

UNIVERSITY OF IDAHO,

COLLEGE OF AGRICULTURE,

AGRICULTURAL EXPERIMENT STATION.

BULLETIN NO. 5.

Office of
EXPERIMENT STATIONS.

Rec'd 94 03 05.

Answ'd 94 03 06

* * . OCTOBER, 1893. * *

THE RELATION OF METEOROLOGY

TO THE

AGRICULTURAL INTERESTS OF IDAHO.

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.

1893.
NORTH IDAHO STAR PRINT.
MOSCOW.

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THE RELATION OF METEOROLOGY TO THE AGRICULTURAL INTER- ESTS OF IDAHO.

BY J. E. BONEBRIGHT, METEOROLOGIST.

HISTORY.

The study of the atmosphere is as old as man himself.

The ancient Egyptians and Chaldeans thinking that the sun, moon and stars ruled the wind and the storm, studied the movements of the heavenly bodies vainly hoping to discover the laws of the atmosphere.

The Greeks and Romans studied the subject in a more practical manner, by observing the effects of the changes of temperature and wind upon storms, but they discovered none of the important laws of atmospheric phenomena. Greek writers wrote very freely upon the subject, the most important articles being Aristotle's "Treatise on the Signs of Rain."

During the middle ages the science seemed entirely forgotten, and it was not revived until 1664, when Drs. Beal and Wallis first studied the application of the Torricellian experiment to climatological purposes.

In 1764 Dr. Denys Papin (France) by the study of precipitation first demonstrated the now universally accepted fact that rivers, springs and fountains derived their supply from the rainfall.

Ten years later Dr. Plot of Oxford began keeping a daily meteorological diary and in 1723 an association was formed in England for the purpose of scientifically investigating the laws of the atmosphere.

Up to this century, predictions had been based on readings taken from one place, and the results were necessarily unsatisfactory. At the beginning of the present century, the distinguished scientists Alexander Humboldt and Sir William Herschel showed

the necessity of basing predictions upon synchronous readings taken at many places over a large extent of territory, but their principles could not be put into practice until the discovery of the telegraph made it possible to transmit all reports simultaneously to one central office.

Dr. Dove who may be properly called the first climatologist, compiled the first valuable book of meteorological data in 1853, and later published his famous "Laws of Storms."

Since that time rapid advancement has been made. The principal governments have seen the practical side of the study and have made good use of the knowledge. Scientific men are studying the subject with renewed zeal and they have so carefully classified the knowledge that it may now be properly called a science. The practical results already obtained are so far beyond what was expected that governments, and scientists are now considering the problem of the production of rain by artificial means.

U. S. GOVERNMENT METEOROLOGY.

The keeping of most of the permanent records and all the forecasting done in this country has been accomplished by the U. S. Government.

Dr. Lining of Charleston, S. C., has the distinction of being the first person to keep a Meteorological record in the United States. He commenced keeping a record of the temperature in 1738, and four years later he began measuring the precipitation. At present there are over two thousand stations which forward records to the Government.

These records are carefully preserved and copies of the same are published by the Chief of the Weather Bureau. In addition to this the climate of certain sections of our country has been described at great length in special volumes written by expert meteorologists in the employ of the Government. And it may be said in connection with this that the Government requires every officer in the Weather Service to give evidence of a thorough knowledge of meteorology before entering upon his duties.

In 1867 the meteorological work was begun by the Signal Service under the supervision of the Department of War where it was kept until 1891, at which date the Bureau of Meteorology was transferred to the Department of Agriculture where it will no doubt permanently remain.

Under the present organization there is a chief of the Weather Bureau, with office at Washington, whose duty it is to supervise all of the meteorological work done in connection with the U. S. Government.

Since the transfer of the Bureau of Meteorology to the Department of Agriculture a State Weather Service has also been organized with State directors who have control of the work done in their respective states.

Mr. J. H. Smith, with headquarters at Idaho Falls, is now director of the Weather Service of Idaho. He is a veteran in the work and is one of the ablest meteorologists in the country. We are indebted to Mr. Smith for valuable data furnished and for cordial cooperation and aid in establishing the meteorological department of the University of Idaho.

PRACTICAL BENEFITS.

The Governments were induced to foster the study because of its practical application to the two leading interests of every nation, viz. Agriculture and Commerce. To illustrate, a few years ago the farmers of Wisconsin, acting on a government forecast predicting frosts, flooded their cranberry swamps and thus saved a large portion of that valuable crop. This is only one of many similar cases which might be cited.

Many horses and even lives have been lost in the Northwest because the people were not warned of the approach of a storm. On the vast plains the approach of the dreaded prairie fire can be foretold in the same manner, thus often enabling the settler to save his home and crops.

Another practical side of meteorology to agricultural interests is the permanent records kept at every meteorological station.

