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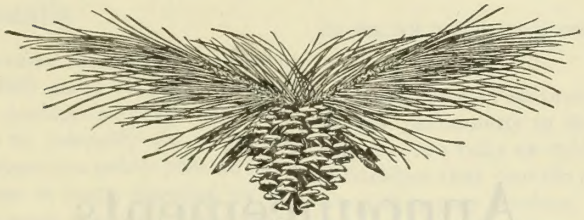

January, 1932

Issued bimonthly by the FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

Announcements

Research Fellowships Offered by University of Washington

Three research fellowships in forestry, one for $700 and two for $600 each, have been made available at the University of Washington for the year 1932–33 through the establishment of the Agnes Healy Anderson Research Fellowship Fund. Applicants for these fellowships must have received a bachelor's degree equivalent to that offered in forestry or in a field closely allied to forestry by the University of Washington. Applications must be received by the university not later than March 15, 1932. A special form for application will be supplied by the dean of the college of forestry upon request. It is desirable, but is not required, that each applicant submit a thesis showing ability to do original research work. Fellows may become candidates for the master's degree.

American Scientific Congress

The Mexican Government has decided to hold in November, 1933, the Seventh American Scientific Congress, originally scheduled to be held early in 1932. The congress is to take place in Mexico City.

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Because the free edition is necessarily limited, this periodical 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.

FOREST WORKER

Washington, D. C. JANUARY, 1932 Vol. 8, No. 1

State Forestry

Wisconsin Plans to Afforest 10,000 Acres Annually

The Wisconsin Conservation Commission plans to plant forest trees on 10,000 acres of land annually beginning with 1932, to develop at least one more forest tree nursery, and to intensify its efforts to encourage private and cooperative public reforestation projects. In 1932, in order to begin planting on the scale of 10,000,000 trees a year, the commission plans to supplement the output of the Trout Lake forest nursery by large purchases of forest planting stock. The proposed expansion of nursery facilities would enable the commission to supply annually 10,000,000 trees for State planting, 1,000,000 trees for planting in cooperation with the State board of control, and additional quantities of planting stock for use in other public enterprises and for distribution to the public.

Hitherto, the State's forest planting has been done principally on pine lands; the new planting program lays an increased emphasis on the planting of spruce to provide material and encouragement to pulp and paper industries. The commission's committee on forest planting estimates that a net productive area of approximately 1,580,000 acres in continuous production and under intensive forest management is required to supply the needs of the paper mills now operating in the State.

The locations recommended by the planting committee for the 1932 planting are as follows: Northern and American Legion State Forests, in Vilas and Oneida Counties, 6,000 acres; State lands in Marinette County, 1,000 acres; Brule River State Forest, in Douglas County, 1,000 acres; proposed Central Counties State Forest, 2,000 acres. In 1933 the committee recommends a continuation of the work on these sites and a beginning on others, the latter to include the planting of 500 acres on the proposed Kettle Moraine State Forest.

Additions to New Jersey's State forests during the quarter July 1, 1931–September 30, 1931, totaled 967 acres and were acquired at an average cost of $8.45 per acre. The State forest receipts during that period, from timber sales, leases, and rents, amounted to $3,777.

Recreational Use of State Forests

By WILLIAM G. HOWARD, Superintendent of Lands and Forests, New York

It has come to be pretty well recognized that State forests, particularly in the thickly settled parts of the country, are fully as valuable for the recreational opportunities they provide as for the saw timber or pulpwood they may produce. I claim no great credit as a forester for making this announcement. On the other hand I make it with humility, knowing that foresters have been among the last of our citizens to appreciate this fact.

Badly as we are in need of timber and other forest products in this day and age, much as we of the Eastern States should like to produce our own timber and thus save the millions of dollars we pay each year for freight on lumber imported from the West and South, anxious as we are to see our own wood-using industries assured of an adequate supply of raw material—in spite of all these considerations, which have been important factors in bringing about the establishment of State forests, we must realize that the relatively small area of such forests may be vastly more important in the recreational opportunities it affords than in its effect on timber-supply problems.

The New York State Forest Preserve was created 45 years ago through setting aside Adirondack and Catskill lands acquired by the State as a result of tax delinquency. At that time the use of the forest for recreation was almost negligible. Forest industries, exemplified by sawmills, paper mills, and tanneries, were numerous and thriving. At the same time forest lands were cheap, and a few far-sighted people realized the advantages of investing State funds in this class of property. The result was the appropriation of $4,075,000 from 1890 to 1909 for the acquisition of land for the forest preserve.

While relatively little use was being made of the forest for recreation in those early years, it is apparent that the future possibilities for such use of the State forest preserve were not entirely overlooked by the originators of this movement. These people had in mind also the protection of the watersheds of important streams, and particularly the preservation of a

future timber supply. As a matter of fact, during the early years of the forest preserve the cutting and utilization of timber from State lands was permitted by law. The State department having jurisdiction over the forest preserve was not adequately manned to handle timber sales efficiently, however, and as a result abuses crept in which led to a constitutional amendment prohibiting the cutting and sale of timber on the forest preserve.

Public interest in the recreational possibilities of the forest preserve began to manifest itself by the end of the first decade of the twentieth century, when automobile touring really began. A rapidly increasing mileage of good roads made both the Adirondacks and the Catskills easier to reach than ever before. Public sentiment engendered by enjoyment of the woods made it easy to get bond issues of $7,500,000 in 1916 and $5,000,000 in 1924 to add to this great public forest property.

When the money from the first of these bond issues became available in 1917, it was obviously necessary to formulate a policy for land acquisition. The policy adopted at that time has proved satisfactory and has been followed ever since with remarkably few changes. The more important of the purposes that govern the selection of lands for acquisition for the forest preserve are:

1. To extend State lands suitable for public recreational use and to protect natural features having æsthetic value.

2. To assure the maintenance of protection forests on the watersheds of important streams.

3. To consolidate State holdings and thus facilitate administration.

4. To perfect the State's title to lands and reduce the cost of litigation.

Lands suitable for recreational use are of many classes, ranging from well-timbered areas in the high mountains to less well-timbered but more accessible land adjacent to the public highways where more public camp sites are needed. The lands acquired under the bond issue have been particularly well selected as regards the extending of the areas available for recreational use, that is for hiking, hunting, fishing, camping, and the like. The high mountains purchased in some cases primarily for watershed protection are the areas most attractive to the hiker and mountain climber. Areas of less rugged topography with attractive water courses appeal to those who desire to hunt and fish, or to have a place to camp with their families over the week-end. Lands acquired under the bond issue include tracts easily accessible from each large town or city adjacent to the Adirondacks. Acquisition has been divided proportionately between the Adirondack and Catskill Forest Preserves and has been extended in all directions with the result that additional State lands have been made available to communities tributary to all parts of the forest preserve.

In purchasing certain areas of high mountain slopes with the purpose of preserving æsthetic features of the landscape the State has had the cooperation of private organizations.

Public recreational use of the State forest preserve reached very considerable proportions as early as 20 years ago; it was not until 1920, however, that any definite steps were taken to develop the recreational facilities of the preserve. At that time an excellent system of State highways gave access to the State land, but there were no areas developed for camping and no official trails giving access to the interior except those that led to fire-observation stations.

An appropriation of $2,500 in 1920 made it possible to begin developing public camp sites and a system of trails. Not much could be done with this amount; but the work was received enthusiastically by the public and appropriations were soon increased to substantial amounts. After 10 years of effort along this line there are 29 large public camp sites with a capacity of 30,000 campers, embracing an intensively developed area of more than 200 acres. More than 400 miles of trails in the Adirondacks and 100 miles in the Catskills have been thoroughly signed and marked for the use of hikers. A total of 141 open shelters have been placed along the trails and waterways of the forest preserve.

While every effort has been made to provide safe, sanitary camping places for the public, no luxuries have been installed nor has anything been done to interfere with the wilderness character of the forest preserve, which is one of its chief attractions.

In spite of the rapidity with which these developments have proceeded, they have hardly kept pace with the demand. At 21 of our larger public camp sites 129,000 persons were registered in 1929, 267,000 in 1930, and 437,000 in 1931. These figures, of course, do not include campers at smaller public camp sites, where no rangers were in attendance, and include only a small proportion of the many travelers who enjoyed the beauties of the forest preserve from the highways. Furthermore, it does not include the host of sportsmen who derived enjoyment from fishing and hunting on forest-preserve land. It is certain that practically all the holders of deer-hunting licenses, 75,000 in 1930, hunt in the Adirondacks and Catskills, and most of them at one time or another on the State forest preserve.

Under a new reforestation law passed in 1929 providing for State acquisition and reforestation of abandoned farm lands, appropriations of $400,000 and $600,000, respectively, were made in 1930 and 1931. Recently the voters approved a constitutional amendment that assures the appropriation of $19,000,000 more for this purpose. The lands thus far purchased by the State under this law total 73,000 acres, including 80 areas located in 18 counties. They have been planted just as fast as they have been acquired. The reforestation areas have been opened to the public

for hunting and fishing. Conservation Commissioner Morgenthau has made a special effort to see that every acre of these lands was marked as a public hunting ground as soon as it was acquired, and he has broadcast an invitation to the sportsmen of the State to enjoy their sport on these publicly owned lands.

The present intensive use of our forest preserve by the public demonstrates the value of these forests to the citizens of our State and others for recreational purposes. If the increased health and happiness resulting from recreational facilities provided by a complete and adequate system of State forests could be measured it would prove, I am sure, not only that State forests are a good investment for any State but that no State can afford to be without such public forests.

Twenty-Year-Old Spruce Plantation Marks Buchanan's Birthplace

A plantation of Norway spruce described by District Forester H. B. Phillips as one of the oldest and thriftiest in the Pennsylvania State forests marks the birthplace of James Buchanan, fifteenth President of the United States, at the Buchanan State Forest Park, in Franklin County, near McConnellsburg. The plantation was established in 1913 under the direction of Forester Alfred E. Rupp, now chief of the bureau of forest management of the Pennsylvania Department of Forests and Waters. Three thousand small 3-year transplants were set out 4 feet apart each way, in a space that in former years had been used as a garden. The plantation was successful from the beginning. A sample plot of one-tenth acre, including 321 trees, was established on the plantation in 1931. In February, 1931, the average diameter of the trees on the plot was 3 inches.

Some pruning is being done on the trees and it is planned to carry out a light thinning operation within the next few years.

Since 1920 the Los Angeles County Forestry Department has constructed 405 miles of firebreaks along mountain ridges. In addition it has built 197 miles of trails, established 21.45 miles of motor ways, and strung 221 miles of telephone lines. Motor ways are one-way roads, not open to the public, which serve the double purpose of firebreaks and means of access to areas where fires are likely to occur.

Equipping a truck for use in fighting forest fires costs only $125 if done according to a plan devised by the Florida Forest Service. The equipment consists of a fan belt power take-off, a 100-gallon tank, and a reel that turns in all directions. One of the convenient features is an outlet for filling hand pumps which has an automatic shut-off similar to those used on gasoline tanks.

Minnesota Develops New Forest Nursery

A new forest nursery authorized by the Minnesota Legislature in its 1930 session is being developed by the State division of forestry in the northeast quarter of section 16, township 139, range 32, a part of the projected Badoura State Forest. There have been constructed a main cabin or office, a bunk house, a warehouse and garage, an ice house, a water reservoir with a capacity of 22,000 gallons, a compost tank that will hold 75 tons of material, and a workshop and storehouse. About 7 acres of land have been cleared, plowed, and harrowed. Under present plans this area will suffice for the next three or four years. Seed beds 4 by 12 feet have been prepared, in compartments of 64 beds each. Northern white pine, Norway pine, and white spruce have been planted in 108, 111, and 37 beds, respectively. A plowed firebreak 2 rods wide borders the nursery on the two sides not bounded by county highways.

A New Transplant Nursery for Indiana

The Indiana Department of Conservation has decided to establish a transplant nursery at the Shakamak State Park, near Jasonville. Large numbers of trees will be required to reforest open areas in this park, a considerable portion of which consists of old fields. Stock grown for planting in the park will include as large a percentage as is practicable of native hardwood species. Evergreens will be grown for planting on soils too poorly drained or too low in fertility for hardwoods.

A second purpose in establishing this nursery is to supply large transplant stock for the reforestation of stripped-over coal lands near by. It is estimated that there are more than 15,000 acres of such lands in southwestern Indiana. The coal operators have agreed on a comprehensive program for cooperative tree planting.

At the Henryville State nursery the area under cultivation has been expanded to 28 acres. In the fall of 1931 this nursery contained 19,750,000 trees, of which 1,000,000 were moved to transplant rows during that season.

During the fall of 1931 the district foresters of Pennsylvania collected for use in the State forest-tree nurseries 500 bushels of black walnuts, 33 pounds of sugar-maple seed, 50 pounds of white-ash seed, 10 bushels of yellow-poplar seed, 24½ bushels of northern white-pine cones, 9 bushels of pitch-pine cones, and 9 bushels of red-oak acorns. In addition George S. Perry, of the Pennsylvania Forest Research Institute, collected 5 bushels of mountain-pine cones from which 1½ pounds of clean seed were produced to be shipped to Russia for experimental planting.

Pennsylvania Oaks Die After Borer Attack

When Josef Knull, Pennsylvania forest entomologist, visited certain parts of Clarion, Venango, and Forest Counties last fall to observe dying oaks, he found that practically all the dead and dying trees were infested with the two-lined chestnut borer. A combination of troubles had preceded the borer attack: Lepidopterous defoliators had been plentiful through certain parts of the Allegheny Plateau for several years; in the spring of 1930 large areas of the plateau were visited by a late frost which killed all the young foliage, making large forest areas look as if they had been burned over; and the 1930–31 drought had lowered tree vitality. The ring growth on many of the dying dominant trees showed retardation over a period of about five years. Mr. Knull's observations led to the opinion that some of the oaks which he found dead and dying would have died even if the borer had not attacked them, but that many would have survived except for the borer attack.

No white oaks were found to be dying.

Deaths of oak trees had been reported during the year from all parts of Pennsylvania.

The larvæ of the two-lined chestnut borer work beneath the bark and cut off the tree's food supply. The insect does not attack healthy fast-growing trees. Mr. Knull states that control measures on large wooded areas are impracticable from a commercial standpoint; for oaks that are especially valued and that are in danger as a result of a combination of adverse conditions such as has just been described he recommends a springtime treatment of fertilizer together with liberal applications of water. Another way to protect valuable trees from the borer, he suggests, is to spray them with an arsenate of lead solution about the first of June.

