UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
GRAZING RESEARCH

GOVERNMENT PRINTING OFFICE 11937

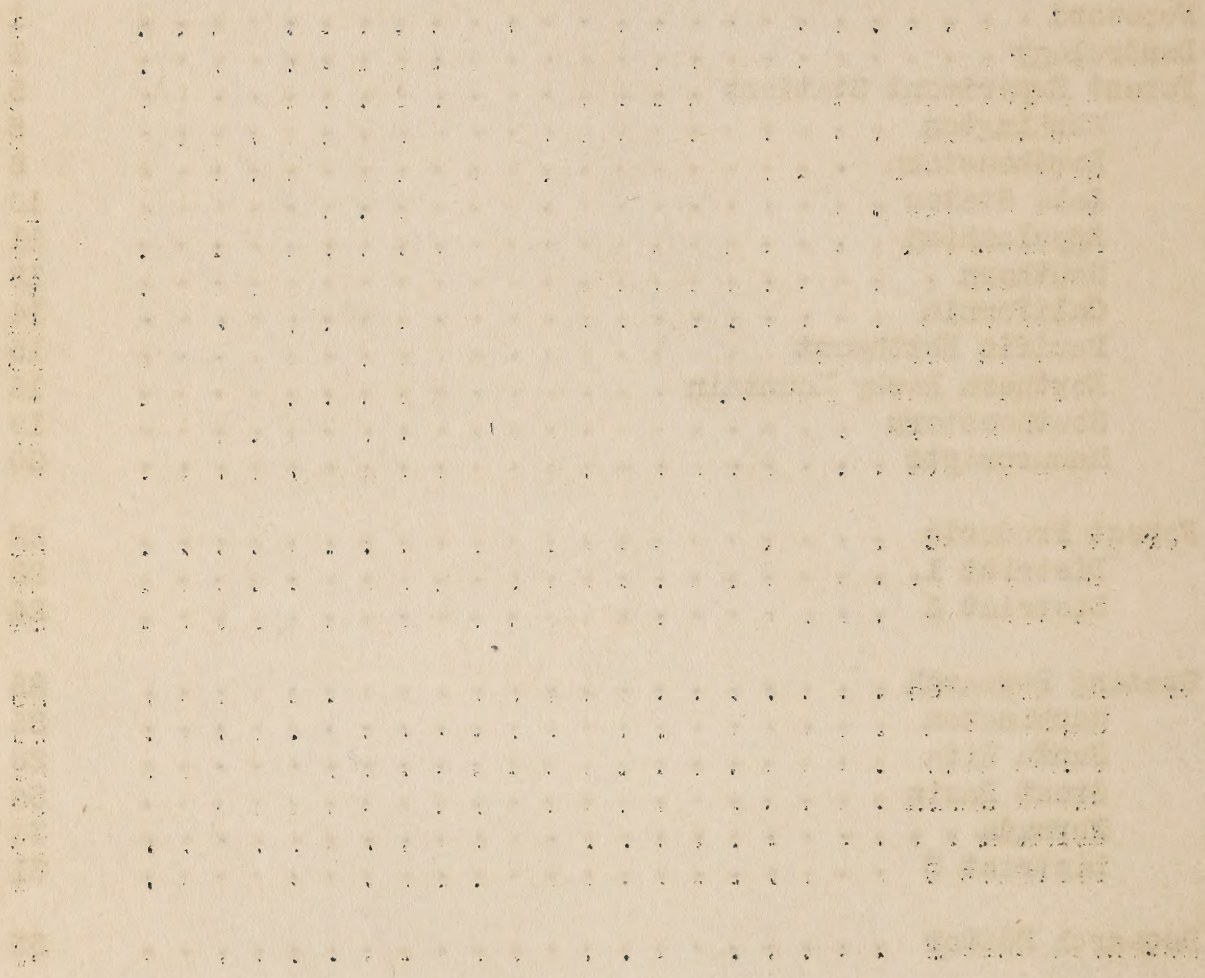
COMBINED MONTHLY REPORT

BRANCH OF RESEARCH

December, 1926

Reports not received:

Rocky Mt. Forest Expt. Station
Forest Products, D-5
Forest Economics
Forest Taxation Inquiry
Grazing Research, D-1
D-6



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FOREWORD

INTRODUCTION TO ORGANIC RESEARCH

E. E. Reid

Personnel - Breadth of Training.--The researcher must be much broader than his special line, much more than a chemist. He should be:

Broadly trained; not running off into some narrow field without a comprehensive knowledge of chemistry as a whole. I'd have him know his mathematics and physics, his botany, mineralogy, and geology - and literature, for he will need them all. I would have him be a chemist - sometime later he may subscribe himself an organic chemist, physical chemist.

The training of a research chemist should begin with the five senses:

Logic is judgment and judgment is a matter of sense; the facts which are used in forming judgments will be gauged accurately only if properly observed. The underlying requirement, then, of all research in which data are gathered first-hand, is that of accurate observation, the exercise of well-trained senses; upon this must be built a sound interpretation of the facts observed.

Our education, elementary as well as advanced, makes scarcely an effort to train the senses; instead, emphasis is placed on the development of the memory and of reasoning, though both are really capable of useful development only when there are first-hand observations to remember and conditions which call for the exercise of judgment. Efforts to develop the power of reasoning are essential, because facts in themselves lead nowhere, but it is none the less true that accurate observation is the first requirement.

For the chemist it is of the very first importance to be able to discriminate between slight variations of hue or shade, to recognize minute differences in the macroscopic and microscopic structure of precipitates, to recognize trifling changes in bodies, and to recall them; he should have a delicate sense of touch and of smell. Not only should he be able to recognize these differences absolutely, but he should have sufficient accuracy of observation to judge of them relatively, even when both are not before him at once. He should have a very keen memory for sense impressions. To have such keen senses he must have developed them during the period extending from infancy through the first years of childhood. That the chemist fails so often to observe rightly is thus an outcome of the fact that there is nothing like a concentrated effort made by the community to develop the senses through the period of childhood and thus to train the faculty

(Over)

of observation. The evolution of the physical organs of sense is left to chance and in the majority of human beings remains in a very slightly developed condition.

Acquaintance with many things outside of chemistry is essential.

A good research man must have a broad training; he must be familiar with subjects other than chemistry, other than the sciences. He must be able to write his own language clearly and state his conclusions with proper emphasis. But the highest attribute of the human mind is constructive imagination; it is this which, in its greatest perfection, leads to the creation of works of art which add to the beauty of the world, and gives us our men of science, those whose vision makes possible the formulation of new theories, new interpretations of the universe. In a lesser degree it is essential to all good research, and our educational institutions should strive to develop it. The best food for the growing imagination are the products of man's mind; more effort should then be made to interest the student in becoming familiar with the beauties of music, poetry, and the graphic arts; in his chosen field he should be led to see the grandeur of the achievements of the human mind by a study of the history of the growth of the great theories of science. He should be encouraged to learn more of the other sciences than is usually the case, more especially the biological group, and he should be given an interest in the development of human society.

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DENDROLOGY

Extended Range of Norway Pine

A year ago announcement was made that the range of Pinus resinosa had been extended from southern Pennsylvania southward into Pendleton County, West Virginia., which is the most southern point at which point it is now known to grow naturally.

From a report just received from the Office of Mr. Lynn W. Meekins, Trade Commissioner of the United States Department of Commerce, Ottawa, Canada, it is learned that the range of Pinus resinosa has been recently extended in Canada far north of previous records for that region. In the course of a survey of Manitoba by aeroplane a body of Norway Pine was located on an island in the south end of Lake Winnipeg, southern Manitoba, at approximately 51 degrees north latitude. That this species is actually represented by the forest located by aeroplane was later determined by an examination of the trees on the ground. Previously this pine was known to grow through central Ontario and southward into the valley of the Winnipeg River.

Canadian foresters look with considerable interest upon the location of this Manitoba tract, because it is believed seed from these trees will afford a hardy form of the species for propagation in the North.

Fortunately, unavoidable delay in issuing the new Check List has made it possible to insert this new extension of range.

