U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF

THE BOTANIST

FOR

1897.

BY

FREDERICK V. COVILLE.

[From the Report of the Secretary of Agriculture.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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CONTENTS.

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U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
Washington, D. C., August 14, 1897.

SIR: I have the honor to submit herewith my fifth annual report, containing a review of the work of the Division of Botany for the year ending June 30, 1897, and a statement of some of its needs.

Respectfully,

FREDERICK V. COVILLE,
Botanist.

Hon. JAMES WILSON, *Secretary.*

WORK OF THE YEAR.

FIELD EXPERIMENTS WITH SEEDS.

In my last annual report the need of trial grounds in connection with our seed tests was emphasized, and late last season a small beginning was made in this direction on the Department grounds. This year, however, no space could be spared for this purpose, and a plot of about half an acre of the typical truck soil of the region was secured at Kensington, Md., about 11 miles from Washington. Two series of trials are now in progress, one a simple test of all the varieties of peas and beans now on the market, the other a seed selection experiment with peas. Reports on both of these trials will be submitted at the end of the season. For the present it may be said that the results of the variety tests will be valuable to the Department when, before purchasing seeds this year, it must decide how many of the new varieties offered for sale are worthy of distribution. The seed selection experiments are confirming the results obtained last year in the greenhouse, that large heavy peas produce an earlier and a heavier crop than either unselected or small peas. The total additional cost of these outdoor experiments and variety tests up to June 30, 1897, was about $130.

INVESTIGATION OF NEW CROPS.

Judging from the large number of letters received by the Department asking for information about the cultivation of new or little-known crops, the farmers of the country are ready, in view of the generally lessened profits on staple farm products, to follow any promising suggestions made by the Department in this direction. As the beginning of an effort to meet this demand, an investigation has been undertaken of the subject of chicory cultivation. This country imports about $250,000 worth of chicory root per annum, which is

used as a coffee substitute and adulterant. There is now every prospect that chicory will be made a profitable farm product in the United States and that this amount of money will go into the pockets of American instead of European farmers.

NATIONAL HERBARIUM.

The mutually cordial relations that have heretofore existed between the National Herbarium and the Division of Botany still continue, to the advantage of both institutions. Such collections as come into the hands of the Division of Botany and are no longer needed in its work are turned over to the Herbarium, which, on the other hand, furnishes much-needed facilities to the division in its reference collections and books.

The Coniferæ of the National Herbarium still remain in the custody of the Division of Botany, awaiting the completion of additional balconies in the National Museum building.

Through the kindness of Prof. W. H. Brewer, of Yale University, the Division of Botany has received for examination and distribution the plant collections of the old California Geological Survey of 1860–1867, upon which was based Brewer and Watson's Botany of California. A full set of this collection, which is one of the most valuable series of plants that has ever come into the hands of the Department, will be turned over to the National Herbarium when ready for mounting

ECONOMIC HERBARIUM.

After the transfer of the National Herbarium to the National Museum building the importance of creating at the Department a reference herbarium of economic plants began to be appreciated. During the past year the beginning of such a collection has been made by preserving a full series of pressed specimens of all the varieties of peas and beans grown on our trial grounds, besides a large number of seedlings of miscellaneous agricultural plants drawn from our greenhouse germination tests, a series of weeds collected in the vicinity of Washington or received from correspondents, and a series of poisonous and medicinal plants obtained in the same way.

NATURAL RESOURCES.

Our examination of the flora of the Columbia plains in eastern Washington and eastern Oregon was completed in the summer of 1896 by working southward and westward from the Blue Mountains to the southern end of the Cascades. The first part of the report on three years' work in these plains, the great grazing area of the Northwest Coast, has been completed, but its publication has been postponed in order to permit the incorporation of the data now being secured by local botanists in remote portions of the area.

This year the only piece of work of this kind in course of prosecution is the examination, by a field agent, of the flora of the Wallowa Mountains of northeastern Oregon.

WEEDS.

The work relating to weeds has been carried on along essentially the same lines as heretofore, by the preparation of circulars and by an extensive correspondence. A circular on wild garlic, *Allium vineale*,

a very troublesome weed in pastures and wheat fields east of the Alleghanies from southern New York to North Carolina, was published early in the year. Another circular, giving warning regarding three newly-introduced weeds of the mustard family, has also been issued, and a paper on weed migration, pointing out the ordinary means of the introduction and spread of weeds in this country, has been prepared for the Yearbook.

A notable example of the eradication, upon receipt of advice from the Division of Botany, of a newly-introduced weed is the case of tumbling mustard at South Bethlehem, Pa. This plant, so damaging to the wheat fields of Manitoba, had become well established on the ore piles and in the grounds of the Bethlehem Iron Company, and in reply to a correspondent who sent a specimen for identification, a copy of Circular No. 7 and a letter relative to the character of the weed was sent. The company immediately pulled and burned every plant on their premises, and this spring when the first yellow flowers appeared they repeated the operation. Late in June, when tumbling mustard should be in its most flourishing condition, our correspondent was unable after several hours' search to find a plant for a herbarium specimen.

A novel case of damage wrought by a plant, namely, the obstruction of navigation in a river, has been investigated during the past year. The plant known as water hyacinth, *Piaropus crassipes*, a native of South America, cultivated for ornament in fountains and ponds, had escaped into the St. Johns River in Florida, where it had propagated itself with wonderful rapidity. The field work connected with the investigation was performed, through the courtesy of the Chief of the Division of Vegetable Physiology and Pathology, by one of the assistants in that division, and the results have been published in the form of a bulletin.

POISONOUS PLANTS.

Nearly the whole time of the assistant in charge of pharmacological investigations has been taken up in the preparation of a Yearbook article on a few common poisonous plants, and later, to satisfy a persistent popular demand for an elementary treatise on the subject, in preparing matter for a bulletin which will treat of about fifty of our best known species. This larger report will be ready for issue during the present fiscal year.

TESTING SEEDS DISTRIBUTED BY THE DEPARTMENT.

The Division of Botany has assumed the task of making germination and purity tests of all the seeds distributed by the Department under the specific appropriation for that purpose. On account of the seed being purchased from five different firms in essentially duplicate lots, the work of testing has been exceedingly onerous. As all seeds falling below our standards of vitality were retested under various conditions, so as to remove any possible doubt as to the correctness of the result, it was necessary to make in all 5,288 tests in order to ascertain the value of 879 varieties of vegetable seeds and 148 varieties of flower seeds. The total cost of this work, as measured by the salaries of the persons engaged upon it, was about $2,600. By a modification, if practicable, of the system of purchasing seeds, so as to secure all of one variety in one lot, the cost of testing would be much reduced.

SEED INVESTIGATION.

In the matter of equipment for the work of seed investigation about 5,000 bottles of seeds have been added to the collection during the year, making a total of over 15,000 bottles. Two of the large germination chambers devised by Mr. Hicks and adopted as a standard for the experiment stations have also been purchased, but beyond these little apparatus not already on hand has been required.

Two articles have been prepared for the Yearbook, one on home seed growing, the other on the superior value of heavy in comparison with light seed for the purpose of sowing. A circular on the vitality of seeds treated with carbon bisulphide to kill injurious insects has also been published.

Reports on the following topics are now in preparation: The general subject of clover seed; the chemical treatment of seeds to aid germination; the germination of immature weed seeds, and the standards of purity and germination.

SUPPORT OF THE PURE-SEED MOVEMENT.

Recognizing the great importance of pure seed in agriculture, the Division of Botany has encouraged wherever possible the sentiment in favor of improvement in this regard. It makes tests free of charge for farmers, seedsmen, and investigators, and conducts a large correspondence on this subject.

During the year we have cooperated with the agricultural experiment stations as heretofore, especially by the official representation of the division, through Mr. Hicks, on a committee of the Association of Agricultural Colleges and Experiment Stations to devise a uniform system of seed testing. Thus communicated, the methods we have pursued and found satisfactory are being adopted by other institutions.

AMERICAN MEDICINAL FLORA.

The Pan-American Medical Congress has undertaken, through a commission, to prepare for publication a complete medicinal flora of North and South America, the first portion laid out being the preparation of a medicinal flora of the United States in charge of a special subcommission. By invitation of the chairman of the commission and with the consent of the Secretary of Agriculture, the Botanist has become a member of the subcommission. At the same time the Smithsonian Institution has undertaken to bring together the material on which the flora is to be based. In this way, it is believed, some of the resources of these two establishments in the direction of economic botany may be made widely useful.

PUBLICATIONS.

The literature issued during the year consists of two numbers of Contributions from the U. S. National Herbarium, one bulletin, and three circulars. Four Yearbook articles were prepared but not issued within the fiscal year.

The detailed statement is as follows:

Contributions from the United States National Herbarium, vol. 3, No. 9. I. Flora of Southwestern Kansas. Report on a collection of plants made by C. H. Thompson in 1893. By A. S. Hitchcock. II. Crepis occidentalis and its Allies. By Frederick V. Coville. III. Plants from the Big Horn Mountains of

Wyoming. By J. N. Rose. IV. Leibergia, a new genus of Umbelliferæ from the Columbia River region. By John M. Coulter and J. N. Rose. V. Roseanthus, a new genus of Cucurbitaceæ from Acapulco, Mexico. By Alfred Cogniaux. Issued August 5, 1896.

Contributions from the United States National Herbarium, vol. 5, No. 1. General Report on a Botanical Survey of the Cœur d'Alene Mountains in Idaho during the summer of 1895. By John B. Leiberg. Issued January 25, 1897.

Circular No. 9. Wild Garlic. By Lyster H. Dewey. Issued March 2, 1897.

Circular No. 10. Three New Weeds of the Mustard Family. By Lyster H. Dewey. Issued May 15, 1897.

Bulletin No. 18. The Water Hyacinth, and its Relation to Navigation in Florida. By Herbert J. Webber. Issued June 7, 1897.

Contributions from the United States National Herbarium, vol. 5, No. 2. Notes on the Plants used by the Klamath Indians of Oregon. By Frederick V. Coville. Issued June 9, 1897.

Circular No. 11. The Vitality of Seed Treated with Carbon Bisulphid. By Gilbert H. Hicks and John C. Dabney. Issued June 24, 1897.

CORRESPONDENCE.

The correspondence of the division continues to require a large amount of time. During the year some 2,500 inquiries have been answered by letter, in addition to several thousand answered by the sending of printed circulars or other reports prepared for such purposes.

NEEDS FOR THE ENSUING YEAR.

BUILDING.

The subject of a building has been so frequently mentioned in the reports of the Botanist that nothing need be said at the present time except to repeat that the inconvenient location and separation of the branches of the Division of Botany, bad lighting and ventilation, insufficiency of space, and the danger of fire still demand as their only proper remedy an adequate amount of space in a modern fireproof building. At the present time the Division of Botany is unable to provide any laboratory space whatever for the investigation of poisonous and medicinal plants, and is compelled to rely on the courtesy of other divisions of the Department.

PERMANENT TRIAL GROUNDS.

The satisfactory results of the trial grounds maintained at Kensington, Md., during the present season show that the permanent possession of such grounds would many times repay their cost. Nothing could more enhance the value of the Department seed distribution than a trial-ground test of the seeds it is proposed to distribute. All large seed establishments maintain such grounds as a necessary part of their business equipment, and by this provision the repetition of many of the mistakes heretofore made by the Department in its distribution of seeds could be prevented. Furthermore, the command by the Department of a trial ground would be of great general value to agricultural science, leading, as it necessarily would, to a scientific study of our field crops. The Department would be enabled to keep, as it ought, a record of all the new plants it distributes, in the form not only of a sample of the seed, but also of an authoritative specimen of the plant itself grown in the trial ground and suitably preserved for future reference.

ADDITIONAL ASSISTANT.

One important subject of botanical investigation, to which attention has been called heretofore, is that of natural agricultural belts or areas as indicated by the natural vegetation. It is well known to most farmers that certain kinds of timber are indications of certain agricultural capacities of the soil, and it is believed that a critical study of the subject will bring out facts capable of practical application. None of the present assistants can well be spared for this investigation and it is very desirable that steps be taken to secure the services of an additional assistant competent for the work.