coniferous woods. An estimate made in 1920 by the North Carolina Geological and Economic Survey placed the stand of timber in the State at 34 billion feet, board measure. With such a plentiful supply of timber, North Carolina has naturally always been one of the leading lumber-producing states. The accompanying chart shows the relative rank of the leading states in the production of lumber for the eleven years from 1909 to 1919, inclusive.

From the foregoing chart it can be seen that North Carolina has never occupied lower than tenth place during any of the years shown, and that for six of those years she ranked either fourth or fifth. The lumber cut in the State by the 1,211 mills that reported in 1921, the most recent year for which these statistics have been gathered, amounted to 931,015,000 feet, board measure. Of this quantity 732,035,000 board feet were softwoods, and 198,980,000 board feet were hardwoods. The annual lumber cut alone does not, however, represent the total drain upon the forests of the State. There must be added to the products of the sawmills the raw material cut for shingles, ties, cooperage stock, pulpwood, poles, etc., the manufacture of which all call for merchantable timber. In addition, several million feet of timber in the form of cordwood is cut for fuel and other purposes. These various items bring the total cut of timber in North Carolina each year up to the 7 billion board foot mark, or an annual cut of 350 board feet per acre for all of the forested area of the State. Even this stupendous figure of 7 billion board feet does not cover the total quantity of timber removed annually, for the reason that it does not take into account the extensive losses in both merchantable timber and potentially valuable young growth due to forest fires.

*The figures presented in this introduction relating to the area of the State, the area of the forest land and the stand of timber are taken from the Biennial Report of the State Geologist for 1919-1920 published in 1921 by the North Carolina Geological and Economic Survey.

The yearly growth of wood per acre in North Carolina has been estimated by the Geological and Economic Survey of the State to be approximately 150 board feet. Since the annual removal per acre, exclusive of that destroyed by fire, is 350 board feet, the State is using each year 200 board feet per acre in excess of that which is replaced by growth.

Although the State Legislature of North Carolina in 1915 passed an excellent law embodying more particularly provisions for forest fire protection, formerly no appropriation was ever made to enforce it. In 1921, however, a sum of approximately $9,000 was set aside for this purpose. With this sum provided by the State for this work, further financial assistance is made available by the Federal Government under the Weeks Law, Section 2 of which provides, among other things, for assistance to the State in fire protection on the headwaters of navigable streams in those states that have some paid system of State fire protection. The amount given by the Government cannot exceed the amount spent by the State, but it may, however, go as high as $25,000 providing the State spends a like amount. With sufficient funds to carry out the provisions of her forest law, and with a well defined policy of forest management in active operation, the State should soon be able to appreciably check the rapid depletion of her forests.

IMPORTANCE OF MANUFACTURING

North Carolina is beginning to take her place among the leading manufacturing states, and her natural resources, which are of great importance, have a marked influence in the establishment and growth of many industries. Some of the materials used in manufacturing, such as cotton, cereals, tobacco, timber, clay, and stone are produced in large quantities. The extensive steam and electric railway mileage and the transportation facilities provided by the harbors and navigable rivers of the State are important factors in the furtherance of its manufacturing and commercial enterprises.

Agriculture is the leading industry of the State, the total value of the farm products produced in 1919, as shown in the report of the Fourteenth Census, being over $503,000,000. In the manufacturing field cotton goods takes the lead, the total value of such products produced, as presented in the census report of 1919, being $318,368,181. Tobacco manufactures ranked second in value with $226,636,000, while the value of lumber and timber products, the third in importance, was $54,928,000. The wood-using industries, with which this report deals, constitute one of the important classes of manufacturing enterprises of the State. Unfortunately, however, no data are available which show the total value of

the products made by this group of industries, but it is more than probable that if combined with lumber and timber products, the figure would be sufficiently large to give the joint industry second place among those of the State.

PURPOSE OF THE STUDY

During the years from 1909 to 1913, inclusive, the Forest Service, U. S. Department of Agriculture, conducted studies of the wood-using industries in practically all of the various states. In certain cases this work was done in coöperation with the state, and the reports prepared as a result of the study were published by the state forester. In others the work was carried on in coöperation with state agricultural experiment stations, state colleges of forestry, state departments of horticulture, state geologic surveys, or state conservation commissions. For the remaining states the Forest Service collected the necessary data, and the reports were published in some of the leading lumber trade journals. Since the data contained in these various reports are now considerably out of date, some of the states for which these studies were originally made have requested the assistance of the Forest Service in the revision of these reports with a view of embodying in them more recent information. Among these is the State of North Carolina, the original report for which was prepared and published in 1910. In the preparation of this revised report on the "Wood-using Industries of North Carolina," which covers the calendar year 1919, the plan of procedure was the same as that previously followed.

An appropriate questionnaire was sent to each wood-using factory in the State, requesting information as to the kind and amount of each species used, the commodities manufactured, the form in which the raw material was received at the factory, and whether the woods used were grown within the State or came from outside. Other data covering past, present, and future local timber supply, manufacturing tendencies, etc., were also requested. Considerable quantities of lumber in its rough form are used with no further change other than slight trimming to fit it together, as in house construction and the building of bridges, concrete forms, scaffolding, fencing, etc. This material is not taken into account in this study, nor is any wood not actually employed as raw material in wood-using factories. The output of sawmills and such other primary products of the forest as veneer, lath, shingles, crossties, cooperage stock, posts, poles, extract wood, pulpwood, etc., is therefore also excluded from these statistics. Information of this kind has always been compiled separately, and such statistics as they relate to North Carolina are presented in the appendix of this report. They cover the most recent years for which such figures are available.

The purposes of this report are manifold, and are intended to show the extent to which lumber is further manufactured in the State of North Carolina, to indicate what industries of this kind exist in the State, the kinds and quantities of the various woods they use, what they pay for them, and the classes of finished commodities into which they are converted.

The United States Forest Service and the North Carolina Geological and Economic Survey are in constant receipt of requests for information from points throughout this and nearby states concerning markets for various kinds of timber and lumber, data on wood uses, manufacturing processes in various wood-using industries, and advice and assistance in waste utilization. This report will supply much of this information. In addition, it will aid the farmer, timberland owner, and sawmill operator in disposing of timber which they desire to market through the presentation of information as to the kinds of wood used by different classes of manufacturers and the forms and prices applicable to such raw material. Wood-using factories are in turn benefited by having these additional opportunities to purchase raw material brought to their attention. Manufacturers will also find in this report helpful suggestions relating to various points pertinent to their respective industries, such as the substitution of cheaper woods for the more costly ones now being used, regional sources of supply for raw material, etc.

FOREST CONDITIONS

Probably as many important commercial timber trees occur naturally in North Carolina as in any State in the Union. Of the twenty-nine "kinds of wood" listed by the Forest Service in its reports on the production of lumber in the United States, twenty are important in this State. Of the twenty-four "minor species" half of them are cut to some extent in North Carolina. Many of the "kinds" consist of a number of species; for instance, seven different species of yellow pine cut in North Carolina are included under this class, though the great majority of the yellow pine cut belongs to two species, the shortleaf and the loblolly. Again, sixteen species of oak are cut into lumber, some of them, however, only occasionally, eight hickories, six ashes, three or four maples, three birches, and two or three of several other kinds. At least seventy tree species are used for lumber in North Carolina, and several others are used in some other form in the wood-using industries of the State.

These trees are by no means distributed evenly over the State. In fact, very few species occur in commercial quantities from the eastern to the western border. Their distribution depends chiefly on soil, moisture, and climate, all of which vary greatly in the different parts of the State.

The range of temperature from the southeastern coast to an elevation of 6,700 feet is accompanied by a change in typical trees from the palmetto of Smith's Island to the spruce of Mount Mitchell.

Three general forest regions are recognized in North Carolina, the Mountain, the Piedmont, and the Coastal Plain. The two former are included in the Southern Appalachian Hardwood Region, and the latter in the Southern Pine Region. Each of these three contains two or more fairly distinct forest types, each furnishing its quota towards the State's timber supply, and each requiring somewhat different methods of management to insure a permanent supply of the best quality of timber in the greatest quantity, which is the chief object of forestry.

MOUNTAIN REGION

Approximately one-sixth of the area of the State, lying to the north and west of the lower or eastern slope of the Blue Ridge, is comprised within this region. It lies above an elevation of some 1,500 feet, and an average elevation for the region would be about 2,500 feet.

Spruce Type.—The spruce forests, lying on the summits and slopes of the higher mountains almost entirely above an elevation of 5,500 feet, consisted of dense stands of spruce and balsam timber occurring in varying proportion, but averaging about 60 per cent spruce and 40 per cent balsam. In second growth the balsam is more abundant than the spruce. These beautiful forests have been so inaccessible that up to twenty years ago they were almost untouched by the lumbermen. Since that time, however, owing to the increasing scarcity of spruce for lumber and pulpwood, this type, of which there are probably not more than 300,000 acres in the State, has been cut until at the present time probably not more than 20 per cent of the area contains any merchantable timber.

The cut-over areas have almost without exception been so severely burned that they not only contain no young growth of these two important species, but no other commercial timber trees are taking their place, the second growth consisting only of shrubs and trees of no commercial value.

During the World War there was a large demand for high-grade spruce lumber for aeroplane construction, but the great majority of spruce and balsam timber has been shipped to the northeastern states for the use of the building trades. Practically no spruce lumber is used in North Carolina industries. There is, however, a steadily increasing demand for these two woods for paper pulp, and probably much more of the spruce in North Carolina is used for this purpose than for lumber.

The spruce forests have been considered of extraordinary value in protecting the headwaters of streams. In North Carolina uncut spruce

forests have seldom been known to burn. The consequence is that the very heavy rains of the high mountains have been so retarded in their runoff that there has been a minimum of variation in the flow of streams whose sources lie in these high altitudes. Unfortunately, these lands have been all held by extensively private owners, who have been obliged to look to the timber for profit only. They should have been in public ownership so that they could have been properly managed and protected for the public benefit. The future prospects are not bright. A very long time must elapse before the burned over spruce areas can be reforested naturally to the same species. If fires are kept out, undoubtedly reproduction will eventually be secured, but without sufficient seed trees this will be a matter of decades or possibly of centuries. Protection of the areas from fire is the first practicable measure. This should be done by the State and Nation coöperating with the landowner.

Mountain Hardwoods.—The remainder of the mountain region below the spruce is known as the mountain hardwood type. The original forests contained a large number of valuable as well as less important species. The composition of the forest varies according to soil, moisture and situation, so that the type is for convenience divided up into ridge, slope, and cove. The timber on the ridges consists largely of chestnut oak, chestnut, red maple, black gum, and a number of less important species. On the higher ridges and slopes above 3,500 or 4,000 feet in elevation often the chief trees are red oak, sugar maple, buckeye, and basswood, as well as chestnut and chestnut oak. The coves have contained the heaviest and most valuable timber, but owing to their accessibility have been culled first. Here have grown yellow poplar, basswood, cherry, ash, as well as chestnut, hickory, hemlock, and several species of oak. The valuable ash, cherry, birch, and walnut have, however, been largely cut out. Between the coves and the higher ridges stretch the slopes supporting timber more or less dense and of large size, according to the soil and aspect. The north slope differs very little in composition from the cove, while the south slope is much more open and differs little from the ridge forests. Occasionally "benches" and some of the cooler slopes support almost pure stands of hemlock, but usually this tree, like the white pine, occurs mixed with the hardwoods in comparatively small proportion.

The earlier lumbering operations selected only the more valuable trees, and often the cut-over area would look like an uncut forest from a little distance. With the general use of logging railroads, however, more and more of the timber within reach has been taken, until now very little of any kind of timber is left after lumbering. However, many of the hardwood trees reproduce readily by sprouts from the

A. Typical forest scene in the Mountain Region of North Carolina.

B. Typical forest scene in the Piedmont Region of North Carolina.

stumps or roots of the younger trees, while others come in from seeds which are easily scattered by the wind. Among the latter are the poplar, ash, basswood, maple, hemlock, the pines, and some others. If seed trees of these species are left there will be little trouble in getting a second growth with these trees in the composition. Fires, however, must be prevented, for practically all of these wind-sown and valuable trees are easily injured by fire when young, and the burned-over forest seldom contains any appreciable percentage of them. The object of the forester in this type is to secure ample seed of the more valuable species by retaining trees which will bear them and to prevent fire in order that the young trees may be protected.

PIEDMONT REGION

From the lower slopes of the Blue Ridge to what is known as the "fall line," which is where the Piedmont Plateau falls off into the Coastal Plain Region, the original forests were a mixture of hardwood and shortleaf pine. This area comprises practically one-third of the State. Inroads have been made upon this forest by clearing for agriculture, until at the present time probably not more than 25 per cent of the area retains the remnants of the original forest. Much of the land that was cleared, however, has been allowed to revert to forest growth, and this has usually come up to pine, making an entirely different type. The mixed hardwood and the pine and the second-growth pine are the two principal types of this region.

Hardwood and Pine.—Very little of this forest can now be found in its original state. In nearly all cases the old pine trees have been cut for lumber and often the best hardwood has also been removed. Excellent quality oak of several different species was yielded by these forests, and the establishment of the furniture industry in Piedmont North Carolina was due almost entirely to the proximity of a large supply of suitable oak timber. Yellow poplar was also abundant throughout the region, but in consequence of lumbering and burning the woods it has become exceedingly scarce. The planing mills of the Piedmont Region years ago manufactured the old growth pine into sash, doors, blinds, and building material of the best quality, but now they depend almost entirely upon the second growth pine forests for their supply. The principal species in this region that comprise the hardwood and pine type of forest are, in the order of their importance, the oaks, which nearly always form as much or more than one-half the stand, shortleaf pine, both original and second growth, white pine and chestnut along the western border of the region, poplar, hickory, gum, and a number of other commercial species.

Unlike the Mountain Region, lumbering is done here almost entirely with portable mills. The areas are small, usually forming parts of the farms, and it is seldom that more than 500 or 1,000 acres belongs to one owner. It is because of the comparatively small continuous areas of woodland that the risk from fire is so much less than in the mountains or the Coastal Plain.

The chief feature of management of these forests is the removal of the old, and in some cases comparatively worthless trees, with the object of favoring thrifty young growth of the better species. With a demand for firewood as great as in any State in the Union, a market for even the valueless trees can be found in most instances. Owners can do much towards improving their woodland by following such a practice.

Second Growth Pine Type.—Throughout the Piedmont Region areas which have been cleared and in turn abandoned have almost uniformly grown up with pine, chiefly the shortleaf. On some areas, however, the scrub pine has come in and on the higher, poorer situations this somewhat inferior tree tends to supplant the shortleaf pine. In the eastern part of the region loblolly pine has in some cases taken possession of old fields, but where it occurs it is usually mixed with shortleaf.

These second growth pine forests, many of them occupying land which was cultivated prior to the Civil War, have for the past twenty years furnished a large part of the pine lumber in this region. Formerly "old field" pine was looked upon as an encumbrance upon the ground, as it frequently invaded old pastures. It has only been in comparatively recent years that its value has been recognized. The shortleaf pine grows somewhat slower than the loblolly pine of the Coastal Plain Region. The lumber of each is put upon the northeastern markets under the same commercial name of "North Carolina pine."

Much "old field" land has been recleared after lumbering because it is easier to remove second growth pine than hardwood stumps, the former usually decaying within a very few years. Where the land has not been cleared a growth of hardwoods follows the cutting of the pine, and often a fair stand of hardwood reproduction is already on the ground before cutting commences. Dogwood, poplar, red gum, oak, hickory, etc., form the succeeding forest. With the reservation of seed trees and the prevention of fires it should be possible to secure a second crop of pine, which in most cases would be desirable.

COASTAL PLAIN REGION

The original forests of the Coastal Plain region, which comprises about one-half the total area of the State, were largely longleaf pine. Ever since the first settlement, however, these forests have been de-

structively exploited by the turpentine operator, the lumberman, and the stock raiser, the latter often responsible for the damage done by both fire and hogs. These two, fire and hogs, have been the principal causes contributing to the desolate and unprofitable condition of much of our eastern pine lands at the present time. There are now practically no old growth longleaf pine forests left, though here and there a few restricted areas of second growth longleaf may be found.

The present forest area, which has been estimated at nearly eleven million acres, consists chiefly of second growth loblolly pine on the uplands and hardwoods in the river bottoms and swamps.

Coastal Pine Type.—Three-fourths or more of the forest area of the Coastal Plain Region is classed as pine forest. The present stand and condition varies according to quality of soil, drainage, ownership, and transportation facilities. It was recently estimated that 40 per cent of this type was nonproducing, namely not growing sufficient timber on it to produce a profitable crop; 25 per cent was in young growth, too small for market, and 35 per cent still supported a crop of merchantable timber.

Loblolly pine, or shortleaf pine as it is generally called throughout the region, is the principal timber tree. When sawed and put upon the market it is almost universally known as North Carolina pine lumber. It is used in this form for all kinds of construction purposes. The tree grows rapidly on most soils in the region and readily reproduces itself naturally where fires are kept out. Unlike the longleaf pine, its seeds are not eaten by hogs, though the seedlings are often uprooted and destroyed by these animals.

Although much of the pine land should be classed as potentially agricultural, there will probably be no demand for the greater part of it for many years to come. Labor is scarce and the reclamation of such lands slow. In order, therefore, to put the land to use and make the investment remunerative there should be no idle land, and what will not be needed for farm crops for the next forty or fifty years should be encouraged to produce a forest crop.

In cutting these forests provision should be made for securing sufficient seed, even by leaving seed trees where necessary, and fire should be absolutely prevented. Some have considered this an impossibility, but no one has a right to this conclusion until an earnest effort towards forest fire prevention has been made by the landowners, the local people, and the State all coöperating.

Hardwood Swamps.—Along the rivers and smaller streams occur alluvial and muck lands, more or less drained, but usually very wet during part of the year. These are occupied mostly by a variety of

hardwoods, sometimes mixed with cypress or juniper. The latter is found in wet sandy and often peaty swamps, while the former is more common on heavier soils and near running water.

On the heavier lands, especially in the overflow swamps along rivers, several species of oak are the chief timber trees. These are associated with red maple, elms and gums. In other places the gums predominate. Up until recent years these were not lumbered to any extent, and even yet the demand for gum lumber is somewhat limited. It is, however, cut into veneer for packages and furniture, and there has been considerable inquiry about it for paper making.

These swamp lands, when cut over, come up largely to red gum, black gum, and tupelo, though seedlings from other hardwood species are usually present in more or less abundance. Cypress and juniper reproduce very irregularly, the large openings made by logging letting in more direct sunlight than is good for the young seedlings of these species.

Many of these swamps, when drained, make excellent agricultural lands, but some are better adapted to forest growth, and upon such areas logging should be done so that a second crop of timber may reasonably be expected. Fire prevention and the protection of the small trees is all that is usually necessary, though sometimes retention of seed trees may be advisable. Fire prevention is fairly simple in these swamps and if fires are prevented, the hardwoods should soon form shade enough to protect the juniper, and where seed trees are present a new crop of this valuable tree may be expected. Cypress reproduction is more difficult to secure, and like the longleaf pine, it may be destined to be replaced by other more adaptable species.

DEPLETION OF FOREST RESOURCES

The forests of this country have been divided into several main divisions, according to the predominant species that grow in each. One of these is the Southern Appalachian Hardwood Region, which includes the hardwood forests of Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Kentucky, and Tennessee. Almost the entire area embraced within this region was once covered by virgin forests. These forests constituted a wealth of timber comprising oak, chestnut, and yellow poplar of large size and high quality, walnut, cherry, hickory, basswood, and the other valuable hardwoods, as well as white and yellow pine, and hemlock. The earliest operations in the region consisted of the removal of only such trees as walnut, cherry, and the finest oak and yellow poplar from easily accessible situations. The introduction of modern logging methods extended operations into nearly all parts of the region, so that at present comparatively little virgin

PLATE II

Typical forest scene in the Coastal Plain Region of North Carolina.

timber remains, most of it remote and difficult to log. Present logging operations consist for the most part of the working over of previously culled stands and the removal of practically every saw log as well as a large part of the smaller material. The lumber cut from such timber is necessarily of poorer quality than that previously produced.

In 1909 the peak of lumber production was reached in the Southern Appalachian Hardwood Region, the cut for that year being approximately 4 billion feet. Since 1909 the cut of lumber in the region has gradually declined so that the normal cut now is in the neighborhood of 3 billion feet. The lumber cut, however, represents only about a third of the total consumption of wood in the region. The balance represents material removed in the form of extract wood and bark, poles, posts, ties, cooperage stock, fuel wood, and other products not cut in the form of lumber. Much of the material converted into these products consists of second growth timber. In the case of lumber production, however, the large proportion of the timber is cut from old growth stands. With the exhaustion of the old growth, lumbermen will then have to look to the second growth timber as a source of supply, and since very little of this will yield lumber of a better quality than No. 1 Common, the effect upon the furniture and other industries largely dependent upon high-grade lumber will be very serious.

The total quantity of timber removed annually from this region is further augmented by that which is destroyed by fire and disease. The chestnut blight has entered the mountainous area and, according to pathologists, is almost certain to sweep through the hardwood forests and eventually eliminate this important species. As a result, tanning and other industries dependent upon this tree for raw material will be deprived of their chief source of supply and other species will be called upon to supply this demand, thus further adding to the depletion of the timber. It is impossible to even estimate the depletion resulting from the chestnut tree blight or from fire, which annually takes a heavy toll from the forests of the region.

Considerable uncertainty exists in the minds of even the best informed men in the lumber industry as to the duration of the cut in the remaining old growth stands of timber in the Southern Appalachian Hardwood Region. In West Virginia, which has been one of the leading hardwood producing states, the statement was made recently by one of the best informed men in the lumber industry that the length of cut on a large scale would not exceed five years. A responsible official in a large mill in that state reported that most of the mills would be cut out within from five to eight years. The State Forester of North Carolina estimates that the supply of old growth hardwood timber will last approxi-

mately 17 years. A prominent lumberman of western North Carolina stated that in his opinion the cut from old growth timber in north Georgia and southwestern North Carolina will last 20 years, but that this cut will come increasingly from small operations. In Kentucky and Tennessee the duration of the cut of old growth hardwoods is believed by the manager of one lumber company to be 20 years, while another well informed man sees 15 years ahead for the Kentucky hardwoods. A future cut of 15 years is predicted for old growth timber in the Southern Appalachian Region by another representative of the industry, while still another estimates that the supply will last 25 years. The consensus of opinion among the best informed men in the industry seems to be that if present conditions continue the Southern Appalachians will have ceased to function as an important lumber producing region of high-grade hardwoods within 20 years, and that within 25 years the old growth timber will be practically gone.

The extent of depletion of the old growth hardwoods in the Southern Appalachian Hardwood Region is further reflected and perhaps more forcibly brought to our attention by the statements made in the schedules furnished by the wood-using factories of North Carolina, from which the data in this report were prepared. Referring to local supplies at the present time in comparison with conditions existing during the past 10 or 20 years, 93 per cent of the furniture plants in the State, 91 per cent of the vehicle factories, and 100 per cent of the chair makers reported that supplies had been greatly reduced. In the matter of prospective local supplies on the basis of a 10-year outlook, 12 per cent of the furniture, 22 per cent of the vehicle, and 43 per cent of the chair factories reported that supplies would be exhausted. That supplies would be gradually reduced was reported by 57 per cent of the chair makers, 88 per cent of the furniture factories, and 67 per cent of the vehicle plants. Of all firms in the State represented by these three classes of establishments only 11 saw an outlook for sufficient raw material, and these were all vehicle plants.

Depletion has not stopped with the hardwoods in the Southern Appalachian Region. The coniferous trees have come in for their share, especially the yellow pines. Recent estimates place the original yellow pine area of North Carolina at 10 million acres. Of this amount all but 500,000 acres have been cut over. In the Coastal Plain region longleaf pine was once the characteristic forest tree. Turpentine operations, lumbering, the destruction of seeds and seedlings by hogs, and other agencies have brought about the depletion of the supplies of this important species in the State. The present stand of longleaf pine in North Carolina is hardly more than 50,000 acres, most of it being second

growth timber, widely scattered in small areas. Such virgin longleaf pine areas as remain will no doubt soon be logged and become either nonproductive or be restocked with loblolly or shortleaf pine. The most valuable tree, from an economic standpoint, in North Carolina is loblolly pine, a species that now occupies in almost pure stands, much of it over 100 years old, nearly all of the cut-over longleaf pine lands, especially those in the Coastal Plain Region. As previously mentioned, loblolly pine and shortleaf pine in the proportion of 80 per cent of the former and 20 per cent of the latter comprise the pine marketed in the State as North Carolina pine. The softwood lumber production of North Carolina in 1921 was 732,035,000 feet, board measure, and of this quantity 647,845,000 board feet, or over 88 per cent, was of yellow pine. Since comparatively little longleaf pine is cut in North Carolina, the bulk of that reported as yellow pine consisted of North Carolina pine. On the other hand, the total quantity of wood consumed by the wood-using industries of the State in 1919 was over 493 million feet, while of this amount more than 248 million feet was North Carolina pine. These figures of production and consumption show the prominence of this species in North Carolina.

As already stated, all but 500,000 acres of the original 10 million acres of yellow pine land in North Carolina has been cut over. Of this total cut-over area 3,600,000 acres are now restocking with trees of saw-timber size, 5,400,000 acres are restocking with trees of merely cordwood size, while 1,200,000 acres are not restocking at all. From this it can be seen that the forest area of North Carolina supporting yellow pine saw-timber size has decreased more than 50 per cent. This is further brought out by the fact that the lumber cut of yellow pine in North Carolina has decreased from 1,575,186,000 board feet in 1909 to 931,-015,000 board feet in 1921, or over 40 per cent during the 13-year period mentioned.

In 1909 the cut of white pine lumber in North Carolina was 96,624,-000 board feet, while in 1921 it was only 3,360,000 board feet, a decrease in 13 years of over 92 per cent. This is but another evidence of forest depletion in the State.

The dependence of the wood-using factories throughout the entire United States upon the forest resources of the country is self-evident. In North Carolina it is particularly noticeable, since, as shown in Table 3, home-grown timber supplied nearly 86 per cent of the total quantity consumed by the wood-using industries of the State. If our forests are to continue to supply the enormous demands for raw material that are made upon them it is perfectly obvious that some steps must be taken immediately to insure future crops. Apparently there is but one

adequate means available, the establishment of a sound forest policy, the details of which will have to be worked out to fit the conditions existing in different regions of the country and perhaps also in different states.

THE FUTURE TIMBER SUPPLY

This country may in a way be likened unto the spendthrift who scatters his money to the winds and later has only vain regrets to remind him of his squandered fortune. Unlike the spendthrift, however, the country has come to the realization of how wasteful it has been with its timber wealth, and is taking timely cognizance of its condition with a view of improving it. The necessity for prompt, vigorous action looking to the perpetuation of the timber resources of the United States is apparent not only to a large number of individuals, but also to many of the important industries which are partly or wholly dependent upon the forest as a source of raw material. Some of the states recognized the handwriting on the wall years ago, others more recently, and immediately took action in the matter of enacting forest laws with the ultimate object of providing for future crops of timber. At present thirty-five states maintain either a state forester, state board of forestry, forest conservation commission, or some similar state organization, the functions of which are to carry out the provisions of existing laws relating to reforestation and fire protection. The Federal Government is doing its part in this work through its administration of the national forests in the west, its acquisition of lands under the Weeks Law for national forests in the east, its coöperative work with the various state forest organizations, and its extensive educational program with the general public. Large corporations, such as railroads, oil companies, and mining companies are also vitally interested in the subject, and some of them are either improving existing timber holdings or utilizing other lands for reforestation purposes.

All of this indicates progress, but forest depletion in this country has assumed such alarming proportions that nothing but a carefully worked out, nation-wide forest policy will serve to prevent further devastation. Such a policy should have the support of all interested parties. Important among these are the private owners, whose forest lands constitute a large portion of the total timbered area of the country. The provisions of such a policy are manifold. Two of them stand out prominently, however, and merit immediate attention, namely, forest fire prevention and reforestation. In this work the Federal Government naturally will and should be expected to take a leading part, especially in such matters as the lending of aid to the activities of the several states, the standardization of technical practice in reforestation and fire protection, and by

the further acquisition of such land as is either more suitable for the growing of timber or more valuable for the protection of watersheds than it is for agriculture. Such a forest policy naturally calls for new legislation and possibly the revision of existing laws, both national and state. For example, before the Federal Government can hope to increase the scope of its present forest policy to one of a national character sufficient appropriation from the public funds must be made available for the purpose. On the other hand, the full coöperation of the private landowner cannot be secured until state laws are enacted which will bring about an equitable form of forest taxation and at the same time place upon the owners certain responsibility in dealing with precautions against forest fires, disposal of slash, and other factors directly affecting forest production.

