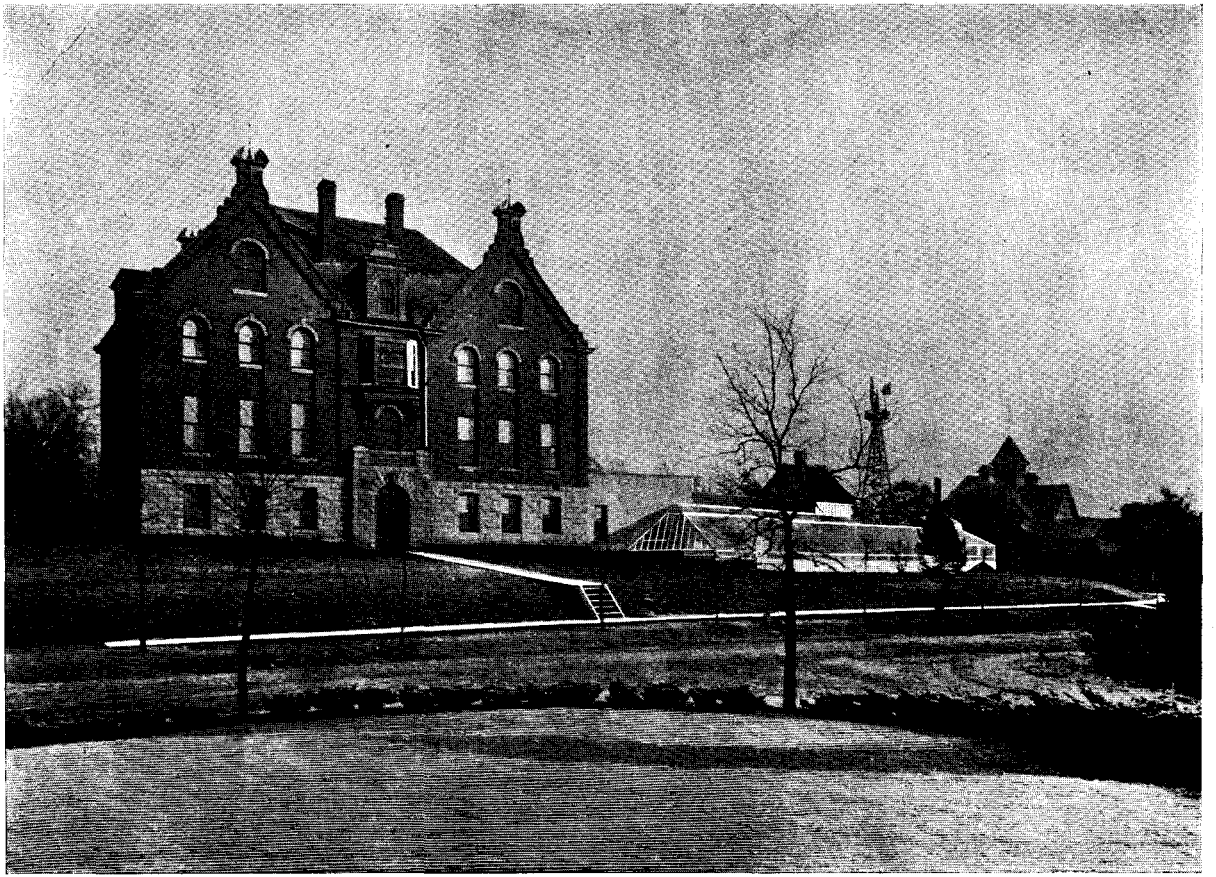

HORTICULTURAL BUILDING.

ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATION

OF THE

UNIVERSITY OF MINNESOTA.

Fiscal Year, July 1, 1898, to June 30, 1899.

DELANO, MINN.:
THE EAGLE PRINTING COMPANY, PRINTERS.
1900.

UNIVERSITY OF MINNESOTA.

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WILLET M. HAYES, M. Agr.,	Agriculturist.
SAMUEL B. GREEN, B. S.,	Horticulturist.
OTTO LUGGER, Ph. D.,	Entomologist and Botanist.
HARRY SNYDER, B. S.,	Chemist.
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H. H. CHAPMAN, B. S., B. Agr.,	Superintendent, Grand Rapids.
J. A. VYE,	Secretary.