Extended Range of Chestnut Oak

Until quite recently Chestnut Oak has not been known to grow naturally any farther west than southern Indiana. Mr. Paul G. Redington brought back specimens of leaves and acorns, which he and State Forester of Illinois, Mr. R. B. Miller, found on gravelly hills in Union County, Ill. They prove to be Chestnut Oak (Quercus montana), thus considerably extending the range of this oak in a southwesternly direction. It is probably that further careful search will discover the tree in adjacent sections of Missouri and possibly also farther north in Illinois. The State Forester of Illinois writes that credit is due Mr. Edward Karraker of Jonesboro, Ill., who first collected specimens of this unknown oak and sent them to Mr. Miller.

Tree Range Maps

Progress is being made in the preparation of tree range maps for the Forest Experiment Stations. The intention is to supply sets of these maps to all of the Stations, the different species mapped comprising such species as grow naturally in the territory covered by each Station. At the present time the Northeastern Station has been supplied with 76 distribution maps, and shortly 20 other maps will be added to these. The Great Lakes Forest Experiment Station has received 14 maps, to which 20 other maps will be added within a few days. Maps for the other Stations are being prepared as rapidly as distribution data can be compiled.

It is expected that with complete sets of these maps, which will contain all of the distribution data of record, the various Stations will, through daily contact with their regional forests, be able to refine and correct a good many of the distribution lines now laid down for the different species. Such criticisms are eagerly looked for. The Northeastern Station has already contributed a number of helpful criticisms made possible by local field observations.

Federal Horticultural Board Activities

The Pink Bollworm was recently found for the first time infesting cotton fields at two points in southeastern Arizona. Previously this pest has been successfully held back in its westward advance to a few isolated points in eastern New Mexico, from which it has been practically eradicated, so that the main infestation is confined to southern and southwestern Texas, where by special efforts the Board has greatly reduced the infested areas. Prompt attention now being given to the control and extermination of the insect in the newly infested areas will, it is believed, prevent further spread in Arizona. The frequent passage of Mexican laborers to cotton-growing centers in Arizona is held to be the immediate source of infestation. Such laborers are constantly carrying pillows stuffed with raw Mexican cotton, which is invariably infested with the Pink Bollworm.

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FOREST EXPERIMENT STATIONS

Washington

New Assistant on Job

Francis H. Eyre reported in Washington the latter part of December to take on his new duties as assistant in the Office of Forest Experiment Stations. Eyre began his forestry education at Cornell, later switching to the University of Michigan, from which institution he graduated in 1922. On leaving school he went to District 4, and after serving in various National Forests in the District as a junior forester, was made Assistant Supervisor of the Wasatch Forest. Here he specialized in timber-sale and management-plan activities, and comes to us with the sincere best wishes of the District. Eyre will spend most of his time for the present becoming familiar with the intricacies of the experiment station machine.

General

December in Washington was a rather lonesome month, as many were on leave, though Washington continued to be a Mecca for those en route home for the holiday season. Wyman, from the Southern Station, spent some time on naval stores correlation work; Forbes, from the Southern Station, drifted through en route to the Philadelphia meetings of the Association for the Advancement of Science, where also were Bates, Haig, Munns, both R. H. and Marinus Westveld, Haasis, and Dana.

Legislation

Congress convened the early part of December and proceeded to act upon the Agricultural Appropriation bill. The bill this year provides for an increase of $60,000, which is to be equally divided for the establishment of the Ohio Valley and the Pennsylvania Stations, the money for these two stations to become immediately available upon the passage of the bill. In addition, the appropriation bill also carries an increase in the Silvicultural Investigation item of $22,000, this being the SI share of the old "Statutory Salary," $22,000 being the amount of "Salaries" in the Washington office chargeable to experiment station work. This provides for the salary liability incurred in the library, mensuration section, files, compilation, and stenographic assistance.

An amendment to the Agricultural Appropriation Bill was introduced in the Senate by Senator Fletcher providing $50,000 for additional naval stores investigations. The Senate Agricultural Committee in its hearing allowed $10,000 to stand, and this amount was passed by the Senate. However, half of this amount was lost in the conference between members of the two Houses.

The Senate Committee also provided an increase of $5,000 for the fire weather warning work in the Weather Bureau and for $12,000 additional upon chestnut blight work. This probably will be spent largely for the introduction of Chinese chestnuts, and for further foreign exploration of resistant species. Some $9,000 was allowed also for the Forest Products Laboratory. The House Bill already provided for $100,000 additional in blister rust control. No increase was made for other forest pathological or for forest entomological work.

A curious mistake in the House resulted in $1,000 being set aside from SI for the improvement of the Bessey Nursery. The author of the amendment intended it as a clause in the Planting item. This will be provided for administratively.

Mensuration

Haig came east the latter part of December to work on the western white pine yield study. He will be assisted in this by the Computing force together with Bruce and Reineke, and, as the Appalachian Station has also detailed Buell to Washington for a short time it is expected that he also will assist Haig in this work.

The new sorter for the tabulating work arrived the latter part of December, but it was found that the machine had been subjected to such rough handling that the instrument was a wreck. After about a week's delay the machine was replaced and is in operation. An order has been placed for a new tabulator to augment the existing one and so as to increase our output of work.

During December over 60 per cent of the time of the Section of Forest Measurements was devoted to getting the western white pine yield study under way. Preliminary volume tables were prepared and the computation started so that when Haig arrived there was no delay in starting his work. In addition, a number of minor miscellaneous matters were taken care of, such as the continuation of the technique of mensuration in forestry, and cleaning up some details on the southern white cedar study for the Appalachian Station. Some help was given Wyman in his statistical analysis of the gum yields from his naval stores studies at Sterke.

On account of pressing needs, about 45 per cent of the work in the Tabulating Section was devoted to the needs of Accounts, while an additional 45 per cent of the time was devoted to the Northeastern forest fire study. The balance of the time was taken up by several minor studies on which information was urgently needed.

Biological Abstracts

The first number of Biological Abstracts was issued during December. This magazine should be in every experiment station. The subscription price is $15 per volume, the volumes coinciding with the calendar year.

Because of the contribution to the journal by biologists generally, a reduction of 40 per cent on all personal subscriptions is offered, so that the cost to the individuals is $9 as against the $15 for all organizations. The new journal is about the same size as Botanical Abstracts, but the paper is more opaque, is thinner, and the new arrangement permits about twice the number of entries found in the original journal.

Increment Borers

A note from the Supply Depot indicates that extra increment borer augers and extractors are carried in stock and can be had occasionally. This is rather important from our standpoint, in view of the fact that perhaps more instruments are broken at the experiment stations than elsewhere because of our greater use of these instruments.

In order to work out the advantages and disadvantages of an increment borer in hardwoods, K and E made a special increment borer for us with a slightly flattened pitch as compared with the regular type. McCarthy and Hursh tried this out and report that the new instrument gives a slightly greater penetration in the same period of time than did the standard type. They report the advantages to be greater ease of turning due to the lower pitch, less liability of chipping the flanges, and greater ease of turning the borer. However, the new instrument cannot be sunk to any greater depth than the standard type because of pinching and binding on the shaft. This appears largely to offset any advantage of the flatter pitch when it comes to deep borings.

Aluminum Tags

Those stations needing aluminum tape for stamping out their own tags can procure it from Roover Brothers, 100 Schermerhorn St., Brooklyn, N.Y., at about $1.25 per roll in lots of 6 rolls.

Library

Stations not now receiving the Bulletins of the Roosevelt Wild Life Forest Experiment Station of the New York State College of Forestry at Syracuse, should request that their names be put upon the mailing list of that institution. The October, 1926, issue on the Relation of Birds to Woodlots is a fine piece of work. Among the things brought out in this work are the Habitat Associations of Woodlot Birds, the Role of Birds in Woodlot Ecology, Forest Insect Pests and Bird Enemies, and Woodlot Policies in Relation to Birds. Pages 153 and 154 should be read by every member of the experiment station force.

Two inquiries from the field indicate an interest in the work of Bose, the Hindu botanist. Station men will find the books entertaining, but as the studies outlined have been thoroughly discredited and have been shown to be based more on imagination than on fact, the book cannot be recommended.

Last month there were 882 loans of books and periodicals from the library, and 138 members of the Service and others consulted the library in person.

The librarian indexed 309 books and periodical articles for the catalogue.