Timber depletion in this country has resulted not so much from the use of the forests as the failure to grow them. Because of this fact there are now in the United States 326 million acres of cut-over land, on 81 million acres of which there is practically no timber growth, due principally to forest fires and improper methods of logging. This enormous area is being added to annually at the rate of from 3 to 4 million acres, as the cutting and burning of forests continues. It is estimated that there are available in this country a total of 463 million acres of land, which, from an economic standpoint, are more suitable for the growing of timber than for any other use. With a national forest policy in full and efficient operation, this land could eventually be made sufficiently productive to meet adequately the country's future demands for wood.

PART II

KINDS OF WOOD

The wood-using factories of North Carolina consumed a total of 493,151,871 board feet of lumber in 1919, representing varying quantities cut from 28 different kinds of wood. In similar reports prepared for other States the information requested on the questionnaire used in gathering the original data called for the exact name of the various woods used, which permitted of the listing of the different kinds according to species, such as red oak, white ash, silver maple, red cedar, etc. This made it possible for the reader to study the uses according to inherent properties. In the collection of the material for this report, however, only the generic name was for the most part specified, such as oak, poplar, hickory, etc. In addition, the questionnaire used listed yellow pine as second growth, original, and longleaf. In view of the fact that these terms as used in any one of the three natural divisions of the State, namely: the Coastal Plain, the Piedmont, and the Mountain regions, are intended to include the predominant species of yellow pine, it was found difficult to differentiate the various species implied in each case. Since for the most part the bulk of the yellow pine in the State is either shortleaf pine or loblolly pine, it was considered advisable to include all wood reported either as second growth or original pine under the designation of North Carolina pine, the term most commonly employed by the lumbermen of the State, especially those of the Coastal Plain Region.

In Table 1 there is shown the quantity of all of the various woods used by the North Carolina wood-using factories in 1919, together with the percentage which each represents of the total consumption. This table also gives the average price per thousand feet, board measure, paid for the raw material f. o. b. factory, and the total cost for each wood.

North Carolina pine ranks first among the various woods listed in Table 1 with a total of 248,221,156 feet, board measure. This represents slightly over 50 per cent of the total consumption of the State. Oak occupies second place, with 85,353,007 board feet, or 17.31 per cent. Red gum was third, with 40,443,000, or 8.20 per cent, and yellow poplar fourth, the quantity of this wood used being 21,560,963 board feet, or 4.37 per cent of the total. Twenty-four other woods were used in gradually decreasing amounts. Rosewood and mahogany were the only two foreign woods reported.

Black walnut was the most expensive domestic wood used, with an average price of $201.62 per thousand board feet. Sugar pine, a Pacific Coast wood, ranked second, the price paid for it being $135 per thousand feet. Of the domestic woods used North Carolina pine was the least expensive wood among the conifers purchased and elm was the cheapest of the hardwoods.

TABLE 1.—*Summary of Kinds of Wood Used in North Carolina in 1919*

Kind of Wood	Quantity Feet, B. M.	Per Cent	Average Cost per M. Feet F. O. B. Factory	Total Cost
Pine, North Carolina	248,221,156	50.33	$ 29.03	$ 7,206,524
Oak	85,353,007	17.31	55.34	4,723,013
Gum, red	40,443,000	8.20	73.90	2,988,589
Poplar, yellow	21,560,963	4.37	42.04	906,383
Pine, longleaf	21,313,077	4.32	38.86	828,158
Chestnut	20,996,915	4.26	42.25	887,134
Gum, black	19,524,000	3.96	25.12	490,379
Hickory	9,124,500	1.85	44.70	407,841
Maple	8,325,000	1.69	54.50	453,690
Pine, white	6,521,557	1.32	40.14	261,759
Cottonwood	2,000,000	.41	75.00	150,000
Dogwood	1,575,000	.32	35.00	55,125
Birch	1,525,500	.31	60.25	91,919
Hemlock	1,028,000	.21	40.00	41,120
Walnut, black	838,000	.17	201.62	168,961
Basswood	735,000	.15	64.42	47,350
Ash	627,000	.13	50.45	31,632
Locust	370,000	.07	40.54	15,000
Cypress	350,000	.07	40.00	14,000
Beech	205,000	.04	35.29	7,235
Buckeye	200,000	.04	104.06	20,812
Sycamore	112,000	.02	57.32	6,420
Cedar	36,000	.01	30.00	1,080
Mahogany	32,500	.01	311.54	10,125
Rosewood	25,000	.01	450.00	11,250
Mountain laurel (Kalmia)	15,000	----------	44.00	660
Elm	6,500	----------	24.00	156
Pine, sugar	5,000	----------	135.00	675
All other	2,083,196	.42	23.42	48,798
Totals	493,151,871	100.00	$ 40.30	$ 19,875,788

Table 2 presents some very interesting data relating to prices paid for raw material by the wood users of North Carolina. In this table are shown the prices paid for the different kinds of woods used in 1909 and 1919. The 1909 figures are those which were published in Economic Paper No. 20 of the North Carolina Geological and Economic Survey, which constitutes the first report issued on the wood-using industries of the State. The 1919 figures are those given in this present report, which is a revision of the report mentioned above. Not all of the woods

shown in the 1919 report were reported in use in the 1909 report, and for this reason it was only possible to show in Table 2 the various woods and the prices paid for those that were used in both years. It will be noted that for the woods shown the 1919 figures represent increases over the prices paid in 1909 of from 40 to over 500 per cent.

TABLE 2.—*Average Prices Paid for Raw Material by the Wood-using Factories of North Carolina in 1909 and 1919*

Kind of Wood	Average Cost per M. Feet F. O. B. Factory		Per Cent of Increase
	1909	1919	
Pine, North Carolina	$ 12.80	$ 29.03	127
Oak	18.05	55.34	207
Poplar, yellow	17.61	42.04	139
Chestnut	16.50	42.25	156
Hickory	21.28	44.70	110
Maple	15.95	54.50	242
Pine, white	15.80	40.14	154
Cottonwood	12.00	75.00	525
Dogwood	18.75	35.00	87
Birch	26.72	60.25	125
Hemlock	12.00	40.00	233
Walnut, black	42.15	201.62	270
Basswood	20.75	64.42	210
Ash	25.62	50.45	97
Locust	14.00	40.54	190
Cypress	13.67	40.00	193
Beech	19.74	35.29	79
Buckeye	40.00	104.06	160
Sycamore	10.76	57.32	433
Cedar	21.40	30.00	40
Mahogany	147.42	311.54	111
Mountain laurel (Kalmia)	10.00	44.00	340
Elm	13.38	24.00	79

STATE-GROWN AND IMPORTED WOODS

Over 85 per cent of the 493,151,871 board feet of lumber consumed by the secondary wood-using industries of North Carolina was grown in the State. The entire supply of 10 of the 28 different kinds of wood used came from within the State. These were dogwood, hemlock, basswood, ash, locust, cypress, beech, cedar, mountain laurel, and elm. In addition, the entire amount used of those woods grouped under the general heading of "all other" was also State-grown. The quantity produced within the State of all but one of the remaining 17 woods was greater than the quantity shipped in. The exception mentioned was red gum, of which 10,782,500 board feet, or 26.66 per cent, was cut within North Carolina, while 29,660,500 board feet, or 73.34 per cent, came from sources outside the State.

Table 3 shows the total quantity of the different kinds of woods used and the amount and percentage of each which was home-grown or imported.

TABLE 3.—*Summary of State-grown and Imported Woods*

Kind of Wood	Quantity Feet, B. M.	Source of Supply			
		Grown in North Carolina		Grown Outside of North Carolina	
		Quantity	Per Cent	Quantity	Per Cent
Pine, North Carolina	248,221,156	231,353,156	93.20	16,868,000	6.80
Oak	85,353,007	73,165,507	85.72	12,187,500	14.28
Gum, red	40,443,000	10,782,500	26.66	29,660,500	73.34
Poplar, yellow	21,560,963	19,350,263	89.75	2,210,700	10.25
Pine, longleaf	21,313,077	18,898,077	88.67	2,415,000	11.33
Chestnut	20,996,915	20,696,915	98.57	300,000	1.43
Gum, black	19,524,000	19,216,000	98.42	308,000	1.58
Hickory	9,124,500	7,999,500	87.67	1,125,000	12.33
Maple	8,325,000	5,192,500	62.37	3,132,500	37.63
Pine, white	6,521,557	6,443,357	98.80	78,200	1.20
Cottonwood	2,000,000			2,000,000	100.00
Dogwood	1,575,000	1,575,000	100.00		
Birch	1,525,500	1,375,500	90.17	150,000	9.83
Hemlock	1,028,000	1,028,000	100.00		
Walnut, black	838,000	576,750	68.82	261,250	31.18
Basswood	735,000	735,000	100.00		
Ash	627,000	627,000	100.00		
Locust	370,000	370,000	100.00		
Cypress	350,000	350,000	100.00		
Beech	205,000	205,000	100.00		
Buckeye	200,000	175,000	87.50	25,000	12.50
Sycamore	112,000	77,000	68.75	35,000	31.25
Cedar	36,000	36,000	100.00		
Mahogany	32,500			32,500	100.00
Rosewood	25,000			25,000	100.00
Mountain laurel (Kalmia)	15,000	15,000	100.00		
Elm	6,500	6,500	100.00		
Pine, sugar	5,000			5,000	100.00
All other	2,083,196	2,083,196	100.00		
Totals	493,151,871	422,332,721	85.64	70,819,150	14.36

THE WOODS DESCRIBED

The following is a brief description of the principal woods employed in North Carolina by the different wood-using industries in the manufacture of the wide range of commodities made partly or wholly of wood which they produce. Lumbermen divide woods into two general classes, namely, hardwoods and softwoods, the former comprising those trees which have broad leaves and the latter those with needle leaves. It has been found that this classification holds true generally and is practical, and for these reasons it has become standardized.

SOFTWOODS

Eight species of conifers were called upon to furnish wood in 1919 for final manufacture in the State. Five of them were pines, while the other three consisted of hemlock, cypress, and cedar, respectively. The quantity of wood contributed by the coniferous trees constituted over 50 per cent of the total amount used.

North Carolina Pine (*Pinus taeda and Pinus echinata*).—Pine marketed and known as North Carolina pine, or Virginia pine as it is frequently called in that State, is composed of approximately 80 per cent loblolly pine and 20 per cent shortleaf pine. In the forest these two species are easily distinguished, because the needles of the shortleaf are generally shorter and the cones smaller than those of loblolly. When sawed into lumber, however, it is often exceedingly difficult to tell them apart, owing to the close similarity of the two woods. Shortleaf pine grows sparingly as far north as Long Island, New York, and at one time was plentiful in New Jersey, Delaware, and Maryland. At the present time it is cut for lumber, perhaps, no farther north than Virginia. Shortleaf reaches its best development and is most plentiful in northern Louisiana, Arkansas, and Missouri, and in those states is often called by the trade name of Arkansas soft pine. In North Carolina it is usually found in the drier situations and frequently enters into the composition of upland forests. It appears less commonly in the Coastal Plain Region, being especially rare south of the Neuse River. Loblolly pine is a tree of the Coastal Plain Region, and finds its best development in the form of original growth in moist, deep soil. Land once cultivated and then abandoned a century or more ago by farmers now supports stands of second growth loblolly.

The importance of North Carolina pine in the State is evidenced by the fact that more than half of the wood used by the wood-consuming factories in 1919 was of this species. The planing mill factories used the largest quantity, while next in importance from the standpoint of consumption were, in the order named, those industries making boxes and crates, those producing sash, doors, and blinds, and the furniture manufacturers. The quantity of North Carolina pine consumed by the various wood-using factories of the State is shown in Table 4.

Longleaf Pine (*Pinus palustris*).—This tree is the most important of the southern yellow pine group. Virginia marks the most northerly limit of its range, while the heaviest stands are now located in Louisiana and the eastern part of Texas, where virgin timber is being cut. Longleaf pine is often referred to as Georgia pine and hard pine. It is the chief source of turpentine and rosin, and because of this is sometimes called pitch pine, especially that which is exported. Longleaf pine gets

its name from the fact that it has the longest needles of any of the pines. Its strength, stiffness, and durability give it an important place among those woods used for structural purposes, and large quantities are demanded for this use annually. It is also extensively employed for flooring, while during the war with Germany it contributed the major portion of the tremendous amount of high-grade heavy timbers and planking needed for wooden vessels of the Emergency Fleet Corporation. Longleaf pine formerly extended in an almost unbroken forest from Texas to Virginia. At present in North Carolina it is found chiefly in widely scattered second growth stands of small area.

TABLE 4.—*Consumption of North Carolina Pine in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Planing mill products	125,734,000	50.65	$ 31.12	$ 3,912,511	112,842,000	12,892,000
Boxes and crates	71,980,000	29.00	26.49	1,906,928	71,010,000	970,000
Sash, doors, and blinds	12,580,000	5.07	32.09	105,300	11,080,000	1,500,000
Fruit, and vegetable packages	9,184,587	3.70	22.79	262,199	9,184,587	----------
Furniture	8,773,000	3.54	26.55	232,945	8,433,000	340,000
Caskets and coffins	6,418,569	2.59	29.70	190,631	6,337,569	81,000
Vehicles and vehicle parts	6,393,000	2.58	29.53	188,797	5,793,000	600,000
Elevators and machine construction	4,200,000	1.69	24.28	101,962	3,765,000	435,000
Handles	800,000	.32	20.00	16,000	800,000	----------
Agricultural implements	627,000	.25	65.14	23,472	627,000	----------
Fixtures	405,000	.16	32.12	13,010	355,000	50,000
Shuttles, spools, and bobbins	225,000	.09	17.00	3,825	225,000	----------
Miscellaneous	901,000	.36	15.00	13,515	901,000	----------
Totals	248,221,156	100.00	$ 29.97	$ 6,971,095	231,353,156	16,868,000

In 1919 the wood-using industries of North Carolina consumed 21,313,077 feet, board measure, of longleaf pine, the bulk of the consumption being for boxes and crates and planing mill products. The distribution of longleaf pine among the different industries that used it is shown in Table 5.

White Pine (Pinus strobus).—White pine is a tree of first commercial importance which occurs from New Foundland west to the Winnipeg River and south through the northern states to Pennsylvania, Michigan, Illinois, Iowa, and along the Appalachian Mountains to Georgia. It reaches its best development in the region of the Great Lakes. The story of white pine is a vivid example of forest depletion in this country. Two hundred and fifty years ago the area mentioned above supported virgin stands of this valuable species. The forests were so vast and the

stands so thick that the supply was considered inexhaustible. Lumbering operations began in New England. When one pine region became exhausted there was another one farther back and mills moved on to new forests. This occurred when the pine on the New England coast was cut. Next came the stands in New York, and after that those of Pennsylvania, followed by West Virginia. Later, when the supply here began to wane, the region of the Great Lakes was invaded and the splendid forests of Michigan, Wisconsin, and Minnesota were called upon to supply the increasing demand for white pine. Michigan was in closer proximity to markets, and her forests were first among those of the Lake States to show signs of depletion. Depletion in Michigan was followed by depletion in Wisconsin, and the lumbermen then transferred their operations to Minnesota. The history of white pine in Minnesota is the history of white pine in other regions. Ahead of the state lies

TABLE 5.—*Consumption of Longleaf Pine in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Boxes and crates	10,653,077	49.98	$ 35.38	$376,905.86	10,653,077	.....
Planing mill products	7,750,000	36.36	43.31	335,652.50	5,695,000	2,055,000
Sash, doors, and blinds	2,700,000	12.67	39.00	105,300.00	2,540,000	160,000
Elevators and machine construction	160,000	.75	42.50	6,800.00	10,000	150,000
Furniture	50,000	.24	70.00	3,500.00	.....	50,000
Totals	21,313,077	100.00	$ 38.86	$828,158.36	18,898,077	2,415,000

the same goal that they have already reached. The Lake States, which once measured their cut of white pine lumber in billions of feet, are now producing comparatively small quantities. Michigan is cutting less than Massachusetts and Wisconsin not as much as New Hampshire. The difference between white pine production in the Lake States and the production of this species in Massachusetts is worthy of note. The Lake States are merely harvesting the crop which nature planted centuries ago, while in Massachusetts, although the timber that remains is all second growth, fires are kept out and it is otherwise protected. As a result the cut of white pine in this State exceeds that of Michigan, once the leader in the world's output. White pine's capacity for reproduction and its rapid growth make it an important tree from the standpoint of forest management. In fact, the tree will readily perpetuate itself if given a chance. Wind scatters the seeds by thousands, and they quickly spring up. Since, however, the bark of the pine seedlings is

thin and tender, the young trees are easily killed by fire. If, therefore, fires can be kept out of white pine cuttings and a few seed trees are allowed to remain, the rest can be left almost entirely to nature.

In North Carolina white pine is found only in the Mountain Region, but the cut here is small compared to that of other regions of its growth. In 1919 the total quantity of wood of this species reported as having been consumed by the wood-using industries of the State was approximately 6½ million feet, board measure. More than two-thirds of this quantity, or 4,942,000 board feet, was demanded for boxes and crates. Nearly 99 per cent of the white pine consumed in the State was cut from home-grown timber. The industries which used white pine in North Carolina in 1919 and the quantity that each consumed is shown in Table 6.

TABLE 6.—*Consumption of White Pine in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Boxes and crates	4,942,000	75.78	$ 37.67	$186,165.14	4,942,000	----------
Planing mill products	610,000	9.35	57.50	35,075.00	584,800	25,200
Caskets and coffins	326,557	5.01	35.60	11,625.43	326,557	----------
Sash, doors, and blinds	270,000	4.14	49.17	13,275.90	220,000	50,000
Chairs	150,000	2.30	40.00	6,000.00	150,000	----------
Elevators and machine construction	98,000	1.50	58.60	5,742.80	95,000	3,000
Vehicles and vehicle parts	75,000	1.15	25.00	1,875.00	75,000	----------
Furniture	50,000	.77	40.00	2,000.00	50,000	----------
Total	6,521,557	100.00	$ 40.14	$261,759.27	6,443,357	78,200

Hemlock (*Tsuga canadensis*).—The range of hemlock extends east to Nova Scotia, west to Minnesota, and south along the mountain ranges to Georgia. In North Carolina hemlock occurs in the mountains, and is found in cool ravines, usually along streams on loamy or rich soil. It is frequently associated with birch, cherry, and other hardwoods. The tree is of considerable value to the tanning industry, its bark being the principal source of supply of raw material for extract plants. In North Carolina it is one of the chief woods used for paper pulp. The wood of hemlock is light in weight, coarse grained, brittle, and has a tendency to splinter. These properties have greatly influenced its use, so that during the years when white pine was plentiful comparatively little hemlock was cut. With the waning supply of pine, however, the demand for hemlock increased, and at present it is called on to meet a liberal share of the country's lumber requirements. It is an especially important species in the region of the Lake States.

In 1919 in North Carolina the box and crate industry was the only one that employed hemlock as raw material in the manufacture of its products. The quantity used was 1,028,000 feet, board measure, and all of it was produced in the State.

Cypress (*Taxodium distichum*).—Cypress is a southern species that occurs in swamps and overflowed lands from Virginia to Texas and up the Mississippi River as far as Missouri. It is a needle-leaf tree which sheds its leaves in winter. The principal supply comes from Louisiana and other Gulf States. In North Carolina it is found in the Coastal Plain Region, where it constitutes one of the most common trees along streams and swamps. The wood is light, soft, and straight-grained, and the heartwood of the tree is extremely durable when placed in contact with the ground or when used in damp situations. Its durability makes it an ideal wood for caskets and coffins, planing mill products, and sash, doors, and blinds, the three industries which together reported the consumption of the 350,000 feet, board measure, shown in Table 7.

TABLE 7.—*Consumption of Cypress in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Caskets and coffins	200,000	57.14	$ 40.00	$ 8,000.00	200,000	.....
Sash, doors, and blinds	100,000	28.57	30.00	3,000.00	100,000	.....
Planing mill products	50,000	14.29	60.00	3,000.00	50,000	.....
Totals	350,000	100.00	$ 40.00	$ 14,000.00	350,000	.....

Cedar.—The two species of cedar grow in North Carolina. They are the common red cedar, often called pencil cedar (*Juniperus virginiana*), and southern white cedar (*Chamaecyparis thyoides*) known locally as juniper. The former is one of the most widely distributed trees in North America, and is found in all parts of the United States except California, Oregon, and the western part of Texas. The latter grows along the Atlantic Coast as far north as New England, but is of little commercial importance above Maryland and the lower part of Delaware. Red cedar meets most of the demands for pencil stock and large quantities of it in the form of slats are shipped abroad. It is also a favorite wood for clothes chests. Southern white cedar is largely used in house construction, is especially desirable for shingles, and with northern white cedar is the principal wood used for telephone and telegraph poles. All native cedars are especially durable in contact with the ground or when

used in damp situations. This property makes the wood valuable for fence post material, and large quantities are employed for this purpose.

In North Carolina red cedar is confined to the Piedmont Region and southern white cedar to the Coastal Plain Region. The wood users in the State reported the use of 36,000 feet, board measure, but since the species used was not stated, it has been classed in this report merely as cedar. The entire quantity was consumed by the planing mills.

Sugar Pine (*Pinus lambertiana*).—Sugar pine is a tree of the Pacific Coast and occurs in heavy stands in California and southern Oregon. The tree reaches larger size than any of the pines. In mechanical properties it compares very favorably with eastern white pine (*Pinus strobus*), and is employed for many of the purposes for which white pine is used. Large quantities of sugar pine are shipped annually from the region of its growth to eastern markets. The quantity used in North Carolina in 1919 was exceedingly small, amounting to only 5,000 feet, board measure, and was employed entirely for elevators and machine construction.

THE HARDWOODS

A summary of the wood-using industries of the entire United States shows that for the manufacture of commodities requiring wood as raw material a larger quantity of softwood is required than hardwood. On the other hand hardwoods are employed for a greater number of uses and from the standpoint of distribution among the various industries are more important. Twenty-one hardwoods entered into the manufacture of the products of the wood-using factories of the State in 1919, and the entire supply of seven of them was obtained from sources within the State. The total quantity used was slightly over 21 million feet.

Oak.—All of the fifty or more oaks that grow in the United States are divided by botanists into two groups. Those on which the acorns reach maturity in a single year are called white oaks, while those on which the fruit does not ripen for two years are known as black oaks, or more commonly as red oaks. The well known white oak (*Quercus alba*) is representative of the white oak group, while red oak (*Quercus borealis maxima*) occupies a similar position in the red oak group. Red oak or white oak lumber may be cut from any one of 25 different kinds of oak, but in the trade it is merely red or white oak, the lumbermen rarely having occasion to use a further differentiation. White oak is usually strong, hard, heavy, durable, dense, and more or less difficult to season. Red oak is less strong and durable and not so dense or hard. Since it is more porous, red oak is more easily kiln-dried than white oak. When white oak is used in situations where it is in contact with the ground or exposed to the action of the elements it is not usually customary to give

it a preservative treatment. Red oak, however, is less durable, and when so used should always be subjected to treatment.

Eighteen different species of oak grow in North Carolina. Twelve of them are red oaks and six belong to the white oak group. From the standpoint of quantity used, oak is the most important hardwood that enters into furniture manufacture, not only in this State, but in practically all others in which studies of this kind have been made. Furthermore, it usually has the widest distribution among the different industries. The quantity demanded by the wood users of North Carolina in 1919 aggregates nearly 85½ million feet. Seventy-four per cent of this was used in the furniture and chair industries. The quantity of wood used by the eleven other industries that reported a consumption of oak is shown in Table 8.

TABLE 8.—*Consumption of Oak in 1919*

Industry	Quantity		Average Cost per M. F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			Grown in State	Grown Outside of State
Furniture	40,465,000	47.41	$ 57.33	$2,319,858.45	35,309,000	5,156,000
Chairs	23,930,000	28.04	60.48	1,447,286.40	18,576,500	5,353,500
Planing mill products	7,545,000	8.84	41.87	315,909.15	6,853,000	692,000
Vehicles and vehicle parts	5,719,500	6.70	45.74	261,609.93	5,319,500	400,000
Boxes and crates	3,347,000	3.92	47.92	160,388.24	2,847,000	500,000
Fixtures	985,000	1.15	65.00	64,025.00	899,000	86,000
Fruit and vegetable packages	813,807	.95	39.50	32,145.38	813,807	----------
Handles	540,000	.63	33.50	18,090.00	540,000	----------
Sash, doors, and blinds	365,000	.43	37.83	13,807.95	365,000	----------
Caskets and coffins	290,000	.34	74.17	21,509.30	290,000	----------
Elevators and machine construction	260,000	.31	52.30	13,598.00	260,000	----------
Agricultural implements	131,500	.15	47.50	6,246.25	131,500	----------
Miscellaneous	961,200	1.13	50.00	48,060.00	961,200	----------
Totals	85,353,007	----------	$ 55.33	$4,722,534.05	73,165,507	12,187,500

Red Gum (Liquidambar styraciflua).—This species occurs from Connecticut to Missouri, south to central Florida, and westward to Texas. It reaches its best development in the bottom lands of the Mississippi Valley. It is one of the commonest trees throughout the hardwood bottom forests and reaches large size. It is found also to a considerable extent on the uplands and low ridges, but is there scattered and of smaller size. In North Carolina it frequents moist situations from the coast to the mountains. It is in the Coastal Plain, however, that it attains its largest dimensions and is found in mixture with black gum and cypress in deep swamps.

Red gum has a tendency to warp and twist, and is therefore a refractory wood from the standpoint of both air seasoning and kiln drying. This fact has always been an obstacle to its commercial exploitation, especially in past years, when the supply of other hardwoods was so large that there was no incentive on the part of wood users to work such a supposedly unsatisfactory wood as red gum. With improved methods of handling and the perfection of kiln-drying practice, red gum came into its own, and today is an important species in many wood-using industries. Among the primary industries it is extensively employed for slack cooperage and is much in demand by veneer mills. Of the secondary industries the box factories, furniture plants, chair makers, and several other classes of wood users demand red gum in large quantities for the manufacture of their products.

In North Carolina in 1919 a total of 40,443,000 feet, board measure, of red gum was used, nearly two-thirds of which was obtained from outside the State. Over 50 per cent of this was converted into furniture. The industry producing vehicles and vehicle parts was the second in importance as far as the quantity consumed is concerned, while large amounts were demanded also by the box and chair factories. The State's consumption of red gum during the year covered by this report by those industries that used it is shown in Table 9.

TABLE 9.—*Consumption of Red Gum in 1919*

Industry	Quantity		Average Cost per M. F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			Grown in State	Grown Outside of State
Furniture	23,475,000	58.04	$ 79.47	$1,865,558.25	2,582,500	20,892,500
Vehicles and vehicle parts	9,240,000	22.85	51.75	478,170.00	7,280,000	1,960,000
Chairs	4,047,000	10.01	95.67	387,176.49	400,000	3,647,000
Boxes and crates	3,000,000	7.42	60.00	180,000.00	500,000	2,500,000
Planing mill products	253,000	.62	113.33	28,672.49	20,000	233,000
Fixtures	178,000	.44	143.33	25,512.74	----------	178,000
Caskets and coffins	150,000	.37	110.00	16,500.00	----------	150,000
Miscellaneous	100,000	.25	70.00	7,000.00	----------	100,000
Totals	40,443,000	100.00	$ 73.90	$2,988,589.97	10,782,500	29,660,500

Yellow Poplar (*Liriodendron tulipifera*).—Yellow poplar, although widely distributed, is seldom the predominant tree in the forest, but is found dispersed through forests of other hardwoods, seldom more than three or four trees in a group. Its range extends from Vermont west to the Lake States and south through Missouri, Arkansas, Mississippi, and Alabama to Florida. It probably reaches its best development

along the tributaries of the Ohio River and on the lower slopes of the high mountains of North Carolina and Tennessee. It grows habitually in deep, rich, moist soil. Yellow poplar is found in all parts of North Carolina, but is most abundant and attains its largest size on the lower mountain slopes of the counties west of the Blue Ridge. The tree is sometimes called tulip poplar, because its blossoms resemble those of the tulip. There is a great difference between the heartwood and sapwood of yellow poplar. The former is yellow in color and derives its name from this fact, while the latter is white and is often called whitewood. This differentiation often leads to the erroneous belief among users of the wood that they are separate species.

The wood of yellow poplar is light, soft, straight-grained, very easy to work, and holds its shape extremely well after drying. In addition it takes and holds paint better, perhaps, than other wood. These properties commend it for many uses and make it a wood of first commercial importance. It is highly prized and much in demand by furniture manufacturers and is converted by them into drawer bottoms, backing, white enamel bureaus, cabinets and chiffoniers, plywood core stock, and many other commodities. Its ability to take paint makes it well adapted for panel work in the vehicle industry.

Twelve industries in North Carolina reported in varying quantities the consumption of yellow poplar in 1919. A total of 21,560,963 feet, board measure, was used, and the furniture manufacturers, the box factories, and the planing mills were the principal consumers. The amounts demanded by the remaining nine industries are shown in Table 10.

