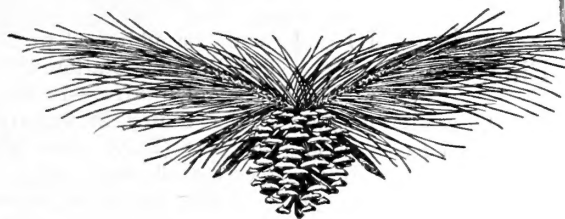
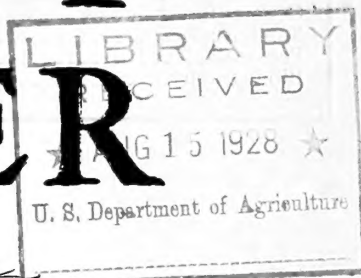


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FOREST WORKER



July, 1928

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Announcements

Eddy Station Wants Seeds of 10 American Pines

The 33 species and varieties of the genus *Pinus* of which the Eddy Tree Breeding Station has not yet obtained seed for its nursery and plantation tests, after two years' work during which it has obtained seed of 87 species and important varieties from all parts of the world, include 10 native American species occurring within the borders of the United States. In the hope that readers of the *FOREST WORKER* may be able to supply small amounts of seed of some or all of these pines, the species and their ranges are here listed as given by the station:

P. apacheca (Apache pine)—Arizona and New Mexico.

P. arizonica, or *P. ponderosa* var. *arizonica* (Arizona pine)—Arizona and New Mexico.

P. balfouriana (foxtail pine)—California.

P. cembroides (Mexican stone pine)—Arizona, New Mexico, and Texas.

P. clausa (sand pine)—Florida to Alabama.

P. cubensis (not *P. caribaea*, but a southern form)—southern Florida.

P. glabra (Spruce pine)—South Carolina to Florida and Louisiana.

P. parryana (Parry pine)—Southern California.

P. ponderosa mayriana (Mayr pine)—Arizona.

P. tropicalis—Florida.

To contributors of seed of these species the Eddy Tree Breeding Station will gladly send in return seed of various California trees including *Sequoia sempervirens* (redwood) and *Sequoia washingtoniana* (giant sequoia). Communications in regard to the matter

should be addressed to Lloyd Austin, Director, Eddy Tree Breeding Station, Placerville, Calif.

EDITOR'S NOTE.—In the Check List of Forest Trees of the United States, by George B. Sudworth, *P. mayriana* (Mayr pine) is given as identical with *P. apacheca*, the common names of *P. cembroides* and *P. parryana* are given as Mexican piñon and Parry piñon, respectively, and *P. cubensis* is given as a former designation of *P. caribaea*. *P. cubensis* is recognized by some botanists as a variety of *P. caribaea*. *P. tropicalis* is not given in the Check List.

Forestry Research Fellowships at Uni- versity of Idaho

Two research fellowships are offered by the School of Forestry, University of Idaho, for the academic year beginning September 1, 1928. A bachelor's degree in forestry is required. The students will be expected to give most of their time to research in the decay resistance of wood or in wood utilization. They will be given opportunity to complete in one year the requirements for the master's degree. The fellowships do not involve any instructional duties. Each carries an annual stipend of \$900. Anyone interested in applying for one of these fellowships should write to Dr. E. E. Hubert, Forest Research Laboratory, School of Forestry, Moscow, Idaho, giving his age, his degree and year of graduation, the name of the institution from which he was graduated, a list of the studies he has completed that fit him for research work of the sort proposed (including cultural studies and laboratory work), an account of his field and laboratory experience, and a small photograph of himself.

Because the free edition of this periodical is necessarily limited, it can be distributed without charge outside of the Government service only to such persons and organizations as State forestry and conservation officials, State agricultural extension directors, faculties and libraries of forest schools, and forestry associations. Others desiring to obtain copies of the *FOREST WORKER* can do so by sending 5 cents for a single copy or 25 cents for a year's subscription to the Superintendent of Documents, Government Printing Office, Washington, D. C. Foreign subscriptions: Yearly, 35 cents; single copies, 7 cents.

Material offered for publication in the *FOREST WORKER* should be addressed to the Editor, United States Forest Service, Washington, D. C.

FOREST WORKER

Washington, D. C.

JULY, 1928

Vol. 4, No. 4

State Forestry

Franconia Notch Now in Public Ownership

On June 7 arrangements were completed for making Franconia Notch, in New Hampshire, the property of the State and the Society for Protection of New Hampshire Forests. Fifteen thousand contributors joined in giving the \$200,000 which the society raised as its half of the purchase price. The property thus brought into public ownership includes the Old Man of the Mountain, Echo and Profile Lakes, the Flume, and about 6,000 acres of land in the towns of Franconia and Lincoln. The former owners are to have the income from the Flume for 1928 and 1929. A deed to about 1,000 acres including the Flume and its surroundings has been received by the society, which agrees to turn it over to the State within 20 years. Condemnation proceedings will be brought by the State to perfect title to the unoccupied wild lands. The society is prepared to advance funds this season for urgent improvement work such as clearing away slash and restoring important trails.

Farmers Lead in New York Tree Planting

If the different "classes" of tree planters in New York were actually competing with each other in increasing their plantings from season to season, the prize for this spring would go to the farmers and other individual landowners. This class planted 10,345,565 trees, or 772,740 more than in the spring of 1927. The largest proportionate increase was scored by the school districts, which in planting 187,000 trees outdid their last spring's record by more than 250 per cent. The 3,161,450 trees from the State nurseries that found their way into municipal plantations were 487,450 more than did so last spring, and the 1,045,800 ordered by sportsmen's clubs and other organizations exceeded last spring's orders from this class by 389,900.

Industrial concerns planted 1,556,900; schools, 165,400 (outside of regular school district forests); Boy Scouts, 120,400; and the State, 3,089,000. The total spring planting was about 19,500,000. It is expected that fall plantings will call for about 6,000,000 trees.

Heavy Fines and Imprisonment for Forest Incendiaries

A sentence of \$200 fine and 90 days' imprisonment was imposed on each of four men in April, 1928, for maliciously setting fires on virgin timberlands and protected cut-over areas near Bogalusa, La. Judge P. B. Carter, of the twenty-sixth judicial district, Louisiana, pronounced the sentences, which are thought to be the heaviest ever given for woods burning in Louisiana. In the not far distant past it was difficult to get fines of more than \$25 imposed upon men convicted of burning areas of even a square mile or more.

Two of the men were convicted of setting fire on March 21 to an area of excellent pine reproduction in a 15,000-acre fenced pasture that had not been burned since 1921. The tract is cut into quarter sections by burned firebreaks about 100 feet wide. A State lookout in a tower $3\frac{1}{2}$ miles away spotted the fire so promptly that the incendiaries were caught as they left the area. With a high north wind, however, and in extremely dry grass and young pine, the fire became so hot that it ran across several recently burned firebreaks and kept 40 fire fighters busy till 10 o'clock p. m. The burn covered 800 acres, part of it in the Memorial Pasture dedicated to Bogalusa's war dead. Damage was done to 650 acres of longleaf seedlings 6 and 7 years old running many thousand to the acre, and a magnificent stand of loblolly seedlings of the same age covering 150 acres was completely wiped out.

The second pair convicted were a father and son who had set fires in virgin timber belonging to a large lumber company.

Planting Stock Distributed by Ohio

About 3,000,000 trees were distributed for planting this spring by the Ohio Agricultural Experiment Station, Wooster. Some 1,390,000 of these went to farmers. The park boards of Cleveland, Akron, Cincinnati, and Massillon took 385,500, and the waterworks of Akron, Barberton, and Wellston 235,000. Manufacturing firms, chiefly manufacturers of brick and other clay products, were supplied with 239,600, and 325,600 were used in plantings on State forests.

Trains and Transients Cause Most Fires in Pennsylvania

More than 30 per cent of the forest fires recorded by the State forestry organization of Pennsylvania in the last five years, Chief Forest Fire Warden Wirt finds, have been charged to "transients"—people who go to the woods for recreation or for such purposes as berry picking. Almost the same proportion has been attributed to railroads. In Pennsylvania more than 4,000 miles of railroad tracks are bordered by forest lands and, in addition, many miles of track are bordered by abandoned or unprotected fields that adjoin forest areas. In several of the State's forest districts half or more of the fires handled by the protection forces in a single season have been traced to railroad operations, and records for 1921 placed on railroads the responsibility for 41 per cent of the year's fires.

In the 15 years since Pennsylvania began to keep records of the causes of forest fires about 7 per cent of the fires recorded in the average year have been charged to brush burning. The proportion classed as incendiary has usually been below that figure. Fires traced to lumbering operations have in no year of this period been more than 3½ per cent, and for the last six years have been less than 2 per cent of the total. Except in 1925, when 62 lightning fires constituted almost 2½ per cent of the fires reported, lightning has seldom accounted for more than one-half of 1 per cent of a year's total.

In recent years not more than 13 or 14 per cent of the fires that have gone into the Pennsylvania records have taken their place under the heading "Cause unknown."

The Locomotive Spark Cools Off in Connecticut

Fires traced to railroads made up 26 per cent of the forest fires recorded in Connecticut in 1924. The proportion sank to 22 per cent in 1925 and to 16.7 per cent in 1926, and in 1927 it was only 13 per cent. This decrease in railroad-caused fires is attributed by the State department of forestry partly to the removal of trains in some sparsely settled regions and to substitution of gasoline and electric power for steam, but also in part to the improvement of locomotives and cleaning up of rights of way.



Headquarters for the Federal inspection of cooperative work in fire protection and the distribution of forest planting stock under the Clarke-McNary law in the Central States have been established by District Forest Inspector E. Murray Bruner in the Federal Building, Louisville, Ky. The Central States district includes Illinois, Indiana, Iowa, Kentucky, Missouri, Ohio, and Tennessee.

Maryland Forestry Department Work in 1927

In reporting on its work during the year ending September 30, 1927, the Maryland Department of Forestry emphasizes its efforts to assist private owners of woodlands. In 55 cases a forester of the State organization, upon the owner's request, examined a woodland in company with the owner or his agent, discussed its condition and desirable plans of management on the ground, and later gave the owner a written report with recommendations. The 55 examinations covered 18,726 acres of woodland in 21 different counties. In 10 cases in which examination showed an amount of mature timber sufficient to justify a logging operation, the department of forestry furnished a forester to go over the tract, with two assistants furnished by the owner, marking and measuring the trees that should be cut. (The cost of this work is borne approximately one-half by the owner and one-half by the forestry department.) These markings covered 465 acres in 7 different counties. In addition one estimate of the amount of timber to be cut was made, covering 1,318 acres of woodland, and three areas were marked for thinning. In 16 cases in which owners were seeking information as to the proper use of waste lands the department examined the lands to determine whether they were suitable for forest planting, and if so what species of trees and what planting methods should be used.

The State forest nursery during the year distributed at cost for forest planting 310,620 trees of 18 different species, of which loblolly pine, white pine, red pine, Norway spruce, and tulip poplar were the most largely used. For roadside planting it distributed at cost 7,064 trees, principally elm, ash, oriental plane, tulip poplar, red gum, and cypress.

The forest warden force of the State was increased during the year by about 50 and the number of cooperating volunteer fire companies by 13. Three large emergency fire crews were organized during the year from employees of the Kelly-Springfield Tire Co., in Cumberland, employees of the Ox-Fibre Brush Co., at Frederick, and the Izaak Walton League of Frederick.

Investigations reported as under progress during the year included preliminary studies of the buried cypress trees of Pocomoke Swamp. For 75 years or more Marylanders have been digging from portions of this swamp cypress timbers sunk there ages ago. Studies are planned to determine the amount of the buried cypress timber and practicable methods for its utilization.



About 60,000 acres of land in Wisconsin has been classified for taxation purposes under the provisions of the forest crop law, through action taken by the conservation commission on June 8.

Reforestation Investigative Committee for New York

An act of the New York Legislature approved March 5 creates a temporary State commission "to investigate generally the subject of reforestation, with particular reference to ascertaining the location, value and area of lands in the State unsuitable for agriculture but which might be utilized for reforestation, and the best means of promoting and financing reforestation within the State." The membership provided for consists of four senators appointed by the temporary president of the senate, four members of the assembly appointed by the speaker of the assembly, three members appointed by the governor, the speaker of the assembly ex officio, the president pro tempore of the senate ex officio, and two members ex officio named by the commission. The commission is authorized to sit anywhere within or without the State, to take testimony, subpoena witnesses, and require the production of books, records, and papers, and otherwise is given all the powers of a legislative committee. The sum of \$50,000 is made available for payment of its expenses. The act directs the commission to report to the legislature on or before March 1, 1929, and to submit with its report such proposed legislative bills as it may consider necessary to carry its recommendations into effect.

Appointments to the commission are as follows: Members at large, Robert W. Higbie, Kew Gardens; George F. Warren, Ithaca; and Nelson C. Brown, Syracuse; State senators, Charles J. Hewitt, Locke; Warren T. Thayer, Chateaugay; Leon F. Wheatley, Hornell; and John A. Hastings, New York City; State assemblymen, Eberly Hutchinson, Green Lake; Ellis W. Bentley, Windham; Clarence L. Fisher, Lyons Falls; and Joseph E. Kinsley, New York City. The responsibility of drawing up a program for the commission's activities has been given to a committee composed of Senator Hewitt, Assemblyman Hutchinson, and Professor Brown.

Increases in Extra Clarke-McNary Allotments

In the fiscal year 1929 each State cooperating in forest fire protection under the Clarke-McNary law will receive from the Federal Government 8.5 per cent of the estimated cost of adequate protection for its State and private forest lands. This is the same percentage on which the regular allotments of the preceding year were figured. Substantial increases appear, however, in the extra allotments made to States in which State and private expenditures for fire prevention alone are greater than the regular Federal allotments. For fire protection work to be carried on under the Clarke-McNary law in the fiscal year 1929 Congress appropriated \$1,200,000, instead of the even

\$1,000,000 it provided the preceding year. Subtracting from this amount the regular allotments to the cooperating States, the \$80,000 required for administration, and \$60,000 for the forest taxation inquiry leaves \$250,000 for extra allotments. Thus in 1929 for the first time the appropriation will be divided almost in accordance with the original program of the Department of Agriculture, by which 25 per cent of the whole would be distributed as extra allotments.

Extra allotments for the fiscal year 1929 are based on the amounts the States expended for forest fire prevention in the calendar year 1928. Previously extra allotments have been determined on the basis of estimated expenditures by the States in the fiscal year covered by the allotments. This change will greatly simplify the handling of reimbursements. Hereafter reimbursements for fire-prevention expenditures will be made currently on a 50-50 basis until the State has received the whole of its extra allotment. Under this arrangement, also, it will be possible to announce the amounts of extra allotments as soon after the beginning of each calendar year as the Federal appropriation is made.

The Federal allotments to the 38 cooperating States are as follows:

State	Regular allotments, 8.5 per cent of estimated cost of adequate protection	Extra allotments	Total allotments
Maine.....	\$38,250	\$11,200	\$49,450
New Hampshire.....	11,416	3,330	14,746
Vermont.....	6,698	750	7,448
Massachusetts.....	14,510	7,700	22,210
Rhode Island.....	1,224	150	1,374
Connecticut.....	5,100	2,520	7,620
New York.....	33,022	21,120	54,142
New Jersey.....	7,004	9,560	16,564
Pennsylvania.....	33,448	9,850	43,298
Delaware.....	765	-----	765
Maryland.....	5,610	1,600	7,210
Ohio.....	2,363	1,540	3,903
Indiana.....	1,700	-----	1,700
Illinois.....	850	-----	850
Virginia.....	30,991	-----	30,991
West Virginia.....	16,362	4,400	20,762
North Carolina.....	41,438	-----	41,438
South Carolina.....	11,810	-----	11,810
Kentucky.....	14,600	-----	14,600
Tennessee.....	21,250	10	21,260
Georgia.....	38,250	130	38,380
Florida.....	25,000	-----	25,000
Alabama.....	38,250	4,820	43,070
Mississippi.....	32,555	860	33,415
Louisiana.....	29,087	10,850	39,937
Texas.....	30,532	190	30,722
Oklahoma.....	13,600	2,030	15,630
Missouri.....	8,000	-----	8,000
Michigan.....	42,594	32,000	74,594
Wisconsin.....	27,276	5,360	32,636
Minnesota.....	55,743	13,880	71,623
South Dakota.....	128	247	375
Montana.....	16,618	3,310	19,928
Idaho:			
North.....	29,750	16,813	46,563
South.....	2,958	1,150	4,108
Washington.....	36,125	33,030	69,155
Oregon.....	34,892	30,120	65,012
California.....	34,425	19,170	53,595
New Mexico.....	1,606	310	1,916
Total.....	795,800	250,000	1,045,800

New York Conservation Law Liberalized

The conservation law of New York State was so revised at the recent legislative session that the State conservation commission is now empowered to establish State parks and parkways in counties where it was formerly restrained from doing so, and to enter into cooperative agreement with municipalities or persons for the purpose of protecting forests of the State from fire and promoting the practice of forestry. As revised the law also permits municipalities, school districts, and other political subdivisions of the State to acquire lands anywhere in the State for forestry purposes. Formerly, municipal and other community forests could be established only within the boundaries of the political unit establishing them.