☞ The Bulletins of this Station are mailed free to all residents of the State who make application for them.

UNIVERSITY OF MINNESOTA, July 1, 1899.

To His Excellency, John Lind, Governor of Minnesota:

I have the honor to transmit herewith the annual report of the Agricultural Experiment Station of the University of Minnesota for the fiscal year ending June 30th, 1899.

JOHN S. PILLSBURY,
President of the Board of Regents.

List of Bulletins Published During the Fiscal Year 1899.

REPORT

OF THE

Director of the Experiment Station Corps.

To the President of the Board of Regents:

I have the honor to transmit herewith my annual report of the Agricultural Experiment Station of the University of Minnesota, including the station established on the farm of Mr. O. C. Gregg, superintendent of the Farmers' Institute of Minnesota, located near Lynd, Lyon County, also the two stations established by an Act of the Legislature in 1895, located near Crookston, and Grand Rapids, Minnesota.

This report contains copies of the bulletins published during the Government fiscal year, July 1st, 1898, to June 30th, 1899, and a detailed statement of the receipts and expenditures of the annual appropriation from the United States Government.

Following this is a summarized statement of the receipts and disbursements from June 30th, 1898, to July 1st, 1899, including the Coteau Station at Lynd, Minnesota, which is maintained out of the current fund.

This shows that the University has expended $13,504.80 more in carrying on the experiment work than the Hatch fund ($15,000) received from the United States Government.

Following this report is a financial statement of the two stations located at Crookston, and Grand Rapids. These stations are maintained by special appropriation made biennially by the Legislature.

VI.

THE MINNESOTA AGRICULTURAL EXPERIMENT STATION
IN ACCOUNT WITH
THE UNITED STATES APPROPRIATION, 1898-9,

Dr.

To receipts from the Treasurer of the United States as per appropriation for fiscal year ending June 30 1899, as per Act of Congress approved March 2, 1887		$15,000.00
Cr.		
By Salaries	$11,469.91	
Labor	1,773.98	
Publications	47.50	
Postage and stationery	187.90	
Freight and express	37.50	
Heat, light and water	141.97	
Chemical supplies	98.39	
Seeds, plants and sundry supplies	226.05	
Fertilizers	.....	
Feeding stuffs	336.29	
Library	20.80	
Tools, implements and machinery	162.09	
Furniture and fixtures	.....	
Scientific apparatus	131.88	
Live stock	144.35	
Traveling expenses	12.69	
Contingent expenses	.....	
Building and repairs	208.70	
Total	$15,000.00	$15,000.00

FINANCIAL STATEMENT.

Statement of disbursements and receipts of the Minnesota Experiment Station for the twelve months beginning July 1st, 1898, and ending June 30th. 1899, inclusive.

	Disbursements.	Receipts.	Cash Outlay.
Station	$ 9,060.23	$ 444.89	$ 8,615.34
Agriculture	7,223.43	595.44	6,627.99
Horticulture	3,638.85	669.88	2,968.97
Chemistry	2,073.98	7.40	2,066.58
Entomology	1,056.07	....	1,056.07
Veterinary	1,544.07	473.28	1,070.79
Dairy	1.238.57	....	1,238.57
Animal Husbandry	7,340.42	2,784.83	4,555.59
Coteau	304.90	....	304.90
	$33,480.52	$4,975.72	$28,504.80
Crookston	5,086,83	809.53	4,277.30
Grand Rapids	4,780.33	1,078.01	3,702.32
	$9,867.16	$1,887.54	$7,979.62