TABLE 10.—*Consumption of Yellow Poplar in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Furniture	11,642,000	53.99	$ 45.42	$528,779.64	10,163,000	1,479,000
Planing mill products	3,057,000	14.18	43.90	134,202.30	3,055,000	2,000
Boxes and crates	2,755,000	12.78	35.00	96,425.00	2,755,000	----------
Caskets and Coffins	956,856	4.44	33.61	32,159.93	956,856	----------
Fruit and vegetable packages	848,307	3.93	37.00	31,387.36	135,807	712,500
Vehicles and vehicle parts	657,000	3.05	45.68	30,011.76	639,800	17,200
Fixtures	286,500	1.33	42.50	12,176.25	286,500	----------
Sash, doors and blinds	243,000	1.13	36.75	8,930.25	243,000	----------
Elevators and machine construction	184,000	.85	55.00	10,120.00	184,000	----------
Chairs	160,000	.74	25.00	4,000.00	160,000	----------
Shuttles, spools, and bobbins	10,000	.05	30.00	300.00	10,000	----------
Miscellaneous	761,300	3.53	23.50	17,890.55	761,300	----------
Totals	21,560,963	100.00	$ 42.04	$906,383.04	19,350,263	2,210,700

Chestnut (*Castanea dentata*).—In 1918 North Carolina ranked second in the cut of chestnut lumber, the total production for the State being nearly 49 million feet, board measure. The tree has a wide range, extending from Maine to Michigan and south to Delaware and Tennessee and along the southern Appalachian Mountains to Alabama. In North Carolina its growth is confined principally to the Mountain Region.

The chestnut bark disease has made heavy inroads upon the stands in various sections of the country, especially in the region north of the Potomac River. The chestnut in Pennsylvania has perhaps suffered most. The disease is becoming more serious each year, and according to pathologists is practically certain to extend throughout the range of this important species unless some unforeseen natural occurrence takes place to check its ravages. The disease is a fungus, the spores of which when carried by the wind or other agency into any wound on the trunk or limb of a chestnut tree germinate and cause a spreading canker which girdles the part attacked and eventually kills the tree. The Bureau of Plant Industry of the United States Department of Agriculture recommends that advance infections be destroyed by felling the trees and burning the bark and brush over the stump, so that the surface of the latter is completely charred. Another excellent method is to paint the surface of the stump with creosote and then burn the bark and brush in piles. The disease does not injure the wood, and sound wood cut from dead timber is fully as strong as wood from healthy trees. Service tests conducted by the Forest Service with posts, poles, and crossties cut from healthy, diseased, and dead chestnut have shown that from the standpoint of service and durability there is no difference between infected or blight-killed chestnut and that which is healthy.

The sapwood of standing blight-killed chestnut starts to decay at the end of two years, not because of the disease, but from the effects of insect attack. At the end of four years the sapwood is full of insect burrows and well rotted. During the fifth year after death the bark usually falls from the trunk and the decayed sapwood dries out and peels off, leaving the heartwood hard and sound. If the tree continues to stand the heartwood will become so badly surface-checked as to make it unmerchantable. It is advisable, therefore, for owners of chestnut timber to cut it as soon as infection becomes apparent. If this is not possible, it should at least be removed not later than two years after death before insect injury, decay, and checking have started.

Chestnut is light in weight, easily seasoned, very durable, readily worked, extremely porous, and possesses a very attractive grain. It occupies an important place among the commercial woods included in the hardwood group. Because of its durability it is the leading wood in

the casket and coffin industry, and is extensively employed for fence posts and telephone poles. It also ranks well toward the top in a number of other wood-using industries. Panel and plywood manufacturers as well as furniture factories value it highly for core stock. The grade known to the trade as "sound wormy," which contains numerous small pin worm holes, but is otherwise sound, is considered most suitable for this purpose, for the reason that these holes provide good anchorage for the glue. This grade of chestnut is also largely used by box factories. Chestnut wood is one of the sources from which tannin is obtained and large quantities are employed annually by extract plants for this purpose.

The furniture factories used over 50 per cent of the chestnut demanded by the wood-users of North Carolina in 1919. The second largest users were the makers of caskets and coffins, while four other industries consumed varying quantities. The six industries of the State, which together reported a consumption of nearly 21 million feet, and the quantity that each required in the manufacture of its products during the year are presented in Table 11.

TABLE 11.—*Consumption of Chestnut in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Furniture	11,244,000	53.55	$ 40.53	$455,719.32	10,944,000	300,000
Caskets and coffins	7,852,915	37.40	43.34	340,345.34	7,852,915	----------
Boxes and crates	1,520,000	7.24	50.00	76,000.00	1,520,000	----------
Planing mill products	300,000	1.43	35.00	10,500.00	300,000	----------
Sash, doors, and blinds	50,000	.24	50.00	2,500.00	50,000	----------
Fixtures	30,000	.14	69.00	2,070.00	30,000	----------
Totals	20,996,915	100.00	$ 42.25	$887,134.66	20,696,915	300,000

Black Gum (*Nyssa sylvatica*).—Considerable confusion has always existed in the classification of the various species of the genus *Nyssa*. Three trees are important in this group, namely, black gum (*Nyssa sylvatica*), cotton gum, or tupelo, as it is frequently called (*Nyssa aquatica*), and water gum (*Nyssa biflora*). They are all members of the dogwood family, but are not related to red gum (*Liquidambar styraciflua*). The last two usually grow together in wet lowlands and swamps in company with cypress and southern white cedar. Black gum grows in similar situations, but usually somewhat removed from the other two species and generally on well drained elevations. The wood of the three species of gum so closely resemble each other that it is

difficult to identify them from their external appearance. The wood of cotton gum splits straight and is fairly easy to work. The fiber of black gum and water gum is closely interlocked and the wood is very difficult to work or split. The wood of water gum has a yellowish hue and is darker than that of black gum while cotton gum is lighter in color than either of the other two. Frequently all three of these woods are called merely black gum, lumbermen making no effort to separate them.

Two of the gums occur in North Carolina. They are black gum and cotton gum, although that used was all reported as black gum. Owing to the variation in nomenclature applicable to these trees, however, it is possible that species other than black gum were used. Black gum is extensively utilized by box factories and by the fruit and vegetable package industries. In the latter industry it is usually employed in the form of thick rotary cut veneer. As shown in Table 12, these two industries were the principal consumers of black gum in North Carolina in 1919.

TABLE 12.—*Consumption of Black Gum in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Fruit and vegetable packages	11,505,000	58.93	$ 22.79	$262,198.95	11,505,000	----------
Boxes and crates	7,060,000	36.16	28.63	202,127.80	7,060,000	----------
Furniture	300,000	1.54	23.00	6,900.00	----------	300,000
Sash, doors, and blinds	300,000	1.54	25.00	7,500.00	300,000	----------
Planing mill products	188,000	.96	32.63	6,134.44	180,000	8,000
Handles	150,000	.77	32.00	4,800.00	150,000	----------
Fixtures	20,000	.10	35.00	700.00	20,000	----------
Agricultural implements	1,000	.00	35.00	35.00	1,000	----------
Totals	19,524,000	100.00	$ 25.12	$490,396.19	19,216,000	308,000

Hickory.—Hickory is often referred to as though it were a single species, like red gum or yellow poplar. In reality there are as many as ten different species, the wood of some of them being considered valuable commercially and others not. From the standpoint of commercial use, especially in the manufacture of handles and vehicle stock, the hickories may be divided into two main groups, namely, pecan hickories and true hickories. In the former group are pecan hickory, water hickory, nutmeg hickory, and bitternut hickory. The true hickories comprise principally shagbark hickory, big shellbark hickory, pignut hickory, and mockernut hickory. At one time hickory was available in ample quantities for commercial use in most of the states east and in several imme-

diately west of the Mississippi River. The Ohio and lower Mississippi valleys were the regions of its best development, and here it was found in the greatest abundance. The original supply has been cut to such an extent that at the present time there is an acute shortage. In the states east of the Alleghanies and north of the Potomac River this shortage is especially marked. A few scattered stands are yet to be found west of the Alleghanies and north of the Ohio River. Most of what remains is in the lower Mississippi Valley, Arkansas and Tennessee being the center of production. It is probable that by now the whole hickory-producing territory has been covered by the timber buyers, and that some of the larger companies are working over their old cuttings, taking material which was rejected ten or fifteen years ago.

Eight species of hickory are found in North Carolina. Two of them, bitternut and water hickory, are really pecans, while the other six are true hickories. Bitternut hickory and whiteheart or mockernut hickory occur throughout the State, but reach their best development in the Mountain and Piedmont regions. Scalybark or shagbark hickory is also found in all parts of the State, but is nowhere common, and least so in the Coastal Plain Region. The southern shellbark, small fruited hickory and pale hickory are most important in the Piedmont Region, while water hickory is confined principally to the Coastal Plain Region.

The handle plants and vehicle factories are the largest consumers of hickory, and use over two-thirds of the total annual consumption in the manufacture of their products. The different hickories can be easily distinguished in the tree by their botanical characteristics, but in the form of lumber or other timber products identification is difficult. In fact, lumbermen make little effort to separate them and the wood-using factories usually report the wood merely as hickory. This accounts for the use in this report of only the generic name hickory. Among the trade, however, especially the handle and vehicle manufacturers, the term "second growth" is commonly used, and is intended to mean wide-ringed material of fast growth. Hickory possesses in combination strength, toughness, and elasticity not found in any other commercial wood. These properties are essential where the wood is used for such commodities as spokes and other vehicle stock, axe, adze, pick and hammer handles, picker sticks, and sucker rods.

In North Carolina in 1919 the combined consumption of hickory by the six industries that used it was 9,124,500 feet, board measure. The largest consumers were the vehicle factories. The quantity used by the shuttle, spool, and bobbin industry, as shown in Table 13, was employed in the manufacture of picker sticks and other loom supplies.

TABLE 13.—*Consumption of Hickory in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Vehicles and vehicle parts	5,553,000	60.86	$ 42.46	$235,780.38	4,443,000	1,120,000
Shuttles, spools, and bobbins	1,925,000	21.10	55.71	107,241.75	1,925,000	----------
Handles	1,351,000	14.81	40.71	54,999.21	1,351,000	----------
Planing mill products	280,000	3.07	32.66	9,144.80	275,000	5,000
Furniture	10,500	.11	50.00	525.00	10,500	----------
Boxes and crates	5,000	.05	30.00	150.00	5,000	----------
Totals	9,124,500	100.00	$ 44.70	$407,841.14	7,999,500	1,125,000

Maple.—Two species of maple are cut for lumber in North Carolina, namely, sugar maple, often called hard maple (*Acer saccharum*), and red maple (*Acer rubrum*). The quantity of maple lumber produced in the State, however, is small, being less than one per cent of the total production for the whole country. Of the two kinds of maple mentioned, sugar maple is the most important commercially. It is used for almost as many purposes as oak, and the figured wood which it sometimes produces, known as birds-eye and curly maple, is much in demand. The tree is highly prized for the sap which it yields, from which are made maple syrup and sugar. When standing in the woods it is frequently called sugar tree, but the lumber cut from it usually goes by the name of hard maple. Hard maple makes an excellent floor material and over one-third of the total quantity produced in this country is converted to this use. It is a favorite wood for chairs and large quantities are cut into squares and dimension stock for this purpose. Furniture manufacturers employ it extensively for drawer and extension table slides, while shoe last and bowling pin manufacturers depend upon it altogether for raw material in the manufacture of their products.

The wood-consuming factories of North Carolina used during the year a total of 8,325,000 feet, board measure, of maple. Eighty-seven per cent of this amount went into final manufacture in the planing mills and the chair and furniture factories. The industries that used the balance and the quantities that each consumed are shown in Table 14.

Birch.—With the exception of the paper birch of New England, the well known spool wood, lumbermen rarely separate the various kinds of birch according to species. The only classification used commercially is the differentiation of the wood according to the section of the tree from which it is cut. For example, the heartwood, which is red, is called red birch, while the sapwood, which is white, is called white birch. Lumber

containing both heartwood and sapwood, either separate or together in the same piece, is known as unselected birch. In other words, the determining factor in this classification is whether the wood is heartwood, sapwood, or both heartwood and sapwood. Forty-eight different wood-using industries in this country use birch in varying quantities in the manufacture of their products. Birch, beech, and maple constitute the three woods most used by the hardwood distillation industry. Since the physical and mechanical properties of these woods are so much alike, most of the uses for one are common to the other two. Among the secondary wood-using industries, the planing mills are the largest consumers of birch, the wood that they consume going principally into the manufacture of flooring and interior trim. Birch is an important wood in the veneer industry and large quantities are demanded by the box, furniture, and chair manufacturers.

TABLE 14.—*Consumption of Maple in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Vent			Grown in State	Grown Outside of State
Planing mill products	4,052,500	48.68	$ 56.67	$229,655.18	3,212,500	840,000
Chairs	2,290,000	27.51	45.34	103,828.60	790,000	1,500,000
Furniture	1,030,000	12.37	79.69	82,080.70	637,500	392,500
Boxes and crates	500,000	6.01	30.00	15,000.00	250,000	250,000
Shuttles, spools, and bobbins	400,000	4.80	45.00	18,000.00	250,000	150,000
Elevators and machine construction	42,500	.51	110.00	4,675.00	42,500	----------
Vehicles and vehicle parts	10,000	.12	45.00	450.00	10,000	----------
Totals	8,325,000	100.00	$ 54.50	$453,689.48	5,192,500	3,132,500

Black or sweet birch (*Betula lenta*), red or river birch (*Betula nigra*), and yellow birch (*Betula lutea*) are the species of birch that grow in North Carolina. Sweet birch and yellow birch are confined entirely to the Mountain Region, while red birch is found along streams and on the borders of swamps throughout the State. The industries of the State that reported the use of birch in 1919 were six in number and are shown together with the quantity used by each in Table 15.

Black Walnut (*Juglans nigra*).—Black walnut is one of the valuable timber trees of this country, and is distributed over practically the entire eastern half of the United States. It reaches its best development in the rich bottomlands of southwestern Arkansas and Oklahoma and on the western slopes of the Alleghany Mountains. This wood was of immense importance from a national defense standpoint during the world

war. Millions of gunstock blanks were made of it and large quantities were used for aeroplane propellers. The whole country was literally gone over with a fine-tooth comb to obtain raw material for these wartime uses. The tree is not found in dense stands, but occurs in small groups of a few trees each, which probably accounts for its wide distribution. The wood of black walnut is straight-grained, very easily worked, highly shock-resistant, glues readily, and possesses the ability to hold its shape extremely well when seasoned. Walnut was used during Revolutionary times for gunstocks, and its stability, shock resistance, and workability are the properties that made it highly satisfactory for that use and for propeller manufacture during the war with Germany. Walnut is also important as a furniture wood and is highly prized for veneer. The most attractively figured wood is obtained by the sliced veneer process from stumps, especially those showing burls. These burls are usually on the root of the tree and mostly beneath the surface of the ground. Burls occurring higher up on the trunk or limbs are not especially desirable, since they are more apt to contain cavities. Good burls should have sound, solid wood, and the best are usually turnip-shaped.

TABLE 15.—*Consumption of Birch in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Chairs	650,000	42.61	$ 38.66	$ 25,129.00	650,000	----------
Furniture	405,000	26.55	57.50	23,287.50	285,000	120,000
Fixtures	255,000	16.72	132.50	33,787.50	255,000	----------
Shuttles, spools, and bobbins	100,000	6.55	30.00	3,000.00	100,000	----------
Vehicles and vehicle parts	68,000	4.46	51.00	3,468.00	38,000	30,000
Planing mill products	47,500	3.11	68.33	3,245.68	47,500	----------
Totals	1,525,500	100.00	$ 60.25	$ 91,917.68	1,375,500	150,000

In North Carolina black walnut is found throughout the State, but attains its largest size and is more plentiful in the Piedmont Region. During 1919 the furniture factories and the casket and coffin makers, as shown in Table 16, used together 838,000 board feet of walnut, or all that was consumed in the State.

Dogwood (*Cornus florida*).—The range of dogwood extends from southern New England west to southern Ontario and south to Florida and eastern Texas. Stands of trees with low crowns growing in the forest and overtopped by other species with which they are usually associated are known as an "understory." In North Carolina in the

Coastal Plain Region dogwood forms an understory beneath pine. In the Piedmont and Mountain regions it occupies a similar position under oaks, hickories, and yellow poplar. The tree is frequently called flowering dogwood from the profusion of beautiful white flowers which it bears in the spring. Dogwood was once considered a weed tree, but at the present time is in great demand. The wood is hard, heavy, dense, and has the particular quality of wearing smooth with continued use. These properties, especially the last one mentioned, enable dogwood to meet the exacting requirements for raw material for shuttle blocks. The first three commend it highly for use in the manufacture of golf club heads.

TABLE 16.—*Consumption of Black Walnut in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Furniture	813,000	97.02	$ 206.67	$168,022.71	558,000	225,000
Caskets and coffins	25,000	2.98	37.50	937.50	18,750	6,250
Totals	838,000	100.00	$ 201.62	$168,960.21	576,750	261,250

Persimmon has been found to possess to a greater degree than any other commercial wood the properties of dogwood, and it contributes largely in supplying the demands of the shuttle block and sporting and athletic goods manufacturers.

No persimmon was used by the wood-using factories of North Carolina in 1919, but they consumed over a million and a half feet, board measure, of dogwood, all of which was converted into shuttle blocks and was cut from home-grown timber.

Basswood.—Three species of basswood grow in the United States. The most common is known merely as basswood (*Tilia americana*). The other two are white basswood (*Tilia heterophylla*) and downy basswood (*Tilia pubescens*). All three species occur in North Carolina, but they are so nearly alike that lumbermen do not differentiate between them. Basswood is often called linn, which is an abbreviation of linden, the name applied to a similar species in Europe.

Since basswood is a broad-leaved tree it is classed as a hardwood. The wood, however, is softer than many of the woods included in the softwood group. Because of the annual rings being indistinct and the medulary rays invisible to the naked eye, basswood shows less figure irrespective of the way it is sawed than any other wood. Basswood is easily worked, warps very little, and imparts no taste when used for food containers.

These properties make it especially valuable for chopping bowls, flour buckets, bread boards, and similar woodenware. It is also highly prized by manufacturers of apiarists' supplies.

Such basswood as was consumed by the wood-using industries of North Carolina in 1919 was not employed for any of the uses mentioned in the preceding paragraph. A total of 735,000 feet, board measure, was reported for the year, and the commodities for which it was used were, in the order of importance, planing mill products, caskets and coffins, furniture, and fixtures. The total quantity of basswood used was cut from forests within the boundaries of the State. Table 17 shows by industries the consumption of basswood in North Carolina in 1919.

TABLE 17.—*Consumption of Basswood in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Planing mill products	400,000	54.42	$ 40.00	$ 16,000.00	400,000	----------
Caskets and coffins	175,000	23.81	110.00	19,250.00	175,000	----------
Furniture	150,000	20.41	75.00	11,250.00	150,000	----------
Fixtures	10,000	1.36	85.00	850.00	10,000	----------
Totals	735,000	100.00	$ 64.42	$ 47,350.00	735,000	----------

Ash.—Fifteen or sixteen different kinds of ash grow in the United States. Some of them occur in restricted areas, but most of them are widely distributed. As is the case with birch and gum, lumbermen rarely differentiate between species. Ash is another very important commercial wood, and is used in the manufacture of a wide range of commodities made wholly or partly of wood. It has always been extensively employed and highly prized by horse-drawn vehicle manufacturers, who use it for shafts, top bows, felloes, panels, and many other parts. The automobile industry depends upon it very largely for raw material, especially for body frames, running boards, storage battery boxes, floor boards, and many other uses. Its value to both industries is attributable to the fact that it is strong, tough, and elastic. These properties commend it for use in the manufacture of agricultural implements and for certain kinds of sporting and athletic goods, such as tennis rackets, baseball bats, and skis. It is the premier wood for handles for pitchforks, rakes, hoes, shovels, and other farm and garden tools and large quantities are converted annually to this use. Because it imparts no taste or odor when used as a food container, ash has always been a favorite wood for butter tubs and lard tierces.

White ash (*Fraxinus americana*), green ash (*Fraxinus lanceolata*), red ash (*Fraxinus pennsylvanica*), and water ash (*Fraxinus caroliniana*) are the four principal members of the ash family found in North Carolina. As is customary in the trade, the wood-using factories of the State which reported a consumption of ash in 1919 did not indicate the species used. The total quantity of ash that went into final manufacture during the year was 627,000 feet, board measure. This was all home-grown wood and was consumed by those industries engaged in the manufacture of agricultural implements, chairs, fixtures, handles, and vehicles. The quantities each used are shown in Table 18.

TABLE 18.—*Consumption of Ash in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Chairs	375,000	59.81	$ 55.00	$ 20,675.00	375,000	----------
Handles	150,000	23.92	42.00	6,300.00	150,000	----------
Vehicles and vehicle parts	91,000	14.51	47.50	4,322.50	91,000	----------
Fixtures	10,000	1.60	35.00	350.00	10,000	----------
Agricultural implements	1,000	.16	35.00	35.00	1,000	----------
Totals	627,000	100.00	$ 50.45	$ 31,632.50	627,000	----------

Beech (*Fagus atropunicea*).—Beech grows in all states east and in several immediately west of the Mississippi River. Since the wood of beech is rather difficult to season and frequently warps and checks when in place even after it has been thoroughly dried, it does not compare in quality with its associates, the maples and birches. At one time it was considered an inferior wood and was seldom cut for lumber. Later, however, beech and other species in its class were called on to meet the increasing demands for wood, so that at present the annual sawmill output of beech lumber exceeds 190,000,000 feet, New York, Michigan, and Pennsylvania being the three states in the order given which lead in its production. Beech is an important wood in the slack cooperage industry, large quantities going annually into heading and staves. It is also manufactured considerably into flooring, that of the special grade of "Red Clear" beech possessing a rich warm color peculiar to no other wood used for this purpose. Beech is much in demand by brush manufacturers, who use it for backs of scrubbing and other cheap brushes. It is the principal wood used for clothes pins, and wood turners value it highly as raw material for the manufacture of their products.

Beech occurs in North Carolina throughout the State. It is found sparingly in the form of small trees in the Coastal Plain Region, more commonly and of larger growth in the Piedmont Region, and most abundantly and of greatest size in the Mountain Region. The quantity of beech lumber produced in the State is small, the cut of the few mills that reported in 1921 being slightly in excess of 1½ million feet, board measure. The total quantity used by the wood-consuming factories of North Carolina in 1919 was 205,000 feet, and was used for bobbins, chairs, and furniture. All of the wood used was obtained from sources within the State, and its distribution among the industries that used it is shown in Table 19.

TABLE 19.—*Consumption of Beech in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Shuttles, spools, and bobbins	100,000	48.78	$ 30.00	$ 3,000.00	100,000	.....
Furniture	80,000	39.02	42.00	3,360.00	80,000	.....
Chairs	25,000	12.20	35.00	875.00	25,000	.....
Totals	205,000	100.00	$ 35.29	$ 7,235.00	205,000	.....

Yellow Buckeye (*Aesculus octandra*).—Although buckeye has rather an extensive range, it is, from the standpoint of lumber production, considered a minor species among the commercial woods of the United States. West Virginia, Virginia, Tennessee, and North Carolina were the only states that reported a cut of buckeye in 1921, which amounted to less than 4 million feet, board measure. Buckeye reaches its best development in the Alleghany Mountains of North Carolina and Tennessee. The wood often loses its identity and goes to market mixed with yellow poplar. Artificial limb manufacturers sometimes employ it as raw material for their product, in which case it is called for by name. The wood is light in weight, cross-grained, soft, and rather difficult to split. In color it is almost white, and the line of demarcation between heartwood and sapwood so indistinct as to be hardly distinguishable. The furniture factories and the makers of caskets and coffins were the only two industries that reported a consumption of wood of this species in North Carolina in 1919. They used together 200,000 feet, board measure, 85 per cent of which was cut from home-grown timber. The quantities consumed by each are shown in Table 20.

TABLE 20.—*Consumption of Buckeye in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Furniture	125,000	62.50	$ 112.50	$ 14,062.50	100,000	25,000
Caskets and coffins	75,000	37.50	90.00	6,750.00	75,000	----------
Totals	200,000	100.00	$ 104.06	$ 20,812.50	175,000	25,000

Sycamore (*Platanus occidentalis*).—This is a very common tree that grows in rich, moist soil, generally near streams, and is found in most of the states east of the Mississippi and in several west of that river. It is often called "buttonwood' and "button ball," getting its name from the similarity of its fruit to a button ball. The tree is easily distinguished by the appearance of its upper branches, from which the outer bark usually peels, leaving the stark white inner bark. Sycamore, perhaps, attains greater diameter than any other American hardwood, trees measuring twelve to fifteen feet having been known. As a general rule, however, such trees are hollow-butted, sound trunks being found only in trees of approximately 24 inches and less in diameter. The wood of sycamore has a distinct grain, somewhat contorted. It is hard, heavy, moderately strong and durable, moderately difficult to season and work, and does not hold its shape well. The choicest material goes to the furniture factories and is rift-sawed, which exposes the broad medullary rays as in quartered oak. The contrast is much more marked, however, in sycamore than in oak and the general appearance of the wood is most pleasing to the eye. Sycamore is a favorite wood for use in the manufacture of butchers' blocks, for which purpose it is usually cut into small blocks that are set on end and bolted together. Considerable quantities are also utilized for meat skewers.

Sycamore grows in North Carolina in all parts of the State, but attains its best size along the edges of the alluvial swamps of the Piedmont Region and is least abundant in the Coastal Plain Region. As shown in Table 21, only 112,000 board feet of this wood was used in the State in 1919, and the industries that consumed it were the furniture factories and fixture manufacturers.

Locust.—Two species of locust occur in North Carolina and both are found in the Mountain Region. They are black or yellow locust (*Robinia pseudacacia*) and honey locust (*Gleditsia triacanthos*). The former is the most important of the two species commercially and was demanded in huge quantities during the war with Germany. Its wartime use con-

sisted of its manufacture into treenails, which are long, round, wooden pins, either straight or tapered, used to fasten the timbers of wooden ships together. These treenails were required by the United States Shipping Board Emergency Fleet Corporation in connection with its wooden ship construction program. Since contracts were let for 375 wooden vessels, each requiring from 30,000 to 50,000 treenails, some idea of the demand for locust for national defense purposes can be obtained. As in the case of walnut, the entire country was covered in order to get sufficient raw material for this purpose. Honey locust is an extremely porous wood and was otherwise found unsuitable as treenail material. Black locust, on the other hand, is a hard, dense wood of great durability, and one which shrinks less than any other commercially important wood found in this country. Black locust is employed extensively for fence posts and has been known to give upward of forty years service in the ground. It is also much in demand for insulator pins and brackets and tie plugs.

TABLE 21.—*Consumption of Sycamore in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Furniture	100,000	89.29	$ 60.00	$ 6,000.00	65,000	35,000
Fixtures	12,000	10.71	35.00	420.00	12,000	----------
Totals	112,000	100.00	$ 57.32	$ 6,420.00	77,000	35,000

Table 22 shows that the wood-using factories of North Carolina consumed 370,000 feet, board measure, of locust in 1919. All of the wood was State-grown and was converted into loom parts and insulator pins.

TABLE 22.—*Consumption of Locust in 1919*

Industry	Quantity		Average Cost per M. Feet, F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B.M.	Per Cent			Grown in State	Grown Outside of State
Shuttles, spools, and bobbins	350,000	94.59	$ 40.00	$ 14,000.00	350,000	----------
Miscellaneous	20,000	5.41	50.00	1,000.00	20,000	----------
Totals	370,000	100.00	$ 40.54	$ 15,000.00	370,000	----------

Elm.—White elm (*Ulmus americana*), slippery elm (*Ulmus pubescens*), cork elm (*Ulmus racemosa*), winged elm (*Ulmus alata*), and cedar

elm (*Ulmus crassifolia*) are the five species of this genus which produce the supply of elm wood in the United States. The proportion which each contributes to the lumber industry is not known, since they are often mixed together, and when included in statistical reports by lumbermen and wood users are merely listed as "elm." In this report no attempt has been made to separate the various species. White elm, often called American elm, is by far the most important species from the standpoint of lumber production.

Three of the five species of elm mentioned above occur in North Carolina. They are white elm, winged elm, and slippery elm. None of them are commercially important, however, as evidenced by the fact that the total production of elm lumber by those sawmills of the State that reported in 1921 was only 74,000 feet, board measure. The wood-using factories of North Carolina consumed but 6,500 board feet of elm in 1919, all of which was home-grown and went into the manufacture of vehicles and vehicle parts.

Cottonwood (*Populus heterophylla*).—Such timber of this species as grows in North Carolina is for the most part well scattered. It is usually found in the Piedmont Region along streams and on rich swampy lands, but is not an important commercial tree in the State. Cottonwood belongs to the poplar family, as do also the aspens. In Virginia it frequently goes by the name of Carolina poplar. Cottonwood is easy to season, works well, and is extensively employed for vehicle body panels, woodenware, soft drink cases, and a number of other purposes where a white wood with practically no figure is required. The box factories of the State, which in 1919 used 2,000,000 feet of this wood, were the only manufacturers that reported the consumption of cottonwood. All of the wood of this species used was obtained from sources outside the State.