Inventory of Alabama State Lands

An inventory of lands owned by the State of Alabama is being made by the Alabama State Commission of Forestry, as directed by the legislature at its last session. Of the 2,258,222 acres of land granted to the State by the Federal Government for various purposes, much has been diverted from the purposes for which it was granted and the legal ownership of much has become a matter of doubt. The commission is making progress in protecting State lands against trespass and larceny, settling title questions in doubtful cases, classifying and appraising particular tracts, and seeing that full value is received by the State in cases of sale of either land or timber.

An appropriation of \$20,000 a year has been made by the Mississippi Legislature for the calendar years 1928 and 1929. This is twice the amount the legislature appropriated in 1926 for the first two years of State forestry work in Mississippi.

The income from Pennsylvania's 1,133,050 acres of State forests in 1927 was \$96,090. Purchased within the last 30 years at an average price of \$2.26 an acre, these forests are now worth about \$12.50 an acre, according to estimates quoted by the Pennsylvania Forestry Association.

Two 90-foot steel lookout towers have been completed this season by the Texas Forest Service in cooperation with the Southern Pine Lumber Co. and the Houston County Timber Co. They are located at Ratcliff, in eastern Houston County, and on Bird Mountain, in southeastern Anderson County. Each is surmounted by a glass-enclosed cabin 8½ feet square,

Locust Plantation Proves Farm Family's Stand-by

On the farm of John M. Ham, in Dutchess County, N. Y., a 6-acre plantation of locusts was made in 1842 by three brothers, Lewis, Milton, and Jonathan Ham, with seedlings they had raised in their own farm forest nursery. In the early nineties, some 50 years later, a New York contractor bought some of the trees for cribbing purposes, paying \$1,500. When a new farmhouse and barn were built the sills came from the locust grove, and from this grove also has come the fencing material used on the farm over a period of about 70 years. To-day the original locust grove is somewhat depleted; but the nursery is now a full-fledged forest, and a field about 100 yards from the old plantation that has not been plowed since 1881 is producing a fine growth of self-seeded locust.

Three Osage Orange Trees for 80 Rods of Farm Fence

Fence posts worth \$45 were cut last summer from three Osage orange trees which Oliver P. La Fuze, of Liberty, Ind., had allowed to grow for 30 years in a waste corner of a field. The posts were sufficient to build 80 rods of fence, including 4 corner posts, with 15 ordinary posts and 5 corner posts left over. Their value was estimated at \$2 each for corner posts and 30 cents each for others. Since the three trees had occupied about 1,600 square feet, their yield was at the rate of \$1,223 an acre, or about \$40 per acre per year.

In relating this instance R. F. Wilcox, acting State forester of Indiana, suggests that since borer and blight have made the locust and the chestnut uncertain crops in Indiana, tree planters of the State might well interest themselves in the possibilities of the Osage orange.

Two State forests were established in Alabama on April 17, 1928. Both are located in Clarke County. Their areas are 1,280 acres and 1,920 acres.

County forestry work in Alabama is to have its beginning in Dallas County, where the commissioners have voted to spend \$300 on such work in cooperation with the State and Federal Governments.

Virginia's first 80-foot steel lookout tower has been erected near Shady Grove Church, Spotsylvania County, through cooperation of the Virginia Forest Service and the Spotsylvania Forest Fire Protective Association.

New State Nursery near Raleigh, N. C. Good Longleaf Seed Year in South Georgia

North Carolina has a new State nursery site in Wake County, about 10 miles southeast of Raleigh. It includes 9.28 acres of land having a frontage of more than 600 feet on Highway No. 10, the main east and west highway of the State. An adequate water system has been established, a house consisting of packing shed and storage room has been built, and longleaf pine seed have been sown in about 600 feet of beds 4 feet wide. An output of about 350,000 trees is expected this fall, about 50 per cent longleaf.

Oregon Ranchers Plant Trees

Four hundred Oregon ranchers this spring planted 88,000 trees that had been raised in the State forest nursery. The trees were principally black locust, green ash, Russian mulberry, Russian olive, and box elder, and were used largely on irrigation projects in the southern and eastern parts of the State. The nursery is being developed out of stump land located near the forest school of the Oregon State College, at Corvallis, under the supervision of George W. Peavy, dean of the school and member of the State board of forestry. Next spring it is expected to have at least 250,000 trees ready for distribution, including some Douglas fir.

Maryland Police Protect Dogwood

Maryland dogwood this year enjoyed the protection of the State police force, each member of which has been sworn in as a deputy forest warden and has received orders to enforce rigidly the State law prohibiting the gathering of wild flowers along roadsides. This statute makes it unlawful "for any person to remove, take, cut, break, injure, or destroy any tree, shrub, vine, flower, moss, or turf," and carries a penalty of from \$5 to \$25.

A Fire-fighting Train Crew

A report of Ranger C. E. Dare, of the New York State forestry organization, recalls a story printed in the November, 1927, FOREST WORKER about the stopping of a train in the Landes district of France in order that crew and passengers might fight a forest fire. On December 15, 1927, a passenger train on the Long Island Railroad was stopped at Great River, Long Island, in Ranger Dare's district, while the crew extinguished a fire in a thicket alongside the tracks. The passengers not only tolerated a 21-minute delay but complimented the conductor and crew on their vigilance, as did the officials of the railroad.

Longleaf pine seed will be abundant in many parts of south Georgia this fall, according to indications reported by members of the Georgia Forest Service. The service is sending out word to Georgia landowners that this will mean an opportunity for obtaining natural reproduction of the longleaf pine such as occurs only once in from 4 to 7 years. It warns them also that in its early years, and especially during the first year, longleaf pine can be killed by almost any sort of fire. On lands where natural reforestation with this species is desired the service urges landowners to have fire-breaks prepared before winter.

A fairly good crop of longleaf pine seed in the central and west central parts of Alabama is reported by the forestry commission of that State.

More Than a Million Deer in Pennsylvania

An open season on female deer, with yearlong protection for bucks, has been declared for 1928 by the Pennsylvania Game Commission. Game officials estimate that there are now in Pennsylvania 45,000 male deer over 2 years of age, more than 1,000,000 does, and only 1 fawn to 10 does. In some districts heavy losses of fawns have occurred, evidently from starvation. Other consequences of the large increase in deer in the State, according to the results of an investigation by Vernon Bailey, of the Bureau of Biological Survey, have been destruction of forest plantations, damage to farm crops, and partial destruction of certain species of plants, shrubs, and trees. In an endeavor to provide against further damage to farm crops the State game commission is supplying farmers with materials for deer-proof fences.

Spring work on the State forests of New Jersey included experimental planting of wild stock of southern white cedar on wet lands on the Bass River and Stokes Forests. A trial planting of Scotch and jack pine was made by the State forestry division on the south Jersey "plains," along the Barnegat-Chatsworth Road.

Bald cypress trees provided by the Maryland Department of Forestry have been planted by three neighboring landowners along a mile of the Robert Crain Highway, just south of Upper Marlboro. Another planting of bald cypress has been made by the Point Lookout Co. along a mile of road on the southernmost tip of the western shore.

A tract of between 600 and 700 acres in North Carolina, about 3 miles west of Reidsville, has been given to the State by Jefferson Penn, of Reidsville, as a State forest and game refuge. The land lies along Wolf Island Creek, near the Reidsville-Wentworth Highway. Part of it is forested, with both hardwoods and pines.



The forest protection system of Wisconsin is being extended this year over 80 townships not previously covered and has been withdrawn from 39 townships. The net increase of about 950,000 acres brings the protected area to a total of about 14,800,000 acres.



Thirty-five counties of California are cooperating with the State this year in forest fire protection, as compared with 30 in 1927.

Ohio Conservation Council Formed

For the purpose of working for the creation of a State department of conservation in Ohio and for the enactment of conservation laws by the next legislature, a State conservation council has been formed by the Ohio Federation of Women's Clubs, the Izaak Walton League, the League of Ohio Sportsmen, the Ohio State Grange, the Ohio Farm Bureau Federation, and the Ohio Chamber of Commerce. Mrs. George McDonald was chosen as the council's temporary president, James W. Stuber as temporary secretary, C. A. Dyer as chairman of the committee on program and policy, and F. C. Furniss as chairman of the committee on constitution.



Blister rust control work in Vermont during 1927 included the pulling of 280,781 currant and gooseberry bushes from 19,405 acres of land, to protect approximately 5,900 acres of white pine.

Education and Extension

Additions to Staff and Plant of Arnold Arboretum

A new and larger greenhouse is being erected at the Arnold Arboretum of Harvard University, at Jamaica Plain, Mass. In this greenhouse, which will occupy a site on the South Street side of the arboretum, there will be a laboratory fully equipped for research in pathology and genetics, a workroom for potting, and pits for growing woody plants. The greenhouse will be about 50 feet long. It is to be adjoined by a new nursery covering about 3 acres of land.

A most important phase of arboretum work—hybridization, and the study of living conditions and diseases of plants with a view of improving their inherent qualities—has never been attempted at the Arnold Arboretum because of lack of the necessary facilities. Up to the present time the work carried on at the arboretum has consisted mainly of assembling woody plants and trees from all parts of the world, identifying, classifying, and propagating them and exchanging them with other arboreta and nurseries, and building up a library and herbarium. With part of the \$1,000,000 endowment now being raised as a memorial to Charles Sprague Sargent, late director of the arboretum, two departments of research are to be established, one in pathology and one in genetics. The work in genetics will be supervised by Dr. Edward M. East, of the Bussey Institute. There is to be added to the staff a systematic botanist whose field will cover the woody plants of tropical America. It

is planned to offer opportunity for special work in dendrology to men who wish to obtain the doctor's degree in this field.

The Arnold Arboretum was established in 1872 for the study and cultivation of all woody plants capable of withstanding the climate of Massachusetts. The original endowment was \$100,000, given to Harvard University by a local merchant. In carrying out this trust Harvard set aside 125 acres of land known as the Bussey farm. By an arrangement with the city of Boston the Arnold Arboretum is assured of its present site for 1,000 years and is tax free. The roads in the arboretum are maintained by the city as part of the park system. Under Professor Sargent's guidance the endowment was increased to more than \$1,000,000 and the area to 260 acres. The arboretum now includes more than 6,500 species and varieties of trees, shrubs, and vines.

Of the projected Sargent memorial fund of \$1,000,000 more than \$900,000 has been collected.



The forestry division of the University of California, Berkeley, Calif., and the California Forest Experiment Station are promised new and larger quarters in a building which they are to share with the university's division of agricultural economics. The new building, construction of which will begin this summer, is to be paid for with funds from the endowment created by A. P. Giannini, president of the Bank of Italy, San Francisco.

Fire Tool Boxes by Popular Subscription

Ralph L. Morgan, under whose leadership the town of Richmond, N. H., has acquired distinction as a community of tree planters, has proposed to his townspeople this season that they protect their plantations by providing boxes of fire tools. Writing as one whose own property is already protected, in a circular letter dated June 15 he calls on property owners of the town to "chip in" and buy an adequate supply of shovels, rakes, hoes, mattocks, wire brooms, axes, saws, 5-gallon pump tanks, etc. Such tools are furnished to New Hampshire towns by the State forestry department at half wholesale price. According to Mr. Morgan's plan the tools would be painted red and branded, and lots sufficient to equip 15 men each would be placed at intersecting roadside locations in sealed red boxes marked "Forest fire fighting tools; property of the town of Richmond."

Mr. Morgan exhorts his fellow townsmen as follows: "Some of you can well afford to give the town of Richmond the price of a complete box fully equipped. Others might give the price of a dozen shovels. Some child can contribute the price of a pail.

"Every single individual can help in some way. Give a day's time to help paint the tools and boxes when we get them. We want everyone to contribute something so that all may have a personal interest in this practical work. Remember that prevention of fire is better than fire insurance.

"Some member of our forestry committee will call upon you folks here in town. All money will be turned in to Harold Dickinson, town treasurer. You out-of-town people who own two-thirds of the forest lands in Richmond will find inclosed a pledge card which you will kindly fill out and mail together with your checks in the inclosed envelope to Mr. Dickinson.

"Come on, now! Let's all pull on the same rope, the same way, and at the same time.

"Richmond is coming back."

Mr. Morgan's work in reforestation and in developing community spirit makes a singularly inspiring story. Having made a personal success as an engineer and inventor, he gave up active business to return to Richmond, which had been known to him in boyhood as a locality rich in virgin forest but had since been stripped of its timber. There he bought and rebuilt as his home a farmhouse whose beams date from pre-Revolutionary days, acquired 500 acres of idle forest land, and began his plantation. He contracted with a professional nurseryman to plant 10 acres of pine land a year for three years, and had his local planting crew watch the work. At the same time he began to raise trees from seed on a large scale.

Mr. Morgan's example promptly took effect on the people of the community. During the third season of the work he gave 250,000 trees to neighbors who agreed to plant them on their own property. The same season

he transferred 220,000 young trees raised in the State nursery to his own nursery, from which he later offered to distribute transplants free of charge. To-day Richmond has a town forest of 846 acres, and 27 of the town's property owners last year planted on their land a total of 250,000 pine trees.

The plan by which the town of Richmond undertakes to carry out forest planting operations for non-resident landowners was described on page 4 of the FOREST WORKER of May, 1927.

West Coast Firms Send Out Fire Prevention Propaganda

The Pacific Coast Cone Co. has notified the Portland (Oreg.) office of the United States Forest Service that it will use forestry slogans on 2,000,000 pieces of printed matter this year and annually hereafter. This includes not only the company's letterheads and advertising leaflets but the labels on its ice-cream-cone boxes, which are used by auto campers as containers on running boards. The Portland Box & Label Co. has just issued gummed labels bearing 12 different forest-protection slogans in red, with attractive borders, which they offer at 50 cents per 1,000. These steps have been taken in response to a letter recently addressed by the Portland office of the Forest Service to the Oregon Manufacturers' Association, inclosing a copy of the "smokers' code" and a page of suggested slogans. Fourteen other firms have responded promising to cooperate in such ways as using slogans on stationery, using the "smokers' code" as an envelope stuffer, and placing special fire-prevention posters over employees' time clocks.

Pennsylvania Women's Clubs to Plant the Highways

The Pennsylvania Federation of Women's Clubs is making a special effort this year toward the beautification of the State's highways and is urging that individual clubs undertake to plant trees along a mile of highway. The State highway department makes a free offer of the services of planting crews to clubs that order trees for this purpose from the department of forests and waters. A general planting project was carried out by the federation with good success in the year ending November, 1926, when club members planted 95,956 trees. Mrs. Hamme, president of the State federation, offered a prize of \$25 to the club planting the greatest number of trees, which was won by the Abington Woman's Club, Clarks Summit, with a planting of 21,321. Mrs. Mary Flinn Lawrence, of Pittsburgh, offered \$20 to the club planting the greatest number of trees in proportion to its membership, which was won by the 16-member Trilogy Club of Biglersville with a planting of 2,165.