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NORTHEASTERN FOREST EXPERIMENT STATION

In the preliminary study of some of his form study data, Behre found it advisable to make an investigation of the relative accuracy of the Swedish bark borer as compared to the hatchet and rule for measuring bark thickness. Two opposite measurements were made at breat height on the stems of 162 red spruce trees in Berkshire county, Mass. The trees covered a wide range of size and age and were taken from both even-aged second growth and mixed old growth. In this test of 324 pairs of measurements the bark borer gave a double bark thickness averaging 0.08 inch greater than the hatchet and rule. The difference tends to increase with diameter of the trees, but this relation was not very closely defined. The regression line showed the difference between the double bark thickness measurements to exceed 0.1 inch in trees 13" d.b.h., or larger.

Since a previous investigation on a peeling job had shown that the Swedish bark borer gives results lower than the actual difference between outside and inside bark measurements with diameter tape, it must be concluded that this instrument is more accurate than the hatchet and rule if the object is to estimate the actual diameter inside bark, as is usually the case. On the other hand, if the object is to get a true picture of actual thickness of bark without respect to diameter measurements, the hatchet and rule, when carefully used, should give the better results, because a stretch of bark 2 or 3 inches in length is exposed from which a reliable figure, unaffected by projections and irregularities of no real significance in judging actual thickness of bark, may be obtained.

With reference to the construction of thermocouples mentioned by Korstian in the Experiment Station Report for November: Gast has found a very convenient method for fusing the junction in an electric arc. This method was devised by the Weather Bureau for the construction of multiple junction thermopiles. It can be used with copper-ideal and iron-ideal couples. ("Ideal" is the trade name for constantan.) One end of a 110-volt alternating or direct current lead is connected to a pointed carbon terminal, or the carbon electrode of a small dry cell may be used. The other lead is connected to a pair of tweezers. The wires to be welded are

twisted together and seized just back of the twist with the tweezers. On touching the twisted wire to the point of the carbon an arc is formed which fuses the wires back to the tweezers where they form a bead. The amperage may be conveniently regulated by a bank of electric lamps in series. According to the size of the wire to be fused 2 to 0.5 amperes may be obtained by use of 250 to 50 watt lamps. It has been used for making junctions of wires of B. and S., numbers 40 to 15. Gast has also done some spot welding in an atmosphere of hydrogen, which is convenient because it prevents oxidation of the metals of the junctions, and more uniform e. m. f.'s are obtained. Details will be sent to those interested.

Last summer the Northeastern Research Council suggested that since so many agencies are now interested in investigations on the white pine weevil it would be desirable to hold a conference to determine the points on which further information is needed and the best means of getting it. As a result of this suggestion arrangements were made to hold a conference in connection with the meetings of the Association for the Advancement of Science and its allied societies on December 29, and the following men were present: J. M. Swaine and R. Hopping, Dominion Entomological Branch, Ottawa, Canada; H. L. Bailey, Entomologist, Vermont Department of Agriculture; H. B. Peirson, State Entomologist, Maine; H. W. Hicock, Connecticut Agricultural Experiment Station; S. T. Dana and H. J. MacAloney, Northeastern Forest Experiment Station.

The consensus of opinion was that direct control measures, except on relatively small areas, were too expensive to be used. Doubt was expressed by all regarding the effectiveness of native parasites. Doctor Swaine suggested that any contemplated breeding and liberation of parasites should be carried out at some laboratory fitted for that purpose. It was suggested that these phases of the investigation be curtailed, only enough time being spent to assure the completing of the experiments now under way at or in the vicinity of the Harvard Forest.

It was decided to concentrate as much as possible on the development of control measures through improved systems of forest management. Density of stocking in pure stands and the composition of mixed stands necessary for protection from the weevil attack were discussed and it was decided that further work should be done along these lines. Cooperation in this study will be continued by Vermont, Connecticut, and Maine. At Doctor Swaine's invitation, it is expected that MacAloney will spend a few weeks next summer in collaboration with the Dominion Entomological Branch.

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LAKE STATES FOREST EXPERIMENT STATION

The revision of the manuscripts "Timber Growing and Logging Practice in the Lake States" and "Forest Planting in the Lake States" has been completed. The computation of the aspen field data and the recomputation of some of the original data of the logging study on Comparative Costs of Logging Small and Large Trees was continued, and cubic foot yield tables for aspen completed.

Wackerman was working up his field notes taken last summer at the Upper Peninsula Station and compiled and analyzed the weather records of the three stations, one in the forest, the second in the open, and the third in the swamp. He also dried the leaf litter collected from the sample plots last summer for further weighing and chemical analysis.

R. M. Brown got infected with the professorial microbe and accepted the position of Assistant Professor, effective January 1, at the Forest School at the University of Minnesota to teach Forest Mensuration. Much as we regretted his leaving our ranks, we rejoiced in the fact that at last there will be someone who is going to teach a subject for which he is especially trained and fitted by his past experience and work.

The Station was active in securing recognition of the importance of forest soils in the forthcoming discussions of the First International Soil Congress to be held next June in Washington. The President of the Congress and the Executive Council expressed themselves in favor of creating a special section on Forest Soils, which would handle all papers bearing on forest soils.

The Station participated in an informal conference with representatives of the Nurserymen's Association on providing forest planting material for State and private forest lands. In the past Minnesota nurserymen fought any attempt to create a State forest nursery. As a result of this conference the nurserymen requested the foresters to present a draft of a bill which they could support. The Minnesota Conservation Council, an organization embracing 250,000 people, requested the Minnesota Section of the Society of American Foresters to draft a similar bill which the Council would be willing to endorse.

The passage of the forest tax amendment last November brought to the front the question of drafting the forest tax legislation in conformity with the letter and spirit of the constitutional amendment. In view of the complexity of the problem the Station took the position that it would be desirable to have a legislative joint committee from the upper and lower branches of the Legislature to consider the matter, have hearings, and later bring in a bill of its own. This suggestion has been adopted and recommended by the Governor in his message. Fred Vibert is to be the secretary of the joint legislative committee.

CLOQUET FOREST EXPERIMENT STATION - NOVEMBER-DECEMBER

Cutting operations were begun in a 100-year-old stand of mature jack pine. Because of the defective nature of the stand and its overmaturity, it will be cut clear. The slash will be burned as logging progresses.

Two auto trailers with 200-gallon storage tanks were built. These are to be a part of the regular fire-fighting equipment and are to be used in conjunction with 5-gallon one-man pumps and fire extinguishers.

Power equipment for tool grinding and saw gumming was installed. The necessary shafting was installed to operate the cone shaker in the seed house by electric power.

Fourteen bushels of white spruce cones were extracted, yielding 20 pounds of seed. Two bushels of white cedar cones were extracted yielding 3½ pounds of not very clean seed.

Winter set in early with sub-zero weather early in November and early snow.

A fire plan was made for the Station tract. Early in November Hansen spoke before the annual meeting of the Horticultural Society.

Early in December Station headquarters were moved to St. Paul for the winter. Hansen took annual leave during the last two weeks in December.

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APPALACHIAN FOREST EXPERIMENT STATION

General

Active field work closed during the early part of this month when several lines of work on the Station Forest were suspended for the winter. Sims and Buell were engaged in this and the computation of the Station Forest survey until they left Asheville on annual leave.

An opportunity to dispose of some fuelwood on the Station Forest furnished the first chance to get cutting done with the purpose of improving the stand on a small area. This cutting was already completed during the month and it shows that a good portion of the sapling and small pole stands will have to be removed to give place to thrifty, sound growth. Fire scars and interference of larger defective trees have seriously damaged stands that appear sound on first examination.

Hursh helped in the compilation of data on spruce regeneration in order to bring this earlier into shape for publication. He also attended to the distribution of some of the seed collected in the fall to agencies within the Forest Service and to research institutions.

Methods of Cutting

Sims compiled the field data collected during the year in the re-examination of the Forest Service timber sale area on the Horse Fork of Curtis Creek, Pisgah National Forest. The first examination of this area was done in 1922, by means of strips tallied and staked after cutting had been completed. Tentative plans were prepared by Frothingham, Korstian, and McCarthy for increasing the work on this project with the object of making a report on it early in 1928.

Oak Study

Preparation of volume tables for second-growth oaks was started during the month. The irregular intervals at which stems were measured by the various agencies which collected this material complicated the task of volume table preparation. Reineke's method of planimetering the volumes is being used and is quite a satisfactory solution for such irfegularly dimensioned data. A plotting board was devised by McCarthy to use plain paper for the individual tree graphs.