Ohio's two State forest-tree nurseries distributed 3,569,855 trees for planting in 1931, exceeding their record for any preceding year. Twenty-six plantings on State lands required 1,031,927 of these trees. The distribution of the remainder, with numbers and classes of planters, was recorded as follows: 823 farmers, 1,754,631; 30 municipalities, 571,119; 6 mining companies, 61,800; 15 organizations and clubs, 114,075; 8 institutions, 23,895; 5 Scout organizations, 9,730; 13 miscellaneous, 2,678.

Orders issued to Georgia highway forces direct them to assist in fire control at the call of representatives of the State forest service whenever possible. Road forces are instructed also to suppress fires starting along highways.

Vermont's State forests and forest parks now number 22 and have a combined area of 40,070 acres.

New York Warms Up for a Great Reforestation Effort

The performance of the New York State forestry organization in reforesting 28,000 acres of land in 1931 has been acclaimed by Conservation Commissioner Henry Morgenthau, jr., as fully demonstrating the practicability of carrying out the reforestation program embodied in the State's recently adopted reforestation amendment. The commissioner's words were as follows:

In this, the second year of the enlarged reforestation program, the crews working under the direction of William G. Howard, superintendent of the division of lands and forests, have completed reforestation of 28,000 acres of land, while the quota set for this year was only 15,000 acres. They have made up a deficiency of 5,000 acres from last year, caused by delays in clearing titles, and have added 8,000 acres beyond the combined quotas for the two years. In doing this they have not only established a pace for the work which puts them a year ahead of schedule, but they have established the fact that it will be a relatively simple matter to expand nursery and planting facilities at the rate required by the program, which rises at the rate of 10,000 acres a year to 100,000 acres in 1904.

Obviously, to reach this rate we shall have to increase our nursery operations by steady progression so as to have enough trees of the right age to plant each year. The necessity of planning the work and starting operations at least five years ahead of field planting is one of the chief reasons why the amendment, setting up a long-time schedule, is of such great importance.

Under the provisions of the reforestatino amendment added to the New York constitution by action of the legislature and the voting public, $1,000,000 will be made available to the State conservation commission in 1932 to buy 50,000 acres of idle land and reforest 20,000 acres. The annual appropriation made mandatory by the amendment will increase by $200,000 in each of the succeeding five years, becoming $2,000,000 in 1937. That year's program will call for the purchase of 100,000 acres of land and the reforesting of 70,000 acres. The annual appropriation and the acreage to be purchased annually will remain constant from 1937 to and including 1942, at which time appropriations under the amendment will reach the total of $19,000,000. The reforestation operations will cover at least 1,000,000 acres of land.

The program involves establishing additional forest nurseries capable of producing a maximum of 100,000 trees annually.

The Farmers' Federation, with headquarters at Asheville, N. C., which has for some time maintained a department for the cooperative marketing of farm forest products, now has its own nursery for the propagation of forest-tree seedlings suitable to be planted in the North Carolina mountain section. One feature of the planting plans which H. Rotha, manager of the department, has under way is a program to encourage the planting of native trees along highways.

Slash Pine Seems to Feel at Home in Texas

Although the natural range of slash pine has its western limit in eastern Louisiana, the tree gives promise of usefulness as a species to be grown for pulpwood in east Texas. Slash pines set out on the State forest near Kirbyville, Tex., in 1926 now average 12 feet in height, the Texas Forest Service reports. The largest trees in the plantation are 19 feet high and 3.5 inches in diameter. In order to obtain further data on the adaptability of this species to Texas conditions, plantings of from 1,000 to 7,500 slash pine seedlings each were made in December, 1931, on 15 representative areas scattered through the east Texas commercial timber region.

A $5,000 appropriation made by the city of Oneonta, N. Y., for unemployment relief in the winter of 1930–31 was used to make firebreaks and improvement cuttings on the city's 1,200-acre watershed-protection forest. The material cut was used by the unemployed as fuel.

Seventy-five thousand board feet of lumber and timbers needed for the construction of a barn and other buildings on the Morgan-Monroe Counties State Forest of Indiana will be cut from the forest itself. About $1,500 will be paid locally for labor and the use of teams.

On the Windsor-Spring property, near Augusta, Ga., is a plantation of shortleaf pines that was established just after the close of the Civil War. Measurements made a few months ago by E. Bauer, of the South Carolina Forest Service, and Charles W. Nuite, forester of the Kershaw County Forestry Association, revealed that the trees average 73 feet in height and 14½ inches in diameter at breast height. No record of the planting is available, but increment borings indicate that the trees are 66 years old.

Education and Extension

Michigan State College to Reforest Farm Land Given by Kellogg

A demonstration of methods of reforesting infertile farm land in southern Michigan is to be established by the Michigan State College on a 360-acre tract of abandoned farm land given to the college by W. K. Kellogg, of Battle Creek. The tract is located 10 miles to the north and west of Battle Creek, close to the Kellogg wild life sanctuary and demonstration farm. A plan is being prepared under the direction of P. A. Herbert, head of the forestry department of the college, for planting the area with forest trees at the rate of approximately 40 acres per year. Use will be made of all the tree species known to be adapted to the conditions existing on the area and the trees will be planted by various methods and in various spacings and arrangements.

Louis Marshall Memorial Approaches Completion

The corner stone of the Louis Marshall Memorial, the new science building of the New York State College of Forestry, was laid by former Gov. Alfred E. Smith on December 4, 1931, the college's twentieth anniversary. The building is now about two-thirds completed, and its dedication is expected to take place next summer or early in the fall.

The Louis Marshall Memorial will be 240 feet long and 62 feet wide, with a rear wing 60 by 70 feet extending from the center of the south wall, and will have four stories and a basement. It will include a library having a capacity of 50,000 volumes and seating 90 persons. It will house the departments of silviculture, forest zoology, entomology, and botany, and the Roosevelt Wild Life Experiment Station. The departments of forest chemistry and wood technology, and the administrative offices, will remain in the old building.

Michigan College Offers Planting Stock at Low Prices

The tree price list issued by the department of forestry, Michigan State College, for the spring of 1932 includes quotations on 13 kinds of stock for forest, windbreak, and Christmas-tree planting. The 4,000,000 trees available for spring planting are being offered at record low prices. One thousand 2-year-old seedlings, enough to plant an acre of land, can be obtained at prices ranging from $2 to $4. Transplant stock especially suitable for windbreak and Christmas-tree plantings is offered for as little as $1.25 per 100. Professor Herbert urges that Michigan landowners who have land suitable for forest planting plan to reforest it this spring when the cost of planting is unusually low and the work will be a help to the unemployed.

Lime soil and irrigation have proved to be ideal conditions for rapid growth of black locust trees in southern Idaho, where the locust borer is unheard of, writes Extension Forester Stanley C. Clarke. They enable the trees to grow to fence-post size in less than 10 years.

Four-H Forestry Clubs in the Central States

By R. A. Turner, United States Agricultural Extension Service

Four-H forestry clubs have now been organized in more than half of the 13 Central States, with approximately 2,000 members enrolled.

This project is carried on with the expectation that, through this phase of extension work, farm boys not only will come to have a better understanding of the forests which are about them and be led to recognize the existence of our forestry problems but will also learn how to conserve our present wooded areas and will become interested in providing forests for future use.

The practice and knowledge gained from satisfactorily completing the requirements of this project do not necessarily make foresters of the boys, but they do equip them with the ability to appreciate the forests, to handle and protect the wood lots on their home farms, and to participate in reforestation and forest fire prevention activities.

Four-H forestry clubs are supervised by the extension service in the State concerned and the Office of Cooperative Extension Work, United States Department of Agriculture, cooperating. The organization of forestry clubs is under the direction of the State club leader and the county extension agent. Material pertaining to this project is prepared under the supervision of the State extension forester. The local club leader directs the activities of the boys who enroll in any given local club.

Among the activities in which 4-H forestry club boys engage are the reforestation of land areas on their home farms or of land obtained for this specific purpose, the planting of windbreaks or shelter belts about the farmstead, making improvement cuttings in the farm woodlot, gathering tree seed for their own use or for sale, and establishing private nurseries with the purpose of growing their own planting stock. The great majority of 4-H forestry club members reforest a certain land area each year, looking toward the future ownership of a sizable piece of growing timber. Forestry pageants are presented; exhibits are made at county and State fairs; demonstration teams are trained; hypsometers, calipers and Biltmore sticks are made and used; firebreaks are constructed when the size of the timbered area warrants; wood-utilization plans are inspected; and tree-identification hikes are taken. In certain States the State authorities recognize the work of the older 4-H forestry club boys by appointing them as assistant State fire wardens.

Wisconsin leads the way in the establishing of school forests. Usually some local organization, such as a lumbering company or a chamber of commerce, deeds the land to the school. Each year the club members reforest a definite area, so that within a stated number of years the entire area will be covered with growing trees of varying ages. Both Wisconsin and Michigan hold forestry club camps where instruction is given by trained foresters and where the boys enjoy the experience of camping out.

Iowa conducts a farm grove history contest which familiarizes farm youths with the history of the woodlots on their home farms. In Minnesota a civic forest is now being developed by a forestry club which instituted the plan with the assistance of village authorities. In the mining section of Minnesota the boys sometimes utilize ore dumps as areas upon which to carry out their planting plans. Ohio boys who live in the coal-mining section often do their planting on the mine strips when other land is not obtainable.

Catalpa Proves a Profitable Crop

By F. W. Dean, Extension Forester, Ohio

In 1904 and 1906 A. B. Canfield, of Fayette, Fulton County, Ohio, planted 25 acres of catalpa. In those days, 25 years ago, reforestation was in its infancy and a man had to be strong at heart to start such a task. This was one of the earliest catalpa plantings in the county and probably the largest in this section of the State. On a recent trip through northwestern Ohio it was the pleasure of County Agricultural Agent Hummon and myself to accompany Mr. Canfield through these plantings, now a woodland of good-sized catalpa trees that are rapidly maturing into a crop of fence posts and telephone poles.

Mr. Canfield picked out an excellent site for the trees—good black soil adjacent to overflow land. His object in planting the trees was to square up fields that had been made irregular by a cross-cutting stream, and also to furnish the farm with a dependable supply of posts. At the time when the land was planted it could not have been cropped successfully for corn, because it was subject to overflows and was not drained. Since that time surrounding land has been improved by a large drainage ditch, yet Mr. Canfield has not felt sorry that he planted the catalpa. For 15 years he has been cutting posts and using them on his 340-acre farm. Since 1920 he has been selling an average of about $150 worth of posts per year. Yet you can hardly see where the posts have been cut, except in one plot where it was necessary to make a heavy thinning. In addition to the posts used on the farm and those sold, Mr. Canfield has obtained from his catalpa plantation a quantity of cordwood, which he cut from the tops. When properly seasoned, catalpa makes excellent firewood.

The trees were originally spaced 8 feet apart each way, or about 700 to the acre. In all, Mr. Canfield planted approximately 15,000 trees. He cultivated them for two years and then let them take care of themselves. The trees have always been protected from livestock and show vigorous healthy growth.

Mr. Canfield estimates that the plantation still contains the material for 50,000 posts. At 10 cents apiece stumpage for the posts this means that as the 25-year catalpas now stand they have a value of $5,000. In addition, in this flat country the grove has been an excellent protection to the surrounding farm crops and buildings, proving its worth not only in the production of posts but also as a shelter belt.

Adjacent to the catalpa Mr. Canfield planted at the same time small plots of black locust, white ash, and Russian mulberry. The black locust in a few years was destroyed by the locust borer and the Russian mulberry on account of its poor form has not produced posts of merchantable size. The white ash has made excellent height growth but has not attained commercial size.

A Method of Controlling the Strawberry Root Weevil in Forest Nurseries

By Donald J. Weddell, Kellogg Fellow in Forestry, Michigan State College

The strawberry root weevil (*Brachyrinus* [*Otiorhynchus*] *ovatus*) is attacking in great numbers the coniferous nursery stock of the Michigan State College nursery. This weevil, known also as the crown girdler, first appeared in epidemic form in the nursery during the spring of 1929. Since that time it has increased in numbers and has caused damage of increasing extent. It has been found working in beds of Norway spruce, white spruce, western white pine, Norway pine, northern white pine, jack pine, Japanese larch, tamarack, and northern white cedar.

During the fall of 1931, control measures on a large scale were carried out. Use was made of a carbon disulphide emulsion, prepared according to the following formula:

Bentonite, 1 quart.
C. P. O. soap, 2 quarts.
CS_2, 3 quarts.
Water, 2 quarts.

On an area of 2,340 square feet from which 3–0 white spruce had just been removed and which was heavily infested with the weevil, carbon disulphide emulsion was applied in solutions as follows, according to the soil temperature:

40° to 50° F., 13.6 c. c. per gallon of water.
50° to 60° F., 11.4 c. c. per gallon of water.
60° to 70° F., 9.0 c. c. per gallon of water.

The solution was mixed in a 150-gallon "Bean" sprayer. One filling of the sprayer was used for 60 square feet of area, the material being applied at the rate of 2½ gallons to the square foot. A rectangular board frame 8 inches deep inclosing 60 square feet of area was used to hold the solution until it could soak into the ground. The outside of the frame was banked with soil to prevent leakage.

Eighteen gallons of solution and 44 hours' labor (22 hours for each of two men) were required to treat 2,340 square feet of nursery beds. The cost of the operation was as follows:

44 hours' labor at $0. 50	$22. 00
18 gallons of emulsion at $0. 65	11. 70
Total	[1] 33. 70

After the operation a check at intervals of a few feet disclosed no live larvæ on the treated area.

In order to combat the weevil successfully it will probably be necessary to combine the carbon disulphide emulsion treatment with one or more other control measures. Application of the emulsion to those parts of the nursery that are worked, at the time when most of the weevils are in the larval stage, will destroy the majority of the insects. The next step should be to surround the treated area with poison bait in order to keep out adult weevils. (The adults are wingless.)

It is expected that control measures will have to be carried on for several years before the number of weevils is reduced to a point at which the damage will be negligible.