Specialization Permitted in Undergraduate Forestry Course at Pennsylvania State College

A certain degree of specialization in undergraduate work is being permitted by the forestry department of the Pennsylvania State College. Students of high standing who show natural inclination along particular lines of forestry work are allowed as early as the sophomore year to elect courses that constitute preliminary training in chosen specialties. Such students are not, however, exempted from any part of the essential training in forestry. During the past school year one sophomore combined forestry and chemistry with the aim of developing himself as a chemist in forest products, and two others combined forestry and animal husbandry with a view of future specialization in range management. These students will have opportunity before graduation to elect at least six courses in their particular field. In the junior class two men combined forestry and botany in preparation for forest pathology; two combined forestry and soils, for work in forest soils; two combined forestry, soils, and botany, for forest research; one combined forestry and entomology, for forest entomology; and one combined forestry and education, for teaching. These students will be able to elect from four to six courses in their chosen field.

The four standard courses offered by the department are in general forestry, lumbering, wood utilization, and city forestry.

Planting Demonstrations in Southern Idaho

Ten demonstrations of correct methods of planting woodlands, shelter belts, and windbreaks on Idaho farms were given this spring by Extension Forester A. M. Sowder in various counties in the southern part of the State. In sections of southern Idaho where tree growth is badly needed Mr. Sowder made two experimental plantings. In one of these he planted 20 different species of conifers and hardwoods on alkali soils, and in the other he planted 16 different species of hardwoods and conifers at an altitude of 6,200 feet.

Demonstration Plantings Established in 45 Pennsylvania Counties

At the end of 1927, 300 demonstration plantings of forest trees had been permanently established on Pennsylvania farms by the State extension service. The demonstration areas on which 302,000 trees were planted in 1927 are located in 45 different counties. The 130 meetings held on these areas during the year attracted a total attendance of 2,153.

Montana School Plans Miniature National Forest

On the 1,366 acres of national forest land which it has been authorized to use as a school forest the School of Forestry of the University of Montana plans to develop "a miniature national forest as such national forests are supposed to exist 200 years from now," Prof. F. G. Clark writes. This land, part of the Fort Missoula Wood and Timber Reservation, is located in the edge of the Missoula National Forest and close to the university buildings in Missoula. Early in 1927 its use was granted to the university for an indefinite period, under a permit issued by the United States Forest Service with the agreement of the commander of Fort Missoula. Plans for its management cover grazing, timber sales, recreation, and other activities represented in the management of a national forest. It is hoped that timber from the tract may suffice to keep busy for an indefinite period the small sawmill already set up by the forestry school on adjacent land. In the larch and Douglas-fir type, which largely predominates on the area, and also in the western yellow pine type it is planned to carry out experiments in timber marking and brush disposal and intensive studies of cut-over areas. Sample plots are to be laid out for study of the growth acceleration resulting from various degrees of thinning.

Demonstration Plantings in Western Oklahoma

In order to interest farmers of the prairie section of Oklahoma in the possibilities of tree planting for windbreak, wood lot, and ornamental purposes the Oklahoma Forest Commission has this year established five experimental and demonstration plantings in the western part of the State, using Scotch pine, Chinese elm, black walnut, and bur oak. Now the commission is arranging for lectures and motion-picture showings before meetings of Izaak Walton League chapters and similar gatherings in about 60 towns of the section. A short lecture will be given with slides showing species of trees desirable for specific purposes, correct planting methods, and the like, and following this the commission's portable motion-picture outfit will be used to show moving pictures of forest planting work on the sand hills of Nebraska, the reel *From Seed to Sawmill*, and a game picture, *When Elk Come Down*.

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A seed-gathering campaign put on by the extension service of Georgia in 1927 resulted in the collecting of 52 pounds of loblolly and 18 pounds of slash pine seed, at a cost of \$2.50 to \$2.75 per pound. Most of the work was done by forestry students of the Georgia Agricultural College.

Parent-Teachers Associations Establish School Forest

For three years after educational leaders of Jamestown, N. Y., began to think that the city should have a school forest they found no way to establish one, because it was contrary to law for a city school to own property outside its city limits. In the fall of 1927, however, the board of education met this difficulty by forming a membership corporation called the Jamestown Schools Forests (Inc.). With the assistance of J. E. Davis, county forester of Chautauqua County, the corporation located a suitable abandoned farm of 150 acres $4\frac{1}{2}$ miles from the city, and with funds donated by parent-teachers associations of Jamestown this land was bought at \$10 an acre.

In April, 1928, seniors from the central high school of Jamestown planted 20,000 trees on the farm as a memorial of their class. The plan is for each outgoing class of the high school to make a similar planting until the entire farm is reforested—and then to purchase adjoining abandoned lands on which to continue the planting.

Since a new law of New York State removes the obstacle to ownership by the board of education, the corporation intends to turn the school forest over to the board as soon as its financial obligations have been met.

Weekly Forestry Lessons Prepared for Alaska Schools

A series of "forest lessons" for the children of the interior of Alaska was prepared by M. L. Merritt, of the United States Forest Service, at the request of the 1928 American Forest Week committee of the Territory, headed by Governor Parks. The lessons not only emphasize the importance of forest conservation but are designed to stimulate love of the woods through training in woodcraft and knowledge of forest lore. The committee distributed 121 sets of the lessons to the Territorial schools, 168 to the Government schools, and 21 to the mission schools. The lessons are intended to be used one a week and thus to carry the impetus of the American Forest Week effort through the school year.

Four-H Club boys of Butler County, Pa., contracted last year with Dr. H. C. McClymonds to set out 80,000 trees on his farm. The boys earned \$400 during spare time, and since about 90 per cent of the trees lived the landowner was well satisfied. Another group of Pennsylvania boys, in the Picture Rocks Vocational School, made \$110 or more by improvement cuttings on about 5 acres of woodland. The boys marked the trees for cutting according to ideas given them by the State extension forester, cut them into logs and fuel wood, and sold the product.

Successful Forestry Contest for School Children

About 400 of the public-school children of Modoc County, Calif., competed this spring in the American Forest Week contest arranged for them by George Lyons, supervisor of the Modoc National Forest. Instead of a forest fire prevention essay only, as in last year's contest, Mr. Lyons required of each contestant a slogan, counting 10 points; an essay on "How I can best prevent forest fires," counting 50 points; and answers to a set of 40 forestry questions, counting 40 points. The children were classed in three groups, one for the fifth and sixth grades, one for the seventh and eighth grades, and one for high school. For the preliminary contests the county was divided into four districts. First and second best papers from each class of contestants in each district were selected by school-teachers and sent to Mr. Lyons, who had the help of local judges in making awards. As in 1927, the children winning first place were given a three-day trip to the Lava Beds National Monument and those who ranked as second best were taken on a one-day trip to Happy Camp Lookout.

During the spring months of this year Extension Forester F. W. Dean, of Ohio, made 98 farm visits with county agents to determine what kind of trees should be planted on different sites. He held 65 forest planting demonstrations in 20 counties, 15 of them in Jackson County. Owners of land adjoining main highways were asked to locate their plantings along the highways if possible, and as a result 25 of the plantings are so located. In five counties plantings were made on school property not in use as playgrounds.

West Virginia landowners planted 102,500 seedlings and transplants in the spring of 1928, Extension Forester Skuce reports.

Boy Scouts of Cumberland, Md., planted 7,000 trees this spring. More than 150 scouts took part in the planting of 4,500 Scotch pines on the Shriver Hill, April 21. On the following Monday evening the Monarch Club entertained the boys with a supper at the Y. M. C. A. and a motion-picture program, including films of the scouts' planting work.

Through arrangement by the American-Scandinavian Foundation, one forestry graduate each from Norway, Sweden, and Denmark has come to the United States this summer for temporary employment with the United States Forest Service.

Forest Service Notes

The Government Pays for the Waterville Tract

The United States Treasurer's check for \$997,978 went forward on June 5 in payment for the Waterville tract in the White Mountains of New Hampshire, which includes the headwaters of the Mad River. The 23,123 acres of land thus acquired by the Federal Government becomes part of the White Mountain National Forest. Through this purchase one of the largest tracts of merchantable timber in the mountains of New England is assured of conservative lumbering leading to permanent timber production. Federal control also insures protection of the remarkable scenic attractions of the Greeley Ponds and the Mad River Notch. On the area surrounding these features, and on certain areas of high slopes, all timber will be held without cutting. Of the merchantable timber outside these reserved areas 85 per cent will be resold to be cut under Government regulations and 15 per cent will be held for further growth, for seed trees, and for the protection of trails.

Large Timber Sale to Help Suppress Pine-Beetle Epidemic

The Forest Service is advertising about 400,000,000 feet of timber, over 99 per cent western yellow pine, on the Modoc National Forest, Calif. This timber is intermingled with about 600,000,000 feet on land owned by the Pickering Lumber Co. In this region there is one of the worst infestations of the western pine beetle (*Dendroctonus brevicomis*) of which we have record. The sale, which will mean the establishment of a new unit of pine-lumber production, has been approved solely because of the necessity for action in salvaging as much as possible of the infested and killed timber and for getting the benefits of the operation in helping to suppress the epidemic. The terms of sale require immediate action by the purchaser, who is to log the infested timber on at least 15,000 acres of Government and private lands included in the sale unit within the first year. The corporation that has applied for this timber plans to put in at least one portable sawmill, which would saw ties and construction timber from these infested logs, burning the bark and slabs currently. It also plans to log infested timber to the line of the logging railroad and proposes to haul the logs to the sawmill site and there place them in

water, thus drowning the beetles. It is hoped to have the railroad completed and the logs moving to the pond before the time of beetle emergence in the summer of 1929. The purchaser's main sawmill must be completed by October 1, 1929.

A 30-day period of advertisement has been approved, ending August 4. This period may be extended by 60 days if a request for such extension is received from an operator of known financial responsibility who will agree to bid if, upon investigation during the extended period, he finds the facts to be as represented by the Forest Service.

The conditions of sale require that the purchaser construct a sawmill of the band type within Modoc County, Calif., as his main mill for the manufacture of the timber.

Diameter and Defect Limits for Profitable Cutting of Inland Empire Pines

Western yellow pine 18 inches in diameter and western white pine 14 inches in diameter are the smallest that can be cut and milled at a profit, according to figures compiled by M. I. Bradner, chief of the office of forest products of the Northern National Forest District. These diameter limits are based on average production costs and average values for 1921-1925, inclusive, including allowances of 10 per cent for interest and risk and of 5 per cent for defect in the yellow pine and 10 per cent in the white pine. Defective yellow-pine logs under 12 inches and defective white-pine logs under 9 inches are ordinarily taken out at a loss. The amounts of defect allowable in logs of various diameters for logging and milling at a profit, with no charge for stumpage, interest, or risk, are as follows:

Western white pine:	Per cent
9-inch logs.....	20
13-inch logs.....	25
14-inch-butt logs.....	36
20-inch (1, 2, or 3 grade) logs.....	41-50
Large butt or middle (select) logs.....	60
Western yellow pine:	
12-inch logs.....	10
15-inch (shop) logs.....	20
18-inch (common) logs.....	20
17-inch (select) logs.....	31-40
22-inch.....	41-50
27-inch (butt or middle).....	51-60
Few large select logs.....	Over 60

How to Estimate Wind Velocities

The important bearing of wind velocity on forest fire hazard and on the rate of spread of fire has long been recognized; but until recently foresters have had no common and simple basis for describing wind velocities. Consequently what one fireman would call a strong wind has been described by another as a gale. A common medium for more accurate estimating of wind velocity is supplied by the Beaufort wind scale, which uses the effect of the wind upon various common objects as a criterion of its velocity. This scale has been used by the Weather Bureau in its forecast work for many years, has been adapted by mariners, and has stood the test of time both on land and on sea. For use in describing the behavior of forest fires the United States Forest Service is adopting a modification of the Beaufort wind scale which is as follows:

Descriptive term	Velocity (miles per hour)	Method of estimating velocity
Light.....	0-7.....	Direction of wind shown by smoke drift; wind felt lightly on face; leaves rustle.
Gentle.....	8-12.....	Leaves and small twigs in constant motion; wind extends light flag.
Moderate.....	13-18.....	Raises dust and light litter; small branches are moved and swayed.
Fresh.....	19-24.....	Small trees in leaf (hardwoods) begin to sway. Crested wavelets begin to form on inland waters.
Strong.....	25-38.....	Large branches or whole trees in motion; inconvenience felt in walking against the wind; whistling in telegraph wires.
Gale.....	39-54.....	Breaks twigs off trees; wind generally impedes progress; slight structural damage to buildings.
Whole gale.....	55-75.....	Trees uprooted; much structural damage.
Hurricane.....	Over 75.....	

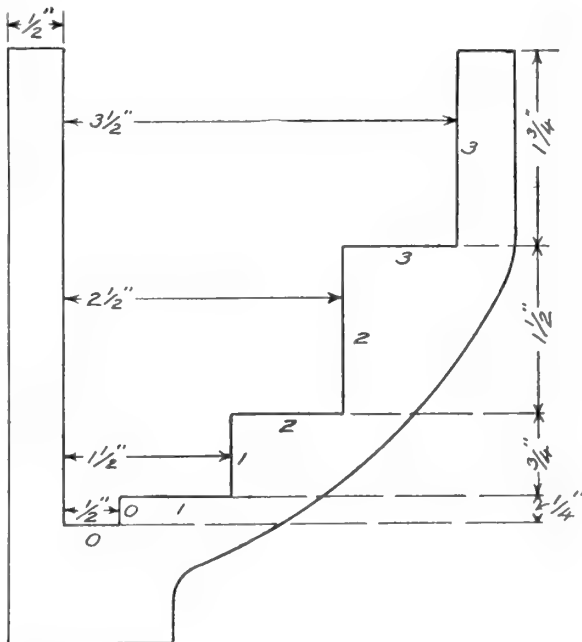
individual trees. As one phase of the study, this summer the Appalachian Forest Experiment Station is cooperating with the Forest Products Laboratory in a mill-scale study on several of the eastern national forests. Other cooperators in this study are the Office of Forest Pathology, the Office of Forest Insect Investigations, and the Eastern National Forest District. Data obtained in this mill-scale study will show the percentage of loss due to decay from fire, insects, and fungi, besides furnishing volume data and a check upon utilization practices. Because of its ramifications, the wide territory to be covered, and the large number of species involved, this study is by far the most ambitious growth and yield project so far tackled by the Forest Service.

A Handy Caliper for Small Trees

A simple caliper that can be quickly cut from one-sixteenth-inch sheet copper or brass has been devised by Lester H. Reineke, of the United States Forest Service. Its shape and dimensions are shown in the accompanying sketch. When this caliper is slipped over a tree at breast height the notch into which the tree fits indicates its diameter class. The largest notch is for 3-inch trees (trees 2½ to 3½ inches in diameter), the next for 2-inch trees, the next for 1-inch trees, and the smallest for trees with diameters of less than 1 inch. Many 4-inch trees—those that are but slightly larger than the largest notch—can also be measured with this caliper. This rig is very handy in measuring reproduction strips or sample plots in very young stands.

Oak Growth and Yield Study

The Central States Forest Experiment Station is continuing this year the study of the growth of oaks which Director E. F. McCarthy has had under way for several years. Stands of even-aged second-growth oaks have been measured in many parts of the Eastern States, particularly in the localities where the oak stands were clean cut for charcoal before the day of coal. In order to make the study truly regional the entire range of oaks throughout the East will be covered. Plots on which the stands contain as little as 30 per cent of oak are being measured for yield, though the bulk of the data is being taken in stands of which oak amounts to 75 per cent or more. Because it is necessary to prepare complete sets of volume tables for the many species commonly growing in the mixed hardwood stands, a vast amount of data must be accumulated. Accordingly State foresters, the eastern forest schools, Federal forest officers of the Eastern National Forest District, and consulting foresters are being asked to assist by furnishing volume data on



A Quick Test for Moisture Content of Hardwood Litter

A quick and fairly accurate method of determining the moisture content of hardwood litter has been worked out by E. F. McCarthy, director of the Central States Forest Experiment Station, in connection with his fire studies in the southern Appalachians. The test consists merely in bending leaves picked up from the forest floor, for the manner in which the leaves break indicates roughly how much moisture they contain. McCarthy's classification is as follows:

Leaves with from 20 to 40 per cent moisture content crack if creased, but do not entirely break.

Leaves with from 14 to 20 per cent moisture crack if folded more than to a right angle.