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SOUTHERN FOREST EXPERIMENT STATION

General

The Southern Station was represented at the annual meeting of the Society in Philadelphia by Forbes and Wyman.

Cooperation with the Zoological Laboratory of Tulane University was established during the month and permission obtained to use some of their laboratory equipment whenever needed. Pessin visited the Laboratory several times in connection with his investigation of the relationship between mycorrhiza and Southern pine seedlings.

Protection, Fire

Forbes, Demmon, and Barrett spent two days at Urania and found weather conditions very favorable for burning the fall fire plots there. It took but 15 minutes to obtain a complete burn on a 1/5-acre plot. The State fire organization proved to be functioning satisfactorily when the State lookout tower man 12 miles away picked up the fire and had a patrolman out in search of it within a few minutes after it was first observed. The fire, however, was completely out before the patrolman had had time to arrive.

Measurements

Considerable time of the clerical force was taken up in checking and recopying the pine growth tables.

In order to check up on methods of site determination in the field, Demmon and Forbes spent a week in southwestern Arkansas on the property of the Dierks Lumber Company. Here they were joined by Mr. W. L. Hall, the consulting forester for the company, Mr. N. T. Barron, the resident forester, and A. J. Streinz, Assistant Supervisor of the Ouachita National Forest. The results of this trip were very gratifying and it is now felt that we have a satisfactory method for site determination. The analysis of the data taken on the sample plots during this week showed actual yields in even-aged second-growth stands in that region which in many cases overran the figures given by the pine growth tables. The indication that the second-growth pine table figures are conservative was very gratifying to all parties.

Management

Demmon continued the analysis of the extensive survey field notes covering Louisiana and Arkansas.

The progress report of the Urania thinning experiments was completed at the end of the month by Gemmer, after which he left to take up his new duties as Junior Forester on the Choctawhatchee Division of the Florida National Forest.

Naval Stores

Early in December Wyman spent about a week in Washington on the statistical analysis of this year's field data, in which he used the system of multiple curvilinear correlation.

During Wyman's absence from Starke the routine work of daily weighings, weather observations, remeasurements, and transferring of records to permanent office forms was carried on by Student Assistants Ochsner and Sanders.

Forestation

This year's experimental plantings at Bogalusa were completed with the planting of 50 Pinus insularis seedlings, and 200 loblolly seedlings apiece from seeds from each of four different Southern States. Wakeley with Barrett's help continued the analysis of seedling measurements. The conclusions to date indicate that top heights of longleaf and slash pines have an arithmetic frequency distribution but top, root, and total weights, and root and total lengths have a logarithmic distribution. If this proves to hold true generally it may necessitate a change in methods of analyzing nursery data.

Wakeley visited about 20 square miles of the Great Southern Lumber Company's plantations with Professor Hayes of Louisiana State University. The company this year is trying out planting of various hardwoods including Carolina poplar, willow, and tulip poplar.

Protection, others

Pessin in the course of his recent visit to the McNeill experimental area has observed certain differences in the occurrence of fungi on the burned and unburned portions of the Pasture which if supplemented by similar observations elsewhere may give, through the presence of certain fungi, an index to the effect of fire.

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CALIFORNIA FOREST EXPERIMENT STATION

Southern California

With the opening up of the Devil's Canyon Nursery on January 1, the Station formally embarks on its program in the watershed forests of southern California. Roscoe Weaver will be in charge of the nursery and planting work. He is a technically trained forester, having been employed by the U. S. Forest Service, the Philippine Forestry Bureau and the California State Forestry Service. Public attitude in southern California is strongly for an extensive program of afforestation in the present brushfields. This substation, which will be largely supported by city, county and State funds, will devote its energies in studying the problem of afforestation. All surplus stock will be distributed to the cooperating agencies.

Siggins has been reviewing all available sources of information on previous planting and nursery work conducted in southern California.

General

Dunning has been crowding through two jobs concurrently, namely, the Methods of Cutting studies and a Tree Class Summary for use by timber sale men in marking in the pine types. Dunning also prepared a paper for the local section of the Society of American Foresters on "Water and Forests."

Considerable progress has been made in the State type map. Wieslander, with the help of the State Rangers, has completed mapping in the field 54 townships outside of the National Forests. Lumbermen and others are evincing considerable interest in this project.

Kotok attended the annual meeting of the Western Forestry and Conservation Association at Victoria and delivered a paper on "Restocking in the Western Yellow Pine Region." This meeting was followed by an interesting conference with British Columbia foresters at which Munger and Weidman participated. As a result of this preliminary discussion, it seems probable that a better coordination of programs in the western experiment stations may result in the future. The Canadian foresters were particularly anxious not to needlessly duplicate work.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Three adding machines have been kept busy most of the month, for office computations have been in full swing.

Munger attended the Annual Meeting of the Western Forestry and Conservation Association in Victoria. As usual this meeting gave stimulating contact with many forest people from the five States and there was good discussion both in the sessions and outside for 3½ days. The rather technical phases of forest management and protection had a good deal of space on the program and were well received. One of the resolutions read as follows:

"Appreciating that progress in reforestation and the management and protection of forests is contingent upon technical research, we commend the policy of the United States Forest Service in establishing regional forest experiment stations, and hope for the expansion of these studies."

After this meeting an impromptu International Research Conference was held in the British Columbia Forest Branch Office attended by Alexander, Barr and Pickford of British Columbia, and Kotok, Weidman and Munger. Chief Forester Caverhill and Chief of Silviculture Manning listened in part of the time. Coordination of fire studies, phenological studies, seed dissemination experiments, and the technique of natural reproduction research were the principal topics of the informal talk. Such "get togethers" are stimulating and effect a real advance in projects in which all are interested.

Mr. A. N. Perham of Rotorua, New Zealand, was another visitor. He is making arrangements for buying seed of Pacific Coast conifers, particularly how to get the best strains for New Zealand conditions. He was especially interested in the western yellow pine that grows on the bottomlands of the Willamette valley near Portland, sometimes called var. Benthamiana.

Much of McArdle's time during the month was spent on the lightning storm study, evolving ways and means of using the punched card system of analyzing certain of the data, checking up on forests which failed to make reports, in writing a plan for handling the data after it is received from the tabulating machine. About a week was put on the Douglas fir yield study.

Meyer has completed the computations on all the Douglas fir permanent growth plots and has been working on a manuscript embodying the results from these plots to date with a view to publication. Two sixty-five-year-old plots have a volume of 65,000 board feet (Scribner) per acre, three fifty-three-year-old plots have a volume of 46,000 board feet per acre, and two approximately 70-year-old stands on a very good site have the large volume of 88,000 board feet (Scribner) per acre.

Isaac spent about 10 days in the field making the periodic seed collection from seed traps and seeding sixteen natural reproduction plots. The plots were seeded to insure a sufficient number of seedlings to work with during the coming year. The work was done in December to avoid loss due to migrating birds and hibernating rodents and still give the seed sufficient time to be soaked up and worked into the soil by the winter rains and snows.

Near Scappoose, Oregon, several pictures were taken of growing fir stumps, the interesting phenomenon due to natural root grafts with living trees. The top of one 36-inch stump was completely grown over and it had increased 4 inches in diameter since cutting 48 years ago.

Isaac and Simson built a new box kite to be used in the seed dissemination tests. It is 5 feet long and weighs 2½ lbs. Everything is in readiness for these tests whenever there is a snow blanket and the right weather.

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NORTHERN ROCKY MOUNTAIN EXPERIMENT STATION

At the Blister Rust meeting, Weidman had a paper on "The Need for Further Study of Growth and Yield of Western White Pine from the Standpoint of Blister Rust Control." A year ago it was planned to finance such studies from the Blister Rust Control office. That finally did not prove feasible and this year it is hoped that the work may be made possible through the passage of the Johnson Bill. If passed, this will place the Northern Rocky Mountain Station on an adequate financial basis and will readily permit going into the aspects of growth and yield studies which pertain particularly to blister rust problems.