Mountain Laurel (*Kalmia latifolia*).—Mountain laurel is a small evergreen hardwood tree which usually attains an average height of from 10 to 15 feet, although trees as large as 20 inches in diameter and 40 feet high have been known. Its range is very wide, extending from New Brunswick and Lake Erie to western Florida and through the Gulf States to western Louisiana and Arkansas. It reaches its best development in the southern Alleghany Mountains, where it often forms dense thickets.

In North Carolina it is found sparingly in the Coastal Plain Region, and to a greater extent in the Piedmont Region. It is most abundant, however, in the Mountain Region, where it is known locally as "ivy." Commercially the mountain laurel is valuable for its large, burl-like roots, which are used in the manufacture of smoking pipes. It serves

as an excellent substitute for the genuine French briar, and in the form of the finished product it is difficult to differentiate them. All of the 15,000 feet of mountain laurel reported by the wood-using factories of North Carolina in 1919 was converted into smoking pipes, and was obtained from sources within the State.

FOREIGN WOODS

Two foreign woods were employed by the wood-using factories of North Carolina in 1919. They were mahogany and rosewood. The furniture industry used 7,500 feet, board measure, and the manufacturers of fixtures 25,000 feet of the former, while the entire amount of 25,000 feet of the latter was consumed by the furniture makers.

PART III

INDUSTRIES

The various species of wood which the wood-using factories of North Carolina employ as raw material in the manufacture of their products, their botanical relations, source of supply, and in some instances their properties, have been discussed in Part I of this report. Part II deals with the various factories which use the different woods and considers the processes of manufacture employed and the extent to which the woods are utilized according to the respective properties of each. In North Carolina a total of 14 industries used 493,151,871 board feet of lumber in 1919, and Table 23 shows how the total consumption was apportioned among them. The largest industry required 150,503,000 board feet of wood and the second in importance utilized 109,776,077 board feet, while the smallest used 962,500 board feet. Six other industries demanded more than 15,000,000 board feet. Several small industries represented by less than three concerns each were grouped together under the heading "Miscellaneous" for the reason that if they were shown separately the figures presented would reveal the individual operations of the firms which reported. The industries presented in Table 23 have been arranged according to the quantity of wood used.

In North Carolina the handle factories and those making agricultural implements were the only two industries which obtained their entire supply of raw material from home-grown wood. The remaining twelve industries obtained the major portion of their wood from sources within the boundaries of the State. The chair factories employed a larger percentage of wood obtained from outside the State than any of the other industries, while the makers of caskets and coffins used the least quantity of shipped-in wood.

As previously stated, the total consumption of wood by the wood-using industries of North Carolina in 1919 was 493,151,871 feet, board measure, which cost delivered at the factories $19,875,788. In 1909, or ten years previous, the amount of wood used was 676,166,250 board feet with a total delivered value of $9,577,242. With these figures before us it is of interest to note that although the quantity of wood used in 1919 was less than the amount reported in 1909 by 183,014,379 board feet, the price paid for the 1919 consumption was more than double the cost of that used in 1909.

TABLE 23.—*Consumption of Wood in North Carolina in 1919, by Industries*

Industry	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply			
					Grown in North Carolina		Grown Out of North Carolina	
	Feet, B. M.	Per Cent			Quantity	Per Cent	Quantity	Per Cent
Planing mill products	150,503,000	30.52	$ 33.54	$ 5,047,181	133,750,800	88.87	16,752,200	11.13
Boxes and crates	109,776,077	22.26	31.04	3,407,479	103,556,077	94.33	6,220,000	5.67
Furniture	98,946,000	20.06	58.04	5,742,749	69,568,500	70.31	29,377,500	29.69
Chairs	31,627,000	6.41	63.08	1,994,920	21,126,500	66.80	10,500,500	33.20
Vehicles and vehicle parts	27,867,000	5.65	43.30	1,206,710	23,739,800	85.19	4,127,200	14.81
Fruit and vegetable packages	22,791,897	4.62	23.38	532,882	22,079,397	96.87	712,500	3.13
Sash, doors, and blinds	16,608,000	3.37	33.60	558,015	14,898,000	89.70	1,710,000	10.30
Caskets and coffins	16,469,897	3.34	39.33	647,708	16,232,647	98.50	237,250	1.44
Elevators and machine construction	4,949,500	1.00	29.01	143,573	4,356,500	88.02	593,000	11.98
Shuttles, spools and bobbins	4,685,000	.95	43.65	204,492	4,535,000	96.80	150,000	3.20
Handles	2,991,000	.61	33.50	100,189	2,991,000	100.00		
Fixtures	2,216,500	.45	72.37	152,902	1,877,500	84.71	339,000	15.29
Agricultural implements	962,500	.20	12.47	48,381	962,500	100.00		
Miscellaneous	2,758,500	.56	32.12	88,607	2,658,500	96.37	100,000	3.63
Totals	493,151,871	100.00	$ 40.30	$ 19,875,788	422,332,721	85.64	70,819,150	14.36

Planing Mill Products.—The manufactured products belonging to this industry include such commodities that come within the scope of interior and exterior house trim as flooring, siding, ceiling, partition, and stock mouldings. It does not, of course, include lumber, either rough or dressed, used for building construction which needs no further change than can be made with a hatchet, chisel, or saw to fit it in place.

Over 25 per cent of the lumber cut of the United States is demanded for the making of products belonging to this industry and more wood in a greater variety of species enters this line of manufacture than any other. It is to be expected, therefore, that these same facts apply to North Carolina, and that in this report the planing mill industry takes first place in point of wood consumed. Table 24, following, lists the kinds and amounts of wood used in this industry during the period covered by this report. It does not, however, represent the total lumber requirements of the State in this line, for the reason that considerable quantities of these products are shipped into the State in finished form by large lumber companies which operate planing mills in conjunction with their sawmills and by factories that manufacture ready-cut houses. A glance at Table 24 shows that fifteen different kinds of wood were used by the North Carolina manufacturers of planing mill products. North Carolina pine heads the list with 125,734,000 board feet, or nearly 84 per cent of the total amount of wood consumed by the industry. Longleaf pine and oak rank second and third respectively, each contributing approximately 5 per cent of the total quantity used. The supply of basswood, chestnut, cypress, birch, cedar, and those woods included under "miscellaneous" was obtained entirely from the forests of the State. Of the balance of the woods listed all but one were obtained in much larger quantities from within the State than from without. Of the total of 150,503,000 board feet of wood used by this industry more than 88 per cent was cut from the forests of North Carolina. This is indicative of the importance which the forests bear to the commercial development of the State. The planing mill industry is not only one of the most prominent wood-using industries of the State, but also one that more strongly appeals to the interest of every class of citizen. In order to keep constant the supply of wood which the State contributes for building material and, if possible, to increase this supply in the future, it is essential that the forests be adequately protected and improved with this object in view. The State has perfected and has had enacted a law embodying an excellent forest policy covering all phases of the subject. If sufficient funds for fully carrying out the provisions of this law are provided and popular support given much will have been accomplished to help solve the problem of a future timber supply.

A. The manufacture of box shooks for canned food packages. North Carolina pine is the wood used.

B. Interior of a small North Carolina box factory.

TABLE 24.—*Wood Used for Planing mill Products in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Pine, North Carolina	125,734,000	83.54	$ 31.12	$3,912,511	112,842,000	12,892,000
Pine, longleaf	7,750,000	5.15	43.31	335,652	5,695,000	2,055,000
Oak	7,545,000	5.01	41.87	315,909	6,853,000	692,000
Maple	4,052,500	2.69	56.67	229,655	3,212,500	840,000
Poplar, yellow	3,057,000	2.03	43.90	134,202	3,055,000	2,000
Pine, white	610,000	.41	57.50	35,075	584,800	25,200
Basswood	400,000	.27	40.00	16,000	400,000	.....
Chestnut	300,000	.20	35.00	10,500	300,000	.....
Hickory	280,000	.19	32.66	9,145	275,000	5,000
Gum, red	253,000	.17	113.33	28,672	20,000	233,000
Gum, black	188,000	.13	32.63	6,134	180,000	8,000
Cypress	50,000	.03	60.00	3,000	50,000	.....
Birch	47,500	.03	68.33	3,246	47,500	.....
Cedar	36,000	.02	30.00	1,080	36,000	.....
All other	200,000	.12	32.00	6,400	200,000	.....
Totals	150,503,000	100.00	$ 33.54	$ 5,047,181	133,750,800	16,752,200

Boxes and Crates.—In reports of this kind prepared in the past for other states an effort was made to secure data on the wood used for boxes from every possible source. In this connection the information was solicited not only from box factories but also from all manner of manufacturing plants that maintain a packing department for the making of packages and containers. Such establishments included glass factories, paper mills, machinery manufacturers, makers of electrical goods, wholesale dry goods stores, and similar concerns. In the preparation of this report, however, these various classes of consumers were omitted, the figures presented in Table 25 merely showing the consumption of wood by those firms engaged in the manufacture of boxes. Boxes are used for so many different purposes that it is impractical to attempt to list them. They may, however, be separated into two main groups, those which are fully made up and ready for use and the knocked-down box, the component parts of which are more frequently referred to as box shooks. The former includes the nailed box, the wirebound box, the lock cornered box, and the dovetailed box. Nailed boxes are rarely ever shipped in any other than the shook form, those that are made up ready for use usually being sold in the same locality in which they are made. The wirebound box is made either of thin, resawn lumber or of sheets of thick veneer. In either case it is usually reinforced with cleats and further strengthened with wire or metal strapping. This is one of the types of boxes used for the shipment of canned food. Even though the poorest grades of lumber are mostly used for the manufacture of

boxes, the shortage of raw material even in this wood-using industry is reflected by the increased use of veneer. This type of package is particularly well adapted for the shipment of light-weight material, such as dry goods, millinery, men's hats and furnishings, etc. Strength is given to the container by the use of mortised and tenoned cleats and wire or metal strapping. The veneer box is less expensive than the solid wood box, and furthermore, since it is lighter in weight, effects a saving in freight charges on a shipment. For an especially strong box of minimum weight plywood is employed. In this type of box the top, bottom, and sides are made of three sheets of veneer glued together, the direction of the grain of the center sheet or core running at right angles to the grain of the two outer sheets or plys. In addition to its strength and light weight the one-piece faces of the plywood box present a very attractive appearance. Boxes of this type are also strengthened with cleats and in some cases they are wire or metal bound. The raw material required for both the veneer and plywood box is usually cut by the rotary or sliced veneer processes. Since cheap veneer woods, principally the gums, are more plentiful in the South, most of the panel makers are located there, and large quantities of this class of boxes in the form of shooks are shipped from North Carolina and other states in the Southern Appalachian Hardwood Region annually.

Shooks are knocked-down boxes so made that they readily and neatly fit when nailed together, and to facilitate assembling, are systematically bundled. The manufacture of shooks includes both boxes and knocked-down crates. At one time any kind of lumber, either rough or dressed, in practically any color, thickness, or width used to do for boxing and crating, and the lumber yard rather than the box factory served as the source of supply. Today manufacturing plants using wooden containers for the shipment of their products give considerable attention to their packages and exercise care in the matter of construction. As a consequence, the factories making box shooks are also called upon to furnish neat and well designed crates. These are usually put up in unit bundles and in their manufacture particular attention is given to the size, kind, and thickness of the material used, dependent upon the weight, form, and character of the goods to be shipped. At the present time well designed and attractively branded packages for the shipment of merchandise constitute an excellent advertising medium, the general public being quick to recognize the make of goods which the box or crate contains without further identification being necessary.

Those factories in North Carolina making boxes and crates consumed the second largest quantity of wood. The thirty firms engaged in this industry which reported used during the year 1919 a total of 109,776,077

board feet of wood. Fourteen different species of wood were employed in varying quantities, North Carolina pine taking first place with 71,980,000 feet, board measure, or 65 per cent of the total consumption by the industry. The average price f. o. b. factory paid for North Carolina pine by the box makers in 1919 was $26.49 per thousand board feet, or nearly three times what this material brought ten years previous. Longleaf pine ranked second, the quantity used being 10,653,077 feet, while black gum was third, with 7,060,000 board feet. Of the total quantity of wood used for boxes, over 94 per cent was obtained from the forests of the State. The entire quantity used of eight of the fourteen woods listed was obtained from sources within the State. Cottonwood was the only species the entire supply of which was obtained from sources outside the State.

The statistics of the United States Forest Service show that in 1921 North Carolina ranked twelfth among the several states in the production of eastern hemlock. In view of this fact it is surprising to note that the quantity of this wood, which is cheap and otherwise well adapted for box manufacture, was so small. A plausible explanation would be, however, that since low-grade hemlock is used for pulp as well as boxes, the bulk of the wood of this quality that was used was consumed by the pulp mills. North Carolina pine, white pine, red gum, black gum, yellow poplar, cottonwood and hemlock are all favorite box woods and enter principally into the manufacture of packing boxes used in commerce. The other woods listed in Table 25 are rarely used for this purpose, but are frequently employed for fancy or novelty boxes for special use.

TABLE 25.—*Wood Used for Boxes and Crates in North Carolina in 1919*

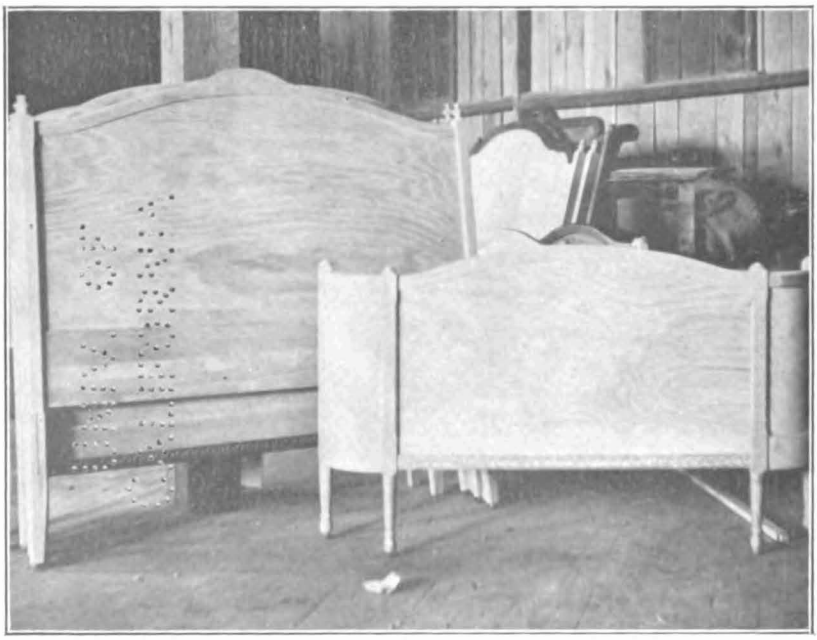
Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Pine, North Carolina	71,980,000	65.57	$ 26.49	$ 1,906,928	71,010,000	970,000
Pine, longleaf	10,653,077	9.70	35.38	376,906	10,653,077	.....
Gum, black	7,060,000	6.43	28.63	202,128	7,060,000	.....
Pine, white	4,942,000	4.50	37.67	186,165	4,942,000	.....
Gum, red	3,000,000	2.73	60.00	180,000	500,000	2,500,000
Poplar, yellow	2,755,000	2.51	35.00	96,425	2,755,000	.....
Oak	3,347,000	3.05	47.92	160,388	2,847,000	500,000
Cottonwood	2,000,000	1.82	75.00	150,000	.....	2,000,000
Chestnut	1,520,000	1.39	50.00	76,000	1,520,000	.....
Hemlock	1,028,000	.94	40.00	41,120	1,028,000	.....
Maple	500,000	.46	30.00	15,000	250,000	250,000
Hickory	5,000	*	30.00	150	5,000	.....
All other	986,000	.90	16.50	16,269	986,000	.....
Total	109,776,077	100.00	$ 31.04	$3,407,479	103,556,077	6,220,000

*Less than .005 per cent.

Furniture.—In accordance with the last official statistics that were gathered, North Carolina ranked first among the several states in the consumption of wood for use in the manufacture of furniture, the city of High Point being the center of the industry. Since, however, the quantity of wood used in 1919 by the furniture makers of the State was less by approximately 35 million feet than was reported in 1909, it is probable that North Carolina does not still hold first place in the industry. The factories of the State engaged in this line of manufacture make all classes of furniture from the cheap kitchen table to the high-priced piano-finished parlor suit. For the most part, furniture may be separated into two main groups: (1) Commodities that are more important from a utilitarian standpoint, such as cupboards, ice boxes, and refrigerators; (2) articles in which the appearance of the finished product is as important as its lasting qualities. This second class comprises dining room, living room, library, parlor, and bed room furniture, all of which is usually purchased with the object in view of having it harmonize with the other appointments of the room in which it is to be placed, as well as to tone in with the general interior decorative scheme of the house as a whole. In the preparation of the 1909 report on the wood-using industries of North Carolina, the two classes of furniture mentioned above were kept separate and considered as separate industries. In this report, however, owing to the form in which the original data were collected, it was found impracticable to segregate them. As was the case in the previous North Carolina report, however, the manufacture of chairs has been considered as a separate industry. This is done because of the fact that the economic conditions existing in the chair industry are distinctly different from those of the furniture industry. For example, the form of the raw material is different, the processes of manufacture are in no way alike, and in the marketing of the products they are usually kept separate.

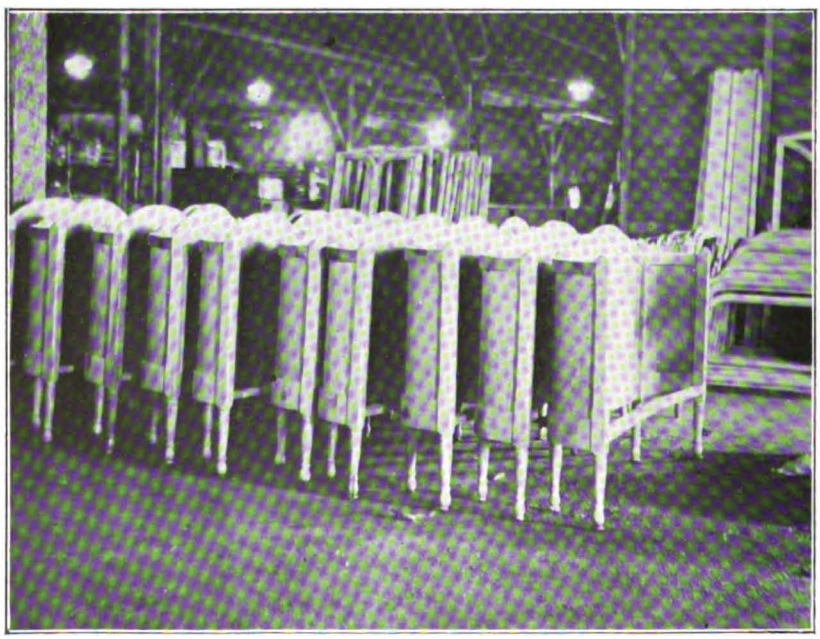
Furniture makers demand various kinds of wood. In fact, the number of woods used by this industry in North Carolina was greater than was reported by any other discussed in this report. The wide variation in classes and grades of furniture makes this necessary. Some are constructed for the most part of costly woods; others entirely of cheap material. Even in the manufacture of expensive furniture, however, it is customary to employ cheap plain woods for interior hidden parts, and reserve the finer ones for the outside finish. An ideal in high-grade furniture manufacture, and one that is sought after in well organized, up-to-date factories, is the production of a product which not only presents a pleasing appearance, but from a practical point of view is constructed of the most suitable material available for the purpose.

PLATE IV

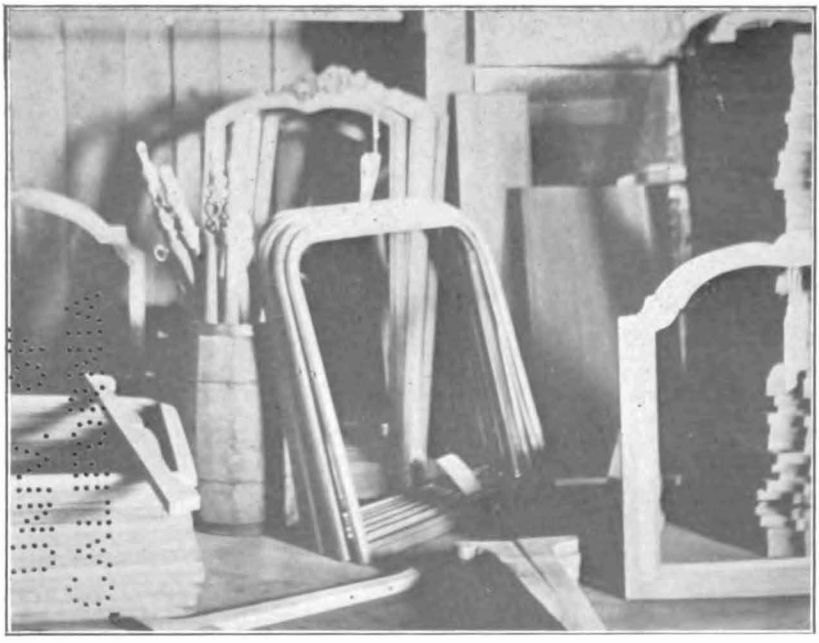


A wooden bedstead of oak in the "white," or before any finish of any kind is applied. The framework is solid wood, and plywood is used for the panels.

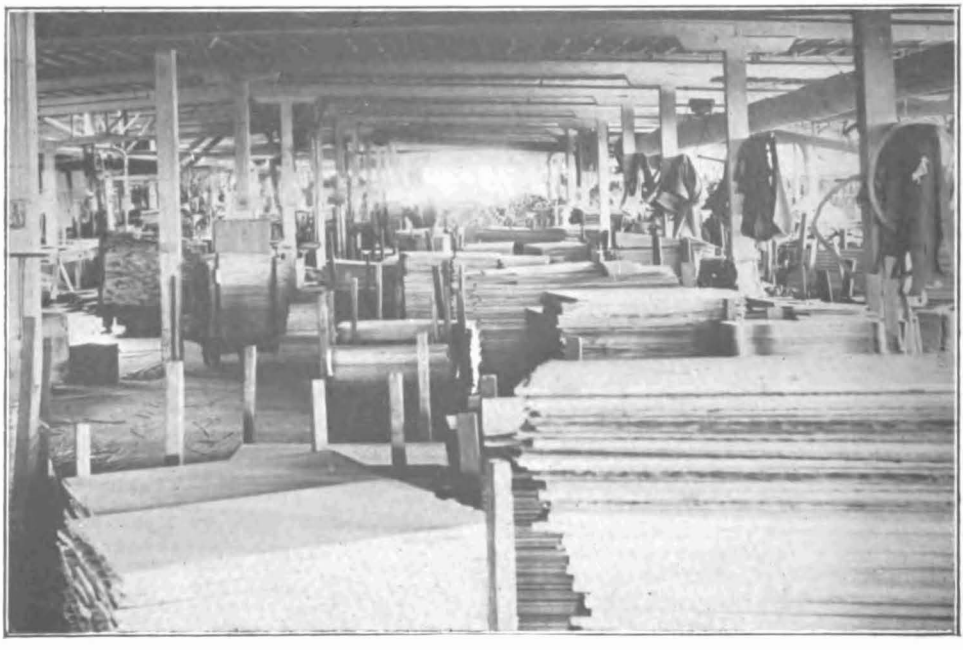
A. Higher grade walnut bedroom pieces in a North Carolina furniture factory. The chairs to the right are finished in old ivory and have cane seats.



B. Interior of a North Carolina factory devoted to the manufacture of bedroom furniture. The articles shown consist of footboards of wooden beds.



A. Mirror frames for bureaus, chiffoniers, and dressing tables as produced by a North Carolina manufacturer of bedroom furniture.



B. The glue-room of a large North Carolina furniture factory.

From the standpoint of quantity used, oak is the most important furniture wood in this country. Even in those states where the supply of standing timber of this species is extremely limited it leads all other woods. Iowa, Minnesota, and Michigan are examples. On the other hand, in those regions where other furniture woods are more plentiful, such as red gum in the southern Mississippi Valley, oak still leads in quantity consumed. Red gum, maple, birch, and yellow poplar in the order named are the other woods demanded in the greatest quantity by furniture factories.

The bulk of the cheaper grades of furniture are constructed of solid wood, as are also some of the better grades, such as the poplar mission type. For this class of furniture woods with pronounced grain are most commonly used, such as oak, ash, chestnut, etc. The more costly pieces of furniture, where one of the main objects is to show an attractive figured surface, are constructed mainly of built-up wood. This character of construction is in general use throughout the furniture industry, and consists of the manufacture of various furniture parts out of several laminations of wood glued together. In the construction of built-up wood or plywood, the name by which it is most commonly known, the inside layer or core is usually of some soft, porous, coarse-grained wood, such as chestnut, ash, or yellow poplar, which possesses the particular quality of absorbing and holding glue well. To each side of this core, which varies considerably in thickness according to the use to be made of the plywood, is glued a thin sheet of finish wood, or face veneer, as it is known in the trade, the grain of which runs at right angles to the core. Such construction is much stronger than solid wood, and will hold its shape better. In addition, the method followed in cutting veneer makes it possible to obtain a wonderful, natural figure in the wood. Hence, in furniture made of plywood a far more beautiful outside appearance from the standpoint of grain can be secured than is possible in solid wood construction. The use of veneer in furniture making dates back to Colonial days, many of the antique pieces of that time being constructed in this manner, with the exception that the core was of the same wood, usually mahogany or walnut, as the face veneer.

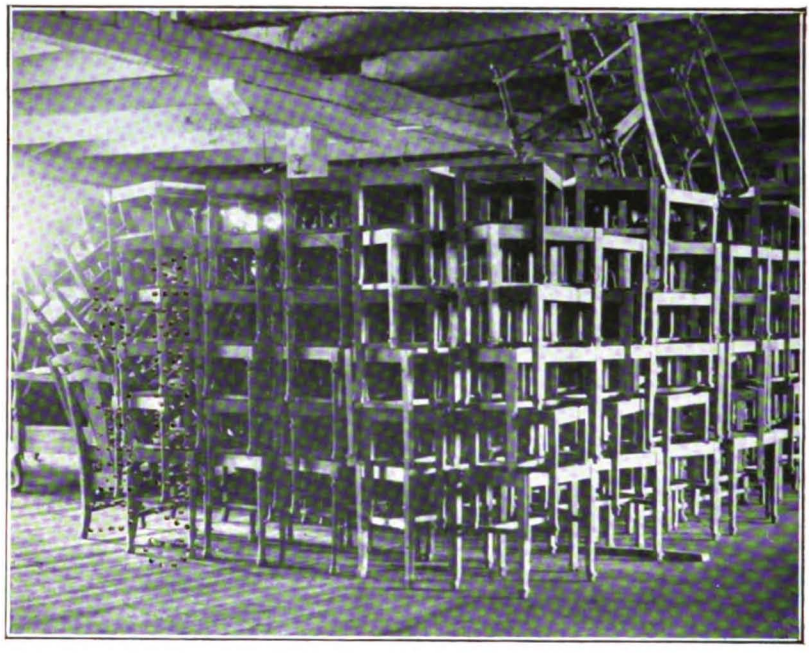
Table 26 gives in the order of their importance from the standpoint of quantity used the various woods used for furniture in North Carolina in 1919. Oak was most in demand, the quantity used being 40,465,000 board feet, or nearly 41 per cent of the total consumption. Red gum occupied second place with 23,475,000 board feet, and was followed in the order named by yellow poplar, chestnut, North Carolina pine, and maple. All of the 13 other woods shown were used in quantities of less than 1,000,000 feet, while mahogany, an important furniture wood, contributed only 7,500 board feet.

Oak, chestnut, North Carolina pine, and sycamore were the woods employed by the North Carolina furniture factories for frame work. Principally because of their ability to wear smooth sugar maple and ash were used for drawer and extension table slides. As mentioned above, soft, coarse grained, porous woods are considered best for core stock, and chestnut, yellow poplar and North Carolina pine supplied the demand. Oak, red gum, black walnut, birch, rosewood and mahogany were the principal woods used for exterior finish. Yellow poplar possesses to a marked degree the property of taking paint well and in this connection serves admirably as a finish wood for white enameled furniture. White pine, basswood, black gum, sycamore, and beech served for drawer bottoms, partitions, shelving and other inside work. Since the wood scours white and is thus easily kept clean, buckeye is valued for kitchen table tops, while for kitchen safes and cabinets yellow poplar, gum and the lower grades of oak were used. Nearly 100 million feet of wood were used by the industry during 1919, and of this quantity over 70 per cent was cut from forests of the State.