Leaves with an average of about 14 per cent moisture crack when bent to a right angle but do not break freely, especially in the veins.

At an average of 10 per cent moisture, leaves break entirely apart if bent to a right angle. Litter at 10 per cent moisture breaks up if crushed in the hand, but does not crumble into small pieces.

Freshly fallen leaves are tougher at any given moisture content than those which have been dried and become saturated again.

While the heavier leaves, such as those of the post oak, crack and break with higher moisture content than the thinner leaves such as those of white oak, the variation is not great.

Snag Shooting Tests

In snag-felling tests carried out during the past winter on the Mount Hood National Forest, Oreg., promising results were obtained by using high explosives in holes bored in the snags with a portable automatic auger. The tests were made by members of the Portland office of the Forest Service, C. S. Cowan, of the Washington State Forest Fire Association, and representatives of E. I. du Pont de Nemours & Co. The automatic auger was supplied with power by a Delcolight unit, placed on a truck, with which it was connected by a flexible cable 1,000 feet long.

Earlier experiments in which holes for the insertion of explosives were bored with a hand auger had not demonstrated any saving of time or expense over the old method of sawing or chopping. With the automatic auger, the use of explosives instead of a saw effects a great saving of time. When the saw is used, from 70 to 80 pounds of bulky equipment must be carried from snag to snag, the work is physically hard, and the men must rest between fellings. Men taking turn about in handling the 18 to 25 pound drill head and stringing out the cable do not tire quickly and need not lose nearly so much time. In the Mount Hood tests a very tall snag 59 inches in diameter, having great quantities of pitch, was felled in 39 minutes by boring and shooting. Experienced fallers estimated that to fell this snag with the saw would have required from 3 hours to half a day.

Sound Douglas-fir snags from 36 to 82 inches in diameter prepared with from 6 to 11 holes and loaded with from 29 to 41 sticks of 40 per cent gelatin were successfully felled, in most cases being cleanly sheared off.

It was found that the direction of fall of a snag could be controlled to a great degree by the placing of the holes and by the angle of drilling. The experiments suggest that holes should be bored at a tangent rather than radially, since the latter method may result in overloading at the center.

Experiments made at the same time in felling snags by loading T. N. T. cartridges in notches and by girdling the snag with a cloth tube loaded with dynamite or T. N. T. gave unfavorable results, in most cases failing to fell the tree and sometimes resulting in flames rolling out a considerable distance.

Further experiments in felling snags with explosives are to be carried out by the Forest Service and cooperating agencies.

National Forest Reservation Commission Approves Land Purchases

At its May 23 meeting the National Forest Reservation Commission approved a purchase program covering 163,053 acres of land. This brings to a total of 187,030 acres the areas approved by the commission for purchase for national-forest purposes since January 1, 1928. The most important tracts approved at the May meeting are the wild Ammonoosuc lands of the International Paper Co. on the White Mountain National Forest; 20,000 acres of Central Pennsylvania Lumber Co. lands on the Allegheny National Forest; and four tracts on the Monongahela National Forest, including lands of the Preston Land & Lumber Co., the West Virginia Coal & Timber Co., and the Wildell Lumber Co., and the Chaffey land formerly owned by the Glady Manufacturing Co.

There was before the commission a proposal to establish three purchase units in Wisconsin, the most important of these being the Oneida unit in the north-eastern part of the State; but since the assent of the governor, which is required by law before any purchase area can be approved by the commission, was not received until after the meeting had adjourned, authorization was deferred. This will be taken up at the next meeting.

In response to the appeal of a delegation that appeared before the commission urging establishment of a national forest in Vermont, an investigation is to be made this summer with a view of examining areas in that State that might be suitable for a national forest.

The forest district embracing the Lake States is already competing strongly with the Appalachian region in area of land purchased for national-forest purposes. It contributed 62 of the 250 cases approved by the commission in May, including 25,174 acres in additions to the Superior National Forest and 12,512 acres in additions to the Michigan National Forest.

Broadcast Sowing in Seed Beds at Savenac

At the Savenac Forest Nursery of the Forest Service, in western Montana, broadcast sowing is practiced according to improved methods that offset the advantages of drill seeding. In seed beds sown broadcast overcrowding is usually a troublesome factor; but through study of the characteristics of the seed and the requirements of the species the Savenac nurserymen have learned how to obtain proper spacing. Drill sowing has formerly had an advantage in that roots of drill-sown stock can be readily pruned in place by the use of a U-shaped drawknife; but a root-pruning implement has not been developed that will prune a whole bed of seedlings in one operation. A cart that straddles the 4-foot bed carries a blade that can be set to any one of several depths underground. As the cart, weighted down by the driver, is pulled along by horses, which follow the paths on either side, the blade passes under the entire bed.

The main advantages of broadcasting over drill sowing are the smaller initial cost of the sowing; the comparatively small ground space required with consequently smaller cost of soil preparation, weeding, watering, mulching, and other care; and the greater ease of supervision owing to concentration of work on a smaller area.

It has been found highly desirable to sow more beds rather than to raise seedlings in beds densely overstocked. The ideal densities for producing nursery stock have been determined by D. S. Olson, in charge of planting at the nursery, to be as follows:

Species	To produce seedlings for planting in the field		To produce seedlings for transplanting in the nursery	
	Age at planting (years)	Number per bed of 48 square feet (4 by 12 feet)	Age at transplanting (years)	Number per bed of 48 square feet (4 by 12 feet)
Western yellow pine.....	2	2,400	1	5,000
Western white pine.....	2	4,000	1	7,000
Western larch.....	3	3,000	2	5,000
	2	2,000	2	5,000
Engelmann spruce.....	2	2,500	2	5,000
	3		3	
	4		3	
Douglas fir.....	3	2,500	2	7,000
Western red cedar.....	4	2,500	3	4,000

In sowing seed of western white pine at the Savenac nursery, it has been found desirable to alter the depth to which the seed are covered according to the season. The fall-sown seed are covered to a depth of five-eighths inch, while a depth of three-eighths inch is found sufficient for spring sowing. The greater depth in the fall-sown beds reduces the danger of frost heaving. Seed of most other species are sown in the spring. Douglas fir and western yellow pine are covered three-eighths

inch; western larch, Engelmann spruce, and western red cedar, one-fourth inch.

Engelmann spruce, western red cedar, western larch, and Douglas fir are found to require shade the first year in the seed beds. Engelmann spruce is not exposed to full sunlight in July and August until the third year, while cedar in the nursery suffers at all ages unless shaded on hot, bright days. Western white pine sown in the fall germinates well the following spring, so that the seedlings become lignified (woody) by midsummer and are therefore able to withstand the hot sun without shade. If seed of this species are sown in the spring, as is rarely desirable or necessary, the seedlings require shade the first summer. The western yellow pine does not require shade.

Natural Area Dedicated

The May outing of the Tucson Natural History Society, Tucson, Ariz., this year was made the occasion of exercises in dedication of the Santa Catalina Natural Area. This is the tract of 4,464 acres in the Marshall Gulch region of the Santa Catalina Mountains, within the Coronado National Forest, that was set aside by the Secretary of Agriculture in March, 1927, as an area to be preserved in its natural condition. The Tucson society, which is largely responsible for the decision to preserve the tract as a "natural area," was addressed at this time by Dr. C. T. Vorhies, University of Arizona; Dr. Forrest Shreve, Carnegie Desert Laboratory; J. D. Jones, United States Forest Service district office, Albuquerque; G. A. Pearson, Southwestern Forest Experiment Station; and Dr. Walter P. Taylor, Bureau of Biological Survey. The purpose and significance of the preservation of natural conditions on this area were expressed by Mr. Pearson as follows:

"The naturalist of to-morrow, whether he seeks to unravel the mysteries of science or whether he is merely one of those who love to dwell in the presence of nature, is going to treasure each bit of nature that has escaped the despoiling hand of man. Speaking for the scientist, I have in mind especially the student of plant and animal life. Biologists are coming more and more to recognize that if they would comprehend the laws governing the intricate relationships between living things and their natural environments, they must study these relationships as nearly as possible under natural conditions. The action of plant upon plant, of animal upon animal, of animal upon plant and vice versa, and the interaction between plants and animals on the one hand and natural environment on the other are still but vaguely understood.

"In utilizing Arizona's two great living natural resources, the forest and the range, it is of utmost importance to work in harmony with rather than in opposition to biological laws. Man can direct and assist nature, but before he can do this he must learn nature's ways. The forest under scientific manage-

ment can be made more productive than virgin timberlands, but it will not afford adequate opportunity for a study of natural relationships. The managed forest will not be permitted to attain the great age of virgin stands. It will be denser and the trees will be smaller than in the original forest. Herbaceous vegetation will be subordinated and animal life will be modified. Range lands under conservative use will probably approach the original state more closely than at present, but there is no assurance that even under careful management the original composition will be perpetuated.

"The Santa Catalina Natural Area, which through the foresight of the Tucson Natural History Society is being dedicated to science, is primarily a forest area, and as such it is also the natural home of birds and mammals. Situated as it is within a few hours' journey from a great institution of learning, it is anticipated that this area will attract many research workers in plant and animal ecology. By virtue of its location at the summit of a high mountain difficult of access for purposes of exploitation, the Santa Catalina area approaches more nearly the primeval state than most forest areas in the Southwest. By judicious supervision this condition can be maintained and even improved. Obviously the area should be closed to all forms of commercial use and human occupancy. Aside from protection against fire and other destructive agencies, human interference must be restricted to a minimum. Man's impulse to exterminate predatory animals, for example, must be curbed, otherwise we may have, as on the Kaibab Forest, an abnormal increase of deer and other vegetarian animals at the expense of plant life. Even rodents and insects should be regarded as playing an important rôle in nature's scheme. In brief, the aim should be to preserve a natural area such as nature would have it."

Smoking Restricted on California Forests

Smoking is banned on the 18 national forests of California and southwestern Nevada this season as in the summer of 1927, being permitted only in camps and at places of habitation. The antismoking order went into effect June 10, and with it the order requiring that motorists and pack train parties entering these forests provide themselves in advance with shovels and axes suitable for use in fighting forest fires.



Headquarters of the Appalachian Forest Experiment Station, Asheville, N. C., have been moved from the New Medical Building to the new city hall. The latter building now contains, also, the offices of the supervisor of the Pisgah National Forest and of the Great Smoky Mountain National Park Commission.

Noble Fir Seed Keep Well in Cold Storage

Seed of the noble fir (*Abies nobilis*) kept in cold storage remain viable in large proportion at the end of five years, according to the results of an experiment carried through that length of time by the Pacific Northwest Forest Experiment Station. The experiment was undertaken for the reason that this species, favored for high altitude planting, does not produce a good seed crop every year, and that under ordinary storage conditions its seed do not remain viable through the three or four year period that may intervene between good seed crops.

In 1921 six lots of noble-fir seed, each lot consisting of four 1-pint samples, were prepared for the experiment by being well dried and then placed in air-tight glass jars. Four lots were given chemical treatment, one each with formaldehyde, sulphuric acid, copper sulphate, and hydrochloric acid. The four lots thus treated were stored at ordinary room temperature, along with an untreated lot. The sixth lot was placed in the cold-storage plant of Swift & Co., where it was kept at temperatures of from 9° to 14° F. Cutting tests and germination tests of all lots were made in 1922, 1923, 1925, and 1926.

The chemically treated seed showed up well in the cutting tests, but none of them germinated. Since no record was kept of the strength of solutions or of the method used in treating these lots, the results obtained in this experiment are inconclusive as to the possibility of preserving the seed by chemical treatment. At the end of a year the untreated seed kept at room temperature were 71 per cent sound, according to cutting tests, but only 6 per cent of them germinated. In later seasons, cutting tests of this lot continued to show a high percentage of sound seed but none of the seed germinated.

In the case of the seed placed in cold storage, the four successive cutting tests showed an average of 58 per cent of sound seed, and germination tests showed a viable proportion averaging just a shade under 21 per cent of the total number of seed tested. As a matter of fact, there was an apparent increase in the viable proportion from 14 per cent of all in the first year to 34 per cent in the fourth. This is attributable to the fact that in the first germination tests the seeds were examined late and infrequently. In the final test, that of 1926, the proportion germinating dropped to 13 per cent of all. According to the results of the cutting tests it appears that the proportion of sound seed in this lot that germinated, in the four different tests, averaged a trifle under 36 per cent.

Four years' cold storage seems to have left the seed with as high a percentage of viability as one year's storage under methods now commonly used. In 1923 some noble fir seed were placed in screw-top glass jars and stored in the cold cellar of the Wind River Nursery where temperatures ranged from 32° to 45° F. At the time when these seed were placed in storage a

cutting test of 300 seed showed 53 per cent sound, and a germination test of a sample sent to the Oregon Agricultural College showed that 34 per cent were viable. When the stored seed were sown in the nursery in the spring of 1924, only 20 per cent of them germinated.

The findings of this study agree with those of earlier investigations in seed storage. Reporting on a series of experiments made in Germany with pine seed harvested in 1905 and 1906, Oberförster Haak wrote: "Keeping seed on ice in air-tight bottles proved under all conditions an improvement over other methods, especially as regards germinative energy. This, as some experiments showed, may be due to the fact that the cold inhibits the carbonic acid formation and consequent loss of substance due to respiration of the seed." He added that the seed should be dried before storing, and suggested that the best practice in drying the seed

might be to place it in the sun or in a well-warmed room for a few days until it had lost from 1 to 2 per cent of its weight.

A second five-year experiment in cold storage of noble fir seed was begun by the Pacific Northwest Forest Experiment Station in 1926, with the purpose of checking possible errors in technique in the first experiment and determining whether the germinative power of the seed can be better conserved by storing them with wings attached, as is done by some European foresters.



Headquarters of the Cherokee National Forest, Tenn., are being moved July 1 from Knoxville, Tenn., to Athens, Ga., where they will occupy offices in the new Federal Building.

General Forest News

Drought-Resistant Pines

By LENTHALL WYMAN, United States Forest Service

How prolonged droughts may aid in establishing climax types was demonstrated in 1927 in the sand-hill region of northeastern Florida. In the original forest of this region the characteristic tree was the longleaf pine, and there was a scattering of small oaks. After the removal of the old growth and repeated fires a temporary type came in composed of *Quercus catesbaei*, *Quercus cinerea*, and *Quercus geminata*, with a few longleaf pines and some pawpaw and blackberry bushes. The soil is medium to coarse sand with little or no humus or clay and with no hardpan or heavy subsoils to a great depth.

For several months prior to March, 1927, there was a deficiency of rainfall, and during the 11-week period from March 21 to June 6 only three very light showers occurred, with a total of 0.56 inch of rainfall. Maximum temperatures reached 105° and the relative humidity went as low as 11 per cent, with 23 per cent as the average minimum over a 10-day period.

In late May it was noticed that the oaks were dying in patches here and there, and the mortality continued until the first heavy rains early in June. It was thought that root disease might have been the cause of death; but this explanation was discarded when it was noted that many trees which had been almost dead just before the rains sent out sucker shoots near the ground and along the lower part of the stem when abundant soil moisture became available.

Although all three species of oaks died off, the pines pulled through, and even such underbrush as pawpaw and blackberry survived. It may be that the deciding factor favoring the one tree species over the others was the fact that whereas the oaks have a lateral root

system 18 to 30 inches underground with no tap roots the pines have tap roots going down to a considerable depth.

Forest Planting at Bogalusa

By PHILIP C. WAKELEY, United States Forest Service

Since the winter of 1920-21 the Great Southern Lumber Co. has planted approximately 16,000 acres of pine in the immediate vicinity of Bogalusa, La. Longleaf and slash are the predominating species. The company's nursery at present contains more than 11,000,000 longleaf seedlings, from seed sown early in March. Enough of these should survive to plant about 10,000 acres next fall, at the rate of 900 trees to the acre.

Slash and loblolly pines planted by the company in 1920-21, 1921-22, and 1922-23 are now 6 to 12 feet high. Longleaf planted as year-old stock in 1923-24 is 3 or 4 feet high—in marked contrast to naturally seeded longleaf of the same age, which is barely commencing height growth.