Trees Are Prizes for Forestry Essays

Six thousand tree seedlings from Washington's State forest nursery at Pullman were offered as prizes in a forestry essay contest sponsored this winter by the State College of Washington, concluding December 31. All 4–H club boys and girls enrolled in 1932 projects were eligible. The subject was Why Should Forest Trees Be Planted in Our Community? A first prize of 100 seedlings and a second prize of 50 seedlings were to be awarded in each county; the winners of first, second, and third place in the State as a whole were to receive, respectively, fifteen, ten, and five 5-year-old transplants. The prize trees, which will be distributed in April, will be selected by foresters of the college faculty with particular reference to soil and climatic conditions in the localities where they are to be planted.

The extension school of forestry held by the College of Agriculture of the University of Arkansas in December, 1930, was repeated in December, 1931, at Camden, Ark. Three half-day sessions devoted to talks on forest economics, wood utilization, and forest-fire protection were followed by an inspection tour of the paper mill of the Southern Kraft Corporation.

The Pennsylvania State College has 196 forestry students in attendance this year, including 61 freshmen and 26 ranger students.

[1] Equals $0.014 per square foot.

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Forest Service Notes

Fringes of the Southwestern Pine Type

By Quincy Randles, United States Forest Service

The western yellow pine type in Arizona and New Mexico is found most commonly at elevations between 7,000 and 8,000 feet, or below the Douglas fir type. At its lower elevation it is bordered by scattered scrubby individuals of western yellow pine, by stands of piñon and juniper, and by open grassland. Inside the type are found areas of open grassland, locally called parks, which show no evidence of ever having carried a stand of timber. The same is true of the open grassland at the border. Mixed with the piñon and juniper are occasional specimens of pine, and extending down the watercourses for several miles is a belt of pine confined to the narrow valleys and to good moist soils.

Reproduction within the western yellow pine type proper is the result of a good seed year followed by a couple of years of favorable weather conditions, such favorable combinations occurring at long intervals, and of the starting of a few seedlings per acre at much shorter intervals. Reproduction of western yellow pine is now noted in many places in the so-called parks and in the grassland on the border of the type, and to a lesser extent in the bordering piñon and juniper stands and in the scattered pine stands. This reproduction is usually less than 30 years old. In places the extension is confined to scattered individuals in a narrow belt; in other places it amounts to almost full stocking in a belt a mile wide.

While the total area involved by this extension is not great compared with the area of the western yellow pine type in the region, since the region is so lightly timbered the extension is of value, occurring as it does at lower elevations where any merchantable product resulting from it will be accessible to local users.

The causes of the spread have not been definitely determined. Climatic records for the region do not extend farther back than 50 years. A study of these records discloses no marked tendency toward an increase of moisture. The wind disseminates the seed, either carrying it or blowing it along on crusted snow.

It is, of course, recognized that fires in the Southwest are much less frequent and are also less severe than they were 30 to 50 years ago before the grazing of livestock utilized the grass. Formerly the grass was only very lightly used by game animals and the unused portion formed a mat on the ground. At that time rodents were no doubt more plentiful, since the unused grass supplied them with food, shelter, and protection. It may be assumed, therefore, that more tree seed and young trees were destroyed by rodents than at present. Also, the heavier grass cover would prevent many tree seed from reaching mineral soil and would choke out many of the tree seedlings that germinated. It is believed that utilization of the grass and a decrease in fires and in destruction of seed and trees by rodents are responsible for the encroachment of reproduction on the grassland in and adjacent to the pine type.

It remains to be seen whether the extension of the type can maintain itself against the violent fluctuations in rainfall so common in the region. Droughts of two or three years' duration occurring within the past 20 or 30 years have resulted in the dying out of this reproduction on certain areas. It is believed, however, that in many places the extension will be permanent and will offer better protection to the type immediately back of the fringe.

The Forest Survey is Washed Out

By C. M. Granger, United States Forest Service

Just when Gus Lentz and his amphibians are ready to go into quantity production on the survey of the bottomland hardwoods in Mississippi, Ol' Man River's little boy, the Tallahatchie, rampages all over the very place they want to work. There being limits to what even a duck can do with water, they may be somewhat delayed in putting the 1932 model of the forest survey machine, southern type, into operation.

Turning to the drier aspects of the subject, we can report that the tryout of the line-plot method in two parishes (counties) in Louisiana has been completed and the data analyzed. The test run was made with lines 3 miles apart, with plots every 10 chains, following the general principles of the Finnish survey. We find that the cost prohibits spacing the lines closely enough to obtain accurate data for land units as small as counties, and that by using larger units of a combined natural and economic character, varying from 2,500,000 to 5,000,000 acres, results of adequate accuracy can be obtained with lines 10 miles apart and plots every 10 chains. These units are of a size and character to make the survey data useful and valuable for local application.

Therefore, as soon as the Tallahatchie gets over its inflation the seagoing surveyors will take to the hardwoods of northern Mississippi and proceed due east and west across the delta until the kind, extent, volume, quality, growth, and depletion of the broad-leaved forests are known.

Meanwhile, minor floods in the pine uplands of Pearl River County, Miss., are not preventing the crews from completing a similar test in the pine types. When the data from this tryout have been analyzed,

we shall be ready to coordinate the hardwood and pine projects so that the crews can work in the pine when the bottomlands are floating barns down the river and in the bottomlands whenever the water gets below DBH—which they *must* measure, and we do not furnish diving suits!

Unless the Mississippi Legislature acts contrary to forecasts there will be very substantial State financial cooperation with the survey. The South is very much alive in wanting to know what forests can do to keep land working profitably, and so in its interest in the gathering of facts about southern forest resources.

Binoculars Help the Lookout Man

The binocular telescope as a tool for the lookout appears to be worth what it costs, according to the results of tests made under the supervision of the California Forest Experiment Station. Its primary use lies in verifying quickly suspicions resulting from observation with the naked eye. It is useful in disclosing the true nature of "false smokes" such as dust clouds and in examining recorded strikes after lightning storms. It may well be used, also, in periodical close examinations of limited areas where fire risk is high, and may prove valuable in obtaining cross shots on fires from lookouts beyond the distance at which the smoke is visible to the naked eye. Use of the binocular makes it possible, also, to obtain valuable supplementary information on the location of a fire, the type in which it is burning, and its proximity to roads or trails.

After trial of several types of telescope sold in this country, it was decided that a six or seven power prism binocular with a wide field and large objectives was the most desirable instrument for lookout purposes. Greater magnification seems undesirable because of the accompanying greater unsteadiness. A large field of view is a necessity if small objects are to be located quickly and easily; a binocular for lookout use should have a field of at least 120 yards in 1,000 yards. For a 6-power instrument, an objective aperture of at least 30 millimeters is recommended.

Definition or resolving power is a most important attribute of binoculars in that it controls the ability to distinguish detail. Resolving power may be measured by observing through the telescope fine lines so close together that the lines of sight to them form an angle of from 3 to 10 seconds.

Binoculars with widespread objectives are to be preferred for lookout use, since stereoscopic vision or relief is increased by an increase in the interobjective distance.

Binoculars must be carefully adjusted, or eyestrain will result. The axes of the instrument should be carefully adjusted for all possible interpupillary distances before they leave the factory, and should be checked periodically thereafter to make sure that the adjustment is maintained.

Degeneration of Coppice

By Perkins Coville, United States Forest Service

Foresters who have studied textbooks on silviculture have, as a rule, read and believed that a coppiced stand degenerates after two or three cuttings and must then be revitalized by regeneration as a high forest of seedling origin. This premise tends to lead one naturally to the belief that reproduction by sprouting or even by other vegetative means will result in degeneration of a given growing stock. Horticulturists, on the other hand, are constantly reproducing various plant forms vegetatively with little or no apparent fear of a decrease in plant vigor.

In a coppiced stand reproduction, of course, takes place predominantly or exclusively by sprouts which spring from stumps of trees that have been cut. Frequently these sprouts make exceedingly rapid growth for a few years. The explanation advanced for this rapid growth is that the sprouts have large root systems at their disposal and so can obtain abundant supplies of nutrients and moisture. As the sprouts increase in size, however, decay attacks the stumps from which they have sprung and presumably parts of the root systems as well. It would seem not improbable that this decay, saprophytic though it may be in general, together with infection from materials such as are often left on the ground after logging, has a deleterious effect upon coppiced stands. Prevalence of fire in sprout stands may still further aggravate the situation.

Some stands on the sprout hardwood areas in the Northeast and on charcoal cuttings in Pennsylvania are in such wretched condition as to seem to present positive proof that stands degenerate through coppicing. In the majority of cases these stands show signs of having been subjected to severe and promiscuous cutting in which no thought was given to sanitation or retention of vigorous stock, and appear to have suffered also from fire. Some of them have perhaps been affected by overgrazing. On the other hand there are numerous examples of the sustained vigor of sprout growth. In the Upper Peninsula of Michigan it is common to find large merchantable basswoods obviously of sprout origin. There is evidence that basswoods in many Iowa woodlots have grown vigorously through several sprout generations. The Balm-of-Gilead poplar, so far as can be discovered, occurs only as a pistillate tree; but by vegetative means it has reproduced itself and has spread over a considerable range. The trembling aspen establishes itself in new areas with unbelievable rapidity, although seedlings of aspen are rarely, if ever, discovered. It may be argued that aspen has deteriorated into a weak and short-lived species, but if so it took several millenniums to do this, and not a few short rotations.

At the forest nursery of the Iowa State College there is a group of cottonwoods that are used as a

source of cuttings. For more than 15 years these plants have been cut back annually to within 6 inches of the ground. The sprouts are dense and make a height growth of from 6 to 8 feet each year. No one has been able to detect any loss of vigor.

Horticulturists reproduce hundreds of plant species vegetatively to keep them "true to type." Examples are the Bartlett pear, the Delicious apple, the Napoleon cherry, and varieties of sugarcane, bananas, oranges, grapes, and potatoes. To be sure these plants may be reproduced by grafting, budding, inarching, etc., and these methods are not directly comparable to the reproduction of forest stands by coppicing. The main point is that vegetative reproduction does not per se lead to degeneration. It is interesting to recall that all the Lombardy poplars in the world, and all the Balm-of-Gilead poplars, represent clons; in each case all the representatives of the species now in existence have actually been derived, over a long period of time, from one plant.

An incident in which sprout growth revealed innate though hidden vigor recently took place in connection with the propagation of cuttings from some willows on the Arlington farm of the Department of Agriculture. Construction work threatened to annihilate a willow holt on the farm. This holt, which had been planted at a density compatible with annual harvesting of basket willow rods, had received no attention for many years. The willows had grown 25 feet tall. Less than 5 per cent of them remained alive, although all were still standing. A very few had small live tips. From these few tips cuttings of five varieties were obtained, which were planted in greenhouse sand flats. The cuttings rooted and grew prodigiously. In six months the tops had been cut back twice because they were a nuisance. Roots emerged through holes in the flats and spread extensively over the bench. This growth developed from material taken from a stand that, to say the least, was on its last legs.

All this brings us to a question raised by Carl Hartley in connection with pathological conditions in coppiced stands: Do sprout species degenerate from coppicing, as we have been told, or do they retain their inherent vigor and appear degenerate only because of the influences of fungal infection, disintegration of the parent root, and deterioration of the site? Doctor Hartley and I believe that if cuttings from sprouts of the fifth or sixth sprout generation were rooted, even though the sprouts were apparently in poor condition, the cuttings would show vigorous growth remarkably similar to that of cuttings from young seedlings grown near by. If some one can demonstrate that stem cuttings, root cuttings, or layers taken from coppice in a so-called degenerate stand and others taken from seedlings will grow equally well under conditions comparable as to sanitation, foresters will perhaps be persuaded that degeneration is due to external and not inherent factors. It may then be possible to discover and combat the external factors, so that sprout hardwoods will grow in a healthy manner. The millennium for the sprout hardwood region will then have arrived!

NOTE.—Doctor Hartley comments on Mr. Coville's paper as follows: "I doubt if decay does harm to sprout growth when it attacks dead material only. Fortunately the fungi that usually develop on logging slash are species that rarely attack living trees. Fungi that are semiparasitic undoubtedly destroy parts of the old root systems that otherwise might have lived, and I should expect that in some cases fungi that had developed on the dying parts of the root systems of felled trees would spread into healthy roots. Heart-rotting fungi sometimes spread from the old stumps into the butts of the sprouts that arise from them, but it is my impression that this is common enough to produce serious decay in fire-protected stands in relatively few species, and only on poor sites or after repeated generations of coppice. We know too little on this point, and Mr. Jackson has undertaken to investigate it at the Allegheny Forest Experiment Station."

Indiana Locusts Are 88 Feet Tall

The tallest stands of locust that the Central States Forest Experiment Station has found in its territory occur in Jefferson County, Ind. A 40-year-old stand at Paris, Ind., is 88 feet tall. In this stand diameters run as high as 13 inches, and one outside tree is about 20 inches in diameter at breast height. The maximum height is 94 feet. The planting was established with locally procured sprouts. Another excellent stand, planted on limestone soils southwest of Dupont, has risen in 31 years to about 75 feet and has diameters as great as 15 inches. Evidence of early attack by locust borers appears in both of these stands. This is in accordance with observations in Ohio, which indicate that the very best plantings are not immune to the borer in their youth but that on good sites the trees recover and grow thriftily in spite of the insect damage.

The Bessey nursery, on the Nebraska National Forest, at Halsey, Nebr., had 800 visitors on September 26, when the annual picnic was held. Not only were the guests given an explanatory tour through the nursery and through the plantations that have been established with its output of many successive years, but on visiting the new packing and storage shed they found packages of 2–2 Scotch pine prepared for those wishing to cooperate in an experiment in fall planting. The 300 recipients of trees left their signatures and received forms on which to report the results of their fall planting to Extension Forester Watkins.

A leaf of bigleaf maple (*Acer macrophyllum*) collected by Ranger John E. Gribble on the Siuslaw National Forest, Oreg., measures $18\frac{1}{16}$ inches in width.

Fire Prevention Gains in the North

By L. C. Pratt, United States Forest Service

After a quarter century, the fire-prevention missionary of Alaska seems to have reached the happy state of having overcome the most disheartening of all his obstacles—public indifference.

Several factors peculiar to Alaska have retarded the advance of fire prevention: First, the tremendous size of the Territory—600,000 square miles, with an extreme north and south distance of 1,300 miles and an east and west distance of 2,300 miles; second, lack of adequate transportation and communication facilities; third, sparsity of population—1 human being to each 10 square miles of territory; fourth, the insect pest, from which at least temporary relief may be obtained by burning off the ground cover; and fifth, the ease with which ground may be stripped of vegetation by burning as an aid to mining.