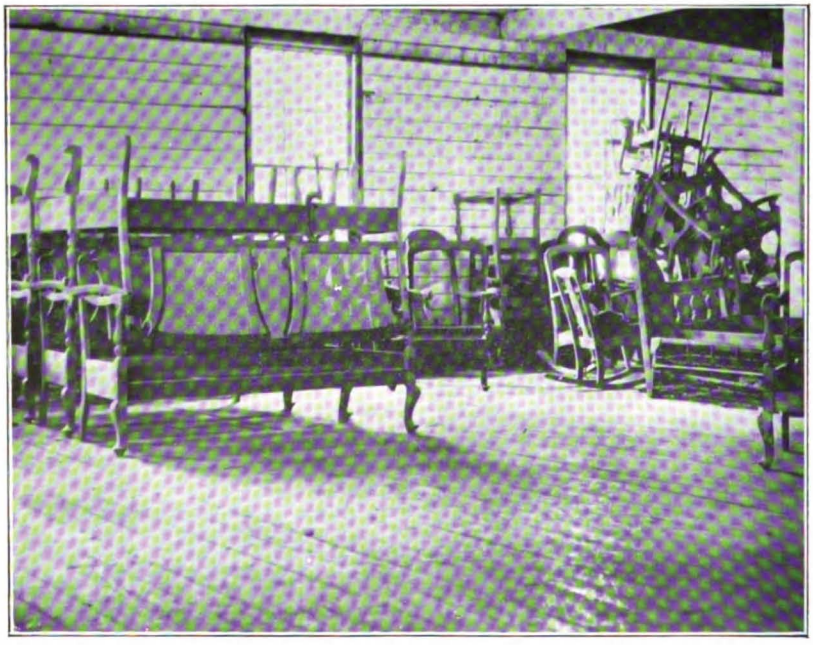
TABLE 26.—*Wood Used for Furniture in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Oak	40,465,000	40.90	$ 57.33	$ 2,319,858	35,309,000	5,156,000
Gum, red	23,475,000	23.72	79.47	1,865,558	2,582,500	20,892,500
Poplar, yellow	11,642,000	11.77	45.42	528,780	10,163,000	1,479,000
Chestnut	11,244,000	11.36	40.53	455,719	10,944,000	300,000
Pine, North Carolina	8,773,000	8.87	26.55	232,945	8,433,000	340,000
Maple	1,030,000	1.04	79.69	82,081	637,500	392,500
Walnut, black	813,000	.82	206.67	168,023	558,000	255,000
Birch	405,000	.41	57.50	23,288	285,000	120,000
Gum, black	300,000	.30	23.00	6,900	----------	300,000
Basswood	150,000	.15	75.00	11,250	150,000	----------
Buckeye	125,000	.13	112.50	14,062	100,000	25,000
Sycamore	100,000	.10	60.00	6,000	65,000	35,000
Beech	80,000	.08	42.00	3,360	80,000	----------
Pine, longleaf	50,000	.05	70.00	3,500	----------	50,000
Pine, white	50,000	.05	40.00	2,000	50,000	----------
Rosewood	25,000	.03	450.00	11,250	----------	25,000
Hickory	10,500	.01	50.00	525	10,500	----------
Mahogany	7,500	.01	350.00	2,625	----------	7,500
All other	201,000	.20	25.00	5,025	201,000	----------
Totals	98,946,000	100.00	$ 58.04	$5,742,749	69,568,500	29,377,500

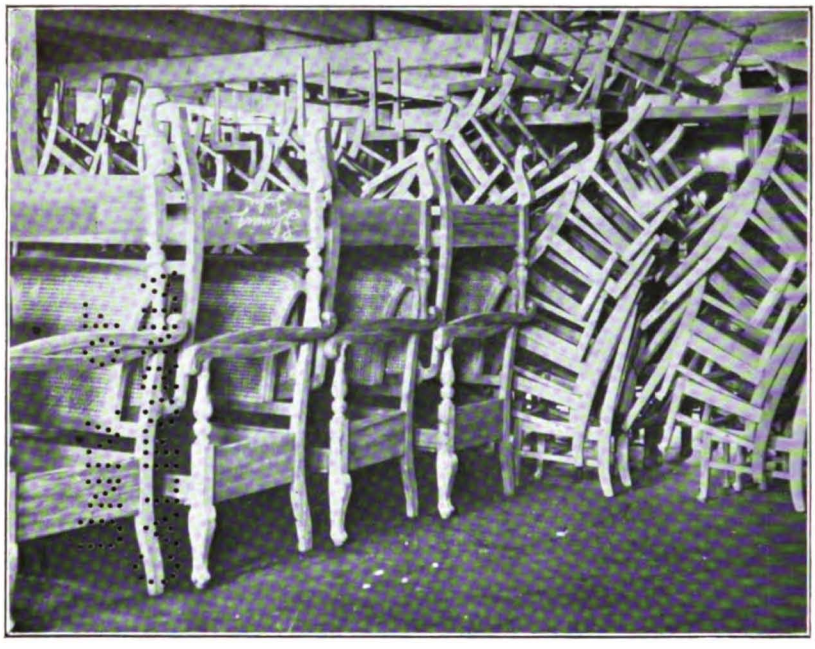
Chairs.—Although chairs are classed as furniture, it is customary, as explained under the chapter on furniture, to consider their manufacture separately. The reason for this is primarily because chair factories confine their operations to that one article, while the furniture industry



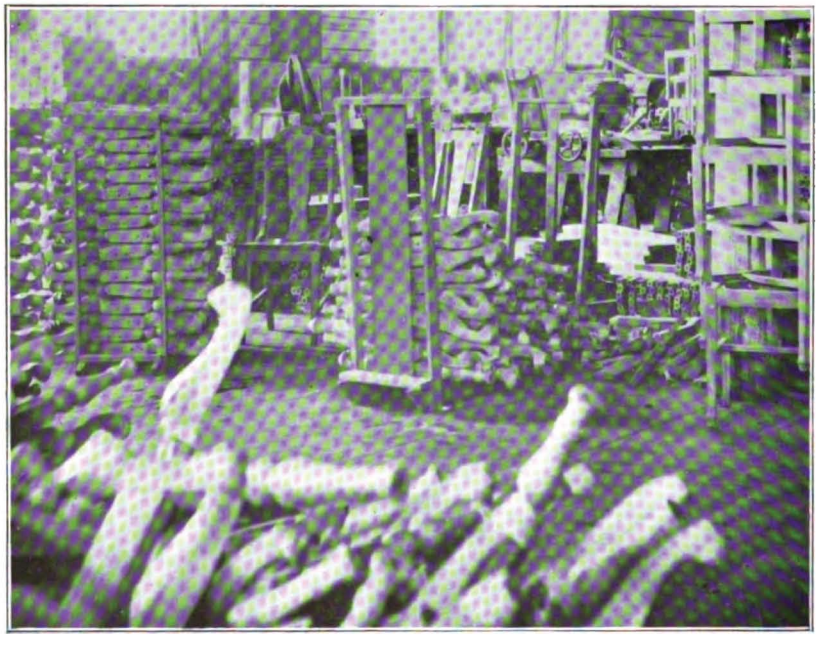
A. Dressing-table seats in a North Carolina chair factory ready for staining and finishing.



B. A corner of the finishing room of a North Carolina chair factory. Settees, rockers, dining-room chairs and others are shown in the picture.



A. Chairs and settees in a North Carolina plant ready for staining and finishing. In this factory red gum is the principal wood used.



B. Chair parts in the making in a North Carolina factory.

has a much wider field of operation. In the manufacture of chairs North Carolina stands well up toward the top among the various states in which this industry attains any importance. In 1919 the chair makers of the State used 31,627,000 feet, board measure, of wood, consisting of eight different kinds. Of these oak was the most important, contributing more than two-thirds of the total quantity consumed. Of the entire amount reported by the chair industry, over 66 per cent was supplied by the forests of the State. Red gum and maple were obtained in larger quantities from outside the State than from within, while the supply of all the others listed, with the exception of oak, was home-grown. Table 27 shows the quantity of each kind of wood used by the industry, the average price paid for it f. o. b. factory, its total cost, and the source from which it was obtained.

The raw material used by the chair industry consists for the most part of dimension stock, usually squares, the chair makers perhaps using more wood in this form than any other industry. Sawmills operating in hardwood timber make a practice of supplying such stock and obtain it by bolting slabs and edgings. They also frequently use for this purpose small crooked logs, tops, down timber, and cut-offs which ordinarily could be disposed of in no other way. Wood-using factories, especially those requiring oak, beech, birch, and maple, constitute another source of supply. In such plants low grades and factory waste are converted to this use. In some instances this material is further manufactured into turned chair parts and shipped to the chair factories ready to assemble. In view of the foregoing, it can be seen that the chair industry occupies a position of economic importance, in that it not only contributes to the industrial development of the State, but also to the movement of forest conservation through its tendency to promote the closer utilization of mill and factory waste.

Not all of the raw material used by this industry is in the form of dimension stock, nor is all of the dimension stock used by chair makers obtained from waste. For chair seats and backs, wide planks in thicknesses ranging from 1½ to 2½ inches are used, and this same class of material is ripped up into squares in order to obtain sufficient stock in this form to meet the requirements of the industry. Chair stock is usually thoroughly air-seasoned or kiln-dried before use. Sawmills cutting dimension stock for the chair industry from green timber are careful to see that the stock is straight-grained and fairly free from defects, and that allowance is made for shrinkage.

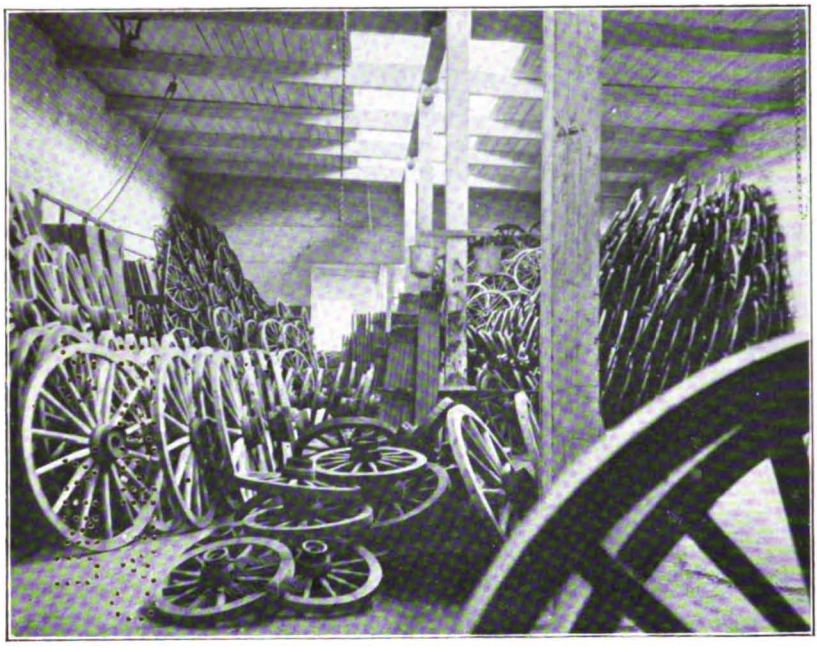
Dimension stock in the form of principally birch, beech, and maple squares are required mostly for turned chair parts or others which can readily be manufactured from raw material of this kind, such as square

tapered legs and square rung stock. For chairs which follow more or less straight line designs, as well as for those of the mission style, requiring parts which are wider than they are thick, the raw material is cut from wide plank. Oak, ash, and chestnut are more commonly called on for raw material for the better grades of these types of chairs, while for the parts of the cheaper imitation articles woods like sap red gum, birch, and also elm are used, with a grain representing that of oak, ash or chestnut printed on them.

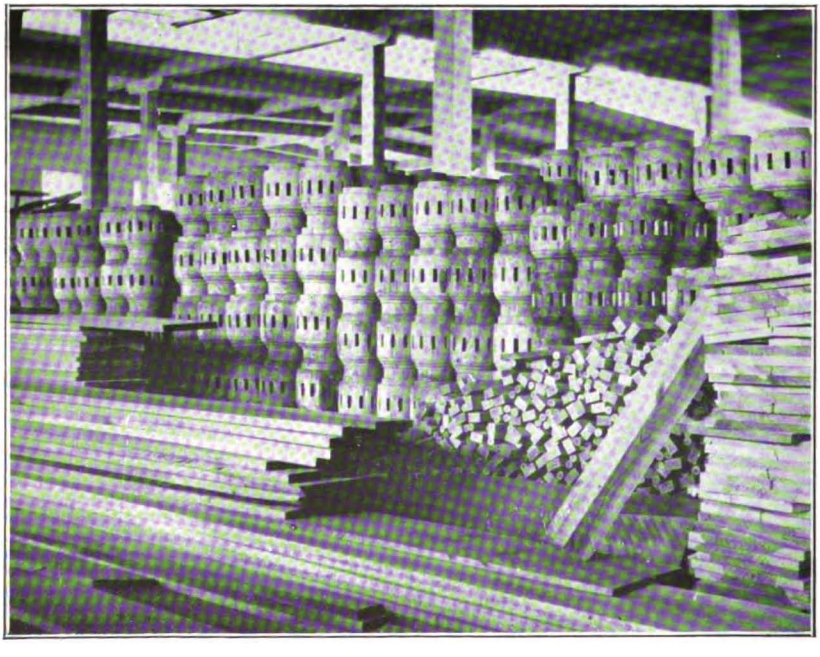
TABLE 27.—*Wood Used for Chairs in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Oak	23,930,000	75.66	$ 60.48	$ 1,447,286	18,576,500	5,353,500
Gum, red	4,047,000	12.80	95.67	387,176	400,000	3,647,000
Maple	2,290,000	7.24	45.34	103,829	790,000	1,500,000
Birch	650,000	2.05	38.66	25,129	650,000	----------
Ash	375,000	1.19	55.00	20,625	375,000	----------
Poplar yellow	160,000	.51	25.00	4,000	160,000	----------
Pine, white	150,000	.47	40.00	6,000	150,000	----------
Beech	25,000	.08	35.00	875	25,000	----------
Totals	31,627,000	100.00	$ 63.08	$ 1,994,920	21,126,500	10,500,500

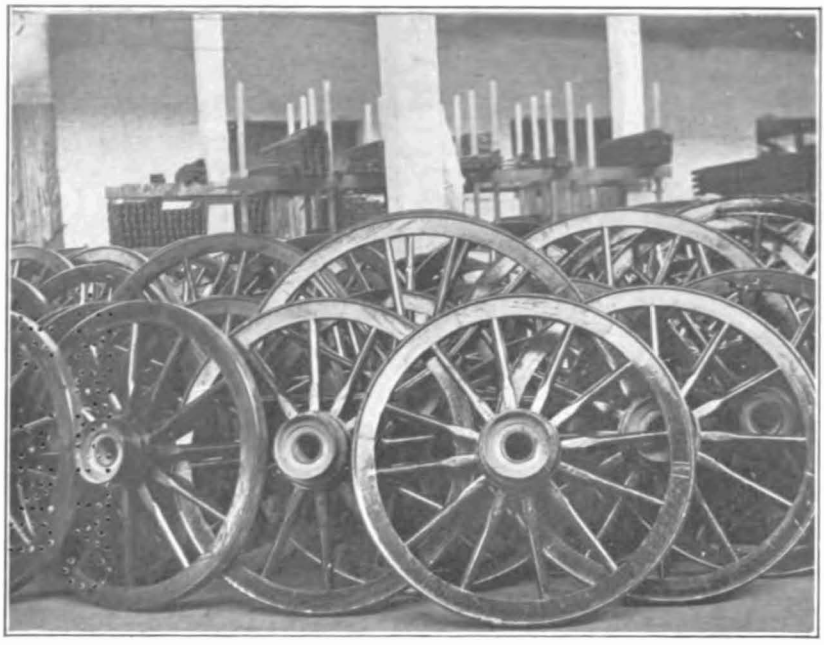
Vehicles and Vehicle Parts.—Hickory and oak, in the order mentioned, have always been the two leading vehicle woods, but in North Carolina in 1919 these two species were relegated to third and fourth place respectively by red gum and North Carolina pine, which from the standpoint of quantity consumed occupied first and second place in the order named. That red gum took first place in the industry is surprising, especially in view of the fact that this wood, on the basis of total annual consumption by the vehicle industry for the entire United States ranks ninth in importance. In North Carolina in 1909 it occupied sixth place, the total quantity consumed by the vehicle industry during that year being only 250,000 feet, board measure. In 1919 the quantity used increased to 9,240,000 feet, board measure, or over 33 per cent of the total amount of all kinds of wood used by the industry. This sudden prominence of red gum in the vehicle industry of the State is explained, however, in this way. A certain factory in North Carolina engaged in the manufacture of wooden automobile parts uses red gum exclusively, and the bulk of the 9,240,000 board feet reported as having been used by the vehicle makers of the State was consumed in this particular factory. It has always been a rule of the Forest Service in preparing reports of this kind to exclude from them all information likely to reveal



A. The wheel-room of a large North Carolina wagon factory.



B. Wagon box-board stock, hubs and spokes in the plant of a large North Carolina farm wagon manufacturer.



A. Interior of a North Carolina wagon factory. Completed wheels in the foreground and finished wooden gear parts in the rear ready for assembling.

B. A portion of the assembly room for running gears in the factory of a large wagon maker of North Carolina.

the operations of individual firms. Since the factory in question is the only one in the State that makes these articles, this rule would be violated if the name of the article were divulged or its use described.

In accordance with the latest statistics of the National Automobile Chamber of Commerce, there were, in 1919, in the entire world a total of 8,750,000 automobiles, 7,558,848 of which are in the United States, or 1 to every 14 of the population of this country. With these facts before us, it is not surprising that many of the establishments throughout the country which formerly made horse-drawn vehicles have been converted and are now engaged in some way in that part of the automobile industry where wood is the raw material used. Even, however, with the phenomenal growth of the motor car industry, the demand, especially in rural districts, for horse-drawn vehicles is still strong.

Specialization has always been an important practice in the vehicle industry, and is the principal reason why so few factories manufacture the full complement of parts needed to turn out a complete vehicle. Some establishments purchase hubs, spokes, and rims separately and complete the vehicle from this point. Others obtain wheels already manufactured, axles with skeins fitted in place, and other parts of the running gear fully ironed, and merely build the bodies. Still another class buy all parts complete, even to the bodies and tops, and assemble them. In order to avoid duplication, assembling establishments of this kind were not taken into account in the compilation of the data relating to this industry.

The kinds of horse-drawn vehicles manufactured in North Carolina are buggies, surreys, carriages, and similar light pleasure vehicles, as well as farm and delivery wagons, carts, warehouse and other trucks and wheelbarrows. In the manufacture of these vehicles, oak and hickory contributed the largest quantity of raw material. Hickory was used for such parts as spokes, rims, tongues, bolsters, axle caps, hounds, top bows, fuchels, single, double and whiffle trees. Oak was employed for body frames, wagon spokes, axles, and felloes, hounds, tongues, bolsters, etc. Ash was converted into top bows and body frames, while birch and elm were used largely for hubs. For body work red gum, North Carolina pine, yellow poplar, and white pine constituted the principal woods used. In making wagons, the vehicle manufacturers used for flooring or bottom boards maple, oak and ash, while for panels yellow poplar, white pine and red gum were the woods reported. Body linings were of yellow poplar and North Carolina pine, the latter wood also being used for warehouse trucks.

In the automobile field, which in North Carolina consisted principally of the manufacture of commercial bodies, the oak and ash that was used

went for body and door frames. North Carolina pine, oak and yellow poplar were employed for seat boxes, while elm, yellow poplar, ash and red gum supplied the raw material needed for floor boards and running boards.

The vehicle industry of North Carolina consumed in 1919 a total of 27,867,000 feet, board measure, of wood, the total cost of which was over a million dollars. Since the industry demands high-grade material, it naturally follows that the average price paid for it was comparatively high. The quantity of wood used by the industry in 1919 exceeded that reported in 1909 by 12,231,000 feet, board measure. Of the total quantity used, slightly over 85 per cent was home grown.

Table 28 shows the kinds and quantities of the various woods required by the industry, the average price per 1,000 feet f. o. b. factory which the vehicle makers paid for it, the total cost, and the source from which it was obtained.

TABLE 28.—*Wood Used for Vehicles and Vehicle Parts in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Gum, red	9,240,000	33.16	$ 51.75	$ 478,170	7,280,000	1,960,000
Pine, North Carolina	6,393,000	22.94	29.53	188,797	5,793,000	600,000
Oak	5,719,500	20.52	45.74	261,610	5,319,500	400,000
Hickory	5,553,000	19.93	42.46	235,780	4,433,000	1,120,000
Poplar, yellow	657,000	2.36	45.68	30,012	639,800	17,200
Ash	91,000	.33	47.50	4,322	91,000	----------
Pine, white	75,000	.27	25.00	1,875	75,000	----------
Birch	68,000	.24	51.00	3,468	38,000	30,000
Maple	10,000	.04	45.00	450	10,000	----------
Elm	6,500	.02	24.00	156	6,500	----------
All other	54,000	.19	38.33	2,070	54,000	----------
Totals	27,867,000	100.00	$ 43.30	$ 1,206,710	23,739,800	4,127,200

Fruit and Vegetable Packages.—Wood in the form of veneer is the raw material used by this industry in the manufacture of barrels, baskets, berry crates, hoppers, etc., for use in shipping peaches, apples, potatoes, beans, tobacco, cucumbers, berries of every kind, and other fruits and vegetables. The veneer used is cut in thicknesses ranging from $\frac{1}{30}$ to $\frac{1}{8}$ of an inch. The cheapest woods available are usually employed. The raw material comes to the factory in the form of logs, which are cut into bolts of the required length. The bolts are boiled or subjected to steam for from 12 to 24 hours to soften them, and then the bark is removed. The bolt is then placed in the veneer stave machine,

which consists of a cylinder containing knives. As the log revolves the knives cut the face of the bolt lengthwise to a depth equal to the thickness of veneer desired, and the staves come from the machine in finished form ready for assembling. One form of waste in this industry consists of core stock, which is that part of the bolt that is left after all the veneer possible has been removed. These cores are sawed into thin lumber, are joined together with cleats to make a square board, and then cut around into bottoms and lids. Other waste is converted into hoops.

By referring to Table 29 it can be seen that black gum, North Carolina pine, and yellow poplar were the principal woods used by the plants engaged in this industry. Manufacturing costs in the industry are high, and for this reason high-priced woods cannot be employed. The low average price of $23.38 per 1,000 feet, board measure, f. o. b. factory, reflects the low quality of the logs used in the production of the commodities made. The cheapness of the material used, coupled with the fact that a thousand feet, log measure, will make six or eight thousand surface feet of veneer, more than offsets costly production. This enables the factories manufacturing fruit and vegetable packages to offer them at reasonable prices, thus stimulating the demand for such packages for shipping farm and truck garden products to market.

The total amount of wood used by the industry in 1919 was 22,791,897 feet, board measure. In point of quantity consumed, black gum took the lead with 11,505,000 feet, board measure. North Carolina pine ranked second with 9,184,587 board feet, while yellow poplar occupied third place. Nearly 97 per cent of the total amount of wood used for fruit and vegetable packages was home grown.

TABLE 29.—*Wood Used for Fruit and Vegetable Packages in North Carolina in 1919*

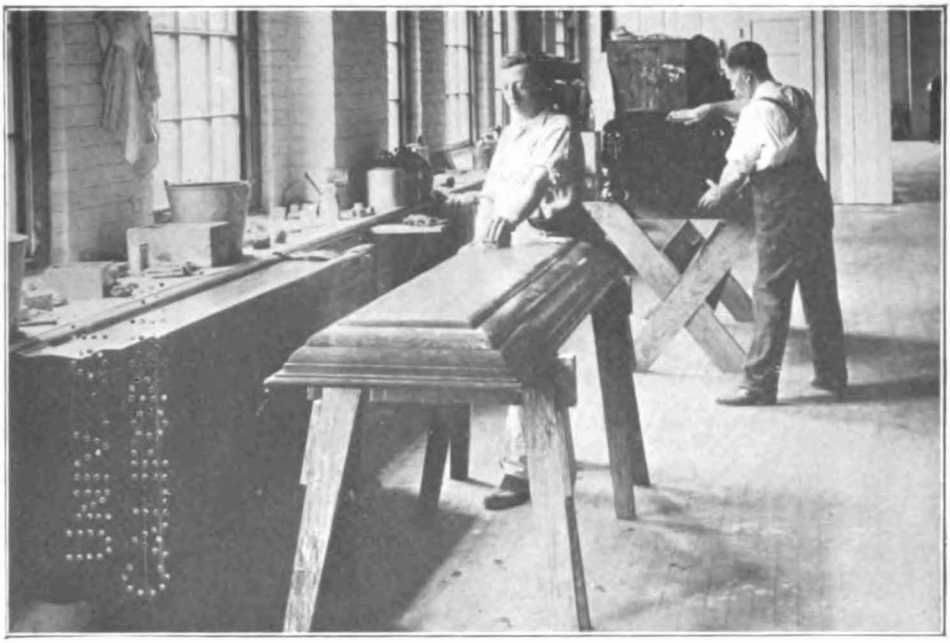
Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Gum, black	11,505,000	50.48	$ 22.79	$ 262,199	11,505,000	.....
Pine, North Carolina	9,184,587	40.30	21.69	199,227	9,184,587	.....
Poplar, yellow	848,307	3.72	37.00	31,387	135,807	712,500
Oak	813,807	3.57	39.50	32,145	813,807	.....
All other	440,196	1.93	18.00	7,924	440,196	.....
Totals	22,791,897	100.00	$ 23.38	$ 532,882	22,079,397	712,500

Sash, Doors, Blinds, and General Mill Work.—The commodities discussed in this chapter are so closely allied to those produced by the planing mill that it is sometimes difficult to differentiate them. Planing

mill products for the most part, however, consist of such articles as flooring, ceiling, siding, partition, and stock mouldings, which are manufactured universally to standard design and size. The ordinary planing mill usually operates planers and nothing else, and is frequently connected with a large sawmill, which supplies it with rough lumber. The mill which turns out sash and doors may be considered more in the nature of a factory, since it planes, saws, cuts, fits, and finishes the article produced. In addition it is usually equipped with a wide variety of machinery adaptable for turning out custom work. Unlike the planing mill, it procures its raw material in the general market in quantities and kinds needed to fill current or anticipated orders. Formerly sash, doors, and blinds were made in local planing mills, but within recent years the establishment of factories specializing in the manufacture of these commodities in standard sizes has caused the small planing mills to abandon this line of work. At the present time, therefore, the products of the local sash, door, blind, and general mill work factories consist for the most part of commodities made on special order. They comprise sash, doors, blinds, window frames, stair work, built-in cupboards, mantels, grills, panels, cornice and porch finish, capitals, columns, lattice work, and other classes of interior and exterior house trim.

Table 30 lists the various woods demanded by this industry in North Carolina during the year 1919. It will be noted that North Carolina pine heads the list and contributed over 75 per cent of the total used by the industry. Longleaf pine occupied second place, while oak ranked third. Nearly 90 per cent of the total quantity of wood consumed by the industry was obtained from the forests of the State. The total supply of five of the eight woods reported by the industry was obtained from sources within the State, as was also the bulk of the other three.

The North Carolina door, as it is known to the trade, is one of the most important articles of commerce produced by the factories of the State. It gets its name from the fact that North Carolina pine is the wood used in its manufacture. Other woods that contributed to the raw material for doors are longleaf pine, cypress, oak, chestnut, and white pine. As is the case in other wood-using industries, veneer plays an important part in the manufacture of doors. Some of the highest grades of this class of woodwork are of built-up construction. For veneer doors the usual run of soft, porous woods, such as chestnut, yellow poplar, and white pine, are employed for core stock and highly figured woods for the face veneer. Veneer doors, if properly made, are much stronger, less liable to warp, and will give better service than those made of solid wood. White and North Carolina pine and some oak were the principal woods used for sash, both stock sash and that calling for



A. The finishing room in a North Carolina casket factory.

B. The manufacture of burial cases in a North Carolina casket factory.

special designs and sizes. The capacity of cypress, especially the heartwood, to resist decay makes it an important wood for use in the manufacture of window screens, cornice, window frames, and greenhouse sash and other articles used in damp or exposed situations.

Yellow poplar is a wood that takes paint well, and because of this fact is extensively employed for outside trim. Oak is a favorite wood for mantels and other high-grade finish, for which purpose it is used on account of its attractive grain and because it takes a high polish. When quarter-sawed, the broad medullary rays, or "flakes" as they are referred to in the trade, present a very pleasing appearance in interior house trim.