Survivals have been high. Fires have been kept out of all but a minute fraction of the area, and almost none of the plantations have dropped below 60 per cent survival. Despite damage by rabbits, tip moths, defoliating beetles, and the brown spot needle disease, most of the plantations run between 75 and 85 per cent survival. One sizable area of longleaf shows a survival of nearly 90 per cent.

The company usually collects its own seed. Ten-month-old seedlings are large enough for field planting, and the expensive process of transplanting in the nursery is done away with. Field planting is done by two-man crews, with dibbles, in plowed furrows, and the cost seldom runs as high as \$5 an acre.

The European Larch Canker

By PERLEY SPAULDING, Bureau of Plant Industry

Early in 1927 the European larch canker was found in eastern Massachusetts, particularly in the towns of Hamilton and Ipswich. Here the disease was present on European larch imported about 20 years ago from Scotland. In areas where the disease was prevalent nearly all the trees were found to be infected. In the vicinity of the worst infections of the larch the Douglas fir, also, was found to be heavily infected, the cankers resembling those of the larch. This attack makes the disease a dangerous threat to the Douglas fir of the Northwest, since an unbroken belt of tamarack reaches across Canada into the native range of Douglas fir on the Pacific coast.

In stands of the native larch in the Northeast there is found a fungus which closely resembles the foreign parasitic canker but which is saprophytic in action. Whether the two belong to the same species is as yet unknown. Both fungi have tiny, cup-shaped, white bodies with short stems, the inside of the cup being a bright yellow or orange color. When the cup is dry, its edges roll inward and the diameter of the whole fruiting body is much reduced. When it is wet, the edges unroll and the cup becomes saucer shaped and much larger in diameter. The best time to look for the fungus, therefore, is in wet weather or just after a rain. The first place to look for the fruiting body is on dead twigs. Fungi of suspicious appearance should be sent for identification to the office of forest pathology, Bureau of Plant Industry, Washington, D. C.

Chemicals Used to Eradicate Ribes

For four seasons the office of blister rust control, Bureau of Plant Industry, has been experimenting in northern Idaho to determine the feasibility of eradicating Ribes by means of chemicals. For spraying the chemical upon the bushes a lightweight forest fire pump has been modified to give spray pressures of 250 to 300 pounds. The first trials, which were on a small scale, resulted so successfully that the scope of the experiments has been much enlarged. The work has shown that *Ribes petiolare* Dougl. can be eradicated by chemicals much more easily and cheaply than by hand pulling. Since this species is very susceptible to the blister rust and is one of the three species that frequently occur in great numbers in stream bottoms of the western white pine type, where the costs of hand work are high, this marks an important step forward in the control of the disease.

The most effective substance yet found is sodium chlorate (NaClO_3), which is marketed under the trade name of Atlas N. P. Weedkiller. This chemical consistently kills 96 per cent of *Ribes petiolare*, but shows

a kill of 51 per cent only on *Ribes lacustre* and a 39 per cent kill on *Grossularia inermis*. Other chemicals being tried on the two latter species are compounds of halogen and oxyhalogen.

Chemical killing as now developed costs from 35 to 50 per cent less than hand grubbing; and experimental work now under way indicates that a still greater saving can be expected.

The Bronze Birch Borer

By RALPH C. HALL, Michigan School of Forestry and Conservation

The bronze birch borer (*Agilus anxius Gory*) has long been recognized as a serious pest to shade and ornamental trees, but only within comparatively recent years has it been regarded as a serious menace in the forest. In Cornell University Bulletin 234, published in 1906, Slingerland states (page 73): "There is no record of any kinds of birches having been killed by the insect in forests or woodlands." To-day the situation is entirely different; borer attack in the forest is very common wherever there are birches. The bronze birch borer follows closely the distribution of its host, the birches, and confines its attack almost entirely to this genus.

Slow development of the leaves in the top of the tree in the spring is an evidence of infestation. The leaves on the lower part of the crown may be fully developed while those in the top are barely starting or only partially developed. Such a condition is very noticeable in late May or early June. Another evidence of infestation is a stag-headed effect. The top part of the tree may be dead or dying and the lower part may be still green and apparently thrifty. The borer may cause discoloration of the bark over the pupal chambers or larval tunnels. This is the least reliable evidence of attack and is useful only for the white birch group. Welts or ridges may form on the bark over the larval tunnels. These welts usually take the form of spiral rings around the stem and are caused by an attempt of the cambium to grow over the larval tunnels. They are especially common when the attack is light. When the infestation is heavy, many trees may show no welts on the bark.

The most serious economic damage to birch is confined to second-growth forests of mixed hardwoods or mixed hardwoods and conifers in which changes from the natural condition have been brought about by some outside agency such as man or insects. Borer injury is especially serious following logging in which the stand is cut to a diameter limit or in which the softwoods are removed and the hardwoods left. It is also serious following an attack by the spruce budworm. In all these instances the natural condition of the stand has been changed in proportion to the severity of cutting or the seriousness of budworm attack. In all cases the stand has been thinned. Since the bronze

birch borer is a light-loving insect, this thinning makes conditions more favorable for its attack. Probably the physical factors of the environment have also been changed to a rather marked degree. During the period of readjustment to their new environment following such changes, the birches are probably more susceptible to attack by the borer than they would be under normal conditions. A specific example of serious borer damage following logging is found on the Cherry Mountain sale area of the White Mountain National Forest in New Hampshire, where the general method of cutting is to a diameter limit of 6 inches in softwoods and 10 inches in hardwoods. Results on a permanent sample plot located on that area during the field season of 1927 show how serious this insect may become in a short period of four years. On this half-acre plot are 45 yellow birches, ranging from 1 to 10 inches diameter breast high, with an average of 5.5 inches. In June, 1927, 38 trees were infested or killed by the borer. This amounted to an infestation of 82 per cent by numbers or 81 per cent by basal area. There seems to be no indication that the borer will cease operations in this stand at an early date, so we may logically expect the degree of infestation to increase for the next few years or until all the birches on the area are destroyed.

Among those who have started work on the problem of bronze birch borer damage are: H. B. Pierson, State entomologist of Maine, whose findings appear in the January, 1927, issue of the *Journal of Forestry*; Dr. S. A. Graham, agent for the Bureau of Entomology, Lake States Forest Experiment Station, who has established a number of permanent sample plots in the Lake States for the purpose of studying borer damage; and Dr. J. M. Swaine, chief of the division of forest insects, Entomological Branch of Canada. The Bureau of Entomology, cooperating with the United States Forest Service at the Northeastern Forest Experiment Station at Amherst, Mass., started work in New England during the field season of 1927, permanent sample plots on the Cherry Mountain sale area being established by the writer under the guidance of H. J. MacAloney, agent for the Bureau of Entomology. A study to be made by the writer in the Lake States during the field seasons of 1928 and 1929, under the direction of Dr. S. A. Graham, is being financed from the faculty research fund of the University of Michigan. The work of the 1928 field season will consist, chiefly, in an extensive survey of the borer damage in the Lake States with an attempt to ascertain the amount of damage in the different crown classes in stands varying in density, age, soil conditions, exposure, topography, and geographical distribution under various systems of cutting and budworm injury. Practically nothing is known concerning the effect of the borer in selective logging practice, and it seems essential to have facts on this matter before a wholesale policy of selective logging is adopted in stands containing birch as an important species in the mixture.

The Influence of Forests on Rainfall and Run-off

By C. E. P. BROOKS, Clark University

[From *Meteorological Magazine*, December, 1927]

Of the water vapor which is condensed as rainfall over the land, about two-thirds is provided by evaporation over the oceans and the remaining third by evaporation and transpiration over the land. The latter contribution is made up of the evaporation of rainfall intercepted by foliage, evaporation from the soil, and transpiration; and estimates are made of these three factors for forests, crop or grass land, and bare soil. The figures are expressed as percentages of an average rainfall of 30 inches a year. For forests they give interception, 15; evaporation from soil, 7; transpiration, 25; total, 47 per cent; for crops, evaporation from soil, 17; transpiration, 37; total, 54 per cent; for bare soil, evaporation, 30 per cent. Thus, the replacement of forests by crops would tend to increase the supply of moisture to the air, and, therefore, the general rainfall; replacement by bare soil would slightly decrease the general rainfall. The changes in the run-off are likely to be more noticeable; replacement of forests by crops would decrease the run-off by 15 per cent and make it less regular; replacement by bare soil would increase the run-off, but would make it highly irregular. A forest 30 feet high may be considered as adding about 30 feet to the effective height of the ground, and this should increase the local orographical rainfall by 1 or 2 per cent.

Data obtained in various localities were examined in detail. At Mauritius, deforestation has resulted in a decrease by 2 or 3 per cent, while in Sweden, Germany, and India the rainfall at forest stations is about 1 per cent greater than that at neighboring stations in the open, allowance being made for differences of exposure. The question of fog and dew was also examined, and it was found that under average conditions their total effect is slight.



Results with deferred and rotation grazing in the Flint Hills of Kansas and on mixed prairie and short-grass country near Mandan, N. Dak., are discussed in an article in the *Cattleman* by A. E. Aldous, professor of range management at the Kansas Agricultural College. In a trial in Kansas, 640 acres of pasture on which grazing was season long supported an average of 103 head of cattle for 6 months each year over a period of 8 years. Under the deferred and rotation system, 640 acres carried stock at the rate of 175 head of cattle for a 6-months season, thus giving 70 per cent greater returns than the season-long pasture. At Mandan it was found that 4 or 5 acres grazed under the deferred and rotation system could carry as much stock as 7 acres grazed season long, thus showing an advantage of approximately 56 per cent.

Clearing the Way for the Smoky Mountain National Park

By VERNE RHOADES, executive secretary, North Carolina Park Commission

Now that the necessary funds have been made available through a gift from the Laura Spelman Rockefeller Foundation and appropriations by the governments of North Carolina and Tennessee, plans are actively going forward toward the establishment of the Great Smoky Mountains National Park. As now planned, the park will comprise 428,000 acres of land in Tennessee and North Carolina. In North Carolina field crews are engaged in estimating the stand on the area chosen for purchase. On the larger holdings a 10 per cent estimate of the timber is being made and on the smaller tracts a 50 to 100 per cent estimate. It is expected that this cruise will be finished by October 1 of this year. The cost of the cruise runs about 18 to 20 cents an acre, which, though high, is cheap when the density of the laurel among the spruce is considered. More often than not, a mile of strip is a hard day's work for a crew. The survey of property lines costs about \$35 a mile.

Of the 214,000 acres proposed for purchase in Tennessee, 150,000 acres is in five holdings and the remainder is in the hands of some 1,000 owners. In North Carolina, 175,000 acres is in eight holdings ranging from 5,000 to 53,000 acres; the balance is in small tracts numbering somewhere around 300.

The appraisal of land and timber values alone is not such a difficult task, but in the present case the value of improvements and operating businesses must also be taken into account. There are three band mills operating on the tract, the large pulp mill of the Champion Fibre Co. gets its spruce from the area, and some 85 miles of logging railroad, many logging locomotives, and logging equipment of all kinds are involved. Under these circumstances the appraisal of damages will be a difficult task.

It seems probable that at least two full years more will be required to complete the work that must be done before title can be transferred to the Federal Government.



The Booth-Kelly Lumber Co., of Eugene, Oreg., has completed an experimental planting of more than 10,000 pine and redwood seedlings. The seedlings were supplied by the nursery maintained cooperatively by the State forest school at Corvallis and the Federal Government, under the Clarke-McNary law. The planting was directed by Norman G. Jacobson, of the Western Forestry and Conservation Association. It is in supplement to the company's policy of providing for natural reproduction of the original species by leaving seed trees and by effective handling of slash disposal.

Fire Protection Rules for Railroad Right of Way

An endeavor to obtain more efficient action by section crews, train crews, and other employees in preventing, suppressing, and reporting fires along the right of way is being made by the Atlantic Coast Line Railroad. In a recent circular detailed instructions were issued to all employees with this object in view. Front-end arrangement and ash pans of locomotives are to be inspected at the end of each trip. Locomotives are not to be returned to service with any holes in plates or netting larger than the original open areas of the netting. Sprinklers are to be used liberally before ash pans are dumped in order to be sure that live coals are not left on the track. Proper precautions are to be taken to see that ash pans are closed and secured so that fire will not drop through. Burning waste from hot boxes must be extinguished by trainmen. The right of way is to be burned promptly as soon as weather conditions permit after the first frost, low places that fail to burn the first time being carefully watched and burned again as soon as they are dry enough. Old logs and stumps that catch fire in the burning of right of way must be extinguished at the end of the workday. The area burned at one time must be small enough so that the fire can be kept under control in the event of a sudden change in wind direction. When old crossties are being burned during dry weather some one must stay with the fire until it is out or must put it out at the close of the workday before leaving. Section masters are ordered to proceed to fires started by accident as quickly as possible with sufficient men to control them. Placards are to be kept posted in smoking compartments of coaches calling attention to the danger of throwing lighted matches, cigars, and cigarettes from windows. Reports must be sent in by wire by section masters in regard to all fires discovered on or near the right of way, so that a quick investigation can be made and responsibility for the fire determined.



The St. Paul & Tacoma Lumber Co., founded June 4, 1888, has marked its fortieth birthday by announcing the adoption of plans for keeping its forest lands continuously productive. A survey of the cut-over lands belonging to the company has been made by the forest research and management department of the Western Forestry and Conservation Association.



J. A. Waters, of Twin Falls, Idaho, set out a woodland of black locusts in 1905 and began cutting fence posts from it in 1911. These first posts, and a wagon tongue cut at the same time, after more than 16 years' service are still in excellent condition. The woodland, besides furnishing durable farm equipment at practically no cost, is in frequent use as a picnic ground.

Dry and Wet Thunderstorms Alike

So-called dry lightning, or the dry thunderstorm, is due to the same causes and occurs in the same manner as any other thunderstorm, E. B. Calvert, of the Weather Bureau, explains. A thunderstorm is caused by a violent vertical convection of air that contains enough moisture to be condensed into an abundance of raindrops. All thunderstorms are equally wet in and just beneath the cumulo-nimbus clouds where the rain-drops form. Under conditions in which the lower air is even moderately humid, the rain forms at such low levels that only a part of the condensed moisture evaporates as it falls toward the earth. On the other hand, in regions where the lower air is extremely dry the water vapor condenses, or the rain forms, so high up that all or nearly all of it evaporates in mid-air as it falls, and the thunderstorm is a dry one. With no accompanying moisture reaching the ground to wet the burning material, forest fires set by such storms spread rapidly, and are very difficult to extinguish. Dry air and high temperatures favor the spread of such fires.



Many who are familiar with the native American larches (*Larix*) will be surprised to know of a genus closely resembling the true larch and represented at the present time by but one known species. This species is *Pseudolarix amabilis*, the golden larch. The tree differs from the real *Larix* in the stalked, pendulous, clustered, staminate flowers and in the deciduous cone scales which separate from the central axis at maturity as in the fir. The lone species comes from a restricted region in eastern China, where it grows in the mountains at an altitude of from 3,000 to 4,000 feet. This tree, which in its native haunts attains a height of 150 feet, is well adapted for ornamental purposes in the United States, since it has a broad pyramidal habit with light green feathery foliage. The needles turn a golden yellow in the fall.



The type of forest growth formerly borne by an area furnishes an indication of the area's probable susceptibility to corn-borer infestation, according to the results of studies by Prof. E. N. Transeau and Prof. H. C. Sampson, of the Ohio State University. Data collected in Ohio and Ontario showed that the most serious borer infestation occurred in parts that were once covered by swamps and swamp forests. Fields of corn growing on the sites of former beech forests were infested less severely, and the lowest degree of infestation was shown by areas once covered with oak-hickory timber. Professor Transeau points out that the beech forests grew on relatively moist lands, whereas the oak-hickory forests developed on land of a drier type.

Apache Pine Appears Fire Resistant

In 1925 an unusually hot fire burned more than a thousand acres in the Chiricahuas of Arizona. A visit to the area in November, 1927, disclosed sprouts from completely consumed silver leaf oaks, dead and badly injured western yellow pine—and Apache pine of all ages and sizes to all appearance unharmed. Apache pine seedlings which must have been right down in the bunch grass at the time of the fire show no signs of injury and have made normal height growth since. Large trees have charred bark but no fire scars or other signs of injury. (Growth was not measured.) Mature Apache pines show no injury where similar neighboring western yellows are "bleeding" and unsightly. Apache pine (or Arizona longleaf) is similar to southern longleaf, which is noted among all pines for its resistance to fire. Apparently it is a worthy relative. The long, coarse needles of the seedling burn and char, but protect the terminal bud in their midst. In addition, either the bark is exceedingly insulating or the cambium layer is wonderfully fire resistant.