In the Division of Agriculture the experiment work has developed, and useful results are being published. A bulletin (No. 62) on the testing of varieties, the breeding and the cultivation of wheat was published, covering the work in these lines for the past eleven years. Besides mentioning superior newly-originated varieties of wheat, which are being distributed to farmers of the State, this bulletin outlines the methods used in wheat improvement by introducing and testing varieties, and by breeding the best standard sorts. Good climatic conditions have resulted in good crops in all the field crop experiments. Progress has been made in the study of field management, and especially with that part of crop rotations which includes the pasturing of permanent, rotation, annual and shift pastures. Methods have been devised for using steers to determine the relative yield, at the different seasons of the year, of the various pasture crops and pastures of mixed seeding. Breeding experiments with corn, flax, oats, barley, timothy, bromus, field peas and beans, as well as with wheat, are being yearly developed into more system, and the valuable results already secured seem to foreshadow greater results in the future. The yields of the farm crop at University Farm have averaged well for a number of years, and the logical conclusion is that by good farming the yields of our fields can be materially increased at a cost which will make profits much greater than is common on the fields throughout the State. The soil is only average in quality. No commercial fertilizers or other unusual or expensive means are used. The crops are properly rotated, the soil is well prepared, good varieties are used and the crops are well cultivated. The yields of shelled corn average from year to year about 55 bushels per acre, wheat about 23 bushels, and other crops correspondingly high. Prof. Hays spent two months during the past summer in studying the agriculture of Europe, paying special attention to agricultural colleges, experiment stations, the breeding and production of seeds for field crops and to the management of farms. He reports that he was received by the many agricultural teachers and experimenters, and by the seedsmen and farmers of Europe, in a most cordial manner, and was able to gather much useful inform-

ation. He mentions as of special interest the fact that because field crops are extensively bred for better yield, and because more labor is put on the land, relatively better crops are grown, as compared with the possibilities of the soil, than in Minnesota. The many experiments in the Division of Agriculture were well cared for during Prof. Hays' absence by Mr. Andrew Boss, first assistant in the Division of Agriculture, aided by several students of the College of Agriculture.

In the Division of Horticulture experiment work has been carried on along lines similar to those of the several past years. It has been the effort of Prof. Green to keep the department in close touch with the horticulturists of the State, and to study their needs and endeavor to help them. No bulletin has been published, but in place of it the forestry association has published a book of 330 pages by Prof. Green, containing the results of his observations along these lines up to date. While nominally this is not a bulletin, yet the station gets the credit for it without expense of its publication, and the School and College of Agriculture get a much-needed text book. Ten thousand copies of this have been issued by the Forestry Association for free distribution, and it has been so widely sought after that this edition is nearly exhausted and a new edition will probably be issued within a short time. It has been adopted as a text book in the agricultural colleges of several other States and put in very many school libraries of this State.

The crowded condition of the rooms occupied by the Division of Horticulture, owing to the great increase of attendance in the School of Agriculture, has put the work of experimentation to some disadvantage, but this will be overcome when the new Horticultural Building, now in process of construction, shall have been completed.

It has been the aim of Prof. Green to keep the campus in such condition that it would be attractive to visitors, and at the same time instructive. With this purpose in mind he has planted in favorable locations on the ground specimen trees, shrubs and plants of various kinds, and labeled them with their common and botanical names. This serves to make the grounds attractive and interesting, and the results

obtained from the material used for this purpose are valuable for publication in our bulletins.

The crops of apples and other fruits, with the exception of plums, were very good in 1898, and the outlook for 1899 is exceedingly good, with the exception of apples, which will be a light crop this year. The card index system of keeping track of the varieties in our orchards and fruit plantation is proving very satisfactory, and is being improved from time to time.

The collection of photographs in the division consists of about 1,000 negatives upon various horticultural and forestry subjects.

The forestry plantation is in a very satisfactory condition, and it has been very favorably commented on by many who are familiar with such work. It is of increasing interest to foresters and of much value for purposes of instruction to our students.

The Horticultural Division is in close touch with the sub-stations. At Coteau Farm sub-station the horticultural work is attracting much attention, and especially the work with forest trees. The plantation which was made there five years ago is now in admirable shape, and is of much interest to the people of that section of the State. When this forest plantation was made, seedling wild plums were introduced as subsidiary trees in some of the plots. These have produced one good crop, and are now heavily laden with fruit. This feature is a new one in forest plantations in this section and has attracted much attention. While the fruit from these seedlings is not of dessert quality, yet it is in much demand for preserving, and the young trees make a most excellent addition to plantings.

The Division of Entomology published during the year two bulletins, viz: Nos. 61 and 64. The former is the first part of a text book in which it is intended to describe and illustrate all injurious insects and diseases of our fruit-producing plants. Bulletin No. 61 describes and illustrates all lepidopterous insects in their various stages known to occur in Minnesota, and which cause such material losses to the growers of apples, plums, cherries, raspberries, blackberries, gooseberries, currants, cranberries, strawberries, as

well as to the owners of nurseries. In every case remedies are given which have been found to be most effective to prevent the losses caused by such insects.