No farmer would venture into a country without knowing something of its climate, and the more scientific agriculture becomes the more will the intelligent farmer study the climatic and atmospheric conditions of the country or state in which he expects to make his home. The farmer may (and generally does) write to some one living in the locality to which he intends to move for information regarding the climate of said place. His answer based upon practical observations may be correct, but he is liable to be often misled by the careless and desultory observations of his informant. Not a few farmers have been deceived by land agents, who through pecuniary interests are very prone to give flattering accounts of the climate of the locality in which they have land.

The farmer in order to assure himself of the exact climatic conditions of the country should write to the Meteorological Station nearest to the place he intends to make his home. In this way and in this way only can he get reliable and impartial knowledge of the climate.

As to commerce every one knows the importance of the forecast for vessels when preparing to put out to sea. Meteorological observatories are now as important to the mariner as life saving stations.

IDAHO.

The first record we have of the climate of Idaho was kept by Lewis and Clark on their famous expedition in 1805.

These records however are of little practical value since they cover only a few months. Up to date authentic records are very meagre.

Very nearly all of the reliable meteorological records of the State of Idaho have been kept thus far by the U. S. Government through the Signal Service and Weather Bureau. The first weather station within the limits of this state was established by the U. S. Government under the Signal Service at Boise City, July 1, 1877. A government station was maintained at Lewiston from 1879 to 1884 inclusive, and since 1884 Mr. Schleisher has kept a private record at that place. We express here our obligations to Mr. Schleisher for valuable records furnished. A third station was established at Eagle Rock (now Idaho Falls) in 1880 but was discontinued in 1883, though reestablished at a subsequent date. A station was also maintained for a short time at Ft. Lapwai, but we have been unable to ascertain the exact date of the same.

The data from the above places can be secured by referring to the Government records or by addressing the Meteorologist of the State University.

At present Idaho has no forecast station, but it is hoped that by the University taking the initiative, the U. S. Government may be persuaded to establish such stations in our state in the near future. The University can furnish data from three meteorological stations which would aid in no small degree the work of forecasting the weather. The state of Idaho is meteorologically divided into two parts, viz., The arid regions of the south and the more pluvial valleys of the north, whose climatic conditions vary so much that it would be necessary to maintain two separate forecasting offices for the state or to connect each part with forecasting offices situated in climates similar to the respective parts.

By request of the University forecasts of the U. S. Weather Service at Portland, Oregon, are now telegraphed to Moscow, the signals being sounded by the City Water Works. It is to be hoped similar benefits may in time be extended to the various cities and towns of the state to the accomplishment of which this department will gladly contribute.

THE UNIVERSITY.

The University while educating the youth of the State carefully considers every scientific question relating to the material welfare of the citizens of Idaho.

The Meteorological work in connection with the Experiment Station of the University of Idaho began September, 1893, with three well equipped Stations. These Stations are located at

Moscow, Nampa and Grangeville, and as may be seen from a state map they have been so chosen that they represent the climate of different sections of the state. They also vary enough in altitude to give one a clear idea of our atmosphere at different elevations. At each Station readings of the Barometer, Anemometer, Anemoscope and Wet and Dry Bulb Thermometers are taken at 7 a. m., 2 p. m. and 9 p. m. of each day. Readings of the Maximum and Minimum temperatures taken daily at 9 p. m. and accurate records are also kept of the number of hours of sunshine and the amount of precipitation. From these daily observations monthly and yearly averages are determined. The records from Nampa and Grangeville are forwarded monthly to Moscow, where with the records taken at Moscow, they are put on file in the University fire proof vault. Copies of these records are sent to the U. S. Government. In order to make these records as useful as possible copies are kept on file for public inspection at each of the Stations, and monthly summaries of the weather are printed by many of the papers of the state. In addition to this, Bulletins giving the daily observations and monthly and yearly averages will be issued from time to time by the meteorologist. Information regarding meteorological data or climatic conditions will be cheerfully furnished by addressing the Meteorologist.

INSTRUMENTS.

In the selection of instruments the University followed the old adage that "What is worth doing at all is worth doing well." The instruments were purchased at a cost of \$1,000 directly from H. J. Green, of Brooklyn, manufacturer of meteorological instruments for the Government. They are all Government standards and have been placed in position according to Government directions. The following is a description of the instruments:

Anemometer—This is an instrument for measuring the velocity of the wind. The form in use is H. J. Green's Cup Anemometer, with an electrical attachment for recording the number of miles the wind travels. The cups are four in number and are attached to four spokes in such a manner as to cause the wind to strike the concave side of one cup while it strikes the convex side of the opposite cup. The result being that the wheel is turned in the direction of the concave cup. This cup-wheel is exposed to the free action of the wind and is connected with a cylinder turned by clock work which by the aid of electricity registers each mile traveled by the wind. The registering cylinder is kept in the office of the meteorologist, and at the end of each day the record is taken off and a new blank put on for the morrow. These blanks are so divided that the

velocity of the wind can be determined for every five minutes of the day. (Anemometer readings are taken at 7 a. m., 2 p. m. and 9 p. m.)