Relation of Forest Types to Farm Fertility

A close correlation of agricultural development with certain soil types that were reflected in the natural vegetation has been disclosed by an ecological study of Pennsylvania, reported in the Bulletin of the Geographical Society of Philadelphia. Thus the white oak-hickory belt is also the region of the better agricultural areas; the white pine-hemlock forest type occupies land that makes poor farms; the spruce-fir type occupies regions of little agricultural value; and the northern hardwood forest of beech-birch-maple coincides with the dairy farm lands.



A new forest industry has made its appearance in Clay County, Ala.—the manufacture of baskets, vases, trays, and flower pots from the needles and cones of longleaf pine. About a year ago Mrs. J. E. S. Rudd, home demonstration agent, began teaching this craft to women of the county. The product of the first month's work sold for \$835, and a year later the sales amounted to \$2,400 in a month.



A plan to trade-mark lumber produced in the mills of the Western Pine Association was adopted at the association's twenty-second annual meeting, in Spokane, February 7 and 8. It was decided to use for this purpose a printing machine invented by D. R. Tanner, superintendent of the Bowman-Hicks Lumber Co., La Grande, Oreg. The marking machines will be installed behind the planers and will print the name of the species, the company trade-mark, the number of the mill, and the name of the association on the lumber as it passes through.

Treated Ties Save Money

Every treated main-track tie put into use in 1910 by the Delaware, Lackawanna & Western Railroad will by 1930 have saved the company 93 cents, according to estimates of G. J. Ray, the road's chief engineer. On the basis of present-day costs the company expects within 20 years to save \$1.26 apiece on treated ties placed in track to-day. On southern lines, where the life of an untreated tie is much shorter than in the north, savings through preservative treatment are expected to amount to \$3.26 per tie in 18 years.

Agricultural Cooperation for Pan America

A division of agricultural cooperation has been established in the Pan American Union. The division will work to advance cooperation and research in agriculture, animal husbandry, and forestry in the member countries of the Union, thus carrying out resolutions adopted by the Sixth International Conference of American States held in Habana in January and February, 1928. It will facilitate the exchange of seeds and plants among these countries, and will study the needs of the different nations for introduction and propagation of new varieties of seeds and plants and for the development of new agricultural industries. It will endeavor to increase the use of Latin America's forest resources by bringing about timber surveys and tests

of woods for industrial uses, and by promoting the study of reforestation and the relation of forests to water supplies and irrigation.

The division will be under the immediate direction of Señor Alberto Adriani, of Venezuela. Dr. W. A. Orton, director of the Tropical Plant Research Foundation, will take part in its direction in the capacity of technical adviser to the Pan American Union.

Wood Silos Give Satisfaction

Of the 34 users of creosoted wood silos who replied to a questionnaire recently sent out by the Forest Products Laboratory, the majority reported that their silos were giving satisfaction. The silos covered by the reports had been treated with creosote by the pressure, hot and cold bath, and dipping treatments, and had been in service for from 9 to 15 years. In no case was any decay reported. Three correspondents reported that when new their silos slightly contaminated the silage.



The southeastern section of the Society of American Foresters was organized at a meeting in Jacksonville, Fla., on April 3 that was attended by about 25 foresters. Lenthall Wyman was chosen chairman, I. F. Eldredge vice chairman, and S. J. Hall secretary-treasurer. The territory of the section includes Florida, Georgia, Alabama, and the coastal part of South Carolina.

Foreign Notes

The "Remarkable" Pine

By E. N. MUNNS, United States Forest Service

Of all tree species the one best known to-day outside of its native country is perhaps the Monterey pine. This is due to the widespread popularity which the tree has gained within the space of a few years in the antipodes, through a growth rate that promises rapid development of merchantable stands of timber. In most parts of Australia and New Zealand the tree is known as "the remarkable pine," a name which its growth justifies.

In South Australia the tree has been used in reforestation work for more than 40 years, and over a somewhat shorter period it has been extensively planted also in Victoria and New South Wales. Stands have yielded over 250 cubic feet per acre per year, and a stand of 33 years cut 100,000 superficial feet per acre. (This included material down to 3 inches.)

Just when the Monterey pine was first introduced into New Zealand is not known, but existing plantations are known to be between 40 and 45 years old. The growth rate is much the same as in Australia, the annual increment (inside bark) being 250 cubic feet per acre at 30 years and 385 cubic feet at 40.

The tree was first introduced into South Africa about 1875, but plantations were not made there until 1884, when 20 pounds of seed were imported. The growth as elsewhere is exceedingly rapid, with annual increments between 250 and 300 cubic feet per acre. One plantation of 163.4 acres at Tokai was cut in 1918 when 32 to 35 years old. From this area 734,450 cubic feet of Monterey pine was removed, besides 207,750 cubic feet of eucalypts. On the average acre the pine cut amounted to about 290 cubic feet, yielding a gross return of \$1,950. The highest stocked acre yielded nearly \$5,000. These prices were much heightened by a temporary shortage of timber. The largest tree at 35 years was 136 feet tall, with a diameter of 38.2 inches and a volume inside bark of 315 cubic feet.

Just what factors are responsible for this tremendous growth is not known. Apparently even in the antipodes growth is not always so rapid, for several bitter disappointments have resulted from planting in regions that differ but little from those where the tree is such a success. In South Africa the tree does better on the slopes than on the bottom lands, and at higher elevations than lower, while in Australia the reverse is true. Poorly drained soils, lime soils, or shallow soils limit the growth markedly. But little has been learned definitely of climatic influences, because of the lack of data.

So far these overseas plantations of "the remarkable pine" are free from disease and insect pests. It is earnestly hoped that these planted forests, now being rapidly extended, will not experience the serious troubles which pure even-aged stands over considerable areas usually invite.

Floods Follow Hungary's Loss of River and Watershed Control

Before the World War, Hungary was one of the most compact countries of Europe, being a large central valley rimmed in by high forested mountains and traversed by a master river. Old Hungary was a first-class forest nation with some 20,000,000 acres, 26 per cent of its total area, forested; about 5,000,000 acres were oak, about 8,000,000 beech, 5,000,000 pine, and 2,000,000 other woods, among which spruce was prominent. Some 16 per cent of this forest area belonged to the State; and 50 per cent more, although in private ownership, was under State control, largely because of the influence of the forests upon water supplies, floods, or erosion. Up to the time of the war about 25,000 acres of privately owned oak and beech forests at the lower elevations were being cleared annually for agriculture, while between 5,000 and 10,000 acres of new forest was being planted each year. All the planting was reclamation work for the control of erosion or floods, done either by the State or by the owner under State direction; for the State had many years ago (about 1850) recognized the importance of forests.

Postwar Hungary consists of only a portion of the original valley, without natural geographic boundaries. Her forest resources are greatly shrunken, since most of her eastern mountains have been lost to Rumania, all her northern mountains to Czechoslovakia, her eastern highlands to Austria, and her southern hills to Yugoslavia. There remains only 14.3 per cent of the original forest land, consisting of 32.2 per cent of the original oak, 13.7 per cent of the beech, and 2.6 per cent of the pine lands. The extensive plantations of acacias in the dune region still remain in Hungary, but the plantations of pine, spruce, and hardwoods for erosion and flood control were lost.

Under the old order, wood, both saw timber and pulp, formed a large percentage of Hungarian exports, and the nation was independent of other countries for timber. Now Hungary is dependent upon the countries that were taken from her. While nearly a third of her oak forest remains, this is mostly an inferior forest much like the oak fringe forest of Missouri, Oklahoma, and Texas, valuable chiefly for firewood.

The loss of the mountain forests has had another result. In the past century some 4,000 miles of levees have been built along the Danube and Tisza Rivers, as along the Mississippi, to protect some 15,000,000 acres of agricultural land. These levees have been augmented in the lower river by other protection devices such as spillways and detention basins and in the

mountains by extensive flood-control works—check dams, terraces, and contouring. Before the war, as a part of the flood-control work, more than 800 rain gauges were in use in the mountains, with 1,700 gauging stations along the streams. These were all linked together with a network of telephones for controlling the disposition of the flood waters in the lower stretches of the rivers. The revision of the national boundaries, however, has placed the headwaters of the streams, and thus all knowledge of storms and of run-off, in the control of other nations. With the partition of Hungary all governmental control of private lands was removed. Lumbering à la carte has taken place, destroying the protective cover. The erosion and flood-control works have deteriorated through lack of maintenance. Overgrazing in mountain forests and meadows, also, now contributes greatly to erosion.

All this does not add to the good will of nations or to the happiness of Hungarian farmers, for since control of the forest has been lost and forest abuses have begun, floods have almost annually destroyed levees and crops, and erosion deposits in the rivers are steadily raising the stream beds. Lack of knowledge of the size of floods and so of information as to how best to handle them, and the increasing ineffectiveness of the "levees only" system were responsible for the severe floods of the spring of 1927, on the Danube and Tisza Rivers. These floods in Hungary, though overshadowed in importance by our own Mississippi River situation, cost many lives and resulted in much property damage.

Upon the representation of the Hungarian delegates, who visualized the situation as it has developed, the Geneva Peace Conference appointed an international commission to study the forest and water relationship in central Europe, and gave this body powers to establish certain restrictions upon land use as it affected Hungary. As yet the commission has not developed any enforceable rules except some providing for forest fire protection. It is to be hoped that in time this commission will be able to work out some means of correcting the situation. In the meantime, Hungary suffers from an enforced policy of "levees only."

Mycorrhiza Helps in Establishing Spruce

In the forest of Namdal in northern Norway, natural regeneration of spruce has been obtained with difficulty because of the luxuriant vegetation of herbs and ferns. Under a dense crown cover, it has been found possible to get the seedlings established upon decaying wood such as windfalls, stumps, and branch wood. Studies by Dr. Elias Mork indicate that all these young trees develop typical mycorrhiza even in the first summer. This is believed to be due in part at least to the acidity of the decaying wood, which is greater than that of raw humus soil. Mycorrhiza seem to be able to transform highly acid compounds into more simplified ones capable of direct assimilation by the plant.

Blister Rust Control Work in Europe Suggested

The *Pinus strobus*, for whose protection from blister rust myriads of currant and gooseberry plants have been destroyed in its native United States, has not enjoyed the tribute of similar sacrifices in Europe—even in the countries where it has shown great value. In the words of a writer in the Quarterly Journal of Forestry, "western Europe may be sorry for the Weymouth pine, but it is not inclined to give up the black currant."

This pine, known in America as the northern white pine and in Europe as the Weymouth pine, when introduced many years ago into central Europe found the climate favorable and demonstrated its value for both timber-producing and silvicultural purposes. Among the few available species of conifers spruce had been chosen by the foresters of Europe as the general utility tree and was by far the most widely planted. The widespread cultivation of spruce had proved by no means an unmixed blessing, being followed in many cases by the development of bad soil conditions. Consequently the *Pinus strobus* was most welcome, and planting it became the fashion. The tree had to be protected against deer, and it suffered early losses from damage by *Armillaria mellea*, the honey fungus. Where rightly treated, however, it more than proved its worth, and it came to be regarded as one of the established forest trees of Europe. It was frost-hardy. It was desirable for afforestation, for reforestation of deteriorated land—especially on heaths, where it suppressed the weeds and brought the soil into better condition—and for mixing with spruce in places where raw humus had accumulated and heath tended to invade the forest. Apart from these rather special uses, the best general manner of cultivation proved to be in larger or smaller groups in mixed hardwood-conifer forest—i. e., in surroundings similar to those among which the tree grows in the Allegheny Mountains in its native country.

Twenty-seven years ago Doctor von Tubeuf, of Germany, prophesied that stringent measures would have to be adopted if the *Pinus strobus* was to be saved from the blister rust. No such measures having yet been taken, within the past year Doctor von Tubeuf has come forward with recommendations for measures to save the species. In order to exterminate the white pine blister rust within a short period he suggests that a special commission be empowered to prohibit the production and sale of susceptible five-needled pines and susceptible species and races of currants and gooseberries; that all rust-infected pines or parts of pines be ordered destroyed and all susceptible currants or gooseberries removed; that the *Pinus peuce*, the five-needled pine native to the mountains of the Balkan Peninsula, which is not quite so quick a timber producer as the *Pinus strobus* but is immune to the blight, be

substituted for the latter where suitable; and that the immune Dutch variety of red currant be cultivated in place of currants susceptible to rust. If alleviative measures only are desired, he suggests that nurseries be forbidden to cultivate and trade in susceptible five-needled pines or susceptible currants and gooseberries; and that owners of forests, parks, gardens, or pleasure grounds be required to remove all diseased *Pinus strobus* and *Ribes*, and in replacing them to use immune sorts, regeneration of the *Pinus strobus* being permitted where the pine is free from rust.

As an additional means of preventing the extermination of *Pinus strobus* in Europe by the blister rust Doctor von Tubeuf recommends the spreading of *Tuberculina maxima*, the small fungal parasite living on the aecidial stage of the white pine and other similar blister rusts. Recognizing the difficulty of carrying out even the less extreme of his suggestions in the present state of public opinion, he proposes that at least the *Pinus peuce* be cultivated for the present as a substitute for the *Pinus strobus*.

New Forest Machinery and Methods Developed in Germany

The machinery committee of the German Forestry Society, headed by Doctor von Monroy, reports the recent development of a tractor engine sufficiently mobile to be used for cultivation work in forests. This engine, of about 20 horsepower, has a length of 1.75 meters, a width of only 80 centimeters, and a ground clearance of about 30 centimeters. It may be used not only for cultivation but also to transport wood.

As a means of ground cultivation in the forests of Germany, Doctor von Monroy writes, implements resembling a plow have hitherto been used but are found unsatisfactory because of obstacles met with in the forest floor. There is now coming into use a ground cutter having quills which revolve rapidly around an axis. Such a machine may be used with either a small motor of 5 horsepower or a tractor such as that just described.

In the "Cobra" method the Germans have found a way to give preservative treatment to telephone poles or railway ties already in use. By means of a small stabbing apparatus a decay-preventive paste is injected into the wood, especially in parts near surfaces that are in contact with the ground. When moisture is absorbed by the wood the paste is distributed evenly through these parts.

An innovation in sawing work is an apparatus consisting of a lamp fitted with an arrangement of wires so that it throws a sharply defined light ray upon the wood to be cut, either lengthwise or crosswise. This, says Doctor von Monroy, makes possible a much better utilization of wood than has yet been obtained by measuring with the eye.

Form Factor for Norway Spruce

Tree-form studies by Erling Eide of the Institute of Experimental Forestry in Norway show that the form factor for every normal type of Norway spruce stand depends solely upon the relation between height and diameter at breast height. This relation is a simple one and may be expressed in the following equation:

$$f = 0.65 - \frac{0.16d - 0.40}{h}$$

in which h is height in meters and d the diameter inside bark at breast height in centimeters. Data for this work were selected from a wide range of sample plots of the institute and included a wide variation in age, soils, density, and climatic conditions.

The results of the investigations show that the form factor increases with increasing height and decreases with increasing diameter; that the form factor is not influenced by age; that density of stand and climate (latitude) influence the form factor only in the same degree as they influence the relation between height and diameter; that the form factor follows the same equation in both even and uneven aged stands; and that the quality of the soil does not influence the form factor if it does not prevent a natural development of the tree. If the form factor is higher on poor than on good soil, it appears to indicate too close spacing in relation to conditions of fertility.

Mysterious Tree Deaths Attributed to Electricity

In the forest of Cudrex, Fribourg, Switzerland, 204 spruce trees on an area of 25.5 acres were killed last fall in a somewhat mysterious manner, according to a report by P. de Gendre published in the Swiss Journal of Forestry.