To make this bulletin still more useful, so that it can be used as a hand book of butterflies and moths in our public schools, the description and illustration of a few species are also given which are not especially injurious, but which are needed to give a classification of this order of insects. For the same purpose a short chapter was added treating of the coarser external anatomy of a butterfly, to enable the student to classify any insect belonging to this order and to arrange it in its proper place. It is intended by Dr. Lugger to add another part in the near future in which the remaining orders of insects will be discussed in the same manner. Only insects injurious to fruit-producing plants, as being the more important members of such orders, will be described and illustrated, excepting in cases where some have to be mentioned to make the work as complete as possible. Besides insects, the many diseases found upon our fruit-producing plants will also be described, as well as the most effective remedies against both insects and parasitic plants.

In this way the experiment station will have a fairly complete handbook of the enemies of fruit-producing plants.

Bulletin No. 61 is a book of nearly 300 pages, with 237 illustrations in the text and on 24 plates, the latter containing half-tone reproductions of original photographs.

Bulletin No. 64 may be called an emergency bulletin, published in a great hurry, to assist our farmers against three very bad enemies to our cereals. It had to be published in this way simply to reach the farmer in time to make the information contained in it of practical value. It treats of the black or summer rust, the Hessian fly and migratory locusts. Black rust has been prevailing in many parts of the State, causing enormous losses, especially in the more open regions, or prairies. It was found, however, that this disease had started from well-defined localities, and always much earlier than in other regions. A closer inspection showed invariably that these local and earlier outbreaks and visitations were caused by the presence of the barberry bushes grown for ornamental or useful purposes in and

about gardens. As is well known, one stage of the black rust is found upon the barberry, where it forms an entirely different disease. Since black rust has to pass through this stage upon the barberry, being unable to exist continuously upon cereals and grasses, at least so far as known, it became very important to teach our agriculturists this peculiar relation, and also that it is exceedingly dangerous to have both plants growing in close proximity to each other, and especially so in our open prairies, where the spores, or seeds, of this disease can be distributed over large areas without let or hindrance. For this purpose Bulletin 64 was issued as soon as the facts became known, and it is to be hoped that no barberry plants will be permitted to grow in regions devoted mainly to the growth of the more valuable and necessary grains.

The Hessian fly is becoming very destructive in the western part of the State, extending northward through the Red River Valley into Manitoba. Bulletin 64 gives in a condensed form the life history of this insect, and the best method of combating it.

As the migratory locusts are again threatening the farmers of our State, it was thought best to give timely warning, and to instruct the farmers how to fight this most destructive insect. Dr. Lugger was invited by the Canadian Government to inspect, in company with their own entomologist and the Deputy Minister of Agriculture, the infested region in Manitoba, and to instruct the farmers in that region how to prevent further losses. It is a pleasure to express the grateful thanks of the entomologist for the kind reception received not alone by the two gentlemen mentioned above, but by all the residents in the region visited.

Many other insects have been more or less destructive during the past season. Early in the spring the chinch-bug threatened destruction in some of the more southern counties, and the entomologist prepared a large amount of disease spores to be mailed to all wishing to use them.

Luckily, so far at least as chinch-bugs are concerned, the excessively wet spring nipped the evil in the bud, so to speak, and made it unnecessary to send much of this mate-

rial, and consequently only 162 boxes were mailed to different persons.

The entomologist had to make numerous trips to various localities to investigate local outbreaks of troublesome insects, and to tell farmers the proper methods to combat them. He inspected also a number of nurseries, so as to enable their owners to ship plants outside the State. We are at present, for lack of suitable laws, in a very peculiar position, since our own nurserymen cannot ship their goods into other states without an inspection, while owners of nurseries living in other states can ship into our state without inspection. We surely need some legislation to enable our deserving nurserymen to do what their competitors in other states are permitted to do.

The correspondence of the entomologist is very extensive, so that much of his time is occupied with writing letters, and it is impossible for him always to give such extensive replies as he would like to give.

The Museum, containing very valuable collections of animals, birds, insects, plants, etc., etc., is a constant source of pleasure and benefit, not alone to the students but also to the many visitors. The room containing it is so small, however, that no extensive and necessary additions can be made.

In the Chemical Division the human food and soil investigations have been continued, and a large amount of miscellaneous work accomplished. About fifty chemical analyses have been made of soils from different parts of the State. These soils have been taken mainly from the farms of the students of the School of Agriculture, and the analytical results have been of value both for instruction and experimental purposes. A study of the available plant food has shown that many unproductive soils contain large amounts of plant food which have become unavailable because of the methods of farming which have been followed. It has been the aim to determine, as far as possible, the amounts of reserve plant food in the soil and the best methods for its conservation.

In the human food investigations particular attention has been given to the study of farm foods and rations. A number of digestion experiments have been made with men

employed at farm labor; eggs, milk, beans, cheese, butter, bread and other food articles being used in different amounts and combination with the view of determining the digestibility and value of the various foods. The comparative digestibility of butter and oleomargarine in a ration has also been determined.

The publications for the year include: (1) Bulletin No. 63, which treats of the composition and food value of tomatoes, the proteids of wheat flour, and the analyses of miscellaneous substances received from the farmers of the State; (2) Bulletin No. 67 of the United States Department of Agriculture, Office of Experiment Stations, which gives the results of "Studies on Bread and Bread Making" made in our laboratory during 1897 and 1898; (3) A text book entitled "Chemistry of Soils and Fertilizers," published during the year by Prof. Snyder.

The Chemical Division has also co-operated with other divisions of the station in the study of the rotation of crops, digestibility of Animal foods, and has made numerous free analyses for the farmers of the State.

The work in the Dairy Division during the year has been a continuation of the study of economic milk production, and the preparation of a bulletin covering the results obtained in feeding experiments during the years 1894, 1895 and 1896, and summarizing the results obtained since the organization of the division.

The popular phase of the cost of milk production has been practically completed, and the results are being published in bulletin form; but while the cost of variation in the productive capacity of different animals has been quite clearly indicated in the work already done, further experimentation seems to be necessary to fully establish it upon scientific principles. The work in this division is year by year being narrowed down to a more scientific research in animal nutrition; and while work of this character requires much time and great expenditure of money to obtain final results, its great importance in showing how foods can be converted most economically into animal products seems to warrant it. A new and large herd of dairy cows has been built up gradually by Prof. Hæcker, and it is his belief that

in the future the herd will not only maintain itself as to numbers, but also bring in a considerable revenue from the sale of dairy products and surplus young stock.

During the past six years a most complete and comprehensive record has been kept of all feeding operations, showing the amount and kind of food given to each animal each day, the chemical composition of the same, the amount and kind of product returned, and the cost of production. This data will be exceedingly valuable to farmers in showing the cost of dairy products and growing young animals on the farm. By the close of another year sufficient data will have been obtained to publish a bulletin showing the cost of rearing dairy calves from time of birth to period of profit. The results obtained are based upon experiments conducted with over 100 calves. The experiment to ascertain the amount and kind of nutritive substances available for dairy cows in corn, sorghum and various other forage plants at different stages of growth and different times and method of planting is still in progress, and the first bulletin on this work will be ready for publication, it is hoped, before farming operations begin next spring. This work has required much time, since it necessitates a large number of digestion experiments. It is believed, however, that the result will be of great value in showing by actual demonstration the comparative feeding value per acre and ton of these food stuffs.

Many of our food stuffs are doubtless being fed simply because of custom, regardless of their money value in supplying the particular nutrient needed for certain products. For this reason experiments have been undertaken to determine the amounts of the different nutriments required for animal production, knowledge of which would avoid the waste consequent upon giving an animal more of a certain kind of nutriment than he has use for.

In the Veterinary Division a great deal of time has been given to the hog cholera problem. This disease has prevailed in Minnesota to a serious extent since 1896. The losses and the infected areas have been continually reduced, however, until the situation at present is very far from being as serious as it was in 1896 and in 1897. The plan of disseminating information among farmers and local health officers has

been continued in co-operation with the State Board of Health, Dr. Reynolds being a member of that board. Health officers and farmers in general are taking more interest in the work and are becoming better informed concerning the disease. The previous opinion that we have two infectious diseases, swine plague and hog cholera usually combined in each outbreak, has been confirmed by further experience. As yet there is no means of knowing what part feed and care have to do with the production of this disease, but it is evident that the bacilli of hog cholera and swine plague are not the only factors to be considered. We are anxiously awaiting for a serum to be perfected so that we can have a vaccine that will protect neighboring hogs in case of outbreak.

There are evidently several diseases among live stock in this State that are as yet undescribed and but little understood. It was hoped that the Veterinary Division would be supplied with a new building and facilities for studying these diseases, but this new building has not been obtained, although urgently needed. The most serious of these diseases are malignant catarrh among cattle; an apparently infectious form of cerebro-spinal-meningitis; so called corn stalk disease; infectious abortion among cattle; and a strange type of influenza, which has prevailed among horses in different parts of the State.

The work of encouraging the use of tuberculin and disseminating information concerning bovine tuberculosis is progressing slowly but satisfactorily.

The prevalence of glanders is apparently about the same as for several years past.

Black-leg has prevailed among young cattle to quite a serious extent during the past year, but we are enabled to deal quite satisfactorily with this disease by means of a vaccine, which has proven a successful preventive and which can be cheaply and easily administered.

We have had one case of anthrax in the State during the past year, but the outbreak was limited, and we will probably have no further trouble from it.

Scab among sheep has not prevailed to any serious

extent, but there have been considerable losses from stomach worms and other internal parasites. Scab is almost unknown in the State except as occasionally received in importations from the west.

There have occurred several outbreaks of rabbies among domestic animals during the past year, in each case due to probable infection from rabid dogs, but financial losses have not been heavy.

The Animal Husbandry Department has carried on experiments in fattening steers, wethers and lambs. in growing pastures other than grass for sheep in summer, and fodders other than hay for them in winter. Swine were also grown of various breeds and grades to produce bacon.

The following are chief among the objects sought in growing them: The steers were fattened to ascertain the results from feeding different quantities of grain; the wethers were fattened to determine the value of grain for fattening while sheep are being grazed; the summer pastures were grown to show their value to farmers engaged in sheep husbandry; the winter fodders were grown for a similar purpose; the swine were grown to ascertain the relative cost of production in various breeds, and grades were grown on the bacon plan, and to ascertain the relative suitability of these for producing bacon.

One bulletin was issued, viz.: No, 60, which treats (1) of growing beef in Minnesota; (2) fattening range steers in winter, and (3) feeding pigs of different grades. Two books were also brought out by Prof. Shaw. The first discusses: "Forage Crops Other than Grasses" in the United States. The second is a revision of "The Study of Breeds." This book discusses all the pedigreed breeds of cattle, sheep and swine in the United States.

In the work carried on at the Northwest Experiment Farm, under the supervision of T. A. Hoverstad, the same general plans have been followed as in former years. Owing to lack of funds, the horse feeding experiments had to be discontinued, and many others carried on on a restricted scale. An extensive system of rotation experiments has been started this year, and more will likely be added from time to time. It is the intention to make this one of the strong

lines of work. It is doubtless the work is in more demand in the Red River Valley than any other. The past season was somewhat unfavorable for field experiments. The unusual amount of rain delayed seeding until the latter part of May and the first part of June. A heavy hail storm just before harvest damaged the standing grain very much.

The method of plowing so that the field will be ridged has been continued, and the effects of draining the fields begin to be apparent.

The testing of varieties of grain has been continued on a smaller scale. The inferior kinds have been discontinued. Some of the better kinds have been distributed quite extensively.

Grasses have received more attention than formerly. The main line of work has been confined to clover. The faith that clover can be grown successfully has been confirmed by the last season's test. Enough has been learned about grasses to know that cultivated grasses can be grown successfully in permanent and temporary meadows and pastures.

In cultivated forage crops the work has been confined to corn, sorghum and rape. These have all proven very satisfactory, and furnished large quantities of very good fodder.

The successful grains, grasses and cultivated crops have been the materials used in our rotation experiments.

While no definite experiments have been conducted with vegetables and flowers, a great many varieties have been successfully grown. This is the preliminary work which will lead to the experiments we hope to carry on in the not distant future.

In forest trees and shrubbery no new work has been attempted. The large number planted in former years furnishes abundant material for study, and in course of time material will be collected for a special report in this line of work. Many species of trees have proven hardy in this climate,—will live in a poorly drained clay soil, and some will live and grow in soil containing an excess of alkali salts. A number of varieties of blackberries and raspberries were planted in early spring. Several apple and plum trees also were planted. They all grew well during the summer,

and special winter protection will be given to them. The currants and gooseberries planted in former years have proven hardy and produced their first crop of fruit the past season. Native varieties of trees, shrubs, fruit trees and bushes are being collected for trial.