As to the first of these factors, by no means all of the vast territory is timbered. The coastal region, with its countless islands and picturesquely irregular shore line, is more or less heavily timbered from Dixon entrance on the southeast to Kodiak Island in the west, roughly a distance of 1,400 miles. Here, however, the precipitation is heavy and the fire problem is not acute. All the great interior river valleys south of the Arctic Circle contain timber, and in this region precipitation averages about 10 inches a year. Here, during the short but intense summers, the ground cover ignites easily and fires spread rapidly.

The Alaskan prospector and miner of an earlier day saw timber mainly as a hindrance to his burrowing for gold or as a breeding place for swarms of vicious insects. His natural inclination was to remove this obstacle in the shortest and easiest way—by burning. Lightning lent no aid, so he did it with his own lily-white hands. Thus when the forester followed the prospector to Alaska he found little difficulty in locating the trails. But he didn't like that particular kind of trail. He began at once, and vigorously, to protest.

Only two national forests were set aside in Alaska, and both of them in the coastal belt. The Chugach, however, included the Kenai Peninsula, where fire danger was great. This offered the forester an opportunity to make a practical demonstation of the value of fire prevention. Here for the past 25 years he has been demonstrating what can be done. Not only has he kept national forest burned areas down to a creditable acreage—for 1930 the total was 421—but in his fire organization he has trained many Alaskans, young and old, in modern methods of fire prevention and suppression. Such men, honest converts to the cause, have scattered to all parts of the Territory. They constitute an active nonpaid missionary corps, and their influence is being felt to a greater degree every year.

A second important factor in the spread of the fire-prevention gospel is the interdepartmental cooperation that is developing as a result of the work of Charles H. Flory, regional forester and commissioner for the Department of Agriculture in Alaska.

A practical cooperative scheme is in effect between Federal agencies and the Alaska Railroad, which traverses 500 miles of partly timbered country. As a result of this plan every section crew, every trainman, and in fact every employee on the line now regards with vast concern any fire along the railroad. Active measures are taken by railroad employees to prevent fires and, when fires occur, to suppress them promptly.

The Department of the Interior, through Chief of Field Division J. A. Ramsey, maintains a small patrol force along the railroad and some of the highways. As more funds become available it is expected that these forces will gradually be expanded.

The Biological Survey and the Alaska Game Commission are effectively lending a hand. They have carried on a campaign of education showing the effect of forest fires on the supply of game and fur bearers.

The work is well begun, and it is music to the ears of the forester to hear an old prospector, miner, or trapper remark "Say, feller, some son of a gun started a fire up on Esther Creek yesterday, but we got 'er out before she spread much. Wish you fellers would put a patrolman in this section. If we don't keep fires out of here the game and fur'll all be gone in a few years more."

It's a sweet song, and the chorus is swelling.

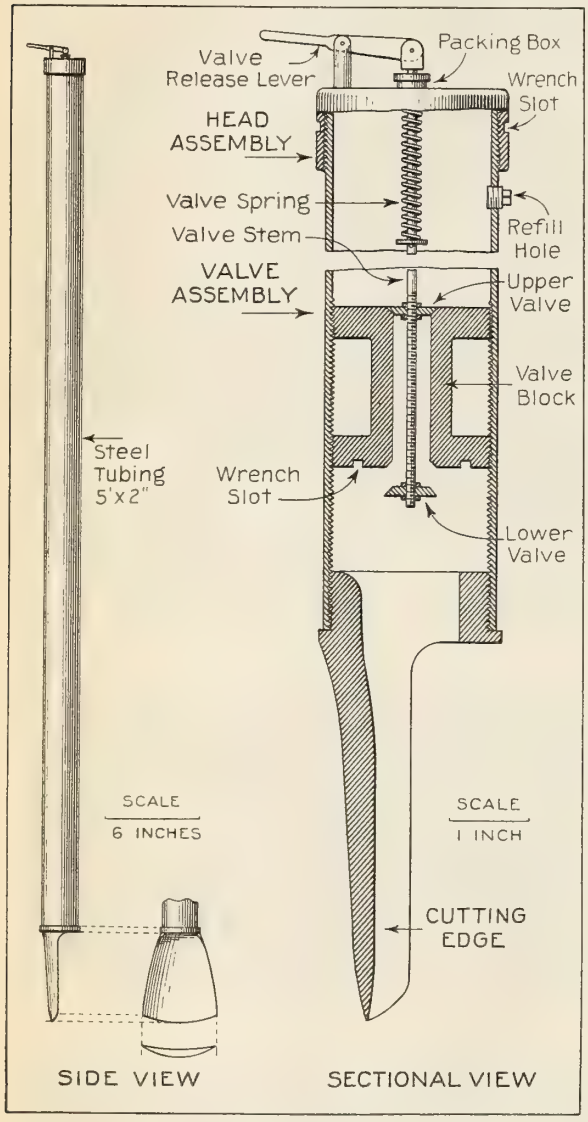
The purchase of 82,575 acres of land in 15 different States for national-forest purposes, at an expense of $204,116, was approved by the National Forest Reservation Commission on December 14, 1931. This purchase program covers 10,875 acres within the Moquah purchase unit, in Wisconsin; 9,531 acres within the Hiawatha National Forest, Mich.; 8,117 acres within the Ouachita National Forest, Ark.; 7,592 acres within the Unaka National Forest, Va. and Tenn.; 7,533 acres within the Superior National Forest, Minn.; and 5,007 acres within the Kiamichi purchase unit, in Oklahoma.

The name "ponderosa pine" has been adopted by the Forest Service in substitution for "western yellow pine" as the common name for *Pinus ponderosa* and "Jeffrey pine" as the common name for *Pinus jeffreyi*. The new name has the approval of the Western Pine Association and will be used in marketing lumber manufactured by the members of the association from these species. It has an advantage over "western yellow pine" in that it is a binomial.

A Tool for Poisoning Trees

By A. L. MacKinney, United States Forest Service

The practice of poisoning undesirable trees in order to improve the composition of forest stands of relatively thin-barked species has gained in practicability through the development of a tool that makes tree poisoning a one-man job. When two men were required, one to make incisions in the tree trunks and another to introduce the poison, labor costs were excessive. The tool that enables one man to do both the cutting and the "dosing" was devised by Joshua A. Cope and J. Nelson Spaeth, of Cornell University. Using their idea, I have designed and made a tool embodying several modifications of the one originally described by Cope and Spaeth in the Journal of Forestry, May, 1931.



The modified tool, sectional and side views of which are shown in the accompanying drawing, consists of a 5-foot length of 2-inch seamless steel boiler tubing fitted with a series of valves set above a cutting edge at its lower end and a 4.8-foot wire running through the tubing connecting the valves with a release lever set on the upper end. The 4.6 feet of barrel above the valves forms a reservoir with a capacity of 3 quarts.

The cutting edge was made by working one end of a solid block of tool steel into a blade 5 inches wide, curved to approximate an arc of a circle with a 1-foot radius. The blade tapers into a block 2.5 inches in diameter, which is threaded to screw into the lower end of the tube. Below the threads is a flange to prevent screwing the blade in too far. Within the block a hole 1.6 inches in diameter serves as a runway for the poison solution from the valves to the surface of the blade.

The valve block was made from a solid cylinder of brass 2.25 inches in diameter and 2 inches long. Its exterior was threaded to screw into the barrel. Through the center of the block a hole was cut 0.5 inch in diameter, the upper and lower rims of which were beveled to provide seats for the valves. The exterior was reamed out so as to leave a 0.25-inch wall around the central portion of the cavity and threaded flanges around the top and bottom. Two shallow holes for wrench slots were made in the bottom of the block. The final position of the valve block is 2.5 inches above the lower end of the barrel.

The wire by means of which the valves are operated is three-sixteenths inch in diameter. The valves are of brass and are screwed onto the wire in such a position that when the upper valve is seated the lower is 0.25 inch below the valve block. The lever used to raise and depress the wire is set in a brass head at the top of the barrel. The wire is held down by a coil spring inside the head except when it is raised by the depression of the lever.

The poison solution is introduced into the barrel through a small hole just below the head. This hole is sealed with a threaded plug.

In using this tool not much force is required to drive the cutting edge about one-half inch into the sapwood. With a downward thrust of the tool, an incision is made as close to the base of the tree as possible. The cut is pried open by pulling back the upper end of the tool. A motion depressing and releasing the valve-release lever immediately liberates a measured quantity of the poison into the wound. This treatment is repeated until a continuous row of incisions encircles the trunk.

A set of nested hollow brass cylinders that fit over the wire inside the valve block can be used to control the quantity of solution liberated.

The complete tool weighs approximately 16 pounds empty. Filled to its total capacity of 3 quarts, it weighs 22.25 pounds. If one teaspoonful of solution is liberated into each incision one filling of the tool

suffices to treat approximately 125 trees 6 inches in diameter.

L. I. Barrett used this tool to poison 150 trees in north Georgia. In this work it was found that a wire attached to the valve release lever and fitting around the operator's hand made possible a material increase in speed of operation.

It is planned to make a new tool on this model in which aluminum alloy will be substituted for steel and brass. This will reduce the weight of the tool by almost one-half and thus make it much more usable for silvicultural improvement work.

Sample Plot Technique for the Southern Appalachians

In establishing new sample plots on the Bent Creek Experimental Forest this winter the Appalachian Forest Experiment Station used a cross of white paint to mark breast height on each tagged tree. Tags were nailed a foot above breast height, so that the swelling often produced about nails driven into hardwood trees will not distort later diameter measurements.

In mapping the stems of trees, and also in charting the shade of rhododendron and laurel clumps, use was made of a network of strings one-half chain apart each way. A chain tape was stretched through the center of each half-chain square and the position of each tree in relation to this line was determined by the use of a long measuring stick. To make contour maps, elevations were read at all corners of the squares with an Abney level.

An advantage of winter over summer as the season for establishing sample plots in the southern Appalachians is the fact that less time is required for plot surveying and stem mapping when the leaves are down. Disadvantages are the difficulty of finding leafless reproduction and the danger that work will be interrupted by bad weather. In this instance, with four experienced men working in pairs, the time required to establish four half-acre sample plots was as follows:

	Man days
Surveying, including temporary location and final survey	8½
Tagging and describing 774 trees	9½
Mapping tree stems and rhododendron and laurel shade	8½
Topographic maps	4
Painting breast-height points on 71 trees to be left, painting boundaries, witness trees, etc	3½

Forest Service motion-picture films sold during the year ending with November, 1931, totaled 75, including 22 of 16-millimeter width and 53 of the standard 35-millimeter width. The purchasers were chiefly State foresters, colleges, and schools.

Erosion Studies in Mississippi Include Contour Mapping

By G. H. Lentz, United States Forest Service

In order to get more definite data as to the bearing of erosion on the utilization of farm areas in the silt loam uplands of Mississippi, the Southern Forest Experiment Station has prepared topographic maps for five representative farms in three counties in the north-central portion of the State. A contour interval of 5 feet was used, with a horizontal scale of 2½ chains to the inch.

The work was carried on with a traverse board, compass, topographic Abney level, and 2-chain slope tape. On badly dissected areas strip lines were run at intervals of not more than 5 chains; where the topography was fairly level, the distance between lines was as great as 8 chains.

Cover type boundaries were indicated by dashed lines, and all areas in gullies or breaks or where the mineral soil was exposed by sheet erosion and gully formation were carefully mapped in. Thus the field map showed in addition to the contours the cultivated areas, pasture land, woodland, abandoned land, and areas actively eroding.

In the office, tracings were made so that blue line prints could be obtained. The acreage included in the various cover types was determined with a planimeter. The total area mapped was calculated and a percentage figure obtained for each class of land.

Even though contour lines can hardly portray the grotesque formations caused by erosion, the maps show very clearly what has taken place. In most cases no erosion has occurred under forest cover, even where tree growth only partially covers the soil and where fires have occurred almost annually.

Colors Mean Numbers on Rods for Charting Brush

In charting dense brush vegetation on run-off and erosion plots the California Forest Experiment Station makes use of wooden rods 10 feet long by 1 inch square. These rods are marked off in feet and painted in bright colors like surveyors' sight rods but with the difference that five instead of two different colors are used, each 5 feet of rod displaying the same sequence of white, orange, blue, yellow, and red. Two such colored rods are thrust through the brush across the plot on the contours and 5 feet apart. Instead of having to look for numbers or letters to identify the foot distance of a plant from either side line the cartographer has only to distinguish the identifying color of the foot in question, and this he can do if only an inch of the color shows through the tangle of vegetation. The location between contour rods is determined by means of a graduated 5-foot rod carried in the hand.

Central States Tests Prove Porosity of Forest Soils

A study carried out during the summer of 1931 by John T. Auten on 36 second-growth forest sites and adjacent field sites in the Central States brought out evidence that the soil of forest areas does not lose its porosity after the timber is cut if grazing use is closely restricted. By determining the specific gravity of soil on plantation and corresponding field areas Doctor Auten found that when forest plantations are established on old fields the soil regains its porosity in from 20 to 25 years. The surface 9 inches of soil was found to be approximately 15 per cent heavier in grazed woods than in ungrazed woods. Virgin forest soil at a depth of 1 inch was found to absorb more than 46 times as much water per minute as soil at the same depth in adjacent fields. The quantities of water absorbed per minute by virgin forest soil at the 3-inch and 8-inch horizons were more than 14 times and more than 2 times, respectively, as great as the quantities absorbed by the field soil at those horizons.

Hunters Again Reduce Kaibab Deer Herd

Hunters entering the Kaibab National Forest, Ariz., during the 30-day deer-hunting season of 1931, which began on October 16, carried away with them 879 deer. State licenses permitting the holders to shoot one deer each were issued to 980 hunters, of whom 771 were residents of Arizona and 157 were from California. The plan agreed upon by the United States Forest Service and the Arizona Game and Fish Commission required that every hunter report at a central checking station and be assigned to a hunting camp, and that he return to this camp each night. Hunting of does as well as of bucks was permitted. When a deer that was very poor, badly shot up, or apparently diseased was brought to camp it was condemned and the hunter was given permission to shoot another. Deer condemned in this way numbered 41, and 45 dead deer were found on the range that were believed to have been killed by hunters. No hunting accidents were reported.