It was noticed that a number of spruces had dead crowns. The cause was not apparent, and the trees were felled for examination. While the felling was being done additional trees became dried out in the crowns. Sometimes the top of the tree was dead and the lower branches green, sometimes the branches in the middle of the crown began to dry out while the top remained green; in the end, however, every tree attacked dried out to the top. Four times additional fellings had to be made because new trees were affected. Examination of the felled trees showed that some trees were dry and dead for the whole length, some for a distance of 3 to 4 meters from the top down. Often a flow of resin was found on the trunk at the lower edge of the crown or within the lower crown. On removing the bark it was found that the cambium was dead, sometimes for the full length of the tree, sometimes only part way, and that it was attached to the wood by long blackish violet filaments. On cut surfaces the

wood was whitish, lightly tinted with yellow. The roots appeared absolutely healthy. The few hardwoods on the area had not been affected.

After the extraordinarily rainy summer of 1927 there could be no suspicion that this effect was traceable to a lack of moisture in the air or in the soil. Trees bearing a trace of insect attack or of fungus were the exception. There was none of the commonly recognized indications that lightning had struck near by. But on the basis of 35 years' observation and of records of similar phenomena observed in coniferous forests by the German foresters Hartig, Hess-Beck, and Von Tubeuf, M. de Gendre has concluded that the trees were killed by electricity. He suggests that losses of this sort due to electricity are sometimes erroneously attributed to insects.

Sterilizing Lumber Infested by Powder Post Beetles

A method of destroying powder post beetles in seasoned timber has been worked out by the Forest Products Research Laboratory, Princes Risborough, Bucks, England. Three species of these beetles are introduced into England in low-grade American oak and ash lumber. They attack the "sapwood of oak, ash, walnut, chestnut, hickory, and other large-pored timbers," partly or fully seasoned. Their activities are especially troublesome to furniture manufacturers, who are unaware of their presence in lumber used for the manufacture of furniture until the furniture is returned on account of "wormholes" that have appeared after sale. The method of sterilizing the lumber is to treat it in a kiln for one and one-half to two hours at a temperature of 130° F. with the atmosphere of the kiln at saturation point. The wood is brought to the required temperature at the beginning of the period of treatment. The time required for the heat to penetrate to the center of the pieces varies with thickness, and it is suggested that a good general rule is to allow one hour per inch of thickness for the preliminary treating. No damage is done to the wood.

The laboratory is now carrying on a study to ascertain a method of impregnating the sterilized timber to prevent future infestation.

Government Reforestation Work in France

Between 1900 and 1927 the French Government reforested about 86,000 hectares of Government land, and by means of subventions procured the reforestation of about 50,000 hectares each of private and communal land. During the same period the Government acquired 317,822 hectares of land, bringing the total of State forests up to 1,466,240 hectares.

Mexican Longleaf Does Well in South Africa

Pinus patula, the Mexican longleaf pine, was first introduced into South Africa as an ornamental tree, about 1907. Between 1910 and 1913 sufficient seed to form plantations became available, and several plantations were started. The importing of seed from Mexico was interrupted by the Mexican revolutions of 1913, but the planted trees soon began to produce seed in abundance. At 12 years the trees average from 4 to 7 inches in diameter and from 40 to 60 feet in height. These stands have an exceedingly high volume, the current annual increment ranging from

300 to 634 cubic feet per acre. The tree appears to stand snow and frost without injury. Plantations are most successful in those parts of the country where the annual rainfall, most of which comes during the summer months, is around 30 inches.



French naval stores producers are congratulating themselves on having succeeded in getting resin recognized as a suitable ingredient in soap. A measure recently passed by the Chamber of Deputies permits its use, although specifying that soap in which resinous products compose more than 5 per cent, by weight, of the fats, can not be sold as "pure."

Personals

Will C. Barnes has retired as chief of the branch of range management, United States Forest Service, and on July 1' becomes secretary of the United States Geographic Board. The work which thus becomes Mr. Barnes's major activity is one in which he is intensely interested and in which he has had an official part since 1920, when President Wilson made him a member of the board. Mr. Barnes got his start as a geographer when as a boy enlisted in the Signal Corps he helped to build the first long-distance telephone line in the world, connecting Coast Guard stations along the coast of Virginia. Next he learned the geography of the Southwest as a military telegrapher at Fort Apache, Ariz. It was there that by a night ride through the Indian lines Barnes saved the lives of a garrison and earned the congressional medal of honor. Soldiering led to ranching, and for 25 years Barnes was a cattleman of Arizona and New Mexico. During that period he served in the legislature of each of the two Territories. In 1907 he joined the Forest Service, as an inspector of grazing stationed at Albuquerque, N. Mex. In 1915 he was called to Washington to take charge of the regulation of grazing on the national forests.

Mr. Barnes's distinguished gift for writing has made his name familiar to the magazine-reading public, and he is well known also as a lecturer. In the summer of 1926, backed by an act of Congress and a special appropriation, he scoured the Southwest for specimens of the old breed of longhorn cattle and established a small herd, safe from extinction, on the Wichita National Forest, Okla.

C. E. Rachford, assistant chief of the branch of range management since 1924, is Mr. Barnes's successor. Mr. Rachford joined the Forest Service in 1905, as guard on the present Modoc National Forest. He served as supervisor of the Modoc and Santa Barbara National Forests, and from 1915 to 1920 was assistant district forester in charge of the regulation of grazing on the national forests of California. In the years 1920-1924 Mr. Rachford performed the enormous task of appraising all the grazing lands on the national forests, his appraisal becoming the basis of grazing fees now in force.

Aldo Leopold has resigned as associate director of the Forest Products Laboratory to engage in private work as consulting forester specializing in game management. Mr. Leopold has been a member of the United States Forest Service since 1908, the year of his graduation from the Yale Forest School. Serving first as a forest assistant on the Apache National Forest, Ariz., he became forest supervisor of the Carson National Forest, N. Mex., and then, in 1919, assistant district forester in charge of fire control and field personnel in the Southwestern National Forest District. He became associate director of the Forest Products Laboratory in 1924. He has served on the executive council of the Society of American Foresters and on the board of directors of the Wisconsin Division of the Izaak Walton League.

Mr. Leopold's first undertaking in his new status is a survey of American game resources for the Sporting Arms and Ammunition Manufacturers' Institute. He will continue to make his headquarters at Madison, Wis.

Lewis E. Staley has accepted appointment as the first State forester of South Carolina. Mr. Staley was for 21 years identified with the State forestry work of Pennsylvania. He was a member of the first class graduated from the Mont Alto Forest Academy, now the Pennsylvania State Forest School. For a number of years he had charge of the Mont Alto State Forest. He assisted Gifford Pinchot in planning the reorganization of the State department of forestry, and during Mr. Pinchot's governorship served as deputy under R. Y. Stuart, secretary of the department of forests and waters. This position of deputy secretary of the department of forests and waters in Pennsylvania corresponds to the position of State forester in other States.

George C. Pardee, former governor of California, has been appointed to head the California State Board of Forestry for a term of four years. Ex-Governor Pardee formerly served as chairman of the State board of forestry in the administration of Governor Stephens. Other members appointed to the board are Swift Berry, Camino, forester for the Michigan-California Lumber Co.; W. O. Blasingame, Fresno, vice president of the California Cattlemen's Association; H. S. Gilman, Los Angeles, general manager of the San Dimas Water District and president of the Angeles Forest Protective Association; D. Eyman Huff, agriculturist, Orange County; A. J. Mathews, Susanville, former assemblyman; and Walter Mulford, professor of forestry, University of California.

Clark C. Heritage has been appointed senior chemical engineer in charge of the section of pulp and paper, Forest Products Laboratory, succeeding to the position recently resigned by John D. Rue. Mr. Heritage attended the University of Chicago and the Armour Institute of Technology, where he received his degree in chemical engineering in 1914. He then entered the pulp and paper industry as chemical engineer with the Nekoosa-Edwards Paper Co. at Port Edwards, Wis. Since 1925 he has been engaged in technical development work in the paper board industry with the Paper Board Corporation and in sales extension work with the Cornell Wood Products Co. His experience includes also the production of synthetic phenol and of war gasses and the redesign of chemical plants and development of new products. Mr. Heritage is a member of the Technical Association of the Pulp and Paper Industry and of the American Institute of Chemical Engineers, having served for several years as committeeman on chemical engineering education.

Axel J. F. Brandstrom joined the faculty of the College of Forestry of the University of Washington on January 1, 1928, as assistant professor of logging engineering. Since his graduation from the school in 1919 Mr. Brandstrom has had several years' experience as a logging engineer for Washington lumber companies and has for five years headed a general contracting firm.

John B. Burnham has resigned as president of the American Game Protective Association, having held that office continuously since the association was organized in 1911. He is succeeded by Carlos Avery, who has served the association first as vice president and recently as secretary-treasurer and editor.

Samuel J. Record, of the Yale Forest School, has sailed for Europe, where he will work to enlist the cooperation of scientists in an investigation of the forest resources of the Tropics. This project is sponsored by Harvey Firestone.

R. Y. Stuart, chief of the United States Forest Service, has been appointed by Secretary of Commerce Hoover to the vice chairmanship of the National Committee on Wood Utilization, an office recently resigned by William B. Greeley.

Valery Tikatchek, chief forester of the Ural district, Russia, and Alexander Karchewski, a mining engineer of Moscow who is a graduate of the Imperial Russian Forestry School, have come to the United States to study methods of logging and logging transportation and the Forest Service, especially its research organization. They will visit a number of the national forests, several of the forest experiment stations, and the Forest Products Laboratory.

Axel H. Oxholm, director of the National Committee on Wood Utilization, United States Department of Commerce, has sailed to spend the summer months in Scandinavia and central and western Europe. Mr. Oxholm will study sawmill operation, machinery and methods for producing lumber with minimum waste, and utilization of materials largely wasted in this country. He will also prepare to report on the possibilities of marketing American lumber in Europe.

Herbert J. Ninman, State blister rust control leader in Wisconsin, recently returned from an extended trip in Germany and Switzerland.

Prof. A. B. Recknagel, of Cornell University, has been appointed to cover developments in American forestry literature for the *Forstliche Rundschau*, a German forestry digest which is to make its appearance in July, 1928, and to be published quarterly. Professor Recknagel has served on the editorial board of the *Journal of Forestry* for 14 years.

William B. Greeley has accepted appointment to the board of directors of the American Forestry Association, filling the vacancy created by the resignation of Henry W. Shoemaker.

Edward A. Sherman, associate forester of the United States Forest Service, received the honorary degree of doctor of science from his alma mater, the Iowa State College, at Ames, Iowa, June 11, 1928.

Walter C. Lowdermilk is joining the staff of the California Forest Experiment Station July 1 on a permanent status as silviculturist. Mr. Lowdermilk has completed the residence requirements for a Ph. D. degree from the University of California.

W. C. McCormick has resigned as assistant State forester of North Carolina in charge of forest fire prevention, to take up work with the American Forestry Association in connection with a forestry education campaign in Georgia, Florida, and Mississippi. Mr. McCormick joined the North Carolina forestry organization early in 1926, after 15 years' experience on the national forests of the northern Rocky Mountains. His place in North Carolina has been filled by the promotion of Charles H. Flory, formerly district forester at Fayetteville.

Perkins Coville has reported at the Washington office of the United States Forest Service for duty as associate silviculturist in the office of forest experiment stations. Mr. Coville comes to the Forest Service from the Iowa Agricultural College, where he has taught forestry since 1922. He received the B. S. and M. F. degrees from Cornell University in 1918 and 1920, respectively, and had forestry experience in the employ of the Great Southern Lumber Co., James D. Lacey & Co., and the Weyerhaeuser Timber Co.

H. Colby, who since 1920 has headed the woodlands department of the S. D. Warren Co., Boston, has resigned to enter the employ of the Dead River Timberland Co. of Boston, and the J. Manchester Haynes estate, of Augusta, Me.

Earle H. Clapp, chief of the branch of research of the United States Forest Service, has received the honorary degree of doctor of science from the University of Michigan, of which he is an alumnus.

Samuel T. Dana, dean of the School of Forestry and Conservation of the University of Michigan, has received the honorary degree of doctor of science from Syracuse University.

Ferdinand W. Haasis, assistant silviculturist at the Appalachian Forest Experiment Station, has received the Ph. D. degree in plant physiology from Johns Hopkins University. Mr. Haasis's thesis was on the subject "Some relations of temperature and length of germination period to the percentage of germination of seeds, especially of pitch pine and rice."

Newly elected officers of the Texas Forestry Association are E. L. Kurth, Keltys, president; W. Goodrich Jones, Waco, president emeritus; E. O. Siecke, College Station, secretary-treasurer.

Charles W. Boyce, of the United States Forest Service, has joined the staff of the American Paper and Pulp Association, New York City, as secretary of the woodlands section.

C. Stowell Smith is the 1928 chairman of the California section of the Society of American Foresters, and F. S. Baker is again serving as secretary-treasurer.

H. J. Lutz is joining the staff of the Allegheny Forest Experiment Station, Philadelphia, as associate silviculturist. Mr. Lutz is a graduate of the Michigan State College and was formerly a technical assistant on the Chugach National Forest, Alaska. He was graduated from the Yale Forest School in 1927 and has since engaged in research in forest ecology at the Connecticut Agricultural Experiment Station. Hugo L. Sundling has been appointed to the staff of this station as assistant silviculturist. Mr. Sundling is a graduate of the Michigan State College, has had experience on the Tusayan National Forest, and spent the past year in graduate work at the Pennsylvania State College.

R. M. Lingren, instructor in forest pathology at the Forest School of the University of Minnesota, has just been appointed forest pathologist in the Bureau of Plant Industry and stationed at the Southern Forest Experiment Station. Mr. Lingren had graduate work in pathology after taking his degree in forestry at the University of Minnesota.

Louis J. Pessin, forest ecologist, has rejoined the staff of the Southern Forest Experiment Station, from which he resigned a year ago to become plant pathologist at the Texas Agricultural Experiment Station. A new acquisition to the staff of the station is F. I. Righter, who has had extensive forestry experience in the Tropics and who has just received the M. F. degree from Cornell.

C. Cyril Klein, district forester for western Maryland, has been transferred to College Park, Md., to take charge of the State forest nursery there.

S. R. Gevorkiantz has returned to his post at the Lake States Forest Experiment Station after a year's graduate work at the Harvard Forest. A new appointment to the Lake States station is that of H. F. Sholz, a junior forester who has studied forestry at the Iowa State College.

V. C. Clements, a graduate of the University of California under appointment as junior forester at the California Forest Experiment Station, has been transferred to the Washington office of the United States Forest Service for duty in the section of forest measurements.

Charles B. Abell, a graduate of Cornell, and Alden B. Hatch, a graduate of the Forest School of the University of Idaho, have been appointed to the Appalachian Forest Experiment Station.

Ernest L. Kolbe, one of this year's forestry graduates of Cornell University, has been appointed as junior forester to the Pacific Northwest Forest Experiment Station.

Bibliography

A Good Book on Insect Enemies of California Pines

By E. E. CARTER, United States Forest Service

In *Insect Enemies of California Pines and Their Control*, F. P. Keen, of the Bureau of Entomology, has not only compiled a convenient reference book of the available information on his subject. He has also reduced the compilation into simple, easily read English that a layman can understand. The use of this bulletin will probably not be confined to California; it could easily serve as an introduction to the whole subject of forest entomology. The keynote is sounded in the first sentence—"Insects are an essential part of the vast association of living, growing, and dying organisms which we call a forest."

The California bark beetles and their destructive work are discussed adequately, but Keen does not stop there. He tells of parasites and predators, of borers and white ants, of cone beetles and saw flies. His final chapter heading is "The field identification of insects attacking California pines," and the chapter contains a guide to field identifications that should be useful throughout the West. This guide does not require the measurement of the length of the abdominal segments in millimeters or the determination of the hairiness of the elytra of a beetle, but is based on the readily seen work done by each species. It looks as if it could be used by the amateur. So does the bulletin as a whole.

(F. P. Keen: *Insect Enemies of California Pines and Their Control*. Bulletin No. 7, California Department of Natural Resources.)