TABLE 30.—*Wood Used for Sash, Doors, and Blinds*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Pine, North Carolina	12,580,000	75.74	$ 32.09	$ 403,701	11,080,000	1,500,000
Pine, Longleaf	2,700,000	16.26	39.00	105,300	2,540,000	160,000
Oak	365,000	2.20	37.83	13,808	365,000	----------
Gum, black	300,000	1.81	25.00	7,500	300,000	----------
Pine, white	270,000	1.63	49.17	13,276	220,000	50,000
Poplar, yellow	243,000	1.46	36.75	8,930	243,000	----------
Cypress	100,000	.60	30.00	3,000	100,000	----------
Chestnut	50,000	.30	50.00	2,500	50,000	----------
Totals	16,608,000	100.00	$ 33.60	$ 558,015	14,898,000	1,710,000

Caskets and Coffins.—Care and reverence in laying away the dead is an age-old custom of the human race the world over, a fact that is well corroborated by the discoveries made at the recently opened tomb of King Tut-ankh-amen. The manufacture of coffins dates back many centuries. The mummy cases of the ancient Egyptians to be found in museums of the present day are evidence of this fact. Cedar of Lebanon was one of the woods employed for this purpose, and, strange as it may seem, some of these burial cases, although made only of wood, have survived the passage of centuries down the misty corridor of time, while the houses and other structures built of stone during those periods have crumbled into dust.

During the present century it was formerly the custom for every community to provide its own coffins as needed, and the local carpenters or cabinet makers were called upon to furnish them. The name "coffin" has almost universally been replaced by the term "casket." Both are used for the same purpose, the only difference being that the coffin is constructed so as to conform to the lines of the human body, while the casket is merely rectangular in shape. The latter type of burial case

is the one most commonly used at present. Today the manufacture of caskets and coffins is an important wood-using industry carried on largely in cities. The manufacture of outer cases, or the rough box in which the casket is placed, is also a part of the industry. As much wood is consumed in making these boxes as is used in the manufacture of caskets. Woods that are easily worked, take stain well, and are susceptible of a good polish are used for cheap coffins. Yellow poplar is more commonly employed than any other wood. In the South the principal wood used for coffins is cypress, while western red cedar serves the same purpose on the Pacific Coast, and basswood is favored in the Lake States.

In North Carolina, as in many other States, chestnut is considered the most suitable wood for caskets. Since nearly all caskets are cloth-covered, this permits of the use of the lower grades of lumber. At the same time the raw material must be free of defects that would be likely to affect the strength and durability of the casket. Chestnut is especially durable under ground, and, in addition, it is light in weight and possesses sufficient strength. Some of the chestnut going into caskets is of the very best grade, but for the most part the grade known commercially as "sound wormy" is used. The lumber sold under this grade is perforated with small worm holes about 1/16 inch in diameter, but it possesses the requisite strength and durability, and the worm holes are an advantage, since they present an especially good surface to which to glue the cloth covering. High-priced caskets are finished in natural wood that has been carefully worked, and in some cases handsomely carved, and then given a piano finish. For such burial cases mahogany, walnut, oak, and similar highly-figured cabinet woods are employed.

In Table 31 are listed the various woods which supplied the raw material consumed by the casket and coffin manufacturers of North Carolina in 1919. Chestnut occupied first place with 7,852,915 feet, board measure, while North Carolina pine was a close second with 6,418,569 board feet. The chestnut reported went into caskets and coffins, while the North Carolina pine was used principally for outer boxes. The total amount of wood consumed by this industry during the year was 16,469,897 feet, board measure, and chestnut and North Carolina pine together contributed more than 86 per cent of this quantity. Of the total quantity of wood reported by the industry, less than 1½ per cent was obtained from sources outside the boundaries of the State. The fact that the requirements of these manufacturers are met so largely by the forests of the State should elicit their interest in any movement that has for its object the perpetuation of the timber supply of North Carolina.

TABLE 31.—*Wood Used for Caskets and Coffins in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Chestnut	7,852,915	47.68	$ 43.34	$ 340,345	7,852,915	----------
Pine, North Carolina	6,418,569	38.97	29.70	190,631	6,337,569	81,000
Poplar, yellow	956,856	5.81	33.61	32,160	956,856	----------
Pine, white	326,557	1.98	35.60	11,625	326,557	----------
Oak	290,000	1.76	74.17	21,509	290,000	----------
Cypress	200,000	1.22	40.00	8,000	200,000	----------
Basswood	175,000	1.06	110.00	19,250	175,000	----------
Gum, red	150,000	.91	110.00	16,500	----------	150,000
Buckeye	75,000	.46	90.00	6,750	75,000	----------
Walnut, black	25,000	.15	37.50	938	18,750	6,250
Totals	16,469,897	100.00	$ 39.33	$ 647,708	16,232,647	237,250

Elevators and Machine Construction.—The principal raw materials used in the manufacture of elevators and various kinds of machinery consist of iron and steel. Wood, however, is indispensable for certain parts, and in North Carolina varying quantities of seven different woods were used by those factories engaged in this industry in the manufacture of grist mills, both stationary and portable, freight elevators, cotton gins, cotton presses, textile, sawmill, and tobacco machinery, feed mills, and similar apparatus. Nearly 85 per cent of the 4,949,500 feet, board measure, of wood consumed by the industry was North Carolina pine, over half of which was employed in the making of portable grist mills, each requiring in the neighborhood of 200 feet, board measure, of wood. The modern passenger elevator is usually an all-metal product, with a sanitary composition floor. In the manufacture of freight elevators, however, wood is still extensively employed. For such parts as platforms, guide posts, and guide strips sugar maple and longleaf pine were found especially well adapted, while oak served for car sills and overhead beams. For freight elevator car siding North Carolina pine was used, and large quantities of this wood were also consumed in the manufacture of miscellaneous machinery, where it was employed for light frames and panel work. Yellow poplar and white pine were used for grain runways, hoppers, and bins of grist mills, as was also sugar pine, a wood of the Pacific Coast. Sugar maple was employed for section beams and other parts of textile machinery where a hard, dense wood is required. This wood was also used along with oak for log decks and carriage platform parts of sawmill machinery. Table 32 shows the woods used by this industry.

Nearly 90 per cent of the total quantity of wood used by this industry was supplied from home-grown timber. Here, again, is evidence of the dependence of the wood-using industries of North Carolina upon a continuous supply of State-grown wood. This should serve to stimulate interest among wood-using factories in the matter of obtaining an adequate appropriation to put into effect the forestry law of the State.

TABLE 32.—*Wood Used for Elevators and Machine Construction in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Pine, North Carolina	4,200,000	84.86	$ 24.28	$ 101,962	3,765,000	435,000
Oak	260,000	5.25	52.30	13,598	260,000	----------
Poplar, yellow	184,000	3.72	55.00	10,120	184,000	----------
Pine, longleaf	160,000	3.23	42.50	6,800	10,000	150,000
Pine, white	98,000	1.98	58.60	5,743	95,000	3,000
Maple	42,500	.86	110.00	4,675	42,500	----------
Pine, sugar	5,000	.10	135.00	675	----------	5,000
Totals	4,949,500	100.00	$ 29.01	$ 143,573	4,356,500	593,000

Shuttles, Spools, and Bobbins.—When the work of preparing State wood-using industry reports was first started by the Forest Service a careful selection of headings was made to cover certain industries or groups of industries. This classification was followed in the preparation of the thirty-odd reports of this kind that were published. In some cases the similarity of the products made in several industries made it advisable to combine such industries under one heading. This accounts for the shuttle, spool, and bobbin industry, and although these various products are not always made in the same factory, the processes of manufacture are so much alike as to make it convenient for purposes of tabulation to combine them.

In North Carolina the articles made by the factories embraced in the above-mentioned group of industries include not only shuttles, spools, and bobbins, but also picker sticks, cones, cobs, clearer rollers, and other loom supplies and skewers. For shuttles the favorite woods are dogwood and persimmon, both of which because of their density possess to a high degree the requisite property of wearing smooth with continued use. In addition, they are heavy, hard, and strong. The manufacture of shuttle blocks is usually an industry separate from the manufacture of shuttles. Great care is exercised in getting out the blocks. Frequently costly delays and damage result when shuttles of second quality are put in the loom. Therefore, to obviate this and to avoid injury to

A. Dogwood is the principal wood used for shuttles. The picture shows a pile of dogwood logs on the yard of a North Carolina shuttle-block factory.

B. Shuttles in the making, the raw material used in being the dogwood blocks produced by the shuttle-block mill.

delicate fabrics during the process of weaving only perfect blocks can be used. Shuttle blocks are cut to full size to allow for seasoning, and the following dimensions are considered standard:

Size	*Dimension of Green Block*	*Dimension of Dry Block*
No. 0	15" x 2" x 1¾"	14½" x 1¾" x 1½"
No. 1	15½" x 2⅛" x 1⅞"	15" x 1⅞" x 1⅝"
No. 2	16½" x 2¼" x 2"	16" x 2" x 1¾"
No. 3	16½" x 2¼" x 2¼"	16" x 2" x 2"
No. 4	17" x 2⅜" x 1⅞"	16½" x 2⅛" x 1⅝"
No. 5	18" x 2⁹⁄₁₆" x 2¼"	17½" x 2¼" x 1¾"
No. 6	19½" x 2⁹⁄₁₆" x 2"	19" x 2¼" x 2"
No. 7	21½" x 2¹³⁄₁₆" x 2⁹⁄₁₆"	21" x 2½" x 2¼"
No. 8	23½" x 3⅛" x 2¹³⁄₁₆"	23" x 2¾" x 2½"

Blocks must be cut from perfectly clear timber, correctly sawn and free from knots, checks, cross grain, bark, or other defects which would give the finished shuttle the slightest bit of rough surface. In sawing out the blocks the practice is to cut them so as not to include the pith of the tree. Immediately after being sawed both ends of the blocks are dipped to a distance of about an inch in paraffin or a mixture of lampblack and rosin to prevent end checking. They are then stacked for sixty or ninety days to permit of partial seasoning and the development of imperfections which cannot be detected in the green wood. The perfect blocks are then sorted out, tied up in burlap sacks according to size, and shipped to the shuttle factory. These blocks pass through twenty-three separate and distinct operations during the process of converting them into finished shuttles. The North Carolina factories engaged in this industry used no persimmon in 1919, but reported over a million and a half feet of dogwood, this species, from the standpoint of quantity consumed, being second only to hickory among the various woods used.

Picker sticks are those parts of a loom mechanism which cause the shuttle to move backward and forward in its groove. For these articles hickory has been found most satisfactory, and a large part of the 1,925,000 feet, board measure, of this wood was converted to this use. The balance was consumed in the manufacture of skewers, the small, pointed, pencil-like wooden sticks used by butchers to fasten together roasts of beef and other cuts of meat after the bone has been removed.

Wood suitable for bobbins must be hard, tough, and close-grained, and possess the ability to turn well without the wood "roughing up" during the process. Beech, birch, and maple possess these qualities to a high degree, and in North Carolina were used for bobbins and speeder material as well as for other turned loom parts, such as quills and twisters.

The yellow poplar reported by this industry went into the manufacture of quill boards, while the commodities made from the locust used consisted of cobs, cones, and other miscellaneous parts.

The manufacture of spools is an industry confined for the most part to New England, the State of Maine being its center, and the wood of paper birch the raw material most used. No spools were reported as having been manufactured in North Carolina in 1919.

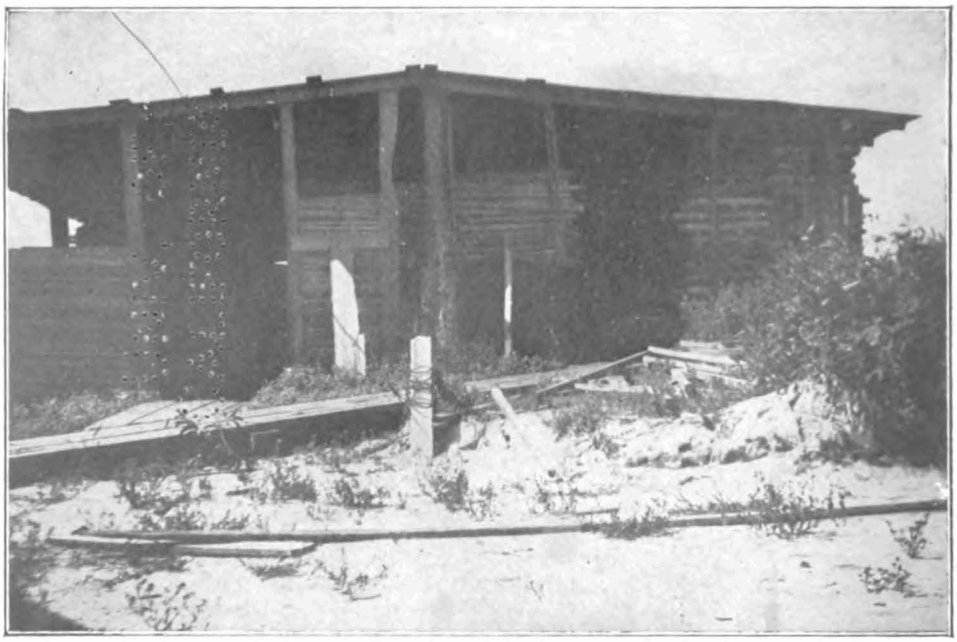
The woods used in 1919 by the North Carolina factories engaged in the manufacture of shuttles, spools, and bobbins are presented in Table 33, and are arranged in the order of their importance from the standpoint of consumption. This table also shows the average cost per thousand feet f. o. b. factory of the different species listed. Nearly five million feet of wood was reported, and of this quantity nearly 97 per cent was cut from home-grown timber.

TABLE 33.—*Wood Used for Shuttles, Spools, and Bobbins in North Carolina in 1919*

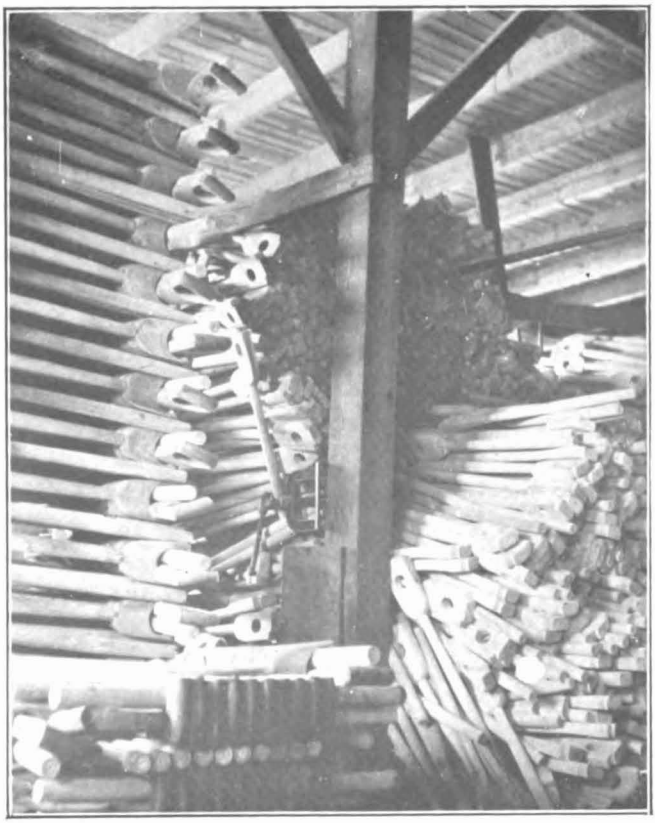
Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Hickory	1,925,000	41.09	$ 55.71	$ 107,242	1,925,000	.....
Dogwood	1,575,000	33.62	35.00	55,125	1,575,000	.....
Maple	400,000	8.54	45.00	18,000	250,000	150,000
Locust	350,000	7.47	40.00	14,000	350,000	.....
Pine, North Carolina	225,000	4.81	17.00	3,825	225,000	.....
Beech	100,000	2.13	30.00	3,000	100,000	.....
Birch	100,000	2.13	30.00	3,000	100,000	.....
Poplar, yellow	10,000	.21	30.00	300	10,000	.....
Totals	4,685,000	100.00	$ 43.65	$ 204,492	4,535,000	150,000

Handles.—The handle factories of North Carolina reported the use of 2,991,000 board feet of wood in 1919, which cost them $100,189, or an average of $33.50 per thousand feet, board measure, f. o. b. factory. All of the wood was supplied by the forests of the State, and the industries that used it are shown in Table 34.

Hickory is the best known material for certain classes of tool handles, such as the axe, pick, hammer, adze, and hatchet. Nearly half of the total quantity of wood consumed by the industry was hickory. Woods to take the place of this valuable handle material have been sought the world over, but no satisfactory substitute has yet been found. There is a strength, toughness, and elasticity to hickory which nature has denied to other commercial woods. Some are stronger, many are harder, but



A. Ash and hickory handle squares seasoning under cover at a North Carolina handle factory.



B. Finished and partly finished "D" shovel handles in a North Carolina handle plant.

PLATE XIV

Rough-turned "D" shovel handles, the product of a North Carolina handle plant.

the rare combination of the qualities mentioned is lacking in all of them. Since this paragraph has reverted to the subject of the mechanical properties of hickory, it may be of interest to discuss briefly a few other points relative to this important wood.

Hickory is often referred to as though it were a single species, like red gum or yellow poplar. In reality there are as many as ten different varieties, some of which are valuable for handle manufacture and others not. The sapwood of hickory is white and is universally referred to as "white hickory," while the heartwood is red, and is known to the trade as "red hickory." The proportion between the heartwood and sapwood varies greatly in different trees, at different ages during the life of the same tree, and between different species. Generally young trees growing in the open are nearly all sapwood, while old trees possess comparatively thin sapwood. There has always existed a prejudice against the use of the heartwood of hickory for handles, a prejudice principally on the part of the consumer. The manufacturer, on the other hand, has long been aware of this condition, and has realized that he has been placing brash white hickory in the grade of No. 1 handles and throwing red hickory handles of excellent quality into the grade of No. 2. This practice, for the most part, however, has been followed principally in connection with axe, adze, machinist hammer handles, and others requiring great resiliency or the ability to resist shock. This property is not insisted upon in pick handles, and for these no objection is usually raised to the use of the heartwood of the tree. In other words, strength in hickory has always been associated with the sapwood. Heartwood in a larger proportion than sapwood is more likely to be found in trees of slow growth. The same is true of old trees, which have naturally reached that age producing narrow annual rings. Accordingly red hickory is associated in the tree with wood showing narrow annual rings of growth. Exhaustive experiments conducted by the Forest Service, however, have shown red hickory to be just as strong, weight for weight, as white hickory, and highly suitable when of proper density for all types of handles.

With the increasing scarcity of hickory, oak is being employed for clay and railroad pick handles as well as others which do not require the elasticity so essential in an axe handle. Ash is the favorite wood for farm tool handles, such as pitch forks, grubbing hoes, rakes, spades, shovels, manure forks, etc. In other states where the manufacture of handles is included among the other industries represented, ash, from the standpoint of quantity used, is usually second in importance to hickory among the woods employed. In North Carolina, however, it came within one of occupying last place, and the 150,000 feet, board

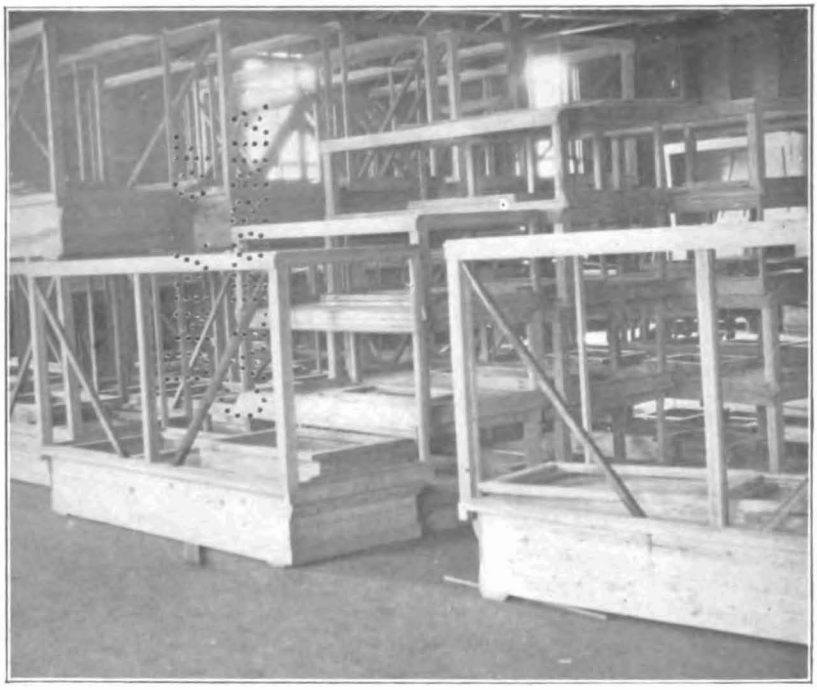
measure, that was reported was not used for the types of handles mentioned above, but went entirely for broom handles, along with North Carolina pine and gum.

TABLE 34.—*Wood Used for Handles in North Carolina in 1919*

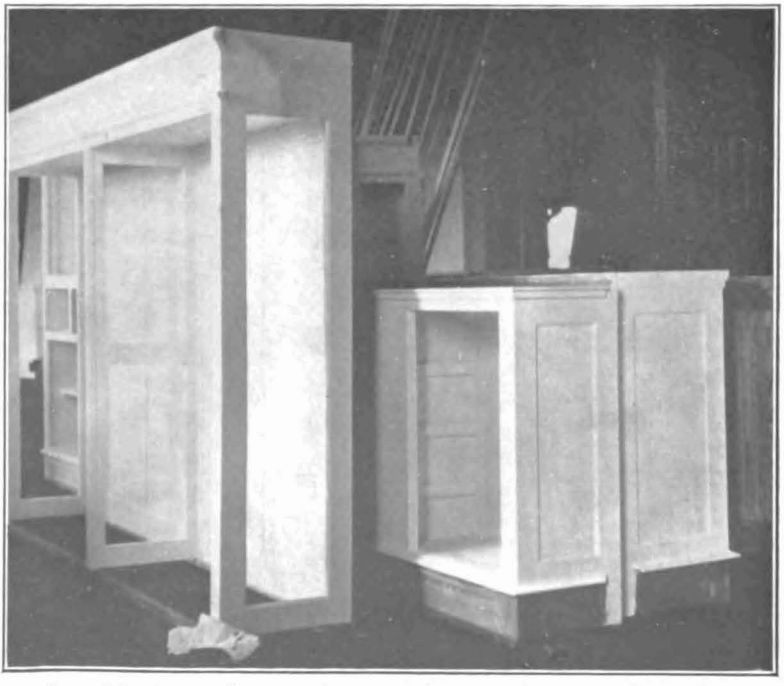
Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Hickory	1,351,000	45.17	$ 40.71	$ 54,999	1,351,000	.....
Pine, North Carolina	800,000	26.75	20.00	16,000	800,000	.....
Oak	540,000	18.06	33.50	18,090	540,000	.....
Ash	150,000	5.01	42.00	6,300	150,000	.....
Gum, black	150,000	5.01	32.00	4,800	150,000	.....
Totals	2,991,000	100.00	$ 33.50	$ 100,189	2,991,000	.....

Fixtures.—The products turned out by those establishments making fixtures are so closely related to those of the sash, door, and blind factories and the furniture plants that it is sometimes difficult to determine under which classification they properly belong. Fixtures may be said to occupy the middle position between these two industries. The term "fixtures" as used in this report includes various types of show-cases and counters for stores and shops, and such furnishings as wall cases, pews, altars, pulpits, partitions, railings, especially designed desks, tables, racks, and telephone booths and similar articles for offices, churches, hotel lobbies, lodge, court, and bank directors' rooms, barber shops, lunch rooms, cafeterias, etc. One item of dissimilarity between the commodities made in the sash, door, and blind factory and those produced in the plant making fixtures is that the former, such as mantels, colonades, and cabinet work are for the most part of permanent, built-in construction, while the latter are usually readily portable, or, at least, can be moved with slight remodeling. Large establishments usually specialize in one or the other of the two lines mentioned. In small towns, however, where the local demand does not justify separate industries, establishments will often be found that are engaged in the manufacture of both.

Practically the same woods as are used in the manufacture of furniture are employed for fixtures, with the exception that perhaps a larger proportion of the higher grades is demanded by the latter industry. In both industries the woods consumed may be grouped into those used for exterior finish and those that go into interior construction of hidden work. In the fixture industry, as in the manufacture of furniture, and, in fact, in many other industries, veneer plays an important part.



A. A store and office-fixture factory in North Carolina. Showcases in the making.



B. A special order of white enamel tea-room fixtures under construction in the plant of a North Carolina office-fixture manufacturer.

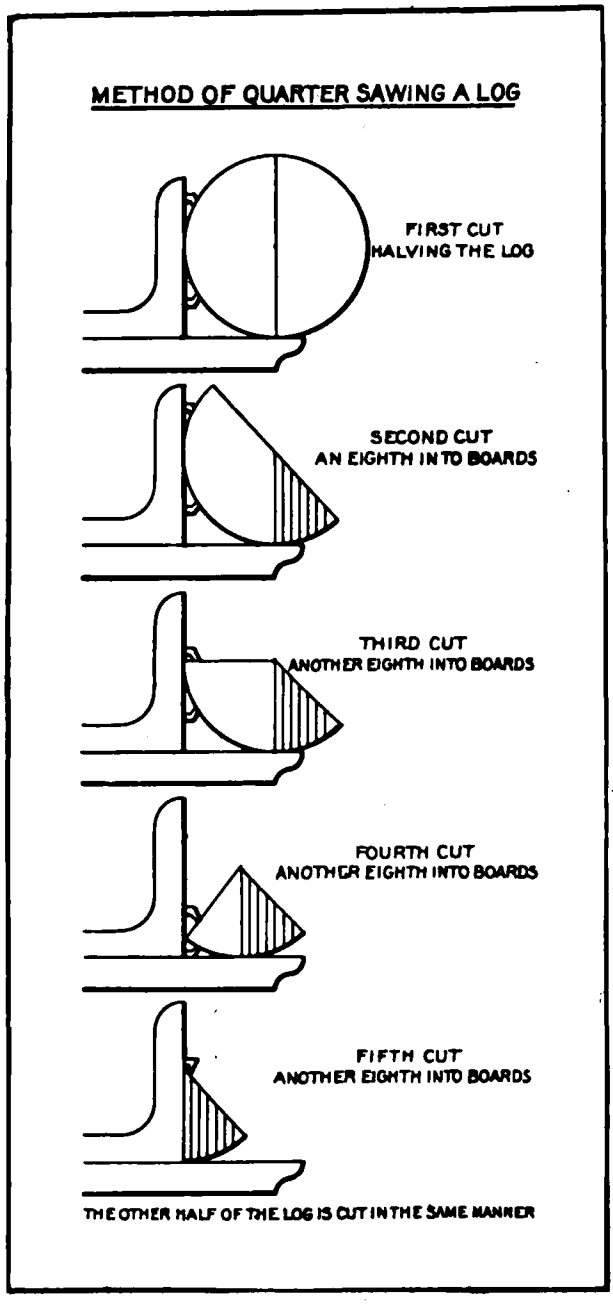
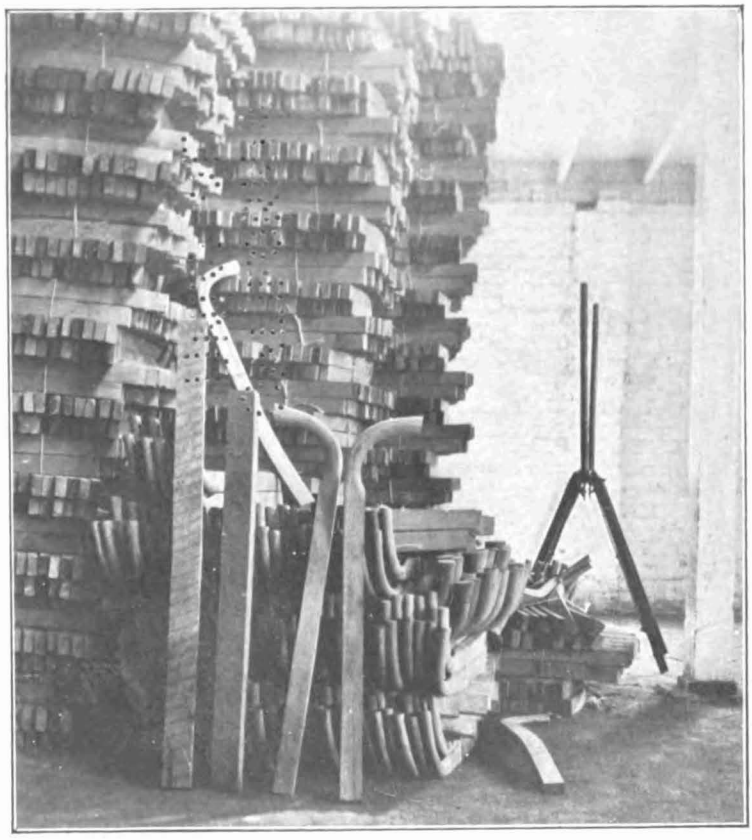


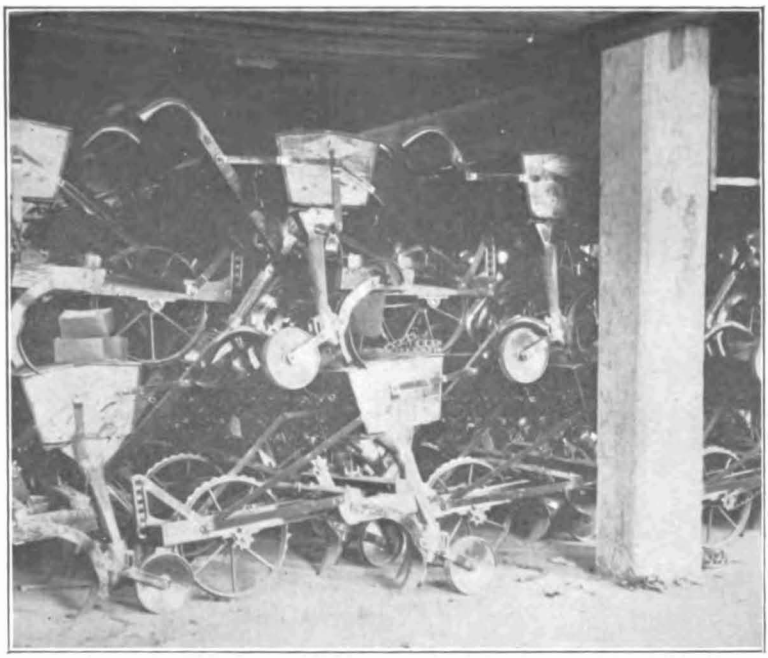
PLATE No. 26—Method of quarter-sawing a log.