A growth study covering the 180 acres of woodland on the Georgia Mountain Experiment Station, at Blairsville, Ga., believed to be typical of the timber lots which form a large proportion of the valley farms in north Georgia, has been completed by the Appalachian Forest Experiment Station. The maximum growth per acre per year, that of the hickory-chestnut oak type, is 0.45 cord (of 90 cubic feet); the lowest, that of the white oak-black oak-chestnut oak type, is 0.28 cord. There is present on the tract an average of 0.5 cord per acre of dead wood usable for fuel.

What's in a Name?

By Oscar Evans, United States Forest Service

If you travel up and down the Sierra and Coast Range, or wander within the national forests of California, you are struck by the frequency with which certain place names bob up. Time and again you come upon a Mill Creek, a Bear Creek, a Willow Creek, or a Cottonwood Creek. You notice also that the creeks often bear good old Anglo-Saxon surnames or names of commonplace objects that the early pioneer happened to spy. If John Jones pitched his camp on a stream it was forthwith called Jones Creek. If he later saw a dead cow on a stream you may be sure it was called Dead Cow Creek—no imagination there. In contrast, the good padres who named many of the topographic features in southern California gave them the names of cherished saints or of human qualities, such as Merced, River of Mercy, or Modesto—modest. The padre, more often than not, named natural features after things that were in his thoughts; the trapper, prospector, or stockman, after things that he saw. The Spanish penetration from Mexico into California began about the time of our Declaration of Independence, and its course was primarily along the coast and into the larger valleys. It never spread far beyond the line of missions extending from San Diego northerly to the San Francisco Bay region. The Anglo-Saxon came overland. Only an occasional American scout or trapper climbed the weary trail over the Sierra summit previous to the first immigrant train in 1841. Between this mere trickle and the flood of goldseekers that came in '49, a simple and elemental naming impulse prevailed in the mountains of California. A review of the names borne by national-forest creeks alone tells the story.

Surnames, of course, outnumber all others, totaling 270. Distinctly English names come with rapid regularity, 240 of them. There are 12 Scotch and 5 Irish; the others include German, Scandinavian, Dutch, Spanish, French, and Hawaiian. Eight Presidents are commemorated.

The most common name of all is Mill, which occurs even unto 29 times. The presence of a mill apparently was a striking fact in those early days. Next come the Bear Creeks, 27 of them, with 10 Grizzlys in addition—not to forget several occurrences of Oso (Spanish for bear). Evidently the old-timers sat up and took notice when a bear was around. Willow claims third place, with a count of 19, and there are 17 Cottonwood Creeks. Those two stream-loving species meant water, and water meant camp. The next six things that most impressed themselves on the minds of the pioneers were Rock, 16 times—plenty of granite in the Sierra; Deer, 15—their main source of food; Rattlesnake, 11—one of their fears; Cold, 11; Indian, 11; and Boulder, 10. The old-timers had drunk the cold Sierra water that came splashing down over the granite bowlders

and had hunted for deer, keeping their eyes open the while for rattlesnakes and Indians.

Trees, shrubs, animals, birds, reptiles, insects, colors, household articles, tools, and features of the earth's surface all contributed to the naming of these beautiful California mountain streams. Thirty species of trees are represented. After Cottonwood and Willow come Cedar, which appears 10 times; Alder, Ash, and Buckeye, 5 times each; Pine, 4 times; Maple, Sycamore, and Laurel, 3 times each. Not so many shrubs and plants were honored—in all, only 12 species: Strawberry (4 times), Huckleberry (4), Onion (3), and Blackberry, Thimbleberry, Grapevine, Peavine, Parsnip, Clover, etc. The berries were the most popular—the old-timer was looking for food. Four times he did not take the trouble to pick out a species, but just used "Brush." Twenty kinds of animals are represented. The more common after Bear and Deer are Horse (7 times), Cow (6 times), Mule, Panther, Coon, and Antelope (4 each), and Dog, Wolf, Sheep, Bull Run (3 each). Inhabitants of the water lent their names as follows: Trout, 7; Salmon, 4; and just "Fish," 5. There are five representatives of the insect family: The lowly louse, the droning bumblebee, the fiery yellow-jacket, the pestiferous mosquito, and the industrious ant. Of the 10 species of birds that play a part in the national forest creek nomenclature Grouse is the most common, with a score of 6—food again. Eagle Creek occurs 4 times and one finds also Partridge, Wren, Sagehen, Goose, Crow, and Owl Creeks. The antagonistic rattlesnake leads all the reptiles, but there are also Scorpion, Tadpole, and Snake Creeks. Of the metals Silver leads with 5, followed by Galena, Iron, Copper, and Gold. The colors are Green, Yellow, Blue, Gray, Brown, and Chocolate, with 4 Blues leading.

The traveler in the mountains will encounter a number of creeks named for European and Asiatic countries and nationalities—Ireland, Wales, Spanish, French, Italian, Portuguese, Dutch, Frenchman, Scotchman, Dutchman, China, Russia, and Siberia. For good measure we have American and Canadian Creeks. Physical factors of the earth gave names to 93 creeks. Following Rock, Cold, and Boulder there are 5 repetitions each of Mud, Fall, Big, and Swamp, 4 of Sand, and 3 of Slate, and also Slide, Meadow, Stony, Bluff, and many others as casual.

In 23 instances the old-timer betrayed the limitations of his vocabulary by giving our sparkling, foaming Sierra streams such commonplace names as Shovel, Trap, Frying Pan, and Pick. Shades of the padre! He would at least have made it "Creek of the Stout Pick." Sometimes odd or trite names crept in such as One-Eye, Tish-tang-a-tang, Whiskey, Moonshine, Pigtail, Texas-chow, Shoofly, and Fiddle. Indian names occur less frequently than one would expect; we find Mowitz (deer), Eltapom (high valley), and others. Only an occasional creek name commemorates some historic incident. Lost Cannon Creek is a reminder that Fremont was forced to leave his cannon behind during one of his path-finding expeditions.

What's in a name? Everything! The whole life of the California pioneer is revealed—his previous history, his daily life, his primitive surroundings, his haunting fears. What's in a name? Say "Clear Creek" to some denizen of the pavement and four walls, and immediately his mind is filled with the romance of a Sierra camp—a purring stream, shimmering lakes, sparkling air, the pungent fragrance of fir and pine, shady trails, light sifting down through a leafy canopy, and quiet carefree days.

Forest Service Dramatic Sketches Go On the Air

A radio dramatic program depicting the life and work of forest rangers on the national forests is to be heard hereafter during the National Broadcasting Co.'s national farm and home hour and western farm and home hour. This program, entitled "Uncle Sam's Forest Rangers," replaces lectures on Forest Service work that have heretofore been given. The stories are woven around two main characters—Ranger Jim Robbins and his newly appointed assistant, Jerry Quick. Harvey Hays has been assigned to the rôle of Jim Robbins, and Arthur Jacobson to that of Jerry. Clifford Soubier plays the forest supervisor and Judith Lowry is Bess Robbins, the ranger's wife. Beginning January 7 the broadcasts will be made every Thursday from the Chicago studios of the National Broadcasting Co. during the national farm and home hour, which begins at 12 noon central standard time. Beginning February 1 they will be made also from the company's San Francisco studios during the western farm and home hour, which begins at 12.15 p. m., Pacific time, on Mondays.

Improvement Operation Covers 9,000 Acres of the Ouachita

Operations to improve growth conditions for shortleaf pine were carried out during the winter of 1930–31 on seven timber-sale areas on the Ouachita National Forest, Ark. The areas treated, all of which were in the better site classes, totaled approximately 9,000 acres.

The improvement work consisted of cutting small hardwoods of poor form and weed species, girdling unmerchantable hardwood wolf trees, and thinning dense patches of advance growth of pine 15 to 30 years of age. Hardwood trees were cut or girdled only if competing with, crowding, or overtopping pine. Trees were girdled by a continuous line of downward hacks through the outer and inner bark well into the sapwood.

At the end of the following summer most of the girdled trees of the narrow-sapped species such as black oak and red oak were dead. Some of the girdled trees

will undoubtedly survive for a few years. According to observations of H. E. Ochsner, in charge of the operation, the order in which the various species succumb is approximately as follows: Blackjack oak, black oak, red oak, post oak, white oak, hickory, elm, black gum, and red gum.

General Forest News

A New Type of Forest-Fire Pumper

At the request of N. C. Sparks of the Canadian Department of the Interior, two mechanical engineers of New Hampshire have designed an engine and pump that have all the appearance of being what forest-fire fighters are looking for in the way of power equipment, writes District Forest Inspector C. R. Tillotson. The two engineers are Ralph L. Morgan, of Richmond, and Arthur A. Cushman, of Keene. Mr. Sparks specified that the pump should be of the displacement type and capable of delivering 66 United States gallons per minute at 200 pounds pump pressure. The engine was to be four cycle. The whole outfit was not to weigh more than 125 pounds, and was to be so constructed that it could be easily separated into two units and just as easily reassembled. Mr. Morgan and Mr. Cushman have many years of mechanical engineering experience behind them. After about a year of intensive effort it seems that they have designed an outfit which will meet the specifications. The engine itself is something entirely new in motor design. The pump, while of the rotor type, is of a new and especially effective design. Money has been raised to manufacture these outfits, and it is believed that they can be produced in quantity by next summer or fall.

The list of States in which white pine blister rust infection is known to be present was enlarged in 1931 by the addition of Maryland, Virginia, West Virginia, Ohio, and Iowa. The area in the East previously known to contain the infection consisted of the Lake States, the New England States, New York, Pennsylvania, and New Jersey. The spread of the infection to the western part of Michigan was discovered in 1931 for the first time.

"Some coast lumberjacks demonstrated to me a new method of carrying falling saws," writes Clyde D. Blake, assistant supervisor of the Nezperce National Forest, Idaho. "They placed the handles on the saw, then bent the saw into a circle, hooked and tied the handles together, then holding the handles they placed the saw on the shoulder (teeth out, of course). A saw bent in this shape can be carried through brush without hooking every bush or twig within 50 yards' distance and can be carried for long distances without the never-ending up and down flop."

Land Use Conference Makes Constructive Recommendations

By W. N. Sparhawk, United States Forest Service

Approximately 375 persons, representing all sections of the country, were registered at the National Conference on Land Utilization which was held in Chicago November 19–21. The conference was called by the Secretary of Agriculture and the executive committee of the Association of Land Grant Colleges and Universities for the purpose of discussing the land-utilization problem and formulating recommendations for Federal and State action. Secretary Hyde delivered an address at the opening session and presided at the concluding session. The topics discussed included utilization of western range land, methods of taking submarginal land out of agriculture and preventing further expansion of agriculture on poor land, forest policy, land acquisition by the public, taxation in relation to agriculture and forestry, soil erosion, adjustment of farming organization and methods in the better areas, and agricultural credits.

Among other things the conference recommended that the western grazing lands be organized into public ranges and administered in close coordination with the national forests; that lands valuable for the protection of watersheds be administered under the supervision of the Federal Government; that only the land that is clearly supermarginal for agriculture be eliminated under the homestead laws and that the remainder be withdrawn from entry and added to the public reserves; that reclamation efforts be confined to projects already started; that Federal and State agencies develop coordinated programs for the use of submarginal land by removing the economic obstacles to private ownership and providing for public acquisition of land that private owners will not hold and manage in accordance with the public interest; and that the Federal Government assist the States in carrying out land economic surveys and classification.

For the purpose of developing a national program the creation of a national land-use planning commission of 15 members was recommended, to consist of representatives of the Department of Agriculture, the Department of the Interior, the Federal Farm Board, the Federal Farm Loan Board, and the land-grant colleges. It is proposed that in formulating plans and furthering their adoption this commission be assisted by a national advisory and legislative committee on land use to be made up of representatives of the farm organizations,

agricultural editors' association, United States Chamber of Commerce, American Bankers Association, State Commissioners of Agriculture, American Forestry Association, livestock associations, and railroads.

Windbreaks Effective Against Desert Winds of Southern California

By FLOYD D. YOUNG, United States Weather Bureau
(From Monthly Weather Review, October, 1931)

Following the damaging desert winds in southern California in the fall of 1924, a study of the effect of windbreaks on the wind velocity and relative humidity was undertaken by the fruit-frost service of the Weather Bureau in cooperation with the Villa Park Orchards Association and the Orange County Fruit Exchange. Records of wind velocity, relative humidity, and temperature were obtained at two stations in a citrus district subject to desert winds, one in an area without windbreaks and the other at varying distances behind a windbreak about a mile to the westward in the same general location. The windbreak was 1,280 feet long and extended north and south. Approximately one-half its length was made up of Eucalyptus (blue gum) trees, about 95 feet high, and one-half Monterey cypress, about 70 feet high. The windbreak trees were 30 years old. The orange trees, set 24 feet apart on the square, were 28 years old. Anemometers at both stations were placed 18 feet above the ground, or about 2 feet above the tops of the trees. Thermometers and hydrographs were exposed in fruit-region instrument shelters in the orange groves, 4.5 feet above the ground. The windbreak station was set 165 feet to the leeward of the windbreak the first season, 310 feet the second season, and 500 feet the third season. Wind velocities in the open (check station) and behind the windbreak during the progress of desert winds are shown in the following table.

	Average hourly wind velocity [1]	Average hourly maximum velocity (5 minutes) [1]	Maximum velocity period of wind [1]
Nov. 18, 1925:			
Check station	12.0	15.0	27.0
165 feet behind windbreak	5.5	6.5	15.0
Decrease due to windbreak—per cent	54	57	44
Dec. 8–10, 1926:			
Check station	18.0	22.0	29.0
310 feet behind windbreak	8.0	9.0	13.0
Decrease due to windbreak—per cent	56	59	55
Dec. 3–4, 1927:			
Check station	23.1	27.6	38.0
500 feet behind windbreak	17.3	20.3	27.0
Decrease due to windbreak—per cent	25	26	29
Dec. 17–18, 1927:			
Check station	20.4	25.7	34.0
500 feet behind windbreak	14.8	18.1	28.0
Decrease due to windbreak—per cent	27	30	18

[1] 4-cup anemometers used.