Forestry in Wisconsin

The "six honest serving men" of journalistic fame must have been present in person at the editorial council where the report of the Wisconsin Commercial Forestry Conference was prepared. What and when and why, and where and how and who, are all well represented in the volume, which is entitled "Forestry in Wisconsin." The editing of the report is a remarkably successful piece of work. The result is a book packed with information and inspiration. It is attractive, easy to handle, and easy to read. And it is a valuable text and source book for everyone interested in timber production or utilization, forest conservation, land use, and all related matters, including the relation of forests to the social and æsthetic health of the Nation. Copies of the book may be obtained from H. L. Ashworth, 49 East Wells Street, Milwaukee, Wis.

Bureau of Railway Economics on Lumber

"Lumber" is the title of Bulletin 30 of the Bureau of Railway Economics. The bulletin is one of a series of studies by that organization on commodity prices in their relation to transportation costs. It deals with mill prices of lumber, the retail prices of lumber at consuming markets, and freight rates on lumber from milling points to important markets. It covers the three years 1924-26. The bulletin is the result of a study of lumber prices in their relation to transportation costs and presents general statistical data on production, distribution, and consumption of lumber. Only those species, grades, and sizes of lumber that enter into general construction operations are included in the discussion.

Copies of this bulletin can be obtained free by addressing the Bureau of Railway Economics, 1024 Transportation Building, Washington, D. C.

The Care of Ornamental Trees

The Care of Ornamental Trees, by C. F. Greeves-Carpenter, published by Macmillan, is a little book of 65 pages that may be easily read and quickly referred to. The author has endeavored to put into words of one syllable some of the things that the owner of a tree or a whole park full of trees may want to know. Very plainly he is directing his attention toward the owner of city or suburban property who has newly acquired an interest in the trees that grow upon it.

In his effort to keep away from technical terms the author sometimes labors, but the instructions bear the mark of one who has actually done the things of which he speaks.

Forestry Bibliographies Available

A limited number of copies of bibliographies on the following subjects prepared by Helen E. Stockbridge, librarian of the United States Forest Service, are available for distribution from the Washington office of the service: Brush disposal, Douglas fir, erosion, farm forestry, forest fire insurance, forest influences, Forest Service publications to 1925, forest soils, forest taxation, forestry books (in English), form and taper, New England States forest problems, phenology, plant breeding, shade trees, thinning, volume and growth studies, preparation of volume tables, water and light requirements of forest trees, windbreaks, and tree surgery.

Rubber Production in Africa

By E. N. MUNNS, United States Forest Service

Considerable interest has been evidenced of late in the possibilities of producing rubber on the African Continent. A summary of the existing information on this subject issued in 1926 by the Department of Commerce under the title "Rubber Production in Africa" indicates that the main source of rubber is a belt extending nearly across the continent along the Equator or a little to the north. This region is mainly covered by tropical evergreen forests and seems to be also the best for the production of *Hevea* rubber.

African rubber comes mostly from plants of the family Apocynaceae, the principal rubber-yielding tree being *Funtumia elastica*. Large quantities of rubber have also been gathered from various vines and so-called shrubs belonging mainly to the genus *Landolphia* and to other closely related genera. Varying amounts of rubber have been contributed to the markets by other species and other families.

During the first decade of the present century colonial officials and commercial companies in nearly all sections of tropical Africa encouraged the planting of rubber, the former by establishing experimental plantings and in some instances by urging the natives to plant rubber-producing trees. Practically all the wild species that were producing commercial quantities of rubber were tried; but by 1912, in tropical Africa as in the East Indies, it was found that *Hevea* was the best for planting.

The most extensive planting took place in German East Africa, where more than 100,000 acres of Ceara rubber was set out. These plantations were abandoned in 1914, and the trees that are left have only recently been retapped. In all Africa there are estimated to be some 38,000 acres of planted *Hevea*. A larger but unknown acreage of various other species includes Ceara, Castilla, *Landolphia*, and *Ficus elastica*. If fully tapped, the *Hevea* might produce annually some 5,000 tons of rubber.

So far, most of the African rubber production has been from wild species. In 1906 and again in 1910, the production amounted to more than 20,000 tons. Beginning in 1910 there was a gradual falling off until 1923, when a little less than 4,000 tons was produced. The production has recently increased and is likely to go close to 10,000 tons; but unless prices rise much higher, it is not likely that the production will again reach 20,000 tons.

In this publication each of 24 African political units is treated rather exhaustively. The subjects discussed include topography and climatic conditions as affecting the production of *Hevea* rubber; the land tenure and labor conditions; the history of wild rubber production, with an enumeration of the species yielding it and a description of the method of collecting it; and

the possibility of future production. An account is given, also, of the experimental and commercial plantings of all the species.

An extensive bibliography is appended.

(H. N. Whitford and Alfred Anthony: Rubber Production in Africa. Trade Promotion Series No. 34. pp. 136. U. S. Department of Commerce, Washington, D. C., 1926.)

New Volume Tables for New Jersey

Associate State Forester Willis M. Baker, of the Department of Conservation and Development of New Jersey, is distributing four volume tables for short-leaf pine and two for southern white cedar, recently constructed by the department.

On the basis of the total heights of trees, the tables show for shortleaf pine the merchantable contents in board feet scaled by the international rule (one-fourth-inch kerf); the total cubic contents of the tree including bark, stump, and top; the merchantable cubic contents exclusive of stump and top (above a diameter of 2 inches outside bark); and the cubic contents of tops above a 5-inch minimum top-log diameter. The converting factor used is 70 cubic feet to the cord. The contents of southern white cedar are expressed in cubic feet for the entire tree including stump, top, and bark, and in terms of numbers of poles and posts classified as fence posts, arbor poles, shade-tree stakes, and bean poles.

These tables are a useful addition to our knowledge of these two commercial forest trees.

New York Bulletin on Reforesting

There has recently come from the press a revision of Reforesting, Bulletin No. 2 of the New York Conservation Department, first issued in 1910. This bulletin is intended largely for the guidance of those who purchase trees from the New York Conservation Department for forest planting. It enumerates the reasons for planting, and states the conditions under which prospective planters may procure trees from the State nurseries. It covers the usual scope of publications of this type, discussing the species adapted for planting in New York State, when and how they should be planted, where it is best to set out transplants and where seedlings, care of plantations, and possible yields of white pine plantations. Discussion of the last-mentioned subject is based on Massachusetts data. Western yellow pine, red oak, basswood, and yellow poplar, which were suggested for planting in the 1910 edition of the bulletin, are no longer recommended, and white spruce and northern white cedar have been added to the list of recommended species.

Old Bulletins Wanted

Recent Books and Pamphlets

The Forest Products Laboratory, Madison, Wis., wishes to obtain copies of these three bulletins, now out of print:

Experiments with Jack Pine and Hemlock for Mechanical Pulp, by J. H. Thickens. (Forest Service unnumbered bulletin, published 1912.)

The Grinding of Spruce for Mechanical Pulp, by J. H. Thickens. (Forest Service Bulletin 127.)

Ground Wood Pulp, by J. H. Thickens and G. C. McNaughton. (Department of Agriculture Bulletin 343, pts. 1 and 2.)

Swedish Forestry Journal Adopts New Policy

The editors of the Journal of the Swedish Forestry Society (Svenska Skogsvårdsföreningens Tidskrift) have announced a new policy. Hereafter the journal will be devoted exclusively to reports of scientific forest investigations and papers on forest policy and forest economics. Book reviews will be included, but the publication of material of purely local interest will be left to the popular bimonthly *Skogen* (The Forest). All articles will be accompanied by full résumés in French, German, or English, and those having more general international interest will be published in extenso in one of these languages.

The journal will be published in four large parts each year, two before and two after the summer. Subscribers can arrange to receive with it as supplements the reports of the Swedish forest experiment station.

With the 1927 volume the journal completed its twenty-fifth year. The editor in chief is Henrik Hesselman, in charge of the natural science division of the Swedish Institute of Experimental Forestry. The assistant editor is Erik Lundh, secretary of the Swedish Forestry Society and docent at the Forest School.

Henry I. Baldwin, Berlin, N. H., American representative of the journal, invites inquiries regarding subscriptions and advertising and offers to forward material submitted for publication.



The Forestry Primer published by the American Tree Association to mark the semicentennial of Government forestry work in the United States had gone into 20 editions of 100,000 each since January 1, 1926. A large proportion of the 2,000,000 copies have gone, on direct request from teachers, to public, private, and parochial schools throughout the United States.



The Forest Taxation Inquiry of the United States Forest Service has initiated the publication of progress reports, which will be multigraphed at irregular intervals. A limited number of copies of these reports will be available for distribution outside the Forest Service.

Bates, Carlos G., and Henry, A. J.: Forest and stream-flow experiment at Wagon Wheel Gap, Colo.: final report, on completion of the second phase of the experiment. 79 pp. illus., maps. (U. S. Department of Agriculture, Weather Bureau, Monthly Weather Review, supplement no. 30.) Washington, D. C., 1928.

Bennett, H. H., and Chapline, W. R.: Soil erosion a national menace. 36 pp. illus. (U. S. Department of Agriculture circular 33.) Washington, D. C., 1928.

Bourke-Borrowes, D. R. S.: The teak industry of Siam. 52 pp. illus., map. Siam Ministry of Commerce and Communications, Bangkok, 1927.

Canadian Bureau of Statistics: Forestry in Canada, 1927-28. 32 pp. diagrs. Ottawa, 1928.

Central Committee on Lumber Standards: Revisions and proposed additions to the American lumber standards, softwood lumber, as reported to the U. S. Department of Commerce. 8 pp. illus. Washington, D. C., 1928.

Cheyney, Edward G., and Brown, R. M.: The farm woodlot of southeastern Minnesota: its composition, volume, growth, value, and future possibilities. 28 pp. illus. (Minnesota Agricultural Experiment Station bulletin 241.) St. Paul, 1927.

Curtin, Leo P.: Experiments in wood preservation, pts. 1-6. illus. American Chemical Society, New York, 1927-28.

Douglas, A. E.: Climatic cycles and tree growth, vol. 2: a study of the annual rings of trees in relation to climate and solar activity. 166 pp. illus. (Carnegie Institute of Washington publication no. 289, vol. 2.) Washington, D. C., 1928.

Hanson, Herbert C.: Revegetation of waste range land. 9 pp. illus. (Colorado Agricultural Experiment Station bulletin 332.) Fort Collins, Colo., 1928.

Harper, Roland M.: Natural resources of southern Florida. 180 pp. illus. State Geological Survey, Tallahassee, 1928.

Howard, William G.: Forest taxation. 7 pp. (New York Department of Conservation, Division of Lands and Forests, bulletin 8.) Albany, 1928.

Hubert, Ernest E.: Manual of wood rots for cruisers and scalers in the Inland Empire. 63 pp. illus. The Timberman, Portland, Ore., 1927.

Japanese Ministry of Agriculture and Forestry, Department of Forestry: Outline of the work of the forest meteorological stations. 16 pp. map, tables. Tokyo, 1926.

Japanese Ministry of Agriculture and Forestry, Department of Forestry: The system of the protection forest as seen from the technical point of view. 16 pp. Tokyo, 1926.

- Lle6, Antonio: El riesgo de incendio en los montes. 95 pp. diags. Instituto Nacional de Prevision, Madrid, 1927.
- Maryland Conservation Department: Fifth annual report, 1927. 114 pp. illus. Baltimore, 1928.
- Maryland State Department of Forestry: Report for fiscal year 1927. 48 pp. Baltimore, 1928.
- Massachusetts Tree Wardens' and Foresters' Association: Proceedings, 17th annual meeting. 25 pp. illus. Salem, 1928.
- Polhamus, Loren G.: Experimental tapping of Hevea rubber trees at Bayeux, Haiti, 1924-25. 32 pp. (U. S. Department of Agriculture technical bulletin no. 65.) Washington, D. C., 1928.
- Scott, C. W., and Parkinson, C. E.: The common oaks and chestnuts of Maymyo and Kalaw. 16 pp. illus. (Burma Forest Department bulletin no. 19.) Rangoon, 1928.
- Scott, M. H.: Notes on the characteristics and minute structure of thirty woods indigenous to South Africa. 20 pp. (South Africa Forest Department bulletin no. 20.) Johannesburg, 1927.
- Shirley, G. S.: Volumes of single trees and volumes and number of trees per acre from data collected in teak (*Tectona grandis*) plantations in Burma. 14 pp. (Burma Forest Department bulletin no. 17.) Rangoon, 1928.
- Smith, Julian D.: Peru as a lumber market. 24 pp. (U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, trade information bulletin no. 539.) Washington, D. C., 1928.
- Spaeth, J. Nelson: Twenty years' growth of a sprout hardwood forest in New York: a study of the effects of intermediate and reproduction cuttings. 49 pp. illus. (Cornell University Agricultural Experiment Station bulletin 465.) Ithaca, N. Y., 1928.
- Tubeuf, Carl von: Das schicksal der strobe in Europa. 32 pp. illus. Eugen Ulmer, Stuttgart, 1927.
- United States Congress, House Committee on Agriculture: Forest products: report to accompany H. R. 12878. 7 pp. (70th congress, 1st session. House report no. 1363.) Washington, D. C., 1928.
- United States Congress, Senate Committee on Agriculture and Forestry: Forest research: report to accompany S. 3556. 3 pp. (70th congress, 1st session. Senate report no. 742.) Washington, D. C., 1928.
- United States Department of Commerce: Seasoning, handling, and care of lumber, consumers' edition: report of the National Committee on Wood Utilization. 63 pp. illus. Washington, D. C., 1928.
- University of Nebraska, Conservation and Survey Division: Tree planting in Nebraska. 24 pp. illus. (Bulletin 1, conservation series.) Lincoln, 1928.
- White, David G.: The hardwoods of the Appalachians. 20 pp. illus. (Appalachian Hardwood Club brochure no. 1.) Cincinnati, 1927.

Articles in Periodicals

- Ecology, January, 1928.—Soil changes and silviculture on the Harvard Forest, by R. T. Fisher, pp. 6-11. Mycorrhiza of southern pines, by L. J. Pessin, pp. 28-33.
- Forest Leaves, June, 1928.—Forest Service states position on the Yosemite timber, by Robert Y. Stuart, pp. 139-140.
- Industrial and Engineering Chemistry, May, 1928.—Effect of decay on the chemical composition of wood, by Lee F. Hawley and others, pp. 504-507.
- International Labour Review, March, 1928.—Forestry and rural employment in Great Britain, pp. 390-395.
- Journal of Forestry, May, 1928.—Adequate fire control, by Howard R. Flint, pp. 624-638. Observations on cutover pulpwood lands in the northeast, by Marinus Westveld, pp. 649-664. Can the farmer afford to grow timber, by Clarence Hill Burrage, pp. 685-691. A special slide rule for foresters, by James L. Averell, pp. 722-723.
- Naval Stores Review, June 2, 1928.—Experiments in improved turpentine methods, by Lenthall Wyman, pp. 25, 27.
- Outdoor Nebraska, April 1, 1928.—Nebraska's tree campaign for 1928, by George E. Condra, pp. 3, 12-13.
- Revue des Eaux et Forêts, March, 1928.—La forêt de Sille; son acquisition par l'état, by R. Potel, pp. 137-142.
- Southern Field, 1928.—Test on flow of gum at demonstration forest, S. C., by Austin Cary and Eloise Gerry, pp. 2-5.
- U. S. Department of Agriculture Journal of Agricultural Research, February 1, 1928.—Rates of growth of immature Douglas fir, as shown by periodic re-measurements on permanent sample plots, by Walter H. Meyer, pp. 193-215.
- U. S. Department of Agriculture Monthly Weather Review, March, 1928.—Second phase of streamflow experiment at Wagon Wheel Gap, Colo., by Carlos G. Bates and A. J. Henry, pp. 79-97.
- West Coast Lumberman, May 1, 1928.—Rate of growth of Douglas fir forests, by Richard E. McArdle, pp. 90-95. Invention of selective logging equipment may solve problems, by J. A. Crawford, pp. 138-140, 182-184.

Recent Publications of the Forest Service

- Miscellaneous Circular 36, Wichita National Forest and Game Preserve.
- Map Folders: Cleveland, Modoc, Sequoia, National Forests of the East and South, Road and Information Map for the National Forests of Oregon.
- National Forest Administrative Maps: $\frac{1}{4}$ -inch, Chelan, Colville, Cherokee; $\frac{1}{2}$ -inch, Selway, Chelan, Colville, Allegheny.