At the Victoria meeting, Weidman had an opportunity to appear on the program on the subject, "Results of the Season's Studies of Restocking Habits." Other papers under this heading which discussed the results for the regions represented were by Munger, Kotok, Dean Miller, and J. L. Alexander (representing the British Columbia Forest Service). Weidman confined his remarks to the recent indications with regard to stored seed and seed trees as sources of reproduction after logging and forest fires in the western white pine type. As in the case of recent investigations in the Douglas fir region, our own studies in the last two or three years have indicated more and more the greater importance of disseminated seed as compared with stored seed as the source of most of the reproduction which follows the removal of the parent stand.

Munger, Kotok, and Weidman had a round-table discussion with the three men comprising the research staff of the British Columbia Forest Service. Considerable attention was paid to fire and reproduction studies. One of the points which made an impression on all was the need for greater uniformity of methods and the need of keeping more closely informed of each other's work. Steps will be taken for the more intimate exchange of ideas, particularly in the field of fire studies.

The office work of the white pine yield study came to a close in Missoula with Haig's departure for Washington. The temporary computers who had been on this job for the greater part of six weeks were released just before Haig's departure. As a result of the concentration of office help at this end xxx the material was in excellent shape for taking to Washington.

Gisborne has just completed a study of the meteorological high lights of the Quartz Creek fire. This was one of the larger fires on the Kaniksu last summer which burned within two miles of the Experiment Station. Its area was 18,000 acres and it burned for 28 days. Gisborne spent a good deal of time making measurements and observations on this fire. His conclusions are that whenever the atmospheric elements conspire to produce fuel moisture contents of 10 per cent or less on the exposed areas, rapid spread of fire may be expected. The indications are that variation in the rapidity of spread under these conditions will then depend upon wind velocity. On the 21 days when this fire spread the least the average wind velocity was 6.7 miles per hour between 6.00 a. m. and 6.00 p. m. On the 7 bad days, when 53 per cent of the area was burned, the average was 9.9 miles per hour. In this connection it is felt that if forecasts of wind are to be of maximum value they must provide expressly for the daylight hours, or they must subdivide the present classification of light winds (7 miles per hour or less) into at least the two following divisions: 0 to 5 m.p.h. and 5.1 to 7 m.p.h. It is believed that forecasts for the day-time winds will be much more valuable than the averages for the entire 24 hours. Gisborne also took temperature and relative humidity measurements. In the case of relative humidity, these show an average minimum of 20.1 per cent for the 21 days on which the fire did not spread rapidly and 18.4 per cent for the 7 days when it burned most fiercely.

A minor fire investigation is worthy of mention. Two wood samples, 2 inches in diameter and 18 inches long, were exposed side by side on an old burn during the past summer and their moisture contents measured daily. The results show that the two samples responded almost identically to changes in the weather. Both samples are now being oven-dried and one of them will later be charred on all surfaces as if it had been partially burned in a forest fire. Both samples will then be exposed for another season and the moisture contents determined regularly to ascertain whether or not a blackened and charred surface appreciably affects moisture content and therefore inflammability. If the charred sample shows moisture content sufficiently lower than the check sample, the results will indicate that incomplete burning of wood (such as always results in forest fires and particularly in broadcast burning of slashings) is apt to increase fire danger by rendering this material more susceptible to rapid and great dyring.

Wahlenberg spent considerable time on laboratory and compilation work preparatory to moving to Missoula for the winter office season. An interesting item which he reports concerns fall sowing in Savenac Nursery. In accordance with results of experimentation, western white pine seed is regularly sown during the first two weeks in September. Due to the failure this fall of the usual sources of seed in northern Idaho, the seed supply became exhausted after sowing 64 beds in September. As a result of favorable fall weather, it was possible to collect additional seed from the Lolo Forest and extract it in time to sow 27 additional beds on December 6. The result of this winter sowing will be watched with considerable interest.

As a part of the intensive fire protection plan for the demonstration forest, about 16 miles of trail construction is to be undertaken in 1927. The trail specifications and estimates for this work have just been revised. With the extension of the trail system planned for next summer, the total trail mileage in the demonstration forest will exceed 30 miles. This will make possible the passage of a trail or road through each quarter section in the existing 4,000 acres of the area. The new trails will particularly open up the Canyon Creek drainage to the protection and research men. As now planned, any point on the area will not be over 15 or 20 minutes' walking distance from a road or trail. This will greatly reduce the present hour control. Fire protection on the demonstration forest at present is afforded by an organization of a district ranger, an office assistant, two smokechasers, two or three resident Experiment Station men, and a small trail construction crew. In addition, there is a 20-mile trail and road system, a telephone line through the length of the area, a primary and secondary fire lookout point, and full fire-fighting equipment including a modern, portable pump with 1,200 feet of hose permanently located at the Experiment Station. Also, there is an experimental firebreak one chain wide and two miles long on the ridge along part of the south boundary of the area.

Perhaps the largest contribution of the year is McIntyre's report on methods of brush disposal. This, while not strictly an experiment station project, is very closely tied in with the work of the station. Some of the high points may be summarized as follows:

No form of brush disposal will meet the needs of all forest conditions, and instructions should be flexible enough to permit the application of the method best adapted to each local area. The heavy soils that bake, the loose cinder soils, soils that erode readily and areas where grazing is heavy can all be benefited by leaving the brush on them.

Fire is not as overwhelming a factor as has heretofore been supposed. Where intensive fire protection measures can be instituted it is doubtful if more than 25 per cent of the brush should be piled and burned, and this mainly on fire lines. On over 91,000 acres the average area burned annually has been .99 of 1 per cent. Where control time has been less than one hour, less than 1 per cent of all fires became Class C.

It has been determined that as the board foot volume cut per acre increases the amount of brush resulting increases on an acre basis but decreases on an M. basis except where reproduction is present. Where 100 per cent stocking of poles and saplings is found the amount of brush decreases as volume cut increases both on an acre and a board foot basis. This is due to the young growth cut by the swampers entering in and adding to the tree-brush volume. At times one-fourth of the total brush mass may be reproduction brush.

A great many factors affect the cost of any method of brush disposal, the three most important being (1) distance brush must be removed, (2) amount of brush in relation to the gross stand cut, (3) whether brush is green or dry. Piling costs the most of any method of disposal and requires the closest supervision.

Brush piles should not be thrown together, but built on a definite plan. The primary object is to obtain a pile that will burn readily and clean. A heap of fine material should form the base of the pile on which the larger limbs are placed, with the curve of the limb up. The finished pile should be more or less conical with a few large limbs placed on the outside to bind the mass. A pile built in this way will be compact and where large piles are built can be burned with a foot of snow on the ground.

Large piles are usually more economical of labor for the large limbs can be placed on the pile without having to cut them into short pieces as is necessary where small piles are being built. In burning, the size of the pile will be less of a factor than location and weather in determining damage. Two small piles containing no more brush than would go into a large one cannot be so advantageously placed and the heat resulting from

burning the two simultaneously will be as great as will that of the large pile. The large pile has many points in its favor such as (1) ability to burn during periods of the year when small piles cannot burn, (2) they can be burned while green, (3) they take up less of the forest floor, (4) they cost less to build and burn, (5) they give a better clean-up, (6) less damage in the aggregate will result from burning large piles providing burning is done at times when little or no wind is present.

Lopped and scattered brush need not be made to lie close to the ground as in the course of a few years show and decay with the trampling of stock will break it down.

Krauch has made an interesting comparison of diameter growth as determined by means of accretion cores and by periodic measurements with a diameter tape. The comparison was made on 360 trees ranging from 8 to 30 inches d.b.h. which had been remeasured three times at five-year intervals. Diameter growth according to the tape measurements was about 14 per cent higher than for the core measurements, and this relation was consistent for diameter classes where fairly large numbers of trees were used. The first thought is that the cores may be in error because of not being on a true average radius. With 360 trees, however, these errors should compensate one another. It is believed that we are dealing with another factor in the growth of bark. This is taken into account in the tape measurements, but not in the core measurements. Assuming that all the difference in this case is due to bark growth, the figures show an increase in bark thickness of .009 inch per annum. Without vouching for the accuracy of this figure, it seems fairly evident that we have here a factor which should be taken into account in making growth studies with the accretion borer which are to be translated into diameter outside bark.

Mr. Elias Arocha, the Mexican forestry student who has spent about eight months at the station, left for Mexico shortly before Christmas. He had planned to visit several other experiment stations, but was unexpectedly called back to his own country. During the first three or four months he was greatly handicapped by not knowing our language. Since then, however, he has been able to grasp our work readily and has rendered good service.

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Status of Manuscripts Received

California

"How Far Does the Wind Carry Forest Tree Seeds?" Howard S. Siggins. (To Timberman)

"The Lumber Industry Discovers Relative Humidity." A. G. Simson. (For Tycos-Rochester)

IN PRINT

Zon, R. Maraton to make swamp drainage experiment. (Paper Trade Journal, November 4, 1926.)

Munns, E. N. Where is the forest biologist? (Jour. For. Dec., 1926).

Munns, E. N. The American forest experiment stations. (Indian Forester, November, 1926.)

Dana, S. T. The Editor's Silver Jubilee. (Jour. For., December, 1926.)

Munger, T. T. (and Geo. L. Drake) "Snags." (Timberman, December, 1926.

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Sawmill Studies

In comparing the effect of various types and combinations of sawing (sawmill) machinery upon the quality and quantity of the lumber produced, the results tabulated below were secured. The comparison is between the single cut and double cut type of head saw, and was made in a mill equipped with one each of the above types.

A group of 1559 sound western white pine logs 6" to 24" in diameter were compared on a 1" top diameter basis. The two runs were placed on the same size basis by weighing each diameter class on the total number of logs (in that class) found in the combined runs. The values are based on Western Pine Manufacturers Association 5-year averages. The sawing cost per second ($0.00386) used in computing the sawing cost per M feet lumber tally is the 5-year average of seven white pine mills.

Variations in width and thickness between boards cut by these two types of saws should be considered along with the value and cost figures given in the table. For example: 360 4/4 boards direct from the saws were measured for thickness at the transfer chain. The single cut saw made 210 per cent more boards of the exact thicknesses which enable an increase in overrun by scant sawing, than did the double cut saw. The single cut also showed 27 per cent less thick boards.

SINGLE CUT VS DOUBLE CUT - WESTERN WHITE PINE

Method	Top Diameter Range	No. of Logs	Wt. Av. Sawing Time (Sec.)	Wt. Sawing Cost per M ft. lbr. tally	Wt. Av. Value ($) Per M Lbr. Tally	Wt. Av. Overrun %: #5 & btr.	Wt. Av. Value ($) Per M Log Scale
Single Cut Band	6"-24" incl.	683	84"	$2.57	$44.57	26.56%	$56.41
Double Cut Band	6" -24" incl.	876	59"	$1.82	$41.41	23.74%	$51.24
	- -	1559	- -	$ .75	$ 3.16	2.82%	$ 5.17
							-.75
							$ 4.42

Lumber Prices and Movement

	Annual 1925	First Q. 1926	Second Q. 1926	Third Q. 1926	Nov. 1926
Idaho white pine	$37.37	$37.10	$38.65	$37.47	$39.16
W. yellow pine	28.02	29.33	28.14	24.87	23.57
Larch - Fir	19.33	19.33	18.05	17.40	16.29
White fir	20.14	19.79	19.86	18.60	18.22
Spruce	24.38	23.60	25.68	22.58	24.79

	November, 1925	November, 1926
Cut	153,746 M	126,689 M
Shipments	119,757 M	131,516 M

Wood Preservation

A report was prepared covering the results of the cooperative treating work at the United States Range Livestock Experiment Station during the past summer. Posts of five species of wood; lodgepole pine, western yellow pine, cottonwood, ash and western red cedar were used in these experiments. Over 1100 posts were included in the project, of which 600 were treated by the steeping process and 92 with creosote-petroleum mixtures. About 300 posts were reserved for treatment with dry arsenic powder when set, and the balance were to be set untreated as a check upon the effectiveness of the various methods of treatment.

A complete analysis of the treating records is given in the project report referred to, and the accompanying table contains only a brief comparison of the absorptions and penetrations obtained with round posts of four different species in seven-day treatments by the steeping process.

The average strength of the zinc chloride solution was 5.7 per cent and that of the sodium fluoride solution about 3 per cent. Approximately one-half of the posts were submerged in the cold solutions for 6 to 7 days and the rest were given a 3 to 4-day treatment.

SEVEN-DAY TREATMENT BY STEEPING

Species	Preservative	Av. Absorption Lbs. per cu. ft.	Radial Penetration. Ins.
Lodgepole	Zinc Chloride	6.59	.52
"	Sodium Fluoride	(3 to 4-day treatment only)	
W. yellow pine	Zinc Chloride	12.30	.78
" " "	Sodium Fluoride	9.00	1.04
Cottonwood	Zinc Chloride	11.09	.24
"	Sodium Fluoride	9.03	.80
Ash	Zinc Chloride	7.50	.14
"	Sodium Fluoride	8.94	.29

The average cost of the zinc chloride and sodium fluoride used amounted to 26.6 cents per cubic foot of wood treated and on the average the posts contained 1.30 cubic feet. The labor cost (not including the preparation of the material) amounted to about 8 cents per post for the actual treating work with these preservatives.

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FOREST PRODUCTS - D-6

General Survey of Woods Waste in the Douglas Fir Region

The office work of computing the tally sheets was continued. No difficulties were encountered in working up the volume of slash proper, but several complications involved the work of determining the amount of waste wood in high stumps and the volume of the original stand of timber. The height and diameter of stumps, the length of waste in the stump and the percentage of slope on which the stump was found had been taken, but in order to carry the computations through, taper tables for the species involved were necessary. As far as can be learned, no taper tables showing the taper of trees from the ground up have ever been prepared for the species represented in the Douglas fir region. Fortunately, Dr. J. S. Boyce, in connection with his study, "Decay in Douglas Fir," had taken a great many measurements of Douglas fir trees, which he used in drawing up taper curves. It was necessary, however, to harmonize the curves, from which a very usable table was prepared. This taper table will be used for the computations in connection with both Douglas fir and western hemlock; the form of the latter is quite similar to that of the former, especially for diameters up to 35 or 40 inches. It is not known as yet what will be done in connection with western red cedar and Sitka spruce.

The preparation and harmonizing of the curves and tables consumed considerable time, but they were necessary for the work in hand. They, moreover, will be of value in connection with other research studies.

The total stock used in the test at the plant of the Standard Seasoning Society at Cottage Grove, Oregon, amounted to 21,611 board feet, of which 19,731 board feet was "B & Btr" Clears and 1880 board feet "C" Clears. The stock included 1, 2, 3, and 4-inch thicknesses in 8, 12 and 16-inch widths.

After being in the "house" from July 24 to November 16, the average moisture content of the stock, based on 39 whole board samples, was 19.9 per cent; the average moisture content of the 1-inch stock was 18.2 per cent; 2-inch 20.2 per cent; 3-inch 21.6 per cent; 4-inch 23.3 per cent. There was an average difference of about 4 per cent in moisture content between the stock in the upper and lower portions of the house; the average for all thicknesses in the top, center and lower portions amounted to 18.1 per cent, 19.5 per cent, and 22.0 per cent respectively.

The degrade occurring in the "B & Btr" Clear stock of various thicknesses, based on the footage of each thickness, was 5.60 per cent in the 1-inch, 11.32 per cent in the 2-inch, 18.46 per cent in the 3-inch, and 36.04 per cent in the 4-inch. The fall-down in all cases was due either to sap stain or season checks (surface). Sap stain largely accounted for the degrade in the 1, 2 and 3-inch stock, amounting to 72, 67 and 67 per cent of the loss in the respective thicknesses. In the 4-inch stock 69 per cent of the fall-down was due to season checks.

The season check loss in the 1 and 2-inch thicknesses was confined to the 12 and 16-inch widths. In the 3 and 4-inch thicknesses it occurred in all widths of stock.

There was no degrade in the "C" Clears.

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Washington

Land Utilization Study for the West

On December 11, Dr. L. C. Gray, in Charge of the Division of Land Economics and Land Utilization of the Bureau of Agricultural Economics, called with Messrs. Wooton and Weitz of his office for a conference with Messrs. Barnes, Rachford and Hill of the Branch of Grazing and Chapline to consider a proposed study of land utilization in the West.

Dr. Gray outlined the problem proposed particularly to determine what influences the homesteading policy is having at the present time and what changes should be made in it. He believes that the homesteading policy is proving an unsatisfactory system of land disposition and that such a study as proposed would show some other plan that would doubtless be more suitable. The other phase of the study which he thought should be given particular emphasis is the subject of control of the remaining public domain. While he has planned such a study for a number of years, he had hoped that legislation might take care of the situation, but it seems more important than ever that definite facts be obtained. Officials of the University of Nevada and of the Colorado Agricultural College have offered cooperation in such study, and it is probable that a material part of it will be concentrated in the land utilization situation in Nevada and that in northwestern Colorado.

It was the consensus of opinion that it would be advisable to make a detailed study in specific areas in an endeavor to determine definitely what the land tenure problem actually is in representative western areas. Dr. Gray was anxious to determine what information was available in the Forest Service that would tie into such a study and what opportunity there would be for cooperation. After the plans are more definitely developed, he expects to take the matter up again with the Forest Service.

Carnegie Institution Desires Additional Cooperation

On December 28 a conference was held with Dr. F. E. Clements of the Carnegie Institution of Washington at which he discussed principally the possibility of cooperation with the Forest Service in the handling of bioecological research in the West. He stressed as of particular importance the necessity to develop a broad point of view among research workers which will recognize the interrelationship between ecology of the vegetation and that of other life which affects it. He was especially interested in a cooperative project of rodents and range feed, largely in Arizona. Preliminary plans have already been developed for studying the problem in cooperation with the Biological Survey on several National Forests of Arizona, and the Santa Rita Range Reserve.

Dr. Clements was also much interested in the study of life histories of range plants, especially growing them under various controlled conditions in the greenhouse or in nurseries. On behalf of the Forest Service, Chapline offered to aid the Carnegie Institution by having seeds of important plants collected on National Forests to be shipped to Dr. Clements for tests at the Alpine Laboratory near Colorado Springs, Colorado, and at his laboratory near Santa Barbara, California. Dr. Clements was informed of the preliminary plan for cooperation with the Boyce-Thompson Arboretum at Superior, Arizona, for studying growth under laboratory and nursery conditions of the important Southwestern plants which we could obtain more readily than the arboretum's representatives.

Conference on Biotic Communities

On December 31, Chapline met again with Dr. Clements together with Dr. Weese and Dr. Shelford of the Ecological Society of America to discuss the preparation of a book on biotic communities which the Ecolggical Society has projected. Dr. Weese is to be the Editor in Chief and they hope to have men throughout the country handle the development of the biotic community regionally. Chapline informed them that the men in the Forest Service could doubtless aid in the development of the vegetative end of the preparation of such material, though for grazing research men there was a question whether any should accept the responsibility for the organization of all the biological material in any specific region.

Grazing Research and Extension

On December 15, Mr. Chapline addressed the weekly conference of Extension workers on "The Relation of Grazing Research to the Range Extension Program." This conference was attended by a large number from the Extension Service and by some members of the Forest Service. The address was not only intensely interesting but was very instructive, as was evidenced by the number of worth-while questions fired at the speaker following the address.

Forage Investigations

During December, an interrupted month due to the holidays, attention was largely devoted to routine matters; some attention, however, was paid to the collation of notes and a little progress made with the bulletin manuscripts.

Three hundred and fourteen plant specimens were submitted to B.P.I. during the month for identification, in addition to a number of resubmissions for check identification. At the close of the month approximately 800 specimens were received from that Bureau and these have all been gotten ready for listing and will be reported on to the field as rapidly as possible.

Approximately 350 plants were mounted and filed in the herbarium during the month making a total of 3,738 for the year.

Palmer's Alaskan Plant Notes

Department Bulletin 1423, "Progress of Reindeer Grazing Investigations in Alaska," by L. J. Palmer of the Biological Survey, a whilom grazing researcher of the Service, is replete with items of botanical (as well as other) novelty and interest. The size and extent of timber in Alaska north of the Arctic Circle will no doubt surprise many. Palmer's note on fires and their effect on reindeer range states that it sometimes takes 25 years for a "reindeer moss" area to recover from burning. Lichens are the chief source of food for reindeer on winter range, Cladonia, Cetraria and Stereocaulon (all represented on the western National Forest in the States, by the way) being the most important and abundant genera; they are slow-growing, long-lived, and rather easily injured plants - especially in the dry seasons. On many ranges, browse is very important and some of Mr. Palmer's reindeer browse notes are of especial interest; for example, Labrador tea (Ledum), unpalatable to livestock in the States and often regarded as more or less poisonous, is one of the most valuable reindeer browse plants in Alaska.

Sotol, "Skoal!"

With a recent specimen from the Jornada by Junior Range Examiner R. S. Campbell, determined as sotol (Dasylirion wheeleri) the collector attaches this intriguing note to the Form 767: "Value, none for stock. Properly made up sotol is a good drink, being about 40 per cent alcohol.". Did Mr. Campbell obtain this information by the "trial and error method" - or how?

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SANTA RITA RANGE RESERVE

Predatory Animals

Fred Ott, Biological Survey hunter, arrived on the Reserve the first week in December and we are in hopes that he will make a clean-up of the wolves which have been giving so much trouble; so far he has been able to get one of them. Mr. Ott believes the wolves are staying back in the higher country and killing deer mostly, as they have made only three forays down on to the Reserve since he came.

Condition of Stock

The cold snap the latter part of the month did not last long enough to hurt stock appreciably and cattle continue in excellent condition for this season of the year.

Condition of Range

The range is all in very good condition; feed is plentiful over practically the entire Reserve. Considerable green growth continued up to the middle of December and even at present writing some green growth is coming on with the warm days and nights that are following the recent rains and snow.

Visitors

December 4th, Professors Stanley, Dickson and McGinnies, of the University of Arizona, together with Junior Range Examiner Canfield of the Jornada Range Reserve spent the day at the Reserve. Unfortunately rain fell the entire day and prevented any field trip; however, the day was profitably spent in the office discussing plans for investigative work during the coming year.

Santa Claus paid his annual visit to the Reserve on the appropriate date and was more than welcome; however, next year we are going to suggest that he leave three of every article so that all three Junior Assistants at the Reserve won't have to waste so much of their time trying to play with the same thing at once.

Precipitation During 1926

Precipitation data for the year 1926 shows quite a large increase in rainfall over 1925; this increase over the entire Reserve averaged 5.30 inches. The smallest increase was at Southwest Station in the semi-desert type, which had in 1925, 14.52 inches; in 1926, 16.65 inches, an increase of 2.13 inches. Northwest Station had in 1925, 9.63 inches; in 1926 12.73 inches, an increase of 3.09 inches. The largest increase was recorded at the Reserve Headquarters in the foothill type, which had in 1925, 14.67 in. less than was received by any station but one in 1926, and which in 1926 had 25.19 inches, an increase of 11.02 inches. The average rainfall in 1925 for the foothill type was 13.17 inches; in 1926, 21.38 inches, an increase of 8.21 inches. The mesa type received 12.17 inches in 1925 and in 1926, 16.64 inches, an increase of 4.47 inches. The average for 1925 in the semi-desert type was 12.09 inches; for 1926 it was 15.53 inches, an increase of 3.44 inches. In 1925 the foothill type average was 1.00 inch above the average of the mesa type, and 1.08 inches above the semi-desert type average. In 1926 the average for the foothill type was 4.74 inches above the average of the mesa type, and 5.85 inches above the average for the semi-desert type.

Personnel

W. V. Turner, Junior Range Examiner, and family spent the last two weeks in December at their home in Fort Sumner, New Mexico, and reported considerable snow, rain and mud; however, they didn't have anything on us for we had the longest continuous period of rain, snow and cold weather that has occurred during the past five years, with a minimum temperature of 16 degrees above, the lowest on record in a like period.

H. E. Moseley, on furlough from the Yosemite Valley Railroad at Merced, California, has been filling the clerical position at the Santa Rita since December 4th. Among other things, he has spent a considerable part of his time on the plant herbarium which is now up to date with the exception of one list of identifications not yet returned from Washington.

