1914

Twenty-Sixth annual report of the agricultural experiment stations of the Louisiana State University and Agricultural and Mechanical College.

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TWENTY-SIXTH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural and Mechanical College

FOR 1913

TO THE GOVERNOR

By W. R. DODSON, Director

BATON ROUGE
Ramires-Jones Printing Co.
1914
Louisiana State University and A. & M. College

Louisiana State Board of Agriculture and Immigration

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A. P. KERR, M. S., Assistant Director, Baton Rouge.
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C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
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E. S. TUCKER, Associate Entomologist, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
W. E. CROSS, Ph. D., Chemist, Audubon Park, New Orleans.
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J. K. MCHUGH, Secretary and Stenographer, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist in Charge of Fertilizer and Feed Stuffs Laboratory, Baton Rouge.
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I. SELECTER, B. S., Assistant Chemist, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
I. LEVIN, B. S. A., Assistant Chemist, Baton Rouge.
R. L. BOWMAN, B. S., Assistant Chemist, Baton Rouge.
MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
E. J. WATSON, D. V. M., Bacteriologist, Baton Rouge.
MISS CORA JACOBS, M. A., Scientific Assistant in Charge of Seed Laboratory, detailed by U. S. Dept. of Agriculture, Baton Rouge.
ROGER P. SWIRE, B. A., Treasurer, Baton Rouge.
F. V. EMERSON, Ph. D., in Charge Soil Survey Work, Baton Rouge.
C. W. DAVIS, Mailing Secretary, Baton Rouge.
A. J. PARENT, Farm Manager, Baton Rouge.
C. J. BARRILLEAUX, Farm Manager, Audubon Park, New Orleans.
To His Excellency, LUTHER E. HALL,
Governor of Louisiana:

Sir—In compliance with the provisions of an act of the National Congress of March 2, 1887, commonly known as the Hatch Act, and of March 2, 1906, known as the Adams Act, providing for Federal appropriations for agricultural experiment stations of the several states, I submit herewith a report of work done by the stations during the year 1913, and a financial statement for the government fiscal year, July 1, 1912, to July 1, 1913.

While the receipts and expenditures of the various funds received from the State of Louisiana have been published twice annually, June 1 and December 1, as provided by state law, I have combined these two reports and submit them along with the statement of Federal funds, so as to show the total receipts and expenditures for twelve months. The accounts have been examined and approved quarterly by the Supervisor of Public Accounts.

The work of the Experiment Stations may be classified under four general heads. First, scientific investigation; second, dissemination of information gained through experimentation; third, administrative affairs; fourth, participation in regulatory service.

1. The scientific investigations range from the higher form of pure research for advancing our knowledge of fundamental principles to the simpler forms of experimentation and test work, such as crop rotation experiments, crop variety tests, introduction of new plants, etc. The appended reports show that this work has progressed satisfactorily in all lines. There has been no change during the year in the staff of men engaged in experimental work. The efficiency of their efforts is partly due to continuity of service. Several members of the staff have been offered positions elsewhere, generally with increased salary, but
these offers have been uniformly declined, mainly for the reason that our men are greatly interested in the development of their investigations and do not wish to leave incomplete work which is yielding results that will add to their scientific reputation for a new field that may not be as fertile in opportunities.

2. *The dissemination of information* is accomplished through the publication of bulletins, special articles in the agricultural papers and scientific journals, correspondence, addresses and discussions at agricultural meetings, exhibits at agricultural fairs, and by personal explanations to visitors to the laboratories and experiment station farms. The participation of the heads of departments in this line of activity is referred to in the several appended reports.

3. *The administrative work* embraces the supervision of the expenditures of the various departments, approval of projects for investigation, making proper reports to State and Federal Governments of the expenditure of funds and of the progress of the work; the publication and distribution of bulletins and attention to the general correspondence of the station. This work falls mainly upon the director and assistant directors. The direct supervision of the farms also falls upon the assistant directors.

All required reports to the U. S. Department of Agriculture have been made. All have been approved by the proper authorities of the Federal Government. Annually the Office of Experiment Stations sends an inspector to examine the vouchers and account books of the Federal funds and to discuss with the several members of the staff the work being done in the laboratories and in the field. The Comptroller of Currency would withhold the Federal funds of subsequent appropriations unless the accounts and vouchers were satisfactory, or unless the work had made reasonably good progress. Our lines of work and the expenditure therefor have been promptly approved. The State Supervisor of Public Accounts examines quarterly the accounts of all money received and disbursed by the Experiment Stations. Our accounts have been regularly approved by him.

We have sent out during the year from the Baton Rouge office 54,864 bulletins, 2,931 postal cards, 17,469 form letters
and 10,091 personal letters, most of them written in response to inquiries of agricultural problems. The total number of personal letters written at the four stations during the year was 12,578.

AGRICULTURAL TRAINS.

The Director and members of the station staff have participated in the work of three agricultural trains. The Texas & Pacific Railway with our cooperation operated a train over their line from New Roads south to White Castle, then north to the extreme northern portion of the state. The Experiment Stations furnished the cattle, general agricultural exhibits and the machinery for demonstration purposes on their line.

The Cotton Belt operated a train on their line consisting of equipment furnished by the railroad. We participated in the lectures and demonstrations.

The Corn Special was run from Monroe to Ruston over the V. S. & P., thence to Alexandria over the Rock Island, thence to New Orleans over the L. R. & N., under the auspices of the Monroe Chamber of Commerce. Some of the station staff lectured at each stop made by the train.

All the railroads have shown marked interest in the work of the stations. The railroads have co-operated with us in every enterprise and with one exception on the part of one of the roads, everything that we have requested has been granted by the railroad authorities.

AGRICULTURAL FAIRS.

As indicated by the reports from the different departments, the station has furnished one or more judges for nearly every Parish Fair and for the State Fair at Shreveport.

The Experiment Stations had an exhibit at the State Fair illustrating some of the more important phases of the work being carried on by the several departments.

AGRICULTURAL FIELD DAYS.

The annual field day was held at Crowley on August 22. Every one pronounced the meeting a great success. A larger number of farmers than ever before went over all the plots
of the field and heard the explanations given of the experiments that are being conducted.

Field day at the Sugar Experiment Station at Audubon Park was held on June 12. The attendance was large and the meeting was a success from every viewpoint. The most interesting exhibition given was that of traction plows.

SHORT COURSES IN AGRICULTURE.

The Director participated in giving short courses in agriculture during the year at Merryville, Leesville, Marion, Markslyville, Dