UNIVERSITY OF IDAHO,

COLLEGE OF AGRICULTURE.

AGRICULTURAL EXPERIMENT STATION.

ANNUAL REPORT FOR THE YEAR 1893.

JANUARY, 1894.

BULLETIN NO. 6.

These Bulletins are sent Free to all residents of Idaho who apply for them. This Station desires to exchange publications with all the Agricultural Papers in the United States and Canada, and all Idaho papers.

1894.
STATESMAN PRINTING COMPANY,
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AGRICULTURAL EXPERIMENT STATION—University of Idaho.

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By action of the Board of Regents the President of the University, the Professor of Agriculture, the Professor of Civil Engineering, the Professor of Botany, the Professor of Zoology, the Professor of Chemistry, and the Instructor of Physics, constitute the Station Council.

The province of the Council is to determine the various lines of scientific investigation and experimentation to be carried on and to enlist in the active promotion of the same the various departments of the University.

STATION STAFF.

F. B. GAULT ..... Chairman
CHARLES P. FOX ..... Director
JOHN E. OSTRANDER..... Irrigation Engineer
CHARLES W. MCCURDY ..... Chemist
LOUIS F. HENDERSON..... Botanist
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T. T. RUTLEDGE ..... Asst. Director, Sub-Station No. 3, Nampa

Central Office and Laboratories, University of Idaho, Moscow.

☞Address all communications to the Director, Experiment Station, University of Idaho, Moscow. Idaho.

UNIVERSITY OF IDAHO,
PRESIDENT'S OFFICE,
January 5, 1894.

To the Honorable Board of Regents,
University of Idaho.

GENTLEMEN:—I have the honor to transmit through you to his excellency, W. J. McConnell, Governor of Idaho, to the Honorable Secretary of Agriculture, and to the Honorable Secretary of the Treasury of the United States, the first annual report of the Experiment Station connected with this institution, as required by Section three (3) of an Act of Congress, approved March 2, 1887, commonly known as the Hatch Act.

The Experiment Station was established by resolution of the Board of Regents of the University of Idaho February 26, 1892, but no part of the federal appropriation was received until after June 30, 1892. This report, therefore, covers not only the fiscal year of the general government ending June 30, 1893, but the operations of the Experiment Station from February 26, 1892, to January 1, 1894.

The Board of Regents received donations of land for the establishment of sub-stations in three portions of the State. Sub-station No. 1 is located at Grangeville, Idaho County. Sub-station No. 2 is located at Idaho Falls, Bingham County. Sub-station No. 3 is located at Nampa, Canyon County. Sub-station number one is located in the pluvial region; sub-station number two is located in the upper valley of the Snake, at an altitude of about 4,700 feet; the Nampa sub-station is also in the Snake river plain, but at an altitude of a little more than 2,000 feet. Sub-stations two and three are in the arid region.

The University was opened October 3, 1892.

The last of October there was added to the faculty a Professor of Agriculture, who was also Director of the Experiment Station. In May, 1893, the Regents deemed it advisable to receive the resignation of the incumbent, and the President of the University was designated as Director, pending the selection of a suitable successor. On July 20, Mr. C. P. Fox, of the Expe-

riment Station staff of the University of Missouri, entered upon the duties of director-elect. Director Fox is also Professor of Agriculture in the University. In addition to his other duties he has aroused some enthusiasm in the study of agriculture, and instructs classes in the same. While these classes are not so large as we could wish, a gratifying start has been made. As soon as the new building is completed and our facilities are otherwise increased and our students have laid the necessary foundation in their scholastic studies, it is confidently believed the agricultural courses of the University will be popular.

The University has a complete course in Agriculture, of the same weight and dignity as the other courses, requiring four years for completion. We have also a short course of two years. But each year of the short course is complete in itself; so the student that can devote but a single year to secondary education is able to secure valuable instruction in agriculture.

It is also proposed that members of the station staff shall participate in Farmers' Institutes, Horticultural Societies, etc., thus extending to the various agricultural interests of the State the beneficent influences of the University.

The mud embargo that has prevailed in the pluvial regions during the fall has prevented our professors from attending such meetings, though they had planned several times to do so.

The last of June, 1893, the Regents so increased the faculty of the University that the station had for the first time a complete working staff. The utmost care had been exercised in the selection of the faculty, as each has to act as a professor in the University, as well as a station worker. To secure men who are experts in both lines of work was no easy task, but I am glad to say that we have not been disappointed in any instance. It is confidently believed that our faculty are as able and enthusiastic station workers as can be found anywhere. For the organization of the station staff the reader is referred to a preceding page.

Little scientific experimentation could be attempted during the present season, as the farms in the arid region were wild land that had to be reclaimed and cultivated at least one year, and the peculiarities of the soil and season observed, before extended and expensive experimentation could be attempted.

It is doubtful whether any other station in the United States

has such varied, complicated and original problems for the experimental agriculturist as the Idaho Station.

Indeed, Idaho, both from a scientific and economic point of view, is little short of an unknown land. It is the intention of the University to occupy the field as rapidly and as fully as circumstances will permit, and particularly through the Experiment Station to make such observations as will benefit the State and contribute to scientific knowledge in its application to agriculture.

The operations of the station to date are fully outlined in the report of the Director, to which your attention is directed.

F. B. GAULT, President.

Report of the Director.

To F. B. GAULT,

Pres. University of Idaho.

SIR:—I have the honor of submitting to you the first annual report of the Idaho Agricultural Experiment Station.

On July 20th, 1893, the writer assumed the directorship. Since that date my time has been given to the affairs of the Station and to giving instruction in the classes in Agriculture and Geology in the University.

During the latter part of the summer I inspected each of the sub-stations. I found that things were progressing as well as could be expected under the circumstances. Both of the farms in the arid region were wild land the year previous. Much labor and expense had to be expended on them in order to fit them for cultivation. To those unfamiliar with the methods of farming in the arid region of this State a few words of explanation may be necessary.

During the first year the land has to be cleared of the "sagebrush," the surface of the soil leveled and ditches constructed for carrying the water used for irrigating. Often a second leveling is necessary on account of gopher holes. For these reasons no experimental work could be accomplished.

During the latter part of the summer of 1893 a survey of farms Nos. 2 and 3 was made by Prof. Ostrander, Irrigation Engineer.

On each farm one hundred 1-20 acre plats have been laid off.

These plats will be used exclusively for experimental work. The remainder of the land will be farmed for profit.

Although farm No. 1 (Grangeville) had been under cultivation for a number of years, more time was necessary to prepare the soil for experimental work. This farm will be surveyed during the coming summer.

STATION STAFF.—The work of the station is carried on by the station staff. The staff consists of one director, one chemist, one botanist, one entomologist, one irrigation engineer, one meteorologist and three assistant directors. The duties of the agriculturist and horticulturist are performed by the director. The reports of these officers are appended to this report.

EQUIPMENT.—The central offices and laboratories are located at Moscow, on the ground of the University. Three well equipped laboratories have been provided for the investigation of subjects pertaining to scientific agriculture. About five acres of good land upon the campus are available for experimental work in agriculture proper. The sub-stations are well adapted to illustrate the various natural conditions under which Idaho agriculture must be practiced. A considerable sum of money has been expended for live stock, implements and other necessary equipment. More will be needed.

LINES OF WORK.—The station is prepared to assist the farmer in many ways. Questions relating to the farm, dairy, poultry yard, stockfold and orchard will be promptly and fully answered. New fruits and plants will be tested. Seeds and plants will be identified. Soils, fertilizers, feeding stuffs, butter, milk and other farm products will be analyzed free of charge. Insects injurious to plants and animals will be identified and the proper remedies prescribed. The habits of weeds and noxious plants will be studied and advice given as to the best methods for their destruction.

EXPERIMENTS IN PROGRESS.—During the spring of 1893 the value of *carbon bisulphide* as a squirrel exterminator was determined by the station. The results were so gratifying that preparations have been made for experiments on a much larger scale. Bulletin No. 4 contains a report of the experiments conducted in 1893.

A few sugar beets were grown at each of the sub-stations. These beets were analyzed at the close of the growing season.

Both the great tonnage per acre, and the high sugar contents of the beets, indicate that portions of this State are well adapted to the production of this crop. The cost of production, the best variety to be grown, the kind of cultivation required, etc., are important factors that remained to be determined.

At farm No. 3 the experimental work was inaugurated by sowing one plat each of fall wheat, fall barley and fall rye.

It was thought best not to undertake any experimental work at the other farms until spring.

On the experimental plats at the University the Agriculturist has sown seventy-five varieties of wheat, three of barley and one each of rye, oats, flax, clover, timothy and millet.

The seed wheat was obtained from the States of New York, Indiana, Kansas and Oregon. The fall and spring sowing of each variety will be shown side by side.

The best time to sow clover will be determined by sowing the seed between the 15th and the 20th day of each month for one year. The growth of each sowing will be carefully noted, and the product harvested and weighed.

At each of the sub-stations an orchard has been set out. Additions to each orchard will be made in the spring. Some ornamental plants and shrubs will also be added.

A list of the varieties of wheat growing on the experimental grounds of the University and a list of the fruit trees at each of the sub-stations will be found in the appendix.

In the chemical laboratory an investigation into the chemical composition of the soils and potable waters of the State is being carried on.

Our Irrigation Engineer has been appointed by the Los Angeles Irrigation Congress, one of the State Irrigation Commissioners. The Botanist and Entomologist have made a few collections. The meteorological work began in October.

BULLETINS.—Four bulletins have been issued by the station, the fifth is in the hands of the printer, and the sixth is being prepared. A Press Bulletin is issued once a month.

The fame of the Idaho Experiment Station is rapidly extending beyond the limits of the United States. From Canada, Brazil and India come requests for our Bulletins. Our Press Bulletins have been published in the New York World and other eastern papers.

DONATIONS.—During the past year the station has received, by donation, numerous articles of value. The thanks of the Director and Staff are tendered to these public spirited firms and citizens for their efforts to aid us in our work. (A list of these articles and the names of the donors is appended.)

The station library has received from Senators Shoup and Dubois and Congressman Sweet many valuable public documents.

Through exchange and by donation the following agricultural papers are received:

Homestead, Des Moines, Iowa; The Live Stock Indicator, Kansas City, Mo.; The Orange Judd Farmer, Chicago, Ill.; The Pacific Farmer, Portland, Or.; The North Pacific Spirit, Portland, Or.; The Practical Farmer, Philadelphia, Pa.; The American Agriculturist, N. Y.; Western Agriculturist and Live Stock Farmer, Quincy, Ill.; Hoarde's Dairyman, Fort Atkinson, Wis.; Farm, Stock and Home, Minneapolis, Minn.; Vick's Illustrated Monthly, Rochester, N. Y.; Wisconsin Farmer, Madison, Wis.; The New England Farmer, Boston, Mass.; Farm and Fireside, Philadelphia, Pa.; The Farmer's Review, Chicago, Ill.; The American Farmer, Washington, D. C.; The American Farmer, Live Stock and Poultry Raiser, Chicago, Ill.; The Kansas Farmer, Kan., The Texas Farm and Ranch, Dallas, Tex.; The Ohio Farmer, Cleveland, O.; The Northwestern Horticulturist, Tacoma, Wash.; Green's Fruit Grower, Rochester, N. Y.; The Prairie Farmer, Chicago, Ill.; The Western Plowman, Moline, Ill.; The Farm-Poultry Monthly, Boston, Mass.; The Rural New Yorker, N. Y.; The Dakota Farmer, Huron, S. D.; Gardening, Chicago, Ill.; American Gardening, Harrisburg, Pa.; The Colorado Farmer, Denver, Col.; The Ladies' Companion, Philadelphia, Pa.; St. Louis Journal of Agriculture, Colman's Rural World, St. Louis, Mo.; Western Stockman and Cultivator, Western Swine Herd, Omaha, Neb.; Farmers' Home, Dayton, O.; School and Home, St. Louis, Mo.; The Bookkeeper, The Inland Farmer, Dayton, O.

LIST OF DONATIONS AND DONORS.

Kansas Agricultural Experiment Station, 50 varieties of wheat.

Oregon Agricultural Experiment Station, 12 varieties of wheat.

James Riley, Thorntown, Ind., 6 varieties of wheat.

Edward Brown, Rochester, N. Y., 5 varieties of wheat.

W. C. Fife, Moscow, Ida., 125 pounds of choice flaxseed.

Dernham & Kaufman, Moscow, Ida., samples of wheat, barley and flax.

Carithers & Son, Moscow, Ida., one sample of wheat.

Farmer's Nursery Co., Tadmor, O., standard varieties of fruit trees.

Wm. Johnson & Son, Wilmot, O., Daisy force pump.

Ed. R. Taylor, manufacturing chemist, Cleveland, O., 300 pounds of Fuma carbon bisulphide.

Logan Nursery Co., 500 strawberry plants.

Mr. Frank Reyburn, Moscow, 3 pure brown Leghorn chickens.

Prof. Alex. Bondurant, Auburn, Ala., 12 packages of tobacco seed.

Mr. Cliff Wilson, persimmons.

Mr. Bundy, fruit.

Spaulding & Holt, Almota, Wash., Alexander and Rhode Island Greening apples.

Pawpaw and persimmon seed from Miss Dottie Bass, Columbia, Mo.

Ralph W. Fox, Springboro, O., for acorns and seeds of other hard wood trees.

"Mirror," Moscow, pumpkin seeds.

Respectfully submitted,

CHAS. P. FOX, Director.

UNIVERSITY OF IDAHO, Jan. 1st, 1894.

Report of Sub-Station No. 1.

Sub-station No. 1 is situated on the edge of the famous Camas Prairie country, and about one mile southeast of Grangeville, Idaho County.

Latitude, undetermined; longitude, undetermined; elevation, 3,500 feet.

Soil is of good quality, of the "foot-hills" class.

To the Director of Idaho Agricultural Experimental Station:

The following report of Sub-station No. 1 is submitted:

The spring of 1893 was in this section unusually wet, cold

and late, and, coming after a severe winter, all farm operations were very much in arrears.

About forty acres of breaking had been done the previous year, a house and stable built.

A well was sunk, water obtained in sufficient quantity at a depth of 45 feet, the buildings were moved, a barn 50 feet by 24 feet built, and a neat office built and furnished in June.

Breaking was commenced April 29 for a small orchard. Fruit trees were obtained from Lewiston, and were planted May 9th, consisting of forty-three varieties of apples, seven varieties of pears, two of cherries and six of grapes. Two specimens of each variety were planted.

A portion of the ground broken the previous year when dry enough was cross ploughed, well broken down and sown with oats May 25th; the sod on this piece of ground was well rotted and in good order; from 9¾ acres 481 bushels were threshed. About 4 acres of wheat were sown, part on May 27th, the remainder June 5. Although sown so late and on wet ground, this crop ripened moderately well. The grain is small and inclined to be slightly thin in appearance. On this part of the farm one acre was sown with beardless barley May 23d; when threshed it yielded 43 bushels. On the barley ground and part of the wheat ground, red clover seed was sown June 7th.

Three pounds of Golden Giant side oats were sown very thinly May 23d, and produced very large heads. This is being saved to sow another season for further trial, promising to be of value.

On the newly broken sod, between the rows of fruit trees, three varieties of corn were planted June 6th—Queen of Prairie, Waterloo Extra Early and King of the Earlies.

This corn received three shallow cultivations and two hand hoeings, did well, attained an average height of about seven feet, and was cut for fodder the latter part of September. King of the Earlies was the only variety showing ears.

About 40 tons of timothy hay were put up in fine condition.

In October the barn was fitted up for stock, and in November the threshing was done; afterwards all the plowing, breaking, manure hauling, etc., was finished, a little more than 30 acres being now ready for spring seeding.

Half a dozen head of cattle were purchased, and a Poland-China hog.

In August the meteorological instruments were received and set up. A daily record is kept.

A new road has been fenced off along the north side of the farm and thrown open to the public.

Respectfully submitted,

JOHN NORWOOD,
Assistant Director.

Report of Sub-Station No. 2.

Sub-station No. 2 is situated about three miles south of Idaho Falls, Bingham County.

Latitude 43° 30' 30" N., longitude 112° 05' W.

Elevation, 4,710 feet.

Soil is sandy with a gravelly subsoil.

Soil is very productive when irrigated.

Water is drawn from the Snake river.

Director Agricultural Experiment Station:

I respectfully submit to you the following report of sub-station No. 2, from May 15th to December 1st, 1893.

On taking charge of the station, on May 15, I found that little preparation had been made for any experimental work, and things in general were in an unorganized condition.

About fifteen acres had been broken up the previous year, but not graded or ditched; otherwise the entire place was in a state of nature.

I seeded part of the land to such crops as had some chance of getting through the early part of the season without water.

About two acres each of wheat, oats, rye and millet were sown, and some potatoes planted, and then work was begun on the ditches. They could not be completed in time to save the crops.

The work was finally completed in August, nearly six miles of ditches and levees having been made. About twenty acres more of ground was then broken up, leveled, ditched and fitted for use next year.

An orchard of 144 trees has been set out, together with a number of currants, grapes, berries, etc.

I acknowledge with pleasure, the donation of 500 fine strawberry plants by the Logan Nursery Company, Utah; also the

receipt of the following papers: Idaho Falls Register, The Practical Farmer, The Ohio Farmer, The Orange Judd Farmer, Breeders' Gazette, American Grange Bulletin, The Rural Northwest, American Bee Journal.

For the future we need a barn large enough to furnish storage room for hay and grain, tools, wagon, etc., and not less than ten head of stock.

The sugar beet is attracting a great deal of attention in this section. The data on hand at present, indicate that beets averaging fifteen per cent. sugar can be grown, yielding about twenty-five tons per acre, and I would suggest that as much work as possible should be done in this line the coming year.

Respectfully submitted,

W. F. CASH,
Assistant Director.

Sub-Station No. 3.

Sub-station No. 3 is situated one mile east of Nampa, Canyon county.

Latitude 43° 43′ N., longitude 116° 29′ W., elevation undetermined.

A fertile soil of volcanic origin with a hard white rock for sub-soil. Irrigation is necessary. Water is supplied from the Boise river.

To the Director of the Idaho Agricultural Experiment Station:

Since taking up the duties of this office, May 19th, 1893, I have endeavored to acquaint myself with the various methods of carrying on agricultural pursuits in the arid region of this State. Have visited a few farms and noted the different systems of irrigation and cultivation of soil.

The following crops were grown on the farm the past season: Wheat, oats, corn, alfalfa, and three varieties of sugar beets, (Vilmorm, Red Top Sugar and White French Sugar), broom corn, brown dourrha, buckwheat, millet, red clover, cucumbers, onions, melons, peas, radishes, potatoes and squashes.

About six acres of wheat, the same amount of oats, and three acres of corn, were the most important crops produced. The wheat and oats made a good yield; the corn failed to mature;

the millet and buckwheat were also caught by the frost. These were sown about the middle of July.

The orchard consists of forty-six apple trees (for a list of these see appendix) and several each of plums, pears, prunes, peaches, cherries, currants, gooseberries and grapes. A number of shade trees (maples, willows, cottonwood, etc.,) have been planted. Many of the trees are dead. Some of them died from unknown causes and a few were destroyed by rabbits.

Three one-twentieth acre plots were sown to fall grain, as follows: Plot No. 1, wheat; plot No 3, barley; plot No. 5, rye. A complete record of all experiments is kept.

A complete set of meteorological instruments has been put in place and a full record is now made up from daily observation.

Respectfully submitted,

T. T. RUTLEDGE,
Assistant Director.

Report of Chemist.

PRESIDENT F. B. GAULT,

Charman Station Council:

SIR:—Herewith I hand you a synopsis of the chemical work of the Experimental Station of Idaho, for the year 1893, as organized under the Hatch Act.

It is less than one year since I was called to the Chair of Chemistry in the University of Idaho, thereby becoming Chemist of the station. During the last collegiate year the work was necessarily largely preparatory and theoretrical; courses of instruction in chemistry for the Agricultural students had to be mapped out, a laboratory equipped and the year's work outlined. Apparatus and chemicals ordered from the far east, were slow in arriving, hence, in my two-fold capacity as teacher and chemist, assuming charge of the work in mid-winter, delay in the arrival of materials for analysis, nothing special in analytical work was attempted for the station until the opening of the present school year.

Bulletin No. 3, "The Application of Chemistry to the Agricultural Development of Idaho," was issued from this department in March. The purpose was to awaken an interest among the industrial classes of the State in the practical side of chemistry.

Owing to the excessive express and freight charges, no material from the farmers for analysis, except ores, reached the department until November. Press Bulletin No. 2 and individual letters were sent out urging the shipment of potable waters and soils. The sub-stations have contributed sugar beets, waters and soils for analysis; Latah County, some technical work; the local miners, ores; and, by purchase of Moscow merchants, kerosene, vinegar, sugar, milk, spices, etc., have been obtained.

The results of these analyses will appear in Bulletin No. 8, now in preparation by this department.

Handicapped thus far by the lack of sufficient water and heating facilities, the department, on its removal to its fully equipped and permanent quarters, in the near future, will prosecute work in soil analysis, grains, food products, ash and fertilizers on a more extensive scale.

Very respectfully,

CHAS. W. McCURDY, Chemist.

Moscow, Jan. 1, 1894.

Report of the Irrigation Engineer.

F. B. GAULT, *Chairman Station Council:*

MR. CHAIRMAN:—In accordance with the suggestion of the Director, I beg leave to submit to the Council the following summary of my work for the experiment stations during the past year:

In accordance with your instructions I conferred with Prof. Fox, the Director, as to the character and amount of work he desired me to do at Stations Nos. 2 and 3 for 1893.

At Station No. 2, (Idaho Falls), I proceeded to make a survey of the farm as determined by the fence lines, all evidence of the original government corners being gone. Sufficient levels were taken so that the contours can be determined approximately. The location of the main canal through the farm was determined; also the laterals and principal distributing ditches as far as laid out.

The location of the house, barn, orchard, and approximate amount of cleared land was also noted.

One hundred plats 12x181.5 feet, and containing one-twentieth of an acre, to be used for experiment purposes, were staked out.

The latitude of the station, as determined from a single observation, was 43° 30′ 30″ N. The longitude, as deduced from the government surveys, 112° 05′ W. The elevation, deduced from that of the Utah and Northern R. R. at Idaho Falls, 4,705 to 4,710 feet. Declination of magnetic needle, 17°·48′ E.

A preliminary sketch of the farm has been made and handed to the Director for his use pending the preparation of a more complete map.

At Station No. 3, (Nampa), much time was taken to locate a part of the boundaries of the station, the same never having been run out. The station consists of a quarter of a quarter-section, of sections 13, 14, 23, 24, of township 3, N. range 2, W. Boise Meridian.

Sections 23 and 24 I subdivided and staked off the quarter quarter-sections forming a part of the farm. No attempt was made to lay off the north half of the farm on account of the lack of sufficient time.

One hundred end eight experiment plats were staked out of the same size as at Statian 2. One acre, 112x389 feet, was staked out for a garden. The location of the buildings, driveway, etc., was also noted.

Levels were taken to determine the contours over the south eighty acres. A map of the station, as far as surveyed, has been prepared for the use of the Director.

The latitude, longitude and declination, determined as at Station No. 2, were found to be 43° 43′ N., 116° 29′ W., and 19° 29′ E., respectively.

The altitude of the station was not determined, but can be deduced from the barometric record which has since been inaugurated at the station.

Respectfully submitted,

J. E. OSTRANDER,
Civil Engineer.

DEPARTMENT OF ENGINEERING,
STATE UNIVERSITY, Jan. 9, 1894.

Report of Botanist.

MOSCOW, IDAHO, January 16, 1894.

PRESIDENT F. B. GAULT,

Chairman of the Station Council:

SIR:—I beg leave to offer you the following report as Botanist

for our experiment stations in the State. The meagreness of this report must be put down to two facts: First, that I have never passed a summer in this State; second, that I am not at all acquainted with the different sub-stations in the State, and consequently have no knowledge of the plants, cultivated or wild, in or about them. Still, a few words as to what has been done and as to what it is my aim to do and see done may not be amiss.

What has been done since my advent into the University last September can be summed up in a few words, and yet they will show a beginning, and that no time was lost in making that beginning. When I came to the University I was able to bring for my department a set of about 1,000 plants, selected from many duplicate specimens collected for the State of Washington at the recently-ended World's Fair. This set I have given to the University, and in about two months more I shall have finished mounting and arranging them in the herbarium case made for this purpose by the University.

At the same time that material was purchased for mounting this set, additional material for pressing and collecting plants was likewise purchased, and at the suggestion of the Professor of Agriculture, every one of the three stations was provided with material for collecting and drying the native flora of the several regions, as well as all fungus diseases of plants as they make their appearance at the sub-stations. The long distances intervening between the University and the sub-stations render it necessary that this work shall be done by other hands than those of the Botanist, and I may say that all of the Assistant Directors at the sub-stations have agreed to do this work according as they may have the opportunity. Instructions, explanatory and directory, have accompanied these several bundles of material, so that there seems little doubt that good assistance will be given the Botanist in this direction.

And now, looking forward to the future, allow me to say that one of the most important things for a new State, next to a survey of its mineral resources, is a survey of its vegetable resources, provided the same can be accomplished without too great an outlay of money. The knowledge of our timber resources, of what lands are adapted to grazing, what to agriculture, and what are worthless, amongst the new or unsurveyed

land, are facts most important to settlers; the fact that while the native flora is being collected, it is furnishing at the same time to the practical botanist of today constant indices of the agricultural value of the land which supports that flora; the fact that no botanical work can ever be published as a text-book for the State, adequate to its needs, until a fairly comprehensive knowledge be gained of its flora—all these facts being beyond discussion important, how necessary is it, therefore, that such work should be undertaken at the earliest date possible, in order that a full collection of the flora may be made and all the scientific data relating to the country traversed be published. Therefore I would beg leave to say that I should hold it a privilege as well as a duty to prosecute such a search during the summer months' vacation, at whatever discomfort and hardship to myself, should it be deemed fit to authorize incurring the expense for such a survey—an expense, I may add, which would necessarily be small, as the trip would have to be undertaken on horseback, and would demand but one competent packer and guide, with at most three or four animals.

I hope, whether I prosecute this latter work or not, to be able to study amongst the cultivated plants, and especially in the orchards, the present status of fungus pests now in the State; and if possible to give from time to time suggestions leading to the prevention of their admission, or, when admitted, the best means of getting rid of them.

Your obedient servant,

L. F. HENDERSON, Botanist.

Department of Entomology.

To the President:

The work of this department began with the arrival of the Entomologist, September 1, 1893. As the season for injurious insects was then nearly past, attention was chiefly given to making a general collection of the insects of the region. By means of a good general collection, arranged and classified, we shall in a year or two have the entomological liabilities, as well as resources, of the State fairly well ascertained. The work is thus of great practical importance, as well as of high scientific interest.

A bulletin on the subject of spraying is now under preparation. This will give a comprehensive summary of the latest and most approved methods of procedure, as well as a general review, with cuts, of the styles of machine that are found to be best adapted to various purposes.

In the great work of subduing insect pests, one of the most important auxiliaries is the spraying machine. Unless fruit growers and farmers can procure these machines when necessary, they cannot take advantage of modern methods of warfare against insects, and the advice of the entomologist will be ineffective. I have therefore thought that in our present circumstances no work could be more fitting as a preliminary to original investigation of the insect fauna of the State than to encourage the leading manufacturers of spraying machines to establish branches or distributing points in our State. As matters now stand, an interval of about a month would elapse after ordering a machine of an eastern maker before it would arrive. Of course it would then be too late to remedy any damage that was in progress at the time of ordering.

As a result of correspondence with eastern manufacturers of spraying machines, it is now probable that one or more of the best firms will establish distributing points for their machines in this State, where stocks will be kept, thus saving to our fruit-growers the heavy freight charges and the great delay that always attend the purchase of such articles at eastern points.

In the coming season a careful study will be made of the various fruit insects already introduced or native to the State, and special investigation will be made in such lines as offer favorable conditions. Definite announcements of these lines can hardly be made so early in the year.

Respectfully submitted,

J. M. ALDRICH, Entomologist.

Report of the Meteorologist.

PRESIDENT F. B. GAULT,

Chairman of Station Council:

SIR:—Herewith I submit the following report for the Division of Meteorology:

The work in meteorology in connection with the Experiment

Station of the University was begun during the month of September, 1893.

Three full sets of meteorological instruments have been placed in position. One set at Moscow, a second set at Nampa and a third set at Grangeville.

At each station daily observations are taken from the following instruments: Anemometer, anemoscope, barometer, hygrometer, maximum and minimum thermometers, rain gauge, sunshine recorder.

Said instruments are all of government test and have been placed in position according to government directions.

Monthly records are forwarded by the assistants at the substations to myself, and, with the records of this station, are placed in the University vault. Copies of these records are sent to the United States government.

Bulletin No. 5—Meteorology—has been prepared by this division. In this bulletin a detailed account of the work is given.

Respectfully submitted,

J. E. BONEBRIGHT, Meteorologist.

Financial Statement.

The Idaho Argicultural Experiment Station, University of Idaho, in account with the United States Appropriation, 1893, Dr.

To receipts from the Treasurer of the United States, as per appropriation for year ending June 30, 1893, under Act of Congress approved March 2, 1887		$15,000 00
To farm produce		15 00
To money returned on transportation		50 00
Total		$15,065 00
Salaries	$4,260 00	
Library	2,224 55	
Chemicals and apparatus	1,155 16	
Buildings	3 000 00	
Incidentals	234 77	
Printing	266 30	
Stationery and postage	228 47	
Labor	1,639 60	
Fencing and irrigation	744 90	
Clearing and breaking	699 50	
Orchards	174 67	
Traveling expenses of director	383 70	
Tools and implements	951 30	
Field experiments	474 56	
Insurance of farm buildings	87 50	
Live stock	396 00	
Office furniture	161 01	
Total		15,081 99
Cr. balance		$ 16 99

This is to certify that, as the authorized auditors of the Board of Regents of the University (State) of Idaho, we have examined the accounts of the Agricultural Experiment Station for the fiscal year ending June 30, 1893, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show that the sum of three thousand dollars, and no more, was expended for permanent improvements, and that there is no cash balance.

P. TILLINGHAST,
W. W. WATKINS,
I. C. HATTABAUGH,
} Auditors.

I hereby certify that the foregoing statement is a true copy from the books of the institution named.

ROBERT S. BROWNE, Treasurer.

Appendix.

List of fruit trees at Sub-station No. 1, Grangeville:

Apples.—Yellow Transparent, Louise, Palouse Apple, McIntosh Red, Whitney No. 20, Pewaukee, Stark, Ben Davis, Grime's Golden Pippin, Red June, Golden Russet, Jonathan, Rhode Island Greening, Northern Spy, Sweet Home, Transcendent. Haas, Late Strawberry, Wine Sap, Gravenstein, Lawyer, Rambo, Yellow Bellefleur, Rome Beauty, Bailey's Sweet, Smith's Cider, Yellow Newton Pippin, Hislop Crab, Duchess Oldenburg, Fameuse, Red Astrachan, Wealthy, Wagner, King Tp. County, Willow Twig, Maiden's Blush, Walbridge, Mammoth Blk. Twig, Arkansas Beauty, Crawford, Tetofsky, Twenty Ounce, Rawle's Janet.

Pears.—Doyenne, Keifer, Bartlett, Easter, Flemish Beauty, Idaho Pear.

Cherries.—May Duke, Royal Ann.

List of fruit trees at Sub-station No. 2, Idaho Falls:

Cherries.—Early Richmond, Olivett, Eng. Morello, Black Tartarian, Gov. Wood.

Plums.—W. Goose, Del Sota, Pond's Seedling, Weaver, Imperial Gage, Italian Prune, Columbia, Lombard, Jefferson, Silver, German, French.

Apples.—Neppy, Minn, Pewaukee, Wealthy, Gavoor, T. Sweet, Rambo, Tetopky, Palouse, Red June, Box Russet, Red Butcheim, Haas, Ben Davis, Smith's Cider, Red Astrachan, Art. Black, Winesap, L. C. Cluster, Yel. Siberian, Silvan Sweet, Yel. Transparent, White Winter Permain, Alexander, Gen. Grant, Whitney No. 20, Duchess, Alaska (Crab).

Pears.—Keiffer, Bartlett, F. Beauty, Sheldon, Sechel, M. Nellis, Paul B. Hays, Clapp, Idaho (Standard).

Apricots.—More Park, J. L. Budd, French Prune.

List of trees at Sub-Station No. 3, Nampa:

Apples.—Wealthy, Ben Davis, Permain, Wine Sap, Pewaukee, Haas, Walbridge, Duchess, Northern Spy, Red Astrachan, Tallmen Sweet, Red June, Rambo, W. Winter, Ark. Black, Rox Russet, Tetosky, Sauver, Yellow Transparent, Alexander, Red Beitigheimer, Smith's Cider, Maun, Palouse.

Crabs, Plums, Prunes, Peaches, Cherries and **Pears** as follows: Gen. Grant, C. Cluster, Sylvan, Alaska, Yellow Siberian, Jefferson, Pond's Seedling, De Soto, Lombard, Italian, Silver,

Wonderful, Foster, Early Crawford, Pride of Idaho, Transcendent, Whitney No. 20, Sweet, Red Siberian, Hyslop, Imperial Gage, Weasen, Columbia, French, German Prune, Moorport, J. L. Budd, Ellenta, Alexander (4 of this variety), Union Peach, Boston Nectarine, Black Tartarian, Early Richmond, Eng. Morello, Kerffu, Sheldon, Bartlett, Winter Nellis, Dwarf Flemish Beauty, New White Newington, Gov. Wood, Alivette, Seckel, Buerre d'Anjou, Clapp's Favorite, Idaho Pear (20 of this), Flemish Beauty, Dwarf Clapp.

Wheat.—The seed of the following varieties was grown in Kansas:

McCracken, Big English, Diehl Egyptian, Buckeye, Canadian Wonder, Red May, Valley, California Blue Stem, Andrew's No. 4, Boyer, Bearded Monarch, Extra Early Oakley, Early May, McPherson, Canadian Velvet Chaff, Rudy, Emporium, Fulcaster, Red Velvet Chaff, Velvet Chaff, Early Red Clawson, Red Fultz, Jones' Winter Fife, Bullard's Velvet Chaff, Fultz, Davis, Hindostan, Lancaster, Lehigh No. 6, Arnold's Hybrid, Seneca Chief, Fahquahr, Democrat, Tasmanian Red, Turkey, Lehigh, Big Frame, White Blue Stem, White Track, Bissell, Gold Medal, Diehl Mediterranean, Rumsey, Bulgarian, Dallas, German Emperor, Theiss, Deitz, Oregon Club.

The seed of the following varieties were grown in Oregon:

Velvet Chaff, Clawson, Round Berry Fultz, Winter Fife, Centennial, Northcolis, Missoyen, Red Wonder, Eaton, Ruby, Hybrid Lamed, French Imperial, "No. 10," Hybrid Dattel, Chili.

Seed wheat from New York:

Jones Winter Fife, Early White Leader, American Bronze, Early Red Clawson.

Seed wheat from Indiana:

Winter Fife, Rudy, Early Red Clawson, Improved Fultz, Early Ripe, Red Wonder.