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GREAT BASIN STATION

The Station force is now comfortably located in rooms in the District 4 office building. Compilation, collation, and analysis of data is the order of the day. In spite of a winter season of six months during which practically no field work can be done, office work is considerably behind. It is strange how easy it is to pile up field data beyond what can be handled satisfactorily with the available force during the winter. We are much impressed by the wisdom of the dictum that an investigative organization should not undertake more work than can be kept up to date in all of its phases. The present organization at the Great Basin Station, however, is not wholly responsible for the present condition since a large part of it is a gradual accumulation of years that was handed down to us, although we do have the responsibility of getting out from under. Part of the trouble lies in somewhat frequent change in personnel and some lapses in positions during the past five years, but a lot of it is that rather common failing of "researchers" of getting so much field work under way that there is not enough time to keep up ~~the~~ on the compilation end. Once that error is fallen into it is difficult to drop some phase of the work and the tendency is to keep up the field records and hope for relief by the eventual completion of a project or part thereof. Consequently we have settled on the policy of undertaking no new work, except absolutely essential phases of present projects that cannot be allowed to lapse. As the result of this policy it will be possible to employ a temporary assistant at least part of the winter to assist on compilation work.

The other alternative is more funds for grazing research work. Additional money is badly needed both for getting caught up on back work as well as undertaking a lot of new urgent projects. But more funds is a long story in itself.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

Range conditions continue unusually favorable both with respect to moisture and temperatures. During the first week in December, approximately 1.6 inches of rain was recorded quite generally over the Reserve. This moisture has maintained the fall and winter weed growth in good shape so that prospects for the immediate future are encouraging.

The precipitation data for this year to date appears to be the highest on record for this locality up to this time. This year to date ten rain gauges on the Reserve have averaged 17.7 inches of rain and during the months of July, August and September, the months when most growth is made, eighteen gauges showed an average of 8.24 inches of seasonal precipitation. According to the State College records which go back to 1851, with 12 years of data missing, the incomplete annual figure for this year is a record and the summer seasonal figure has only been equalled or exceeded 4 times. The lowest amount registered by a single gauge on the Reserve this year is 12.73 inches and the highest amount shown for one station is 19.14 inches; this latter figure is the highest figure on record for this locality up to this time. The highest summer precipitation shown by a single station was 11.23 inches which also appears to be a record. The lowest seasonal rainfall recorded by a single gauge was 4.82 inches. The mean annual precipitation for this locality is 8.50 inches and the mean seasonal for the months of July, August, and September is 4.70 inches. It is interesting to note that although the rainfall this year was more generally distributed than is usually the case, yet it was rather localized in spots, which is characteristic of this country.

Investigative Work

The major portion of the month has been devoted to the compilation of data and working up the annual report.

Cattle Sales

276 Jornada calves were delivered this month. The sale price was $27 per head for both sexes. This is a record price for this locality this year.

Personnel

Junior Range Examiner Roy Canfield was on leave, visiting in Tucson, Arizona, December 1 to 7, inclusive.

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DISTRICT 3

Once again the unexpected has happened in south central Arizona. Not that the unusual is not frequently forcing itself into prominence for Tonto is said to be an Apache Indian word meaning silly or foolish, and Tonto Basin and Tonto River imply a crazy stream, a fool's paradise. The month started with storm clouds. Some precipitation fell the first week of December while the second week the mean for Roosevelt of .74 of an inch was broken. Frequent showers and hours of slow steady rain have increased the total fall until it is probable that December 1926 will go down in record as the banner December with at least five times the average precipitation. The stage was set for heavy run-off, for the summer was dry, the

ground hard and bare, but luckily there were no hard storms. Erosion, though, ever with us, was at a minimum. Nature saved the day once again but one might appropriately express the sentiment of the Roman of old in "How long, oh man, wilt thou abuse her patience!" It has been unusually cold since the rains. Weather and not the usual variety has for once interfered with field work. Snow fell among the Palo Verde trees (Cercidium and Parkinsonia species) and Christmas morning the near-by peaks were white.

Weather has resulted in a much-needed session on data compilation.

Sheep feed should be plentiful on the desert this spring. Our old friend alfilaria (Erodium cicutarium), already in evidence, should become prominent here on the semi-desert with a few warm days of sunshine.

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EDITOR

Three bulletins dated September came out about November 1 - 1405 (long delayed), 1436, and 1437. Of these the grazing bulletin, Sampson and Malmsten's "Grazing Periods and Forage Production on the National Forests," is by far the best in appearance, owing to the fact that the photographic illustrations are on three plate pages tipped in. The other two, Cuno's "Utilization of Dogwood and Persimmon" and D-6's "Red Alder of the Pacific Northwest" are as horrible examples as any yet seen of what happens when the attempt is made to print photos on the paper that is given us for bulletins. Take, for example, the view on page 35 of the Red Alder bulletin, showing (supposedly) a thicket of delicate, graceful stems. The view actually presented on the copy on this desk is very like the imprint on a white counterpane made by a filthily muddy and carelessly slung boot. On page 33 a photograph of larger saplings showing sleek grey stems checkered with the black of the wood showing through is similarly mauled and becomes a nightmare of scabrous, distorted stalks, diseased and dying. Figures 8 and 5 become absurdities, for the background of the one and the center section of the other, referred to in the titles, are lost in the general smudge. In the Dogwood bulletin it is only barely discernible on page 34 that the man with the cap is sawing a good-sized billet of wood. Fortunately the title makes this clear. As in many newspaper illustrations, there is considerable doubt about the complexion of the workman.

These illustrations are bad enough as they are. Compared with the clear-cut light and shade of the original photographs, especially chosen for their effectiveness, they are a pitiful exhibit.

Even the Grazing bulletin fared none too well. I do not know what the originals were like, but take it for granted they were fairly clear. In Plate I the whole landscape partakes of a sympathetic shagginess, which may have an unintended value in accentuating the miserable condition of the recumbent bovine and her progeny. In Plate VI the difference between figs. 1 and 2 is to be found rather in the titles than in the pictures as reproduced. However, in general the use of plates insures a fair reproduction of what the author fondly intends shall be an illustration of his subject matter. In Bulletin 1405 these three leaves of plate paper have all been tipped in. This is an expensive process to which the Department naturally objects when it is carried to excess in big editions or when many photos are used. Much of this expense can be saved, however, where the number of plates is divisible by four and the plate paper can be bound in between signatures, instead of being pasted in.

The numerous graphs in the Grazing bulletin are in general effective, particularly the rather complicated fig. 10. This should, however, have been on a page facing fig. 9, and fig. 9 should not have been attempted on a contour map. A specially drawn map with only those items on it that appear in the legend would have been sufficiently complicated.

Even so, the various boundary lines and the salt and unit designations should have been made heavier and larger. In the other figures the lettering is often needlessly small and hard to read, and the use of free-hand italics does not better this.

Comparison in the matter of figures cannot be made with the other two bulletins, for the few figures used in No. 1436 are extremely simple. Even here, though, in fig. 19, the dimensions of spool head and pulley were entirely relettered to make certain of legibility, and they are none too large as they are.

Probably not one reader of Government publications but appreciates legibility, understandableness, clear-cutness, and every other quality in every detail of our publications that helps him to a quick and thorough comprehension of what we are trying to tell him. This is worth remembering when the effort is being made to win his interest. A blurred and smudged publication, or one that runs into petty intricacies, is as heartily disliked as a mumbling, wandering public speaker.

Belated Journal Reprints

Some members of the Service may have been startled during November at the sudden appearance of a group of hoary reprints from the Journal of Agricultural Research. Evidently someone in the mailing room of the Superintendent of Documents has been housecleaning. The arrival of these Rip van Winkles probably explains why often in the past experiment station men and others have written in to know why they had not received copies of current reprints. The greybeards were as follows, so far as this office was able to check them:

Korstian's "Growth on Cut-over and Virgin Western Yellow Pine Lands in Central Idaho." (From the June 14, 1924, issue, which was published in November, 1924).

Korstian's "Density of Cell Sap, &c." (From the May 31, 1924, issue, which was published in November, 1924).

Wahlenberg's "Fall Sowing and Delayed Germination of Western White Pine Seed." (From the June 14, 1924, issue, which was published in November, 1924).

November, 1924, appears to have been a black month for contributors to the Journal of Agricultural Research. At that time there was no effective machinery for checking up on deliveries of reprints. What has been attempted since does not always work. Perhaps the best system of all is your immediate and bitter complaint if publications which you should have do not reach you on time.

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