Oak, which occupied first place among the eleven woods used by the fixture makers of North Carolina, was called on to supply nearly half of the total quantity of raw material used by the industry in 1919. Its prominence in this industry, and the fact that it ranked first among the woods used for furniture, is due mainly to its highly-figured grain, especially when quarter sawn or when cut into veneer by the rotary process. Quarter sawing is the same as rift sawing and consists of the cutting of the log into halves lengthwise and the sawing of these halves into boards, the saw crossing the annual rings of growth at right angles or as nearly so as possible. During the operation the halves of the logs are canted two to several times on the carriage. Plate 23 shows the common method of quarter-sawing a log. Perhaps more figure is shown in cutting oak if the boards are merely plain sawed, but the pleasing effect of the wide flake produced by quarter sawing is more in demand, and, in addition, lumber, when so cut, is less liable to warp. North Carolina pine was second among the list of woods used, but practically all of it went into hidden work. Yellow poplar goes both into exterior and hidden works, its suitability for these uses being due to its soft texture, stability, straight, even grain, the fact that it is easily worked, and because it takes and holds paint perhaps better than any other wood. All of these properties commend it for exterior enameled work, partitions, drawer bottoms, hidden parts of show-cases and shelving. Birch is the wood most often used to imitate mahogany, for which purpose the heartwood of the tree is usually employed, although the white sapwood is also similarly used. Birch occupied fourth place from the standpoint of quantity used in this industry. Red gum is another wood extensively employed for fixtures, although in North Carolina the quantity used during the period covered by this report was less than 200,000 feet, board measure. Some red gum trees produce what is termed "figured wood." The figure in red gum is fundamentally different from the characteristic figures of oak and many other woods. Oak's figure in quarter-sawed stock is due to the medullary rays, with certain modifications by annual rings of growth. The figure in chestnut is due almost wholly to the annual rings of growth. Red gum's figure is due to neither. The shades and tones cross the annual rings in every direction, although they sometimes follow them with a certain amount of regularity. The medullary rays have practically no visible effect, the colors ramifying through the wood and obeying no known law of growth or deposit of earthy matter. With red gum, especially figured wood in the form of rotary cut veneer, it is possible, therefore, to obtain a wonderful variety of markings and color tones to meet the individual taste of the designer. Red gum has

PLATE XVI



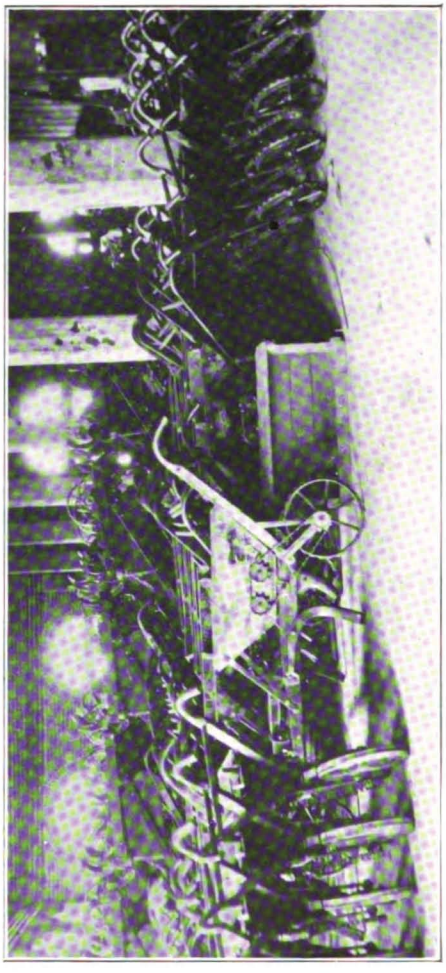
Agricultural implement handles and the raw material from which they are made. The handles are of oak and are first steamed and then bent, and afterwards worked.



A. One-horse, three-row grain drills as manufactured in an agricultural implement factory of North Carolina. Oak is used for handles and beams, while North Carolina pine is employed for seed boxes.

B. Interior of a North Carolina agricultural implement factory. Oak is the only wood used in the manufacture of the small fertilizer distributors shown in this plate, the wood being employed for plow beams and handles.

PLATE XVIII



Single-row oat sowers with oak handles and North Carolina pine hoppers, the product of a North Carolina agricultural implement manufacturer.

the combined beauty of Circassian walnut and mahogany, and yet it possesses a distinctive character peculiar to no other wood.

Table 35 shows the total amount of each kind of wood used by the fixture manufacturers of North Carolina in 1919. Of the 2,216,500 board feet consumed, nearly 85 per cent was supplied from sources within the State. Fixture manufacturers, like many others using home-grown timber, should also be vitally interested in forest conservation looking to the State's future timber supply.

TABLE 35.—*Wood Used for Fixtures in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Oak	985,000	44.44	$ 65.00	$ 64,025	899,000	86,000
Pine, North Carolina	405,000	18.21	32.12	13,010	355,000	50,000
Poplar, yellow	286,500	12.93	42.50	12,176	286,500	----------
Birch	255,000	11.51	132.50	33,788	255,000	----------
Gum, red	178,000	8.03	143.33	25,513	----------	178,000
Chestnut	30,000	1.35	69.00	2,070	30,000	----------
Mahogany	25,000	1.13	300.00	7,500	----------	25,000
Gum, black	20,000	.90	35.00	700	20,000	----------
Sycamore	12,000	.54	35.00	420	12,000	----------
Ash	10,000	.45	35.00	350	10,000	----------
Basswood	10,000	.45	85.00	850	10,000	----------
Totals	2,216,500	100.00	$ 72.37	$ 160,402	1,877,500	339,000

Agricultural Implements.—The articles produced by manufacturers engaged in this industry consist of the various tools and machinery employed by farmers in the preparation and tilling of the soil, the planting of seed, and the gathering or harvesting of crops. Among such are threshers, harvesters, drills, grain cradles, harrows, cultivators, ensilage cutters, hay ladders, hay presses, manure spreaders, corn planters, mowing machines, hay rakes, plows, and binders. In North Carolina this is perhaps one of the least important among the various wood-using industries, as evidenced by the fact that of the several hundred firms that furnished the data on which this report is based, only four were engaged in the manufacture of any of the commodities mentioned above. Furthermore, the total quantity of wood used was less than one million feet, board measure, all of which was home-grown.

North Carolina pine ranked first among the woods used and contributed over 65 per cent of the total. Oak, the only other wood reported in any quantity, occupied second place. Table 36 shows the quantity of the different woods used by the industry, the average price of each per 1,000 feet, board measure, f. o. b. factory, and the total cost.

TABLE 36.—*Wood Used for Agricultural Implements in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Pine, North Carolina	627,000	65.14	$ 37.44	$ 23,472	627,000	----
Oak	131,500	13.67	47.50	6,246	131,500	----
Ash	1,000	.10	35.00	35	1,000	----
Gum, black	1,000	.10	18.00	18	1,000	----
All other	202,000	20.99	55.00	11,110	202,000	----
Totals	962,500	100.00	$ 42.47	$ 40,881	962,500	----

Miscellaneous.—It has been the custom of the Forest Service in preparing reports of this kind to refrain from including in them any information that would be likely to reveal the operations of individual firms. Therefore, whenever reports were received from less than three firms engaged in the same industry, the data was placed under the heading "Miscellaneous." This practice has been followed in this report and the information presented in this chapter covers the activities of six different establishments representative of as many separate industries.

Table 37 shows the quantity of wood used by the factories referred to above. Oak, which in point of consumption occupied first place, was used in the manufacture of insulator pins and brackets and for parts of reed organs. North Carolina pine, which ranked second, was also employed in the manufacture of reed organs and for excelsior, wood wool, and wash boards. Yellow poplar and red gum contributed the raw material used in the manufacture of butter tubs, while kalmia (mountain laurel) was converted into smoking pipes. Over 96 per cent of the total quantity of wood consumed by this group of industries was cut from home-grown timber.

TABLE 37.—*Wood Used for Miscellaneous Commodities in North Carolina in 1919*

Kind of Wood	Quantity		Average Cost per M. Feet F. O. B. Factory	Total Cost	Source of Supply	
	Feet, B. M.	Per Cent			In State	Outside State
Oak	961,200	34.84	$ 50.50	$ 48,541	961,200	----
Pine, North Carolina	901,000	32.66	15.00	13,515	901,000	----
Poplar, yellow	761,300	27.60	23.50	17,891	761,300	----
Gum, red	100,000	3.63	70.00	7,000	----	100,000
Locust, black	20,000	.73	50.00	1,000	20,000	----
Kalmia	15,000	.54	44.00	660	15,000	----
Totals	2,758,500	100.00	$ 32.12	$ 88,607	2,658,500	100,000

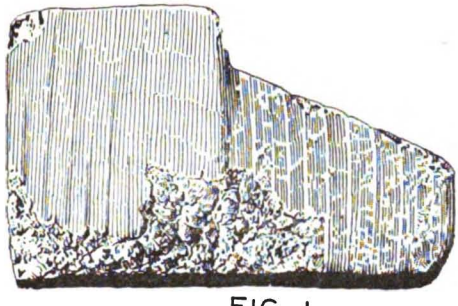


FIG. 1.

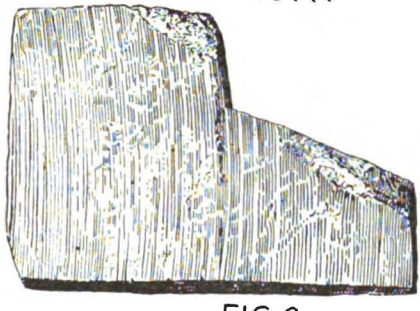


FIG. 2.

FIG. 3

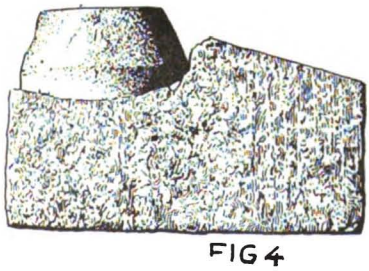


FIG 4

FIG. 5.

FIG. 6.

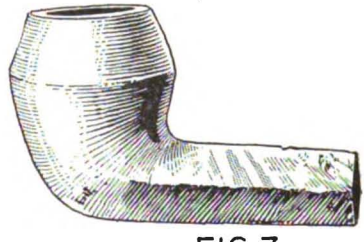


FIG. 7

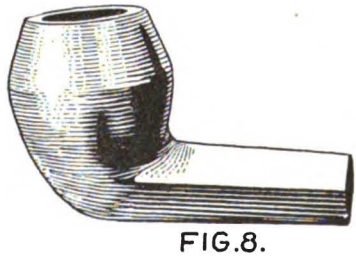


FIG. 8.

PLATE No. 33—The evolution of smoking pipe. Mountain laurel is the wood used for pipes by the North Carolina factories engaged in this industry.

PART IV

THE USES OF WOOD BY NORTH CAROLINA MANUFACTURERS

The uses for which the various woods previously described were employed by the North Carolina wood-consuming factories in 1919 are shown in the following list:

Ash

Backing, show-case
Backs, seat
Boxes, automobile seat
Bows, vehicle top
Chair parts
Cotton planter parts
Counters, store
Doors
Drop gates, wagon
Fertilizer distributor parts
Fingers, grain cradles
Fixtures, exterior work
Foot boards, automobile
Frames, automobile body
Frames, buggy
Frames, carriage bodies
Frames, drays
Frames, wagon bodies
Frames, farm machinery
Furniture, case goods
Gear parts, vehicle
Handles
Handles, contractor's shovels
Handles, grubbing hoes
Handles, hay fork
Handles, hoe
Handles, long shovel
Handles, mallet
Handles, pitchfork
Handles, rake
Handles, small tools
Handles, spade
Hay beds, farm wagon
Head blocks, wagon
Hubs, wheelbarrow
Hay ladders, farm wagons
Moulding, window
Neck yokes
Panels, wagon bodies
Partitions, store and office
Peanut picker parts
Peanut planter parts
Posts, chair
Push cart bodies
Rungs, plow
Rungs, ladder
Running boards, automobile
Shafts, light vehicle
Show-cases
Sides, wagon bodies
Side pillars, light delivery wagons
Snathes, grain cradle
Tubs, butter
Trucks, tobacco
Trucks, factory
Trucks, warehouse

Basswood

Astragals, folding door
Backing, mirror
Backing, furniture
Backing, fixture
Balusters
Blinds, window
Boards, drain
Boards, ironing
Cabinets, medicine
Cabinets, kitchen
Casket cases
Casing
Clothes driers
Drawer sides, furniture
Fixtures, hidden work
Furniture, hidden work
Moulding, picture
Moulding, house interior trim
Panels, door
Partitions, furniture drawers
Sash, window
Store and office fixtures, interior work

BEECH

Arms, chair
Backing, bureaus
Backing, desk
Backing, mirror
Backs, chair
Bobbins
Bottoms, drawer
Book shelves
Cabinets, medicine
Chairs, stepladder
Cupboards, kitchen
Loom parts
Moulding, bed
Posts, chair
Rounds, chair
Seats, chair
Sides, drawer
Slides, drawer
Stools
Tops, kitchen table

BIRCH

Arms, chair
Axle caps
Backs, chair
Back posts, chair
Backing, furniture
Balusters, stair
Benches, piano
Bookcases
Book racks
Bottoms, automobile seat
Bottoms, carriage bodies
Bottoms, wagon
Bottoms, factory trucks
Bottoms, warehouse trucks
Brackets, stair
Brackets, plate rail
Bureaus
Cabinets, medicine
Cabinets, instrument
Cabinets, music
Casing, window
Casing, door
China closets
Costumers
Davenports
Doors
Dowells
Drawer bottoms
Drawer sides
Drawer slides
Fixtures, curtain
Fixtures, office
Fixtures, store
Flooring
Frames, furniture
Furniture, case goods
Hubs, buggy wheel
Leaves, table
Moulding, picture
Moulding, house interior trim
Panels, door
Panels, furniture
Partitions, office
Partitions, drawer
Parlor furniture, frames
Rails, stair
Risers, stair
Rockers, chair
Rounds, chair
Sash
Seats, chair
Screens, window and door
Shelves, book
Show-cases
Slides, table
Stands, flower
Store and office fixtures, exterior
Tables, library
Tables, sewing
Tabouretts
Tops, case goods
Wainscoting
Wagon boxes
Wardrobes

BUCKEYE

Backing, mirror
Backing, furniture
Bins, kitchen cabinets
Bottoms, drawers
Core stock, furniture panels
Cupboards, kitchen
Outer boxes, casket and coffin
Tops, kitchen table

CEDAR

Bannisters, porch
Brackets, porch
Columns, porch
Cornice work
House trim, exterior
Newel posts
Siding

CHESTNUT

Backing, bureau
Backing, desk
Backing, dresser
Box shooks
Boxes, plant
Boxes, tin plate
Boxes, tobacco
Bureaus, hidden work
Caskets
Cabinets, medicine
Casing, door and window
Ceiling
Chairs, arm
Chairs, desk
Chairs, mission
Chairs, rocking
Chests, hall
Coffins
Cores, veneer
Couch frames
Counters, store
Crates
Doors
Drawer sides
Footstools
Frames, mirror
Frames, picture
Frames, furniture
Frames, store and office fixtures
Interior finish, house
Kitchen cabinets
Mantels
Newel posts
Panels, veneer
Refrigerators
Stair work
Screens, door and window
Shelves, book
Tables
Treads, stair
Wainscoting
Washstands

COTTONWOOD

Boxes, bottle
Boxes, butter
Boxes, cracker
Boxes, creamery shipping
Boxes, plant
Boxes, plug tobacco
Boxes, packing
Box shooks
Cases, soft drink
Cases, egg
Crating

CYPRESS

Battens, O. G., barn
Beams, pergola
Bevel siding
Blinds
Boxes, plant
Brackets, porch
Cases, casket
Casing, door and window
Caskets and coffins
Columns, porch
Cornice
Doors
Face brackets
Fence pickets
Frames, door and window
Frieze railing, porch
Gable ornaments
Greenhouse, woodwork
Lattice work
Moulding, drip cap
Moulding, porch
Moulding, screen
Moulding, stair
Railing, outside stair
Railing, porch
Sash, hotbed
Screens, porch
Screens, door and window

Siding
Sills, window
Spindles, porch
Subframes, hotbed
Thresholds, porch door
Window stool

DOGWOOD

Shuttles

ELM

Axles, wagon
Bent parts, automobile body
Bows, automobile top
Eveners
Floor boards, automobile
Frames, automobile body
Frames, horse-drawn vehicle bodies
Hubs, carriage wheel
Hubs, wagon wheel
Hubs, wheelbarrow
Hounds, light vehicles
Reaches, light vehicle
Running boards, automobile
Seat frames, automobile
Singletrees
Yokes, neck

GUM, BLACK

Backing, furniture
Baskets, fruit
Baskets, grape
Baskets, split
Baskets, vegetable
Barrels, veneer
Berry cups
Blocks, hub
Boxes, tin ware
Boxes, bottle
Box shooks
Brake blocks
Crates, berry
Crates, bottle
Cleats, box
Dishes, lard
Fertilizer distributor parts
Handles, broom
Hoops, veneer package
Hubs, buggy wheel
Hubs, wagon wheel
Hubs, wheelbarrow
Mauls

GUM, RED

Backs, chair
Backing, furniture
Backing, case goods
Bannisters, stair
Baskets, fruit
Baskets, vegetable
Bedsteads
Boxes, cracker
Box shooks
Bureaus
Cabinets, medicine
Cabinets, music
Cases, casket
Cases, clock
Cases, sample
Cases, shipping
Casing, door and window
Caskets
Chairs, rocking
Chairs, dining room
Chiffoniers
Church pews
Coffins
Colonnades
Commodes
Costumers
Crating
Cupboard doors
Doors
Drawer bottoms
Dressing tables
Frames, chair
Frames, door
Frames, dresser
Frames, window and door
Front doors, house
House interior trim
Humidors
Mantels
Mirror doors

Moulding, bed
Moulding, picture
Panels, furniture
Plate rails
Posts, bed
Posts, dresser
Reed organs
Show-cases
Store and office fixtures
Tables, library
Telephone stands
Telephone booths
Wardrobes
Washstands

HEMLOCK

Boxes, glassware
Boxes, cracker
Boxes, packing
Boxes, canned goods
Box shooks
Cases, packing
Cracker boxes
Crates, bottle
Crating stock

HICKORY

Axles, wagon
Axle caps, buggy
Bows, automobile top
Carts, dump
Cross bars, buggy shafts
Doubletrees
Eveners
Felloes, wheel
Fifth wheel bars
Fifth wheel circles
Flooring, motor truck
Furniture dowels
Gear parts, vehicle
Handles, axe
Handles, adze
Handles, blacksmith's hammer
Handles, claw hammer
Handles, cant hook
Handles, chisel
Handles, grub hoe
Handles, hatchet
Handles, machinist's hammer
Heads, mallet
Hounds, light vehicles
Head blocks, light vehicle
Loom parts
Neck yokes
Picker sticks
Pole fuchles, light vehicle
Poles, buggy
Porch furniture
Reaches, buggy
Ribs, wagon top
Rims, automobile wheel
Rounds, chair
Rounds, ladder
Split bottom chairs
Shackle bars, light vehicle
Singletrees
Spokes, buggy wheel
Spokes, automobile wheel
Spring bars, light vehicle
Spring blocks, wagon
Sweep sticks, loom
Trucks, warehouse
Wheelbarrows

KALMIA (MOUNTAIN LAUREL)

Smoking pipes

LOCUST

Insulator pins
Loom parts
Telephone brackets

MAHOGANY

Arms, chair
Back posts, chair
Bedsteads
Bureaus
Book cases
Book racks
Cabinets, magazine
Cabinets, music

Cabinets, smokers
Cases, dental
Caskets
Chairs, rocking
Chests, clothes
Chiffoniers
Desk chairs
Frames, furniture
Frames, mirror
Panels, furniture
Show-cases, exterior
Stands, plant
Tables, card
Tables, parlor
Tables, sewing
Trays, sewing
Tops, table
Veneer panels
Wardrobes

MAPLE

Arms, chair
Axles, wagon
Back posts, chair
Beds, warehouse trucks
Bobbins
Bolsters, wagon
Bottoms, basket
Bottoms, drawer
Boxes, cutlery
Boxes, buggy
Boxes, automobile seat
Boxes, knife
Box shooks
Bureaus
Cabinets, medicine
Cases, shipping
Chairs, camp
Chairs, rocking
Chair seats, plywood
Chair frames
Cogs, flour mill machinery
Crates
Dowels
Eveners
Flooring
Frames, box mattress
Frames, corn sheller
Frames, cot
Frames, farm machinery
Friction blocks
Gear parts, farm machinery
Guide strips, elevator
Knobs, door
Knobs, furniture
Legs, furniture
Packers, flour mill machinery
Partitions, drawer
Parts, hay press
Posts, bed
Posts, chair
Posts, dresser
Rockers, chair
Rungs, chair
Seat boxes, automobile
Slides, extension table
Stops, drawer
Straw carriers
Swings, porch
Tables, kitchen
Thresholds
Trucks, factory
Wheelbarrows

OAK

Altars, church
Altars, lodge room
Arms, chair
Bedsteads
Buffets
Baseboards
Bedposts
Bed rails
Boxes
Box shooks
Buggy bodies, bottoms
Bureaus
Cabinets, music
Casing, door and window
Caskets
Chairs
Chairs, dining
Chairs, rocking
Chairs, mission
Chiffoniers, exterior work
China closets
Church altars

Church pews
Cider presses
Coffins
Commodes
Couch frames
Davenport frames
Desks, office
Doors
Drays
Dressers
Dump carts
Felloes, wagon
Flooring
Frames, vehicle
Frames, furniture
Fixtures, exterior
Hounds, wagon
Hubs, wagon
Insulator brackets
Interior finish, house
Kitchen cabinets
Landing posts
Lounge frames
Mantels
Newel posts
Panels, furniture sides
Pilasters, furniture
Pilasters, mantels
Plow beams
Plow handles
Plug tobacco boxes
Plow rungs
Pole steps, telephone
Reed organs, exterior work
Road carts
Sash
Sills, wagon bodies
Sideboards
Singletrees
Spokes
Spring bars, buggy
Stair balusters
Stair rails
Stair risers
Stair treads
Stair work
Stands, bedroom
Stretchers, table
Tables, extension
Tables, library
Table leaves
Table slides
Table tops
Telephone boxes
Thresholds
Tobacco machinery parts
Toilet seats
Tree blocks
Truck parts, cars
Wagon bodies, framework
Wagon gear parts
Wagon tongues
Wash stands
Whiffletrees

PINE, LONGLEAF

Balusters, porch
Balusters, stair
Baseboards, house trim
Base moulding
Battens, O. G., barn
Beams, elevator
Bevel siding, house
Blinds, window
Box shooks
Brackets, porch
Cabinet work
Cars, elevator
Cases, tobacco
Casing, door and window
Ceiling
Cleats, elevator
Cornice, house construction
Crates, cabbage
Derricks, well
Elevators, freight
Flooring, house construction
Footing pieces, elevator
Frames, couch
Frames, freight elevator
Frames, window and door
Interior finish, house construction
Lattice
Moulding, bed, house construction
Moulding, brick, house construction
Moulding, cap, house construction
Moulding, cove, house construction
Moulding, crown, house construction
Moulding, drip cap, house construction
Moulding, picture

Moulding, plaster
Moulding, quarter round
Newel posts
Nosing, house trim
Partition
Platforms, elevator
Poles, wagon
Porch columns
Porch newels
Risers, stair
Sash
Screens, window and door
Sheathing
Siding
Sills, door and window
Thresholds
Treads, stair
Wainscoting
Window apron
Window stool

PINE, NORTH CAROLINA

Balusters
Baseboards
Basket bottoms
Blinds
Boxes
Boxes, dry goods
Box cleats
Box shooks
Cabbage crates
Cabinets
Casing
Ceiling
Clapboards
Coffins
Conduits
Cornices
Crates, vegetable
Crates, fruit
Cross-arms
Cultivators
Doors
Door frames
Excelsior
Fixtures, store and office
Flooring
Flooring, factory
Furniture backs
Furniture, veneer cores
Grain doors
Guide strips, elevator
Harrows
Hoppers
Interior trim
Kitchen safes
Landing posts
Lattice
Mouldings
Newel posts
Outer cases, caskets
Panels, furniture sides
Partitions
Pilasters
Porch columns
Poles, wagon
Poultry coop bottoms
Roofers
Sample cases
Sash
Screens, door
Screens, window
Siding, house
Stair rails
Stairways
Stepping
Store fronts
Veneer boxes
Truck bodies
Wagon panels
Window and door frames

PINE, SUGAR

Bins, flour mill machinery
Bins, grain
Grain shutes
Hoppers, feed mill
Panel sides, mill machinery
Troughs, ensilage cutters

PINE, WHITE

Backing, furniture
Backing, mirror
Balusters, porch
Beds, light delivery wagon
Bins, flour mill machinery
Bins, grain

Blinds, window
Boxes, packing
Boxes, plant
Boxes, tobacco
Box shooks
Brackets, porch
Capping, sink, house trim
Cases, casket and coffin
Cases, leaf tobacco
Cases, sample
Casing, door and window
Chests, clothes
Cornice
Crating
Doors
Drain boards, sink
Floor boards, automobile
Frames, window and door
Gable ornaments
Hoppers, plow and feed
Lining, dumb waiter shafts
Lattice
Mantels
Mirror doors
Moulding, house trim
Panels, stair work
Porch columns
Porch railings
Risers, stair
Running boards, automobile
Sash, window
Sash, hotbed
Seat boxes, automobile
Screens, door and window
Shelves, dumb waiter
Sides, wagon bodies
Siding, house
Spindles, porch
Wheels, water mill
Window stools

POPLAR, YELLOW

Balusters
Backs, dresser
Bands, berry basket
Bedsteads, white enamel
Berry baskets
Blinds
Boxes, bottle
Boxes, cracker
Boxes, cutlery
Boxes, plug tobacco
Boxes, wagon
Cabinets
Cases, casket
Casing, door and window
Ceiling
Cigar boxes
Clapboards
Coffins
Cores, veneer
Cornice work
Crating
Doors
Doors, poultry coops
Drawer bottoms
Drawer sides
Fixtures, store and office
Frames, upholstered furniture
Interior finish, house
Kitchen cabinets
Kitchen safes
Kitchen tables
Lining, light wagon bodies
Lounge frames
Mantels, white enamel
Mirror backing
Moulding
Packing cases
Panels, automobile bodies
Panels, delivery wagon tops
Panels, furniture sides
Panels, interior house trim
Partition
Pilasters, mantels
Plug tobacco boxes
Porch blinds
Porch columns
Porch newels
Porch railing
Poultry coop bottoms
Reed organs, interior parts
Running boards, automobile
Sample cases
Sash, window
Seat boxes, automobile
Shelves
Siding, house

Stair risers
Traveling cases
Wagon bodies
Wagon beds
Wardrobes
Window frames

SYCAMORE

Backing, Bureau
Backing, mirror
Bottoms, drawer
Cabinet work
Chairs, kitchen
Frames, kitchen cabinet
Frames, furniture
Frames, fixture
Mantels
Seat frames, chair
Sides, drawer
Slides, drawer
Tables, kitchen

WALNUT, BLACK

Altars, church
Arms, chair
Bedsteads
Benches, piano
Bible stands
Bookcases, exterior
Bureaus, exterior
Cabinets, magazine
Cabinets, music
Cabinets, phonograph
Caskets
Chairs
Cheval mirrors
Chiffoniers, exterior
Coffins
Footstools
Frames, mirror
Furniture, lodge and church
Panels, desk
Pews, church
Rockers, chair
Screens, fire
Settees
Sewing tables
Tables, dining room
Tables, library
Tables, parlor
Tables, tea
Trays, serving
Wall cases