The records indicate that the effectiveness of the windbreak is as great at 310 feet as at 165 feet, and that its effectiveness decreases by approximately 50 per cent at a distance of 500 feet. The openings between the trunks of the windbreak trees were large enough near the ground to permit considerable air movement through them, while higher up the heavy foliage of adjoining trees was interlaced, leaving few open spaces. It is believed that the wind entering the orchard near the ground increased the velocities shown at the 165-foot station and accounted for the lack of difference between the velocities at 165 feet and 310 feet. This breeze coming in between the tree trunks very close to the ground undoubtedly was spread and dissipated to a large extent by the resistance of the orange trees before it had traveled far into the orchard.

A careful inspection of the two orange groves in which the windbreak studies were carried on was made immediately after the desert winds of December, 1927. * * *

In the orchard protected by the windbreak no fruit was blown off the trees for a distance of 288 feet. From this point to the 500-foot line fruits on the ground averaged four to the tree. From 500 feet to the western border of the orchard, 784 feet from the windbreak, the number of fruits per tree on the ground increased rapidly. A count of oranges under 10 trees in the last row showed an average of 30 per tree.

The number of oranges per tree on the ground in the check orchard varied from 98 to 452, with an average for all parts of the grove of 163.

The relative humidity was always somewhat higher behind the windbreak during relatively light desert winds, but there was little difference between the two stations during the heaviest winds.

These studies indicate that a windbreak such as the one for the orchard in which the records were obtained affords practically complete protection from desert winds, both as to loss of fruit and damage to foliage, up to a distance of about 500 feet, and partial protection up to at least 800 feet from the break. Data on wind damage show the necessity for an adequate system of windbreaks throughout the sections visited most frequently by desert winds. The disastrous effects of desert winds in 1924 and 1927 resulted in the planting of many miles of new windbreaks in portions of Orange County, but lack of severe winds in recent years has resulted in many of them being removed. Large windbreak trees compete for food and moisture with citrus trees in adjoining rows, and cause some reduction in the crop of fruit. Also the planting of windbreaks throughout a large area increases the frost hazard to some extent. However, the protection from desert wind damage far outweighs either of these factors in the districts most subject to wind damage.

Many different types of windbreaks have been devised in addition to the familiar lines of growing trees. Artificial windbreaks erected in an orange grove near El Modena, Calif., are placed in every fourth tree row

north and south, or about 96 feet apart. They extend to a height of about 23 feet and are anchored firmly to heavy stakes driven into the ground. Their cost, when constructed with second-hand lumber, was slightly more than 75 cents per running foot.

Studies to determine the effectiveness of these windbreaks were carried on during the winter of 1930–31. Unfortunately the wind direction at the chosen location was subject to change from north to east, or vice versa, during the progress of desert winds, so that the wind direction was sometimes parallel to the windbreaks. When the wind was in the east its velocity midway between two breaks was reduced by approximately 50 per cent, but when the wind direction changed to north, the velocity was sometimes stronger between the breaks than at the check station. The windbreak structures withstood velocities as high as 20 miles per hour without any indication of weakness.

Examining needles of Monterey pine (*Pinus radiata* D. Don) growing on the grounds of the coastal laboratory of the Carnegie Institute of Washington, at Carmel, Calif., in 1930, Ferdinand W. Haasis found them occurring not uncommonly in fascicles of four instead of the usual three or occasional two. Four-leaved fascicles were found on nine different trees, on the growth of the years 1925, 1927, 1929, and 1930. The greater number of the 4-leaved clusters noted were on the main stem. Such clusters were found both on vigorously growing trees and on overtopped trees. A few 5-leaved clusters were seen.

The Migratory Bird Conservation Commission, of which Secretary of Agriculture Hyde is chairman, on December 3 authorized acquisition by the Bureau of Biological Survey of 10 areas for migratory game bird refuges in New York, Maryland, North Carolina, South Carolina, Florida, Nebraska, North Dakota, Wyoming, and Nevada. The total area is 43,227 acres and the cost to the Government will average $5.74 an acre.

A forestry committee is one of the 10 major committees through which the Southeastern Economic Council, organized at a meeting held in Savannah, Ga., October 19–21, 1931, plans to study and endeavor to ameliorate economic, industrial, and social conditions in individual States of the Southeast. One hundred or more representatives of economic, civic, and social organizations, industries, public agencies, educational institutions, etc., in eight States took part in the organizing of this council. Each committee is to have two members from each of the member States.

A New Psychrometric Whirling Apparatus

To facilitate fire weather survey work Leslie G. Gray, of the San Francisco office of the United States Weather Bureau, has designed a new apparatus for whirling the standard Weather Bureau hand sling psychrometer within the usual cotton region or cooperative observer's type of instrument shelter. Mr. Gray describes the apparatus as follows:

The whirler consists of a simple pipe support with a flange at the bottom and a T at the top. The flange is bolted to the floor of the instrument shelter, the floor being reinforced by a short strip of 1 by 4 inch lumber. The T is fitted with solid brass plugs at each end through which holes are drilled to form bearings for a small crank shaft. A combined clamp and counterbalance, to hold the psychrometer, is fitted to one end of the shaft, and the other is bent in the form of a crank handle, to which is fitted a rotating sleeve for convenience in turning the crank. The drop of the crank handle is such as to permit of readily achieving the standard ventilation for the wet bulb thermometer, that is, a travel of the wet bulb of approximately 15 linear feet per second. The psychrometer is fitted to the clamp without alteration other than the removal of the chain links and handle, the hole in the aluminum psychrometer back fitting on the end of the crank shaft and the back fitting a machined channel in the clamp. The psychrometer is held securely in the clamp by a small rectangular plate and wing nut threaded on the end of the shaft. The psychrometer hangs in the clamp in such a position that readings of the thermometers and wetting of the wet bulb covering may be readily accomplished. Suitable oil holes are provided at main bearing points. The psychrometer may be whirled in the shelter without interfering with maximum and minimum thermometers, Townsend pattern thermometer support, or hygrothermograph. Operation of the whirler is simple, involving only the turning of a crank, in contrast to the knack or skill required to whirl the hand sling psychrometer without damage to the instrument.

It is expected that the new whirler will have several advantages:

(1) The cost is about one-third of that of the geared apparatus now in use; the present apparatus is also too large for cotton region shelters.

(2) It utilizes standard hand sling psychrometers without alteration.

(3) It secures a fixed exposure for humidity measurements, eliminating the effects of varying local exposures such as occur when observations are made without shelters, it makes possible direct checks on recording instruments exposed in the same shelter, and it makes fire weather observations more strictly comparable with those made in shelters at regular Weather Bureau stations.

(4) It provides a feasible apparatus for securing humidity observations from cooperative climatological stations, with but little additional cost.

(5) Its construction is very simple, long wearing, and requires little care. It has no gears, making for smooth and easy action without vibration which might cause the minimum thermometer index to be jarred from its correct position.

(6) It requires very little operating skill, turning and stopping a crank being all that is necessary.

(7) It eliminates a large part of the breakage of thermometers commonly experienced, because of the

simple operation of the instrument and the sheltered position of the thermometers.

A working model of this instrument is on display for inspection by those interested. A limited supply of instruction sheets and specifications are available for loan to those wishing to construct instruments of this type, and will be furnished on request to the writer.

The root nodules that occur on all cultivated and most wild legumes, constituting the laboratories in which bacteria gather free nitrogen and transform it into compounds capable of being assimilated by the host plant, apparently do not occur on the roots of the tree species honeylocust, coffee tree, redbud, and carob, and certain other plants, so far as information is available to the Department of Agriculture. Nonleguminous species that produce root nodules very similar to those of legumes include the alder.

The Paper Makers Chemical Corporation, of Kalamazoo, Mich., has become affiliated with the Hercules Powder Co., of Wilmington, Del., the Naval Stores Review reports. It will continue to operate under its own name, as will its subsidiaries. This corporation obtains all its raw material from the Suwannee Forest, at Fargo, Ga., of which I. F. Eldredge is manager.

Foreign Notes

The Danish Beech Forests [2]

By C. H. Ostenfeld, University of Copenhagen, Denmark

There is not much forest-clad land in Denmark—not more than about 8 per cent of the surface can be considered as covered by forests. Of this forest area about one-third is beech forest, while most of the remainder is coniferous forest, mainly spruce. All the coniferous forest is artificial and has been planted during the last two centuries. Only two coniferous plants (Juniperus and Taxus) are spontaneous in Denmark and neither is forest forming: the juniper is rather common in Jylland and northeast Sjælland; the yew has been found wild in one place only, in southern Jylland.

Among the deciduous trees the beech is the commonest. Nearly all deciduous forests in Denmark are beech forests. Nowadays the beech forest is almost pure; in earlier times, before it was so much influenced by man, the deciduous forest consisted of beech, oak, ash, alder, elm, etc. The last tree to immigrate was the beech. Its victory over the other trees is of very recent date and is due partly to man, partly to the deep shade in a beech forest preventing other trees from growing. Man's influence consisted mainly in the fact that owing to the higher value of the oak wood as timber the oaks, especially the well-grown trees, were felled, while the beeches were allowed to remain.

With the exception of parts of western Jylland, where the climatic and edaphic conditions do not allow the growth of beech, and some smaller islands in the Baltic (Bornholm) and in the Cattegat (Laesø, etc.) to which the beech has not yet immigrated by natural means, beech forests occur scattered all over the country, the southern parts of the islands and the southeastern parts of Jylland having the best developed beech forests.

As Denmark is a very flat country (the highest hill is only 172 meters above the sea) no altitudinal limit for the beech forest occurs, nor are the exposure and the steepness of the slope of any noteworthy importance. On the other hand a climatic factor, the wind, has a very strong effect, both directly and indirectly. That the western part of Jylland is destitute of beech is due partly to the effect of the strong western winds which prevail there. The wind acts both as a killing factor by drying the young shoots and also by its mechanical force.

As the soil of the surface in Denmark with few and small exceptions (Bornholm, Møens Klint) is a loose soil, the chemical variations of the surface are not so many as in a country of hard rocks. The differences are due mainly to the greater or smaller quantity of lime and to the varying quantity of water and air in the soil. On well-drained soil which is rich in lime, neither too dry nor too wet, we get the best development of beech forest. As regards the acidity, the sandy and poor soil is rather acid (pH=ca. 4), while the good loamy soil, rich in lime, is much less acid (pH=ca. 6); the beech forest can endure much more lime than the oak; while the oak stands wetness better than the beech. We have beeches growing on nearly pure chalk, and beeches growing on nearly pure sand. Where the soil is very loamy and the height of the underground water is very high, e. g., on the low island Lolland, the beech forest is poor, in spite of the other conditions of life being favorable.

The tallest and best developed beeches in Denmark reach a height of about 40 meters and the girth of the trunk at about 1 meter from the ground is about 6 meters, but usually the good beech forests are not more than 25 to 30 meters high and the poorer ones of course much less, until in places much exposed to wind the beech is a shrub reaching a height of only

[2] Paper read at the Fifth International Botanical Congress, Cambridge, England, 1930.

1 to 2 meters. The ages of the older beech forests are not more than about 250 years, although single trees are said to reach an age of 300 to 400 years. Usually the forests are exploited when the trees are 80 to 150 years old, which seems to be the most profitable age.

A natural regeneration of beech trees takes place where the soil is good and fertile ("muld" or mild humus) and the other conditions of life are favorable. On the other hand where the soil is poor and acid ("mor" or raw humus) and the other conditions not favorable a natural regeneration does not occur. There it is necessary to break up and manure the surface layers of the soil, and then sow the fruits or plant the young trees. In this connection it is natural to mention that owing to the dense shade hardly any other trees are able to grow up under the canopy of a beech forest. When it is not too dense, a few other individuals may be found and then a growth of the young beeches themselves. Under the densest canopy the light is not sufficient for growth—in young beech plantations the light intensity is not more than one-fiftieth of that outside the forest. For the same reasons few shrubs live under the beeches—*Sambucus nigra* and *racemosa*, *Lonicera xylosteum* and a few others. There is a very marked contrast in this respect between the beech and the oak forest.

The ground vegetation is very uniform in any one locality and it is composed of few species, but owing to the differences in the soil there is a long series of plant communities, mostly in relation to the degree of acidity of the soil. Where the acidity is not high (pH 6 to 5) the ground vegetation is composed of *Anemone nemorosa*, *Asperula odorata*, *Mercurialis perennis*, *Corydalis cava*, *Ficaria*, *Ranunculus auricomus*, *Primula elatior*, etc.; while on a somewhat poorer soil the five last are absent, and in some places Oxalis and Galeobdolon replace them: still poorer is a pure or nearly pure community of Anemone and *Oxalis acetosella*. When the soil is raw humus Trientalis, Majanthemum, *Deschampsia flexuosa*, *Convallaria majalis*, and in places *Vaccinium myrtillus* are the dominating species. According to recent investigations by Dr. C. H. Bornebusch we may distinguish between "ground types" and "phenotypes" (Grundtyper og Tilstandstyper), the latter being the expression or result of the ground type and the existing conditions of life (e. g., age and density of the beech trees, the effect of the wind, etc.).

The types of the ground flora are so different that the author is inclined to consider the beech forests as consisting of several (or at least two) natural communities.

The effect of the conditions of life on the growth of the beech trees is also seen in the degree and composition of the epiphytic cryptogam vegetation (lichens and mosses). The tall and slender trees of good beech forest on mild humus bear only a slight cover of small crustose lichens and few and inconspicuous mosses, while the slow-growing and low beech trees on poor and wind-exposed places have a rich stem covering of larger lichens and mosses. The flora of the higher fungi is very different according to the health of the beech forest, agarics are different in species in the good "muld" soil and in the raw humus. The beech trees have always mycorrhiza.

There are no species absolutely exclusive to the beech forest. The few rare species which have been found only in beech forests, e. g., some orchids, owe their exclusiveness not to the beech but rather to the large quantity of lime in the soil.

The exploitation of the forest is rather intensive and the culture has been brought up to a high standard in both the State-owned and the private forests. The wood of the beech is used partly as fuel and partly for making different kinds of tools. The result has, as mentioned above, been a much purer beech forest than would exist under natural conditions.

There is practically no grazing in the Danish beech forests and practically never fire in them.

The attacks of both plant and animal parasites, mostly insects, are sometimes rather serious, and the purity of the beech forest adds to the danger.