Fourteen plots have been laid out for the purpose of experimenting in killing the French weed. This is done on the farm of Mr. Nils Roen, Warren, Minn.

The number of live stock has been slightly increased by breeding. Twenty-five hundred dollars should be invested in good types of pure bred and grade cattle and sheep. There is much interest in live stock in the Red River Valley, and some feeding experiments should be made at this station. The Legislature refused the appropriation asked for. Nothing in this line can be done until an appropriation is obtained.

At the Northeast Experiment Station, under the supervision of Herman H. Chapman, the season of 1899 was characterized by excessive rainfall. In spite of this drawback much was accomplished. The plots were laid out for the rotation experiments, and the yields of this year's crop on the ground carefully compared as a test of the uniformity of the plots. The work in testing small grains has enabled us to select a variety of oats far superior to others, and this has been grown in quantity and will be ready for general distribution in another year. A dent corn has been grown which promises a sure crop in this latitude. Growing clover has met with phenomenal success, the first crop cutting two and one-half tons, and the second one and one-half tons per acre. Corn fodder has given large yields. Millet hay, sown as late as July 1st, has been successfully cut and cured. It has already been shown that a short rotation of oats one year, clover and timothy two years, will keep up the fertility of the poorest soil and give good returns, as these are the most readily marketable crops in this district.

Large yields of strawberries and raspberries were obtained, and some blackberries. A plum orchard of 100 trees was set out. Many apples survived the severe winter of 1898-99 and give great promise. The pines in the forestry plots are making rapid growth.

A flock of fifty ewes, grade western sheep, have been added to the live stock on the farm. The sheep are doing wonderful work in clearing up the brush in their pasture and will in this way more than pay for themselves, and furnish an object lesson to farmers besides.

A hay shed has been erected to accommodate the hay crop.

The problem of an adequate outlet drain for the muskeg swamp on the farm has been solved by the construction of a ditch cribbed on the sides with tamarack poles, which are held in place by stakes driven into the bottom of the ditch and held apart by cross pieces. This work, interrupted by the rains, has occupied all summer, but is now completed, and with the work previously done on the swamp, the next season will see the actual testing of the productive capacity of the swamp soils begun.

The experiment work at the station on Coteau Farm, Lynd, Lyon County, Minn., is progressing satisfactorily. Upon the appointment of Mr. W. G. Smith as assistant in the division of soils, in the National Department of Agriculture, Mr. W. C. Palmer, a graduate of the School of Agriculture, and now a student in the College of Agriculture, was employed to take charge of the experiments.

A bulletin prepared by Prof. W. M. Hays and Mr. W. G. Smith is soon to be issued, giving the results of the several years' work in soil moisture studies and other experiment work at Coteau Farm. The soil moisture studies are showing important facts relative to one crop succeeding better after some crops than others in our rather dry climate, and experiments are being conducted to determine what preceding crops best prepare the soil for each crop.

Supt. O. C. Gregg continues his enthusiastic and helpful interest in these experiments and year by year is transforming his farm into a beautiful and profitable property. The forest plantation, his fruit and vegetables, the plots of forage crops, his sheep, cattle, horses, swine and poultry, and the experiment field plots, together with his well built and neatly kept farmstead, make his place very attractive to many farmers and travelers who annually visit it.

The work of this year of the Experiment Station closes

with more satisfactory results than any that have preceded, and the outlook for the future is more encourgaing each year. We find the interest taken by the Minnesota farmers, as well as the business men of the towns and cities of the State, increasing, which is not only encouraging to the station workers that their efforts are appreciated, but is stimulus to do even better work.

Five bulletins have been published during the year, 18,000 copies of each issued, excepting Bulletin 61, making 10,350,000 pages of the results of the investigations made by the station staff.

These bulletins are issued for gratuitous distribution to the citizens of this State who apply for them. We have many calls for our Annual Reports that we cannot supply, as it is not possible to print more than our exchanges demand.

Respectfully submitted,

WM. M. LIGGETT,

Director.