WOOD-USING FACTORIES OF NORTH CAROLINA

The following is a list of the wood-using factories of North Carolina which supplied the data upon which this report is based. It will be noticed that the names of several establishments appear under more than one industry, the reason for this being that they produce more than one class of wooden commodity. This list is arranged to correspond with the industries described in the preceding pages:

AGRICULTURAL IMPLEMENTS

Asheboro Wheelbarrow Company.....Asheboro
Cole Manufacturing Company.....Charlotte
S. B. Carter.....Elizabeth City
Gardner Manufacturing Company.....Greenville
A. G. Cox Manufacturing Company.....Winterville

BOXES AND CRATES

Interstate Cooperage Company.....Belhaven
Jarman Lumber Company.....Burlington
Styers Sash and Door Shop.....Cherryville
D. L. Boney.....Clinton

Carolina Cross-Arm Company	Elkin
West Lumber and Box Company	Fayetteville
Warlich Lumber Company	Gilkey
Roberson, Strader & Company	Greensboro
C. F. Hany	Grover
Hutton and Bourbonnais Company	Hickory
Zove Box and Crate Company	High Point
Selwood Manufacturing Company	Hobgood
Morehead City Manufacturing Company	Morehead City
John L. C. Miller	Mt. Pleasant
Jeffreys Myers Manufacturing Company	Oxford
Halifax Builders' Supply Company	Roanoke Rapids
The Church Lumber Company	Ronda
Yadkin Valley Mill and Lumber Company	Ronda
Makepeace Box and Lumber Company	Sanford
C. M. Wall & Son	Southmont
Stantonsburg Lumber Company	Stantonsburg
Boyce Lumber Company	Statesville
Statesville Lumber Company	Statesville
Alexander Lumber Company	Taylorsville
Hughes and Peace Lumber Company	Thomasville
Carolina Lumber Company	Walnut Cove
Mengel Box Company	Winston-Salem
J. E. Shelton Box and Lumber Company	Winston-Salem

CASKETS AND COFFINS

Burns Casket Company	Asheboro
National Casket Company	Asheville
Burlington Coffin Company	Burlington
Charlotte Casket Company	Charlotte
Rankin Coffin and Casket Company	High Point
Rockwell Furniture Company	Rockwell
Atlantic Coffin and Casket Company	Rose Hill
Rose Hill Coffin Factory	Rose Hill
Richardson Manufacturing Company	Sparta
Hearnes Brothers and Company	Whitakers
The Turner-White Coffin Company	Winston-Salem

CHAIRS

American Bentwood Chair Company	Asheboro
Asheboro Chair Company	Asheboro
Piedmont Chair Company	Asheboro
Randolph Chair Company	Asheboro
Coleridge Manufacturing Company	Coleridge
Denton Chair Company	Denton
Hickory Chair Manufacturing Company	Hickory
Barnes Manufacturing Company	High Point
Southern Chair Company	High Point
Thomasville Chair Manufacturing Company	High Point
Tomlinson Chair Manufacturing Company	High Point
Johnson Chair Company	Julian

Bernhardt Chair Company	Lenoir
Carolina Chair Company	Lenoir
Ethel Chair Company	Lenoir
Lenoir Chair Manufacturing Company	Lenoir
Hoover Chair Company	Lexington
Lexington Chair Company	Lexington
Liberty Chair Company	Liberty
Hanes Chair and Table Company	Mocksville
Bent Oak Chair Manufacturing Company	Siler City
High Point Bending and Chair Company	Siler City
Statesville Chair Company	Statesville
Standard Chair Company	Thomasville

ELEVATORS AND MACHINE CONSTRUCTION

Alexander and Garsel	Charlotte
Liddell Company	Charlotte
Moffatt Machinery Manufacturing Company	Charlotte
The Park Manufacturing Company	Charlotte
Grover Gin Company	Grover
W. C. Meadows Mill Company	North Wilkesboro
E. V. Williams Company	North Wilkesboro
New Williams Mill Company	North Wilkesboro
R. C. Meadows Mill Manufacturing Company	Pores Knob
Blue Ridge Mill Company	Roaring River
Briggs-Shaffeur	Winston-Salem

FIXTURES

H. M. Wade Manufacturing Company	Charlotte
Moss Cabinet Shop	Hickory
Myrtle Desk Company	High Point
Cochran Hardwood Manufacturing Company	Lincolnton
Raleigh Manufacturing Company	Raleigh
Allright Manufacturing Company	Rural Hall
Dellinger Show Case Company	Statesville
Statesville Show Case Company	Statesville
Kwick-Bath Manufacturing Corporation	Wilson

FRUIT AND VEGETABLE PACKAGES

Aberdeen Crate and Box Company	Aberdeen
Patten Package Company	Calypso
Rhaney and Rector Company	Drexel
Foreman-Derrickson Veneer Company	Elizabeth City
Southern Roller Stave and Heading Company	Elizabeth City
N. J. Brown and Company	George
Empire Manufacturing Company	Goldsboro
Utility Manufacturing Company	Goldsboro
Cecil Manufacturing Company	High Point
O. E. and C. A. Bivins	Hillsboro
Eureka Lumber Company	Washington
T. R. Peppers	Winston-Salem
Sheppard Veneer Company	Winston-Salem

FURNITURE

Albemarle Mantel Company	Albemarle
Carolina Wood Products Company	Asheville
Styers Sash and Door Shop	Cherryville
Home Table Furniture Company	China Grove
Drexel Furniture Company	Drexel
Elkin Furniture Company	Elkin
Newberry Brothers & Cowell	Dunn
Goldsboro Furniture Manufacturing Company	Goldsboro
Warlich & Sherril Company	Granite Falls
Melton-Rhodes Company, Inc.	Greensboro
Standard Table Company	Greensboro
Sterling Furniture Company	Greensboro
C. F. Hany	Grover
Unagusta Manufacturing Company	Hazelwood
Waynesville Furniture Company	Hazelwood
Hickory Cabinet and Manufacturing Company	Hickory
Martin Furniture Company	Hickory
Southern Desk Company	Hickory
Alma Furniture Company	High Point
Continental Furniture Company	High Point
Dalton Furniture Company	High Point
J. F. and Arthur Ellison	High Point
Giant Furniture Company	High Point
Globe Parlor Furniture Company	High Point
Ideal Table Company	High Point
Kearns Furniture Company	High Point
Keystone Cabinet Company	High Point
J. A. Lindsay	High Point
Marsh Furniture Company	High Point
Tate Furniture Company	High Point
Tomlinson Chair Manufacturing Company	High Point
Union Furniture Company	High Point
Welch Furniture Company	High Point
Wrenn Columbia Furniture Company	High Point
Zone Box and Crate Company	High Point
Kernersville Furniture Manufacturing Company	Kernersville
Ring Furniture Company	Kernersville
King Manufacturing Company	King
Caldwell Furniture Company	Lenoir
Harper Furniture Company	Lenoir
Lenoir Furniture Corporation	Lenoir
Atlas Furniture Company	Lexington
Dixie Furniture Company	Lexington
Elk Furniture Company	Lexington
Foster Furniture Company	Liberty
Catawba Furniture Company	Marion
Drexel Furniture Company	Marion
McDowell Furniture Company	Marion
White Furniture Company	Mebane

J. H. Myers	Monroe
Mooresville Furniture Company	Mooresville
Morganton Furniture Company	Morganton
Banner Manufacturing Company	Mt. Airy
National Furniture Company	Mt. Airy
Mt. Airy Furniture Company	Mt. Airy
Mt. Airy Mantel and Table Company	Mt. Airy
John L. C. Miller	Mt. Pleasant
Valley River Lumber Company	Murphy
Forest Furniture Company	North Wilkesboro
Oak Furniture Company	North Wilkesboro
John R. Hagaman	Patterson
Fitts-Crabtree Manufacturing Company	Sanford
High Point Bending and Chair Company	Siler City
Carolina Parlor Furniture Company	Statesville
Imperial Furniture Manufacturing Company	Statesville
Statesville Furniture Company	Statesville
Statesville Wood Products Company	Statesville
Forsyth Dining Room Furniture Company	Winston-Salem
Forsyth Furniture Company	Winston-Salem
B. F. Huntley Furniture Company	Winston-Salem
Hyatt & Company	Waynesville
Keller Manufacturing Company	Waynesville
J. C. Money	Yadkinville

HANDLES

A. W. Vickory & Company	Bonlee
Craven Brothers	Boonville
Bryson City Handle Company	Bryson City
J. D. Pitts	Glen Alpine
Crawford Spoke and Handle Company	Mebane
Jesse Lovell	Pilot Mountain
Fred R. Thompson	Staley
Brendle Handle Works	Wilmington

PLANING MILL PRODUCTS

Asheboro Wheelbarrow Company	Asheboro
Home Building and Material Company	Asheboro
Jordan Hampton	Blowing Rock
Miller Supply Company	Brevard
Spoon & Safford	Burlington
J. D. Bush Lumber Company	Cary
Lee Lumber Company	Cary
Beam Lumber Company	Charlotte
Cathey Lumber Company	Charlotte
Doggett Lumber Company	Charlotte
Hardwood Manufacturing Company, Inc.	Charlotte
J. H. Wearn & Company	Charlotte
Styers Sash and Door Shop	Cherryville
Clinton Lumber Company	Clinton
Sampson Power and Planing Mill Company	Clinton

Cary Lumber Company	Durham
Chatham Lumber Company	Durham
Durham Lumber Company	East Durham
Jackson Brothers	Fayetteville
Spencer Lumber Company, Inc.	Gastonia
Warlich Lumber Company	Gilkey
E. E. Bain	Greensboro
Fuller Lumber Company, Inc.	Greensboro
Oetinger Lumber Company	Greensboro
Pennsylvania Lumber Company	Greensboro
C. F. Hany	Grover
J. D. Pitts	Glen Alpine
Hendersonville Lumber Company	Hendersonville
Pace Lumber Company	Hendersonville
C. M. and W. G. Wilson	Hendersonville
H. S. Smith	Hickory
Kannapolis Lumber Company	Kannapolis
Hines Brothers Lumber Company	Kinston
Kent-Coffee Manufacturing Company	Lenoir
Lenoir Manufacturing Company	Lenoir
C. M. Thompson Sons	Lexington
E. E. Wallett	Littleton
C. H. Fallin Lumber Company	Madison
Beaman Lumber Company	Marion
Chapman Lumber Company	Marion
Payne and Decker Lumber Company	Marion
Dixie Lumber Co.	Mebane
Fitch & Riggs Lumber Company	Mebane
J. L. Sheek	Mocksville
J. H. Myers	Monroe
G. M. Tucker	Monroe
Mooresville Furniture Company	Mooresville
Beasley & Tesh Lumber Company	Mt. Airy
John L. C. Miller	Mt. Pleasant
Cherokee Manufacturing Company	Murphy
The Pine Lumber Company	New Bern
Setzer Lumber Company	Newton
Wilkesboro Manufacturing Company	North Wilkesboro
Oxford Orphanage Wood Shop	Oxford
C. D. Ray Lumber Company	Oxford
Job Hiatt	Pilot Mountain
S. K. Harris & Son	Polkton
John B. Rogers	Reidsville
Richfield Lumber Company	Richfield
Sider & Kluttz	Rockwell
Halifax Builders' Supply Company	Roanoke Rapids
Rocky Mount Woodworking Company	Rocky Mount
Wilson Mill and Lumber Company	Rural Hall
Goodman Lumber Company	Salisbury
Graf-Davis-Collett Company	Salisbury

Makepeace Box and Lumber Company	Sanford
Thompson Company	Shelby
Boone Fork Lumber Company	Shulls Mills
Little River Lumber Company	Star
Southern Timber and Lumber Company	Star
Boyce Lumber Company	Statesville
Statesville Lumber Company	Statesville
Stantonsburg Lumber Company	Stantonsburg
Alexander Lumber Company	Taylorsville
Guilford Lumber Manufacturing Company	Troy
Dan River Lumber Company	Walnut Grove
Pridgen Manufacturing Company	Warrenton
Moss Planing Mill Company	Washington
Hyatt & Company	Waynesville
Dixon Lumber and Millwork Company	Weldon
Chadbourn-Bate Company	Wilmington
Chadbourn Lumber Company	Wilmington
Clark-Lynch Lumber Company	Wilmington
Hilton Lumber Company	Wilmington
Fogle Brothers Company	Winston-Salem
Orinoco Supply Company	Winston-Salem
The Phillips Lumber Company	Winston-Salem
Yadkinville Buggy Company	Yadkinville

SASH, DOORS, BLINDS, AND GENERAL MILL WORK

William W. Jones	Asheville
Spoon & Safford	Burlington
John I. Barns	Clayton
Styers Sash and Door Shop	Cherryville
Durham Lumber Company	East Durham
T. A. Henry	Gastonia
A. T. Griffin Manufacturing Company	Goldsboro
Novelty Lumber Company	Hickory
J. R. Wilson Lumber Company	Hendersonville
J. M. Beam & Brother	Henry
Jonesboro Sash and Blind Company	Jonesboro
Builders Supply Manufacturing Company	Lincolnton
J. H. Lineberger & Son	Lincolnton
Morganton Manufacturing and Trading Company	Morganton
Neuse Lumber Company	New Bern
Baker-Thompson Lumber Company	Raleigh
J. M. Beam and Brother	Reepsville
Builders Sash and Door Company	Rocky Mount
Graf-Davis-Collett Company	Salisbury
Sanford Sash and Blind Company	Sanford
L. K. Overcash	Statesville
Guilford Lumber Manufacturing Company	Troy
Dixon Lumber and Millwork Company	Weldon
The Aladdin Company	Wilmington
W. W. Simms Company	Wilson

SHUTTLES, SPOOLS, AND BOBBINS

J. Elwood Cox	Biltmore
Hickory Handle and Manufacturing Company	Conover
Ivey Manufacturing Company	Hickory
Elwood Cox Manufacturing Company	High Point
Liberty Picker Stick and Novelty Company	Liberty
Novelty Wood Works	Ramseur
Jordan Manufacturing Company	Toecane

VEHICLES AND VEHICLE PARTS

Asheboro Wheelbarrow Company	Asheboro
The Knowles Manufacturing Company	Biltmore
Tyson & Jones Buggy Company	Carthage
Charlotte Wagon and Auto Company	Charlotte
Cotton States Wagon Company	Charlotte
T. A. Smitherman	East Bend
Gastonia Wagon and Auto Company	Gastonia
W. H. Piland	Gates
Corbett Buggy Company	Henderson
Carolina Buggy Manufacturing Company	Henderson
Piedmont Wagon Manufacturing Company	Hickory
North Carolina Wheel Company	High Point
W. G. Hollowell	Hobbsville
Parkers Wagon Shop	Kelford
J. H. Hampton Buggy Company	Leaksville
Waters Buggy and Auto Company	New Bern
Garman Wheel Company	Oxford
C. R. Overton	Powellsville
Wilson Mill and Lumber Company	Rural Hall
Veneer Products Company	Smithfield
Thomasville Spoke Works	Thomasville
Washington Buggy Company	Washington
Hackney Brothers	Wilson
E. S. Dail Carriage Company	Windsor
George E. Nissen Company	Winston-Salem
S. J. Nissen Company	Winston-Salem
J. C. Spach Wagon Works	Winston-Salem
Winston Vehicle Company	Winston-Salem
J. C. Money	Yadkinville
Yadkinville Buggy Company	Yadkinville

MISCELLANEOUS

J. F. Rodman	Clinton
Blue Ridge Locust Pin Company	Dillsboro
Carolina Cross Arm Company	Elkin
Carolina Woodenware Company	Fayetteville
High Point Veneer and Panel Company	High Point
Shipman Organ Company	High Point
Clarence Call	North Wilkesboro
Oval Oak Manufacturing Company	Siler City
Putnam & Parks	Spruce Pine

PART V

PRODUCTION OF FOREST PRODUCTS

As previously stated, the information given in this report does not include rough lumber or the products of primary industries, such as shingles, lath, cooperage, pulpwood, etc. Such statistical data have always been collected separately, either by the Bureau of the Census or the Forest Service. Since statistics of production of forest products have such an important bearing on those of consumption, it was considered advisable for purposes of reference and comparison to include the former, in so far as they relate to North Carolina, in this appendix.

Lumber.—Although North Carolina, in 1921, was among the ten leading states in the production of lumber, she did not occupy first place in the cut of any one particular species. In the production of chestnut lumber, however, the State ranked third.

Table I given below shows the rank according to quantity produced of the 22 woods cut for lumber in North Carolina in 1921.

TABLE I.—*Production of Lumber in North Carolina in 1921*

Kind of Wood	Quantity (Feet B. M.)	Average Value per M. Feet F.O.B. Mill	Total Value F.O.B. Mill
Yellow pine	647,845,000	$ 19.04	$ 12,334,968.80
Oak	83,088,000	23.78	1,975,832.64
Spruce	47,486,000	27.01	1,282,596.86
Chestnut	36,806,000	24.21	891,073.26
Red gum	26,346,000	17.38	457,893.48
Yellow poplar	18,728,000	31.56	591,055.68
Hemlock	16,894,000	18.47	312,032.18
Cypress	11,817,000	27.10	320,240.70
Maple	11,209,000	25.39	284,596.51
Tupelo	7,426,000	15.81	117,405.06
Cedar	4,633,000	41.45	192,037.85
Basswood	4,058,000	30.86	125,229.88
White pine	3,360,000	25.82	86,755.20
Hickory	2,053,000	26.28	53,952.84
Ash	1,769,000	35.98	63,648.62
Beech	1,716,000	23.93	41,063.88
Birch	1,521,000	31.31	47,622.51
Sycamore	117,000	20.80	2,433.60
Elm	74,000	26.50	1,961.00
Cottonwood	65,000	25.15	1,634.75
Walnut	38,000	64.41	2,447.58
All others*	3,966,000	51.02	202,345.32
Totals	931,015,000	$ 20.83	$ 19,388,828.20

*Includes buckeye, chittem, and box elder.

Lath and Shingles.—Lath are chiefly a by-product of lumber manufacture, and are cut from so many kinds of timber that no effort is made in the collection of such statistics to differentiate between species. They are manufactured for the most part from slabs, although large quantities are also produced by portable lath mills working in cut-over tracts and utilizing the small timber, crooked logs, tops, and other material left behind the sawmill. The quantity produced in North Carolina in 1921 is shown in Table II.

The bulk of the shingles produced in this country are made of cedar, principally the western red cedar of the Pacific Coast, although considerable quantities are cut from the eastern white cedar. Other woods used are cypress, southern yellow pine, and chestnut. The total production of shingles in North Carolina in 1921 is shown in Table II.

TABLE II.—*Production of Lath and Shingles in North Carolina in 1921*

Product	Quantity (Pieces)	Number of Mills Reporting	Equivalent in Feet B. M.
Lath	16,164,000		3,233,000
Shingles	46,064,000	36	4,606,000

Cooperage Stock.—Cooperage stock is of two kinds, slack and tight. Slack cooperage includes barrels intended for use in the shipment of dry products, such as sugar, flour, cement, plaster, salt, certain classes of hardware, crockery, etc. Tight cooperage consists of barrels used as containers of alcoholic and other liquids. The substitution of cotton, jute, and paper sacks has limited the demand for slack cooperage stock, especially in the flour, salt, cement, plaster and sugar industries. The increased demand for slack barrels in other industries has, however, probably offset the reduced consumption of wood as containers of certain industries as brought about through substitution of other materials. Woods that dry quickly, steam well, retain their form when bent, and which are comparatively free from resin and odor make the best slack stave material. Red gum, pine, elm, and ash are in the order named the four most important woods employed by the industry.

White oak, especially that cut from the heart of the tree, is considered the most satisfactory wood for tight cooperage stock. The pores of the wood are not open like those of red oak, and after the barrel is made, no leakage of the contents takes place through the pores. Although the uses for tight barrels, other than for the shipment of alcoholic beverages, are many, there is no doubt but that national prohibition will have the effect of greatly reducing the consumption of wood by the tight cooperage

industry. Table III shows by kinds of wood the number of slack staves and sets of heading that were produced in North Carolina in 1921.

The tight cooperage industry in North Carolina in 1921 was of such minor importance that the production of tight staves in the State during that year was not shown separately in the published statistics.

TABLE III.—*Production of Slack Cooperage Stock in North Carolina in 1921*

Kind of Wood	Staves (Number)	Heading (Sets)	Equivalent in Board Feet
Tupelo	38,102,000	1,708,000	17,824,000
Pine	16,427,000	620,000	6,715,000
Red gum	3,700,000	3,214,000	7,661,000
All other	50,000		16,000
Totals	58,279,000	5,542,000	32,216,000

Veneer.—North Carolina, in 1921, ranked fifth among the various states in the consumption of wood in the manufacture of veneer. The total quantity used in the State was 24,264,000 feet, log scale, as compared with 400,388,000 feet, log scale, reported for the entire country. Table IV shows by species and processes of manufacture the consumption of wood in this industry in North Carolina during the year.

TABLE IV.—*Consumption of Wood in North Carloina in the Production of Veneer in 1921*

Kind of Wood	Total (Feet Log Scale)	Process		
		Rotary Cut, Quantity (Feet Log Scale)	Sliced, Quantity (Feet Log Scale)	Sawed, Quantity (Feet Log Scale)
Red gum	13,707,000	13,677,000	30,000	
Yellow poplar	7,498,000	7,498,000		
Tupelo	2,299,000	2,299,000		
All other*	760,000	225,000	35,000	
Totals	24,264,000	24,199,000	65,000	

*Includes yellow pine, maple, white oak, beech, spruce, sycamore, walnut, and chestnut.

Pulpwood.—Since there are less than half a dozen pulp mills in North Carolina, the industry is of minor importance in the State. As small as the industry is, however, it consumed in 1921 over 70 million feet of raw material in the form of cordwood, which constitutes quite an item in the total annual drain upon the forests of the State.

APPENDIX

LIST OF COMMERCIAL TREES OF NORTH CAROLINA

Common Names	*Botanical Name*	*Local Names*	*Trade Name*
White pine	Pinus strobus	White pine	White pine
		Balsam pine	
Loblolly pine	Pinus taeda	Old field pine	N. C. pine
		Shortleaf pine	
		Longleaf pine	
		Bog pine	
		Slash pine	
		Loblolly pine	
Shortleaf or rosemary pine	Pinus echinata	Old field pine	Yellow pine
		Forest pine	
		Yellow pine	N. C. pine
		Rosemary pine	
		Shortleaf pine	
Longleaf pine	Pinus palustris	Longleaf pine	Yellow pine
Spruce pine or virginia pine	Pinus virginiana	Spruce pine	N. C. pine
		Nigger pine	
		Alligator pine	
		Hickory pine	
		Scrub pine	
Pond pine	Pinus serotina	Bay pine	N. C. pine
		Pocosin pine	
		Black bark pine	
		Pond pine	
Pitch or black pine	Pinus rigida	Black pine	Yellow pine
		Pitch pine	
		Ridge pine	
		Mountain pine	
		Old field pine	
Table mountain or mountain pine	Pinus pungens	Black pine	Yellow pine
		Ridge pine	
		Prickly pine	
Red spruce	Picea rubra	Spruce	Spruce
		He balsam	
Southern or mountain balsam	Abies Fraseri	Balsam	Balsam
		She balsam	Spruce
Hemlock	Tsuga canadensis	Hemlock	Hemlock
		Spruce pine	
Carolina hemlock	Tsuga caroliniana	Hemlock spruce	
Cypress	Taxodium distichum	Cypress	Cypress
Pond cypress	Taxodium ascendens		
White cedar	Chamaecyparis thyoides	Juniper	Juniper
Red cedar	Juniperus virginiana	Red cedar	Red cedar
White walnut or butternut	Juglans cinerea	White walnut	Walnut
Black walnut	Juglans nigra	Black walnut	Black walnut
White heart or mockernut hickory	Carya alba	White heart hickory	Hickory
Bitternut hickory	Carya cordiformis	Red heart hickory	Hickory
Water hickory	Carya aquatica	Swamp hickory	Hickory
Pignut hickory	Carya glabra	Hickory	Hickory
Scaly-bark or shagbark hickory	Carya ovata	Scaly bark	Hickory
Pale-leaf hickory	Carya pallida	Hickory	Hickory
Southern shell-bark hickory	Carya carolinae-septentrionalis	Scaly bark hickory	Hickory
Little-nut hickory	Carya microcarpa	Hickory	Hickory
River birch	Betula nigra	River birch	Birch

Common Names	*Botanical Name*	*Local Names*	*Trade Name*
Black birch	Betula lenta	Mountain mahogany, Mahogany, Cherry birch	Birch
Yellow birch	Betula lutea	Birch, White birch	Birch
Beech	Fagus grandifolia	Beech	Beech
Chestnut	Castanea dentata	Chestnut	Chestnut
White oak	Quercus alba	White oak	White oak
Post oak	Quercus minor	White oak	White oak
Overcup oak	Quercus lyrata	Overcup oak, Swamp post oak	White oak
Swamp chestnut oak	Quercus prinus	Swamp white oak, Swamp chestnut oak	White oak
Chestnut oak	Quercus montana	Chestnut oak, Rock oak, Mountain oak	White oak
Live oak	Quercus virginiana	Live oak	Live oak
Northern red oak	Quercus borealis maxima	Red oak, Water oak, Mountain oak, Buck oak	Red oak
Scarlet oak	Quercus coccinea	Spanish oak	Oak
Black oak	Quercus velutina	Black oak	Oak
Southern red oak	Quercus rubra	Red oak, Turkey oak, Spanish oak	Oak
Swamp red oak	Quercus pagedaefolia	Red oak	Oak
Water oak	Quercus nigra	Water oak	Oak
Willow oak	Quercus phellos	Water oak, Willow oak	Oak
Slippery elm	Ulmus fulva	Slippery elm	Elm
Winged elm	Ulmus alata	Small-leaved elm, Corky elm, Winged elm, Southern elm	Elm
White or american elm	Ulmus americana	Elm, White elm	Elm
Hackberry	Celtis occidentalis	Hackberry, Sugarberry	Hackberry
Red mulberry	Morus rubra	Mulberry, Red mulberry	Mulberry
Mountain magnolia	Magnolia Fraseri	Cucumber, Mountain cucumber, Wahoo	Cucumber*
Sweet or white bay	Magnolia virginiana	White bay, Sweet bay	Cucumber*
Cucumber-tree	Magnolia acuminata	Cucumber	Cucumber*
Yellow poplar	Liriodendron tulipifera	Yellow poplar, White poplar, Poplar, Tulip poplar	Poplar
Sweet or red gum	Liquidambar styraciflua	Sweet gum, Red gum	Red gum, Satin walnut
Sycamore	Platanus occidentalis	Sycamore, Buttonwood	Sycamore
Black cherry	Prunus serotina	Black cherry, Wild cherry	Cherry
Black locust	Robinia pseudacacia	Locust, Black locust	Locust
Holly	Ilex opaca	Holly, American holly	Holly
Sugar maple	Acer saccharum	Sugar tree, Sugar maple	Hard maple

Common Names	*Botanical Name*	*Local Names*	*Trade Name*
Red maple	Acer rubrum	Red maple Swamp maple Carolina maple	Soft maple
Yellow buckeye	Aesculus octandra	Buckeye Yellow buckeye	Buckeye
Linden or basswood	Tilia spec.	Linn Basswood	Basswood
Dogwood	Cornus florida	Dogwood	Dogwood
Black gum	Nyssa sylvatica	Black gum	Black gum
Water gum	Nyssa biflora	Sour gum Tupelo gum Black gum Bowl gum	Tupelo
Tupelo	Nyssa aquatica	Tupelo gum Cotton gum	Tupelo
Sourwood	Oxydendrum arboreum	Sourwood Sorrel tree	Sourwood
Persimmon	Diospyros virginiana	Persimmon 'Simmon	Persimmon
Silverbell	Halesia carolina	Silverbell tree Snowdrop tree Box elder Bell wood	Pee wood†
White ash	Fraxinus americana	Ash White ash	Ash
Red ash	Fraxinus pennsylvanica	Red ash	Ash
Biltmore ash	Fraxinus biltmoreana ash	White ash	Ash
Green ash	Fraxinus lanceolata	Green ash	Ash
Pumpkin ash	Fraxinus profunda	Pumpkin ash	Ash
Water ash	Fraxinus caroliniana	Water ash	Ash

In addition to the trees listed above, there are some ninety other species of trees native to North Carolina, most of which are either too small or too rare to be used commercially. There are also some dozen introduced species which have escaped from cultivation and become wild.

---

*Cucumber is often cut with and classed and sold as poplar.
†Sometimes cut and sold with cherry.

(Compiled by J. S. Holmes, State Forester, North Carolina Geological and Economic Survey, Chapel Hill, N. C., with the advice of Dr. George B. Sudworth, U. S. Forest Service.)