As to succession, the existing pure beech forest is an artificial forest, which could not continue if the forest were left to itself. It has developed by the influence of man from a mixed deciduous forest in which the beech was intermingled with oak, elm, ash, lime, and other trees and in which the shrub layer was much better developed. The foresters try nowadays to get that type of forest back again, as the pure beech covering has impoverished the forest soil so much that in many cases the forest is not able to regenerate as beech forest. It may become a spruce forest, which is much more acid, or even heath.

There is a fairly well-known paleontological succession of the forest from the first forest which formed after the late glacial heath and tundra until now. The beech immigrated at rather a late epoch, but not so late as was thought to be the case a few decades ago.

Growth Plot Established on Mexican Forest

Extension Forester Adolfo E. Galicia, Madera, Chihuahua, Mexico, writes that the first permanent forest sample plot in Mexico has been established near the town of Madera, Chihuahua, on lands belonging to the Mexico Northwestern Railway. The plot is a square of one hectare, and contains 1,410 western yellow pine seedlings. The soil is stony and is rated as second class. The altitude is 6,994 feet. In general the seedlings on the plot are nine years old, the area having been cut over by the Madera Co. (Ltd.), in 1922. The average height of the seedlings is 6 feet and their average diameter at a height of 1 foot is 3 inches. The data obtained from the plot will be compared with those obtained in the western yellow pine stands of Arizona and New Mexico.

Lucerne-in-Quebec Association Practices Forestry

Lucerne-in-Quebec Community Association (Ltd.), a subsidiary of the Canadian Pacific Railway, is now managing 125 square miles of forest on a sustained yield basis, writes G. R. Lane, who is chief of the forest's protective service. H. D. Heaney is woods inspector. The forest is situated on the north side of the Ottawa River between Montreal and Ottawa. Improvements include 3 fire towers, 8 miles of forest highway, 41 miles of telephone line, 11 ranger cabins, and 80 miles of good trails. Lakes within the forest boundaries number 116.

The staff consists of one inspector, two assistant inspectors, a telephone maintenance man, a teamster, and six rangers.

In 1931, 35,000 Norway pines, white spruces, and Norway spruces were planted. Hereafter it is proposed to plant at least 100,000 transplants annually. Each ranger is growing planting stock for use on his own territory. Silvicultural thinning of the present forest stands is well under way.

Fish and game on the area are protected for the members of the Seigneurie Club. The deer population is estimated at 500.

British Columbia Study of Influences Affecting Seed Production

To obtain data on factors influencing the quality and quantity of seed produced by conifers, British Columbia foresters at the Cowichan Lake Experiment Station began in 1931 to make observations on 65 individuals of Douglas fir, lowland white fir, western red cedar, and western hemlock at a series of seed-tree stations in the neighborhood of the station. The observations are calculated to yield information relating to the effect of weather on seed production, the interval between good crop years, the ages at which different species begin to yield seed of good quality, and the relation between vegetative growth and seed production. Trees were chosen to represent the greatest possible variety of age classes. Their heights were carefully determined and the leader growth for the year was measured. Cones were counted through the transit telescope on a definite portion of the crown, the bounds of which were usually defined by two recorded angles on the transit. Cones were collected from several trees of each age class for tests of seed viability. Weather records will be carefully correlated with seed production. Soil samples gathered at intervals throughout the growing season from the different soil horizons will be analyzed for pH, carbon content, free nitrogen, and total nitrogen.

It is proposed to continue these observations for at least 10 years.

Cambridge Board Would Drop Forestry

The general board of the University of Cambridge, England, is reported by Science to have recommended suppression of the university's forestry department, on the basis that openings for trained foresters are practically limited to the small number offered by the Government forest services, that four university schools other than that at Cambridge are engaged in training candidates for these posts, and that university policy in forestry teaching can not be reconciled with the present official view. According to the board's recommendations examinations in forestry for the ordinary B. A. degree would be discontinued after 1934 and examinations for the diploma in forestry would cease in October, 1935.

The National Forestry Association of Mexico was formed October 23, 1931, with Eulogio de la Garza Ollervides as secretary general. Offices of the association are at Av. Francisco I. Madero No. 16, Mexico, D. F.

Personals

Joseph Kittredge, jr., has resigned as silviculturist at the Lake States Forest Experiment Station after eight years at that post, to join the forestry faculty of the University of California. Doctor Kittredge's connection with the United States Forest Service dates from 1913, the year when he received the M. F. degree from Harvard University. His Ph. D. degree was conferred by the University of Minnesota. The professorship which he has accepted, a newly created one, is in the general field of forest influences, and is the first such recognition in this country of the place of forest influences.

C. M. Granger, director of the Forest Survey, United States Forest Service, has been elected president of the Society of American Foresters for 1932 and 1933. John D. Guthrie, assistant regional forester in the North Pacific Region, is again vice president. Members elected to the council of the society for the 4-year period beginning with 1932 are E. L. Demmon, director of the Southern Forest Experiment Station; C. F. Korstian, professor of silviculture, Duke University; Hugo Winkenwerder, dean of the College of Forestry, University of Washington; and A. F. Hawes, State forester of Connecticut.

Albert E. Wackerman is being reinstated at the Southern Forest Experiment Station, from which he resigned several years ago to become forester for the Crossett Lumber Co., Crossett, Ark. He is taking over in part the work in financial aspects of forestry formerly handled by Edwin A. Ziegler, now head of the Pennsylvania Forest Research Institute.

Members recently appointed by the Secretary of Agriculture to the northeastern forest research advisory council are Burton S. Ward, Moretown, Vt.; S. B. Copeland, vice president, Eastern Manufacturing Co.; George N. Ostrander, manager, woodland department, Finch, Pruyn & Co.; and Lawrence F. Whittemore, general manager, Boston & Maine Railroad. Members reappointed are R. T. Fisher, director, Harvard Forest; G. W. Sisson, president, Racquette Paper Co., Potsdam, N. Y.; and J. H. Foster, State forester, New Hampshire.

L. S. Matthew has resigned as extension forester in North Dakota to take charge of the North Dakota State forest nursery, at Bottineau, succeeding G. H. Wiggin, now forester for the University of Kentucky. Before accepting appointment as extension forester three years ago Mr. Matthew served for several years as inspector in forestry work at the Northern Great Plains Field Station, Mandan, N. Dak. John Taylor, a native of North Dakota who received forestry training at the North Dakota School of Forestry and the University of Idaho Forest School, succeeds Mr. Matthew.

Joshua A. Cope, extension forester of the New York State College of Forestry, expects to spend about half the year 1932 in European travel. Leaving this country in January, he plans to visit Germany, Denmark, Finland, Norway, Sweden, England, France, and Switzerland and to return about the first of August.

Preston P. Patraw has been made superintendent of the Zion and Bryce Canyon National Parks. Mr. Patraw has served as assistant to the superintendent of the Hot Springs National Park and as assistant superintendent of the Grand Canyon National Park.

Lenthall Wyman, of the Southern Forest Experiment Station, has been granted a patent on a tool to be used in scarifying trees for naval-stores production. The tool is shaped somewhat like a drawshave, the knife-edge being about 4 inches across and curved so as to make a flat crescent-shaped cut. The design of the tool is adapted to conservative chipping. Mr. Wyman has dedicated the patent to the Government.

Ben E. Bush, State forester of Idaho, is president of the Association of State Foresters for the current year. Harry Lee Baker, of Florida, is vice president, and Ralph F. Wilcox, of Indiana, is secretary-treasurer. W. G. Howard, of New York, and B. M. Lufburrow, of Georgia, are members of the executive committee.

James N. Templer, since 1925 assistant supervisor of the Deerlodge National Forest, Mont., has been made supervisor of the Helena National Forest, in the same State. He succeeds L. C. Hurtt, who was recently transferred to the Northern Rocky Mountain Forest and Range Experiment Station to take charge of range investigations.

S. D. Anderson, formerly supervisor of the Superior National Forest, Minn., is now assigned to regional headquarters of the United States Forest Service at Milwaukee for special work on transportation problems involved in forest protection work.

Victor A. Beede has been appointed to the faculty of the department of forestry, Pennsylvania State College, to teach forest mensuration and forest management as successor to D. B. Demeritt, now associate professor of forestry at the Iowa State College. Mr. Beede, who is a graduate of the Yale School of Forestry, has had wide experience in woods work. For the past 12 years he has been connected with the Brown Co., Berlin, N. H., and the Brown Corporation, Quebec.

J. L. Van Camp has been appointed instructor in the department of forestry, Michigan State College. He will have charge of the forest nursery of the college, will conduct courses in nursery practice and in seeding and planting, and will engage in silvical research. Doctor Van Camp comes to Michigan from Saskatchewan, where he had charge of one of the Dominion forest nurseries. He is a forestry graduate of the University of Toronto. His work for the doctor's degree was directed by Doctor Faull, of Harvard University.

Paul Thompson, a forestry graduate of the Oregon State Agricultural College, is a full-time forestry instructor in the college this year, as a result of readjustments necessitated by the absence of Professor Starker on sabbatic leave.

John C. DeCamp, while on leave from the forestry department of the Michigan State College, is directing forestry and other conservation activities of the Hiawatha Sportsman's Club, which owns a 42,000-acre tract in the Upper Peninsula of Michigan.

Members of the American Geophysical Union whom O. E. Meinzer, chairman of the section of hydrology, has appointed as a committee to cover the subjects of infiltration and transpiration are Charles H. Lee (chairman), Harry F. Blaney, Lynn Crandall, S. T. Harding, W. C. Lowdermilk, B. E. Livingston, John E. Weaver, and W. N. White.

Percy M. Barr, who for some years has had charge of British Columbia's forest research work, has gone to the University of California to teach forestry during the remainder of the present school year. Doctor Barr is a graduate of the Yale School of Forestry.

Bibliography

Distribution and Mechanical Properties of Alaska Woods

By C. L. Hill, United States Forest Service

The increasing demand for information in respect to the resources of Alaska has been met, for the Alaskan forests and timber trees and the properties of their woods, by a recent publication of the United States Forest Products Laboratory.[3] The bulletin is characterized by the thoroughness and excellence which have come to be expected in publications from that laboratory. So far as space permits, everything is here gathered together that could be helpful in judging the usefulness and availability of the tree species discussed.

The introductory pages give a concise description of the timber resources of Alaska, indicating the division of its forests into coast and interior types and the predominating importance of the former type. This coastal forest, which is composed primarily of hemlock and Sitka spruce, with western red cedar as a frequent associate and Alaskan cedar more sparsely represented, is largely included within the Chugach and Tongass National Forests. The Forest Service policy in respect to these forests is stated as being primarily "the providing of a continuous and adequate supply of timber for the present and future wood-using industries of the region." A paragraph deals with the present timber production and export of the Territory and the probable future yield of its forests.

About 15 pages are devoted to describing the nine timber species of the region, each individual species description following this outline: Other names, general description, distribution and growth, supply, production, properties, principal uses. The species described are Alaska white birch, Alaska cedar, western red cedar, northern black cottonwood, mountain hemlock, western hemlock, balsam poplar, Sitka spruce, and white spruce. They are listed in the order here given, which carries through tabulations as well as text. To a forester it is a little irksome to find broad-leaved species and conifers mixed so indiscriminately in the listing. This was doubtless thought to be justified by the fact that the total number of species is very small; even so, it seems that the list would have been more usable if the two categories had been segregated.

Three tables (Nos. 2–4) giving the average mechanical properties, by localities of origin, of Alaskan and other woods are prefaced with a short explanation of the general nature of the mechanical tests employed. Table 2 gives data for Alaskan woods of 8 of the species previously described (the omission of northern black cottonwood is not explained), Table 3 for "woods from the United States proper whose range of growth includes Alaska," and Table 4 for woods of 8 Alaskan species and 10 other species, native to the continental United States, with which it is desirable to compare them. Since the species included in Tables 2 and 3 are identical, it seems that the author might well have combined these two tables, enabling the reader to compare the Alaskan values with those for wood from the States without the inconvenience of referring to different tables on different pages. The values in Table 4 are averages for all localities for which comparable data were available.

The author explains clearly, in some 12 pages, the nature of the various standard mechanical tests on small clear specimens, the significance and application of their results, and the criteria of variation of properties with specific gravity, the reliability of averages, and the probable deviation of individual specimens from the averages. The final pages of the bulletin proper are devoted to description and results of certain tests carried out at the former Seattle branch laboratory of the Forest Service on full-sized sawed structural timbers of Sitka spruce and western hemlock and on full-sized round mine timbers of Alaskan birch, western hemlock, Sitka spruce, and white spruce.

An appendix of some 25 pages gives the detailed test data on the individual structural timbers for which average test results are given in the body of the bulletin and, finally, a classification of green and air-dried western hemlock timbers according to grade which adds materially to the helpfulness of the volume.

It may be remarked that in this bulletin all the results tabulated are expressed in terms of the most exacting engineering practice. Composite strength values such as were used in Department of Agriculture Technical Bulletin No. 158, likewise prepared by the Forest Products Laboratory, would apparently have been more useful to a large proportion of the lay or semitechnical users of the publication. This suggests that the audience contemplated by the author was less the local users of Alaskan timber than the engineers of large timber or paper manufacturing interests.

The bulletin is illustrated by a number of plates, which contribute to the reader's understanding of the character of Alaskan forests and the way in which timber material was selected for testing. The laboratory was fortunate in being able to have a higher grade of paper used for these plates than that which in recent years has practically destroyed the illustra-

[3] Markwardt, L. J.: The Distribution and the Mechanical Properties of Alaska Woods. U. S. Department of Agriculture Technical Bulletin No. 226. 80 pp.

tive value of photographs in not a few Government bulletins otherwise highly valuable. The text is well written, in the terse style of the engineer. Some small imperfections have resulted from grammatical carelessness and inept punctuation.

A Light-Burning Study in Africa

By E. N. Munns, United States Forest Service

Among ecologists and foresters of Africa the "light-burning" problem is the subject of a controversy almost as lively as that which centers around it in America. We are further along because in this country the results of woods burning have been observed and studied for many years, whereas in South Africa the question to burn or not to burn is of comparatively recent origin. Furthermore we have not had to contend with the health argument for burning, whereas in South Africa the use of fire is widely advocated as a method of eliminating the tsetse fly, that dread carrier of sleeping sickness. This fly, like chiggers and ticks, is commonly found in brush-covered localities.

Recently John F. V. Phillips, forest research officer of Tanganyika Territory, East Africa, has made a rather general study [4] of the problem in southern Africa. Among his conclusions are the following:

Vast stretches have been kept in an "open" condition by annual or nonperiodic fires.

Fire has been an important factor in vegetational development and possibly in the elimination of certain growth forms.

Fire profoundly affects the behavior of animals associated with vegetation.

Fire brings about changes of far-reaching consequence in the physical, chemical, and biological conditions in soils.

Certain plants can be termed fire-indicators; that is, they develop under a practice of burning and their presence may indicate the frequent occurrence of fire.

Controlled burning is a *useful* and *oftentimes necessary* agent in veld management and in tsetse-fly control. (Italics are those of the author.)

The author urges that "generalizations regarding the influences of firing should be made only after the local circumstances have been examined."

Phillips sums up his experience by saying: "On reviewing what is known of the influences of firing in South and East Africa, I feel it desirable to urge the need of our carefully considering all regional circumstances in the light of scientific experience before we definitely decry the practice of firing. Possibly I may be criticized for this statement, but in making it I consider I have done my duty."

With such a statement even the ardent protectionists in America must agree. It is only through sound investigations that we shall be able to arrive at the truth, and what may be true for one vegetative type or ecological condition may not be true for another. Generalizations based on limited knowledge of conditions in one region have been held all too freely to apply widely to other regions where conditions are entirely dissimilar. In spite of all our beliefs and in spite of research to date, there is much yet to learn as to the possible use of fire in land management. Less loose talk and more clear thinking should characterize American consideration of the problem.

A Neglected Range Story

By William A. Dayton, United States Forest Service

On a recent visit to my office Earley Vernon Wilcox, well-known writer on agricultural subjects, perhaps most familiar to members of the Forest Service as joint author of Chesnut and Wilcox's elaborate report The Stock-Poisoning Plants of Montana (published in 1901), presented me with a copy of his bulletin The Grazing Industry.[5] It seems desirable to apprise foresters and others interested in the history of the western range and its problems of the existence of this valuable publication, which apparently has failed to attract the attention it deserves, probably owing to the fact that although it pertains to the range country of the western United States it was published in Hawaii. Professor Wooton names the bulletin, but does not quote it, in one of the bibliographies of his publication The Relation of Land Tenure to the Use of the Arid Grazing Lands of the Southwestern States (U. S. Department of Agriculture Bulletin 1001, published in 1922), and Doctor Sampson does likewise in his Livestock Husbandry on Range and Pasture (1928). These, however, are the sole references to it that I have thus far noticed in our range literature.

This bulletin by Doctor Wilcox gives the history of the public domain, with general description of the lands and notes on their extent, topography, climate, soil, vegetation, economic uses, forage plants, wild life, rodents, and insect pests, and also on such subjects as fires, effects of overgrazing, and methods of range management and improvement. The bulletin shows a very wide range of reading, and one of its most valuable features is an excellent résumé of the published range literature available at the time when it was written. Some of the passages are of especial interest because of their having been written more than two decades ago; for example, the author's definition of and notes on overgrazing, his discussion of the relative influences of various classes of livestock on range, his comments on erosion, and his recommendation of open herding of range sheep. Many of the older historical notes given are

[4] Phillips, J. F. V.: Fire—Its Influence on Biotic Communities and Physical Factors in South and East Africa. South African Association for the Advancement of Science. Report 1930, pp. 352-367.

[5] Hawaii Agricultural Experiment Station, 1911.

equally intriguing. One of these relates that Alexander Hamilton, in proposing "the first plan for the disposition of public lands," suggested that on account of threatened deficits in the Federal Treasury the wishes of capitalists should be given priority over those of actual settlers; another quotes President John Quincy Adams as declaring in his letter of instructions to Gallatin and Rush, the American representatives on the Oregon Boundary Commission, that in that region "there is no object to any party worth contending for."

The Rôle of Tropical and Subtropical Plant Growth in Forming Humus

By Bernard Frane, United States Forest Service

The impression that tropical and subtropical soils are poor or lacking in humus is not always correct and has caused an unnecessary neglect of the culture of such soils, P. Vageler declares in his book Grundriss der Tropischen und Subtropischen Bodenkunde.[6]

In Chapter III Doctor Vageler describes the important rôle played by many forms of plant growth in the accumulation of organic matter. The greatest accumulations occur as shallow peats in standing water and in the watercourses of sluggish streams such as the Congo, Niger, and Zambesi Rivers. Papyrus formations in Africa often reach a depth of more than 10 meters. They contain very little solid matter, however, and on drying shrink to a small fraction of their former volume and weight. When drained they are immeasurably superior agriculturally to the good lime-bearing temperate soils.

Shallow peat formations are limited to definite localities. In regions of high uniform as well as of intermittent precipitation forest moors are much more widespread, as in Borneo and Sumatra. They are the final product of forest swamps covering poorly drained lowlands. These forests are simple in composition and form, in striking contrast with the luxuriant virgin upland forests. The humus cover is seldom more than 1 meter deep and then only over subsurface depressions. Agricultural drainage is hardly practicable because of the thinness of the organic layer and the considerable leaching out of essential plant nutrients from the upper strata of the subsoil.

The deep peat formations of the Tropics differ altogether from those of the Temperate Zones. Although highly acid, with costly drainage and mineral fertilization they provide the rich mediums for tea culture in India and for the cultivation of the oil palm. In temperate climates the corresponding formations are at best only second-rate mediums.

The rain forest, the many-storied virgin forest of the Tropics, produces annually a larger quantity of organic material than any other type of forest on earth—at a conservative estimate, 100 to 200 tons per hectare. In a temperate climate humus layers a meter deep would result; but in the dampness, semidarkness, and warmth of the rain forest, decomposition is so rapid that humus seldom accumulates to a depth of even 20 centimeters.

Beneath the shallow humus there often occurs a red or yellow soil which appears to contain no organic matter but which actually contains in some cases 10 per cent or more of humus in its upper strata. A similar soil in the temperate climates would be very dark colored. This tropical soil gives the high acid reaction typical of virgin forest soils, unless the parent rock was highly basic. In that case the entire soil structure is different; the soil becomes weakly acid and exceedingly rich in plant nutrients to a great depth, and organic content may exceed 20 per cent. Unfortunately such soils are limited in extent, developing mainly from volcanic deposits of basic types such as occur in the Dutch East Indies. No other tropical soil type is so amenable to good management. Yet, with improper care, its qualities are easily destroyed.

The monsoon forest, representing a distinct transition from the rain forest, is of very simple composition. It produces annually about 50 tons of organic matter per hectare, which, in lowlands, may develop forest bogs. Elsewhere accumulation is relatively slight, decomposition being very rapid because of the high soil temperatures and the exposure to light caused by leaf shedding at the start of the dry season. A more or less decomposed leaf litter several centimeters deep overlies either a very thin, slightly organic layer, which quickly merges into the red subsoil, or the pure mineral soil itself.

The savanna is a formation which approaches the high grass type but in which trees and shrubs are still dominant enough to characterize the landscape. It produces little less organic material and has hardly less humus in its soils than the monsoon forest. This is true also of the bush forests interspersed with the savannas and occurring where annual precipitation ranges from 1,100 to 1,500 millimeters.

The tropical steppes are best developed over vast areas in West Africa and Central and South America having a minimum annual precipitation of about 600 millimeters concentrated in torrential downpours during a major rainy season and having a dry period of equal length. This holds especially for the high grass steppes on which occur trees and shrubs of the umbelliferae family, and for the "orchard" steppes.

The humus content of the high grass steppe soils is very slight; humus layers are lacking entirely. It is heaviest beneath the patches of forest and shrub growth scattered throughout this type.

If that portion of South America extending to 30° latitude is excluded from consideration, the dry forest and steppe rank as the most widespread vegetative type of the Tropics. In no other vegetative type are plant formations so radically modified by minor, barely per-

[6] Verlagsgesellschaft für Ackerbau M. B. H. Berlin SW 11. 1930.

ceptible topographic and edaphic factors. These are closely related to the soil-moisture requirements of the vegetation. The smallest depression in which water can collect becomes a soil-climatic "island" permitting the existence of otherwise exotic plant associations. This may be due merely to increased moisture or may result from the alkalinity of the water. A similar condition holds for the mountain slopes and cliff bottoms of the steppe region.

Throughout the arid region the production of organic material is small, and certain factors act to limit closely the accumulation of humus. The hot winds of the dry period scatter the fragile disintegrated grass leaves, depositing them far from their point of origin. Little decomposition occurs in the heat and dryness of the uppermost soil layers. During the rainy period the leaf remains are washed into depressions where moisture conditions permit rapid decomposition. Accumulation is hindered further by fire. The steppe fires, mostly man caused, lay waste annually thousands of square kilometers, destroying the dried plant remains. Carbon is a leading constituent of steppe soils.

Humus formation in conditions of aridity or excess of salts becomes localized, confined to the close proximity of individual shrubs and bushes. The humus is barely decomposed matter, chiefly saturated with salt, such as occurs in the tamarisk bush steppes of alkali regions.

In the desert proper, humus is practically lacking.

Stands established on abandoned clearings or burns in the Tropics have an enormous extent. Very little of the old humus persists. Even a thick humus cover disappears entirely within a few years after clearing or burning. These formations include the secondary savannas of the East Indies, especially in the Malay Archipelago where they consist chiefly of alang-alang, the most frightful weed of cultivated tropical soils.

Soils on which secondary plant associations occur are usually impoverished and undesirably low in humus. This fact must be carefully considered in selecting such soils for cultivation.

Canadian Station for Spruce Research

In a booklet multigraphed on bond paper and illustrated with photographs and maps the British Columbia Forest Service briefly describes the purpose and development of its Aleza Lake Forest Experiment Station. This station, established in 1924, is a center for research work in the spruce forests of the central interior of the Province. Situated on the Canadian National Railway 34 miles east of Prince George, it has an experimental forest of 6,600 acres. Investigations undertaken have dealt with factors affecting natural regeneration of spruce, the effect of soil moisture on the establishment of spruce reproduction, reproduction and growth in spruce-balsam forests after logging, natural reproduction after forest fires, slash disposal, and the extent of decay in balsam.

A Soils Study of Black Rock Forest

By J. T. Auten, United States Forest Service

A recently published bulletin [7] by Harold F. Scholz gives a clear picture of the soils of the Black Rock Forest, based on the results of a cooperative study by the Harvard Forest and the Black Rock Forest. (The Black Rock Forest is located just west of the Hudson River at the southern edge of the village of Cornwall on the Hudson. It is privately owned and is managed by Henry H. Tryon.)

A general description of the forest and of the climate and geology of the region, and a discussion and definition of podsol and brown earth soils, are followed by an explanation of the methods of sampling. Forty-six sets of profiles were studied, each consisting of three separate soil holes so spaced that the triangular areas demarked by the sample holes varied from 0.04 to 0.58 acre. The soil was examined by horizons for depth, structure, color, texture, and consistency. Samples were taken at fixed depths for humus and texture analysis. Root concentration was observed, also the topography of the site.

In characterizing the soil textures the author departs from the conventional procedure of using the upper 6 inches of soil and uses the 4 to 6 inch horizon. He does this, he explains, because root concentration is at its maximum at this depth and the texture of this horizon varies little from the average texture of the four steps from 0 to 18 inches.

It is not clear why this departure was necessary or desirable, inasmuch as the texture varied only slightly from the surface to the 18-inch depth. The zone of maximum root concentration varies with soil moisture distribution and tree species; consequently no fixed depth (aside from the arbitrarily chosen one, 0–6 inches) can serve as a basis for texture classification and at the same time accommodate itself to variation in root development. The author states, to be sure, that such a depth is used because it seems to fit this particular case.

The technique of the work and the presentation of material are excellent. There lingers in the reader's mind, however—this is by no means a criticism of the work done—a desire for some tangible connection between such an investigation and forestry plans for the area. If the work is to be a site evaluation, then soil properties must be correlated with tree growth and with suitability to species, or appraised by comparison with those of similar areas on which satisfactory stands have been established. This is only a beginning in working out the problem the three steps of which are (1) inventory of the soil, (2) suitability of the soil to individual tree species, and (3) possibility of yield of the chosen species.

The comment by P. R. Gast which accompanies Scholz's report seems to evince a feeling that further

[7] Physical Properties of the Cove Soils on the Black Rock Forest.

work is needed. It includes a generalized discussion of the principles of soil fertility and concludes with the statement that more sensitive procedures for measuring soil changes brought about by silvicultural methods are needed.

Forestry Courses in Germany

Under the title "Possibilities of Forest Studies in Germany," the foreign relations committee of the German Forestry Society has published an English version of its 16-page illustrated booklet outlining the opportunities for theoretical and practical training in forestry that are offered by the forest colleges of Tharandt, Eberswalde, Hannover-Munden, and Vienna, and the forest institutes at the Universities of Freiburg, Giessen, and Munich. Conditions of matriculation, examinations and degrees, language requirements, and expenses are discussed, and directions are given for obtaining more detailed information. Several copies of the booklet are available for distribution by the Branch of Research, United States Forest Service, Washington, D. C.

Notable Trees of Virginia

In publishing Notable Trees of Virginia, by J. Elton Lodewick and Mrs. Lynwood R. Holmes, the Virginia Polytechnic Institute has made a welcome addition to the records of historic and picturesque trees and trees of great age and size. The 24-page booklet includes photographs and information submitted by many individuals. Among the trees pictured and described are the live oak at William and Mary College, Williamsburg, which was designated as a line corner on a map made in 1678; trees planted by Washington at Mount Vernon; a cork oak smuggled out of Spain in 1847; and a northern white cedar at Natural Bridge estimated to be nearly 800 years old. It is unfortunate that the authors have not in all cases been careful to name the species of the trees mentioned. Locations are given with care.

Wood Utilization Bulletins from British Columbia

Four attractive bulletins published by the British Columbia Forest Service in cooperation with the Canadian Forest Products Laboratory and the timber industry of British Columbia deal with the utilization of Douglas fir, western red cedar, western hemlock, and spruce (including both Sitka spruce and Engelmann spruce), respectively. Each bulletin is profusely illustrated with excellent pictures showing a wide range of uses, both domestic and commercial. Each contains a table of mechanical properties. These bulletins should be of considerable value to anyone interested in the subject of wood utilization. The data presented are very similar to those contained in pamphlets published from time to time by different lumber manufacturing associations in the United States.

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