Anemoscope—This instrument shows the direction of the wind. In other words, it is a weather vane rendered highly sensitive by frictionless bearings and a wedge blade. (Anemoscope readings are taken at 7 a. m., 2 p. m and 9 p. m.)

Barometer—This instrument measures the pressure of the air. The Barometer used is H. J. Green's, No. 3273, with attached thermometer No. 8462.

At 60° Farn. air weighs nearly .00073 oz. per cubic inch, and a column of air one inch square with a length equal to the depth of the atmosphere (about 50 miles) at the sea level weighs nearly 15 lbs. This pressure will support a 30 inch column of mercury and in the Barometer such a column is actually upheld by the air.

In high altitudes the pressure is less because the depth of the atmosphere is not so great, and it has been estimated that at a height of fifty miles the air pressure is inappreciable. At an altitude of two thousand five hundred (the average altitude of Idano) the air will support a column of mercury to a height of 27.2 inches. By the aid of a vernier (instrument for measuring small lengths) the column of mercury in the Barometer used can be read accurately to the 1-100 of an inch.

Mercury is so readily expanded by heat that it becomes necessary to know the temperature of the mercurial column at the time of reading and it is for this reason that we have the attached thermometer. By the aid of tables taken temperatures can be reduced to readings taken at 60° F. or 32° F.

The Barometer readings are very important especially in forecasting, storm centers generally showing low pressure.

Rain Gauge—Instrument for measuring rain-fall. It is rendered accurate to one one-hundredth of an inch, by the following device:

the precipitation on a surface 7 inches in diameter is conducted into a tube of such size that a depth of 1-10 of an inch on the 7 inch surface measures one inch in the tube, and thus 1-100 of an inch on the surface measures 1-10 of an inch in the tube. The mouth of the gauge is placed two or three feet from the ground to prevent errors caused by the splashing of the rain. Snow and hail are always melted before measuring.

Sunshine Recorder.—This instrument records the sunshine. The one in use is Julien P. Friez's, No. 304. During the hours of unshhine a ray of light is admitted through a small aperture to a prepared paper upon which the sunlight leaves a dark blue print.

Hygrometer, or Wet and Dry Bulb Thermometers.—By these thermometers the amount of moisture in the air is scientifically determined. The Wet Bulb Thermometer is H. J. Green's, No. 8881, and the Dry Bulb is H. J. Green's, No. 8880. The Dry thermometer is an ordinary thermometer with the mercury bulb exposed to the air, while in the wet thermometer the bulb is inclosed in a thin cloth which is kept constantly saturated with water. The different exposures of the thermometers give rise to a difference in readings from which, by the aid of tables, the moisture in the air is determined.

Maximum and Minimum Thermometers.—The Maximum Thermometer is H. J. Green's No. 8999 and the Minimum Thermometer is H. J. Green's No. 9055. These thermometers which are both self-registering, record the highest and the lowest temperatures of the day (24 hours), and with the Wet and Dry Bulb thermometers are kept in a case, the sides of which are made of thin boards, so placed that they allow a free circulation of air and at the same time protect the thermometers. The double roof of the case shields the thermometers from the direct rays of the sun while the effect of reflected heat is prevented by elevating the case ten feet from the ground.

DIRECTORY

—OF—

IDAHO AGRICULTURAL SOCIETIES.

The Secretaries of other societies are requested to report names and addresses of officers, and date of regular meeting.

Idaho State Wool Growers Association.

President: Frank R. Gooding Shoshone, Idaho
 Vice-Pres: William Jones Boise City, Idaho
 Secretary: W. T. Montgomery Mt. Home, Idaho
 Treasurer: A. Pence Bruneau Valley, Idaho
 Next meeting will be held in Boise City, March 14, 1894.

Payette Valley Fruit and Agricultural Association.

President: W. G. Whitney Fayette, Idaho
 Secretary: W. M. Gorrie Payette, Idaho

North Idaho Horticultural Society.

President: J. M. Howe
 Secretary: Robert Schleisher
 Society meets at Lewiston on the first Saturday of each month.

Paris Farmers' Club

Presidents: Thos. Sleight Paris, Idaho
 Sec. & Treas: Chas. H. Wright Paris, Idaho
 DIRECTORS: —Thos. Sleight, Adam Seigmiller, Hyrum Humphreys, John A. Sutton, Jr., Chas. Ennis.

FRUIT INSPECTORS.

Latah county, Martin J. Wessels Lewiston, Idaho
 Nez Perce county, Martin J. Wessels Lewiston, Idaho

NOTE:—Fruit inspectors are appointed by County Commissioners.

As infected nursery stock is being distributed throughout the state it is important that Fruit Inspectors be appointed to protect our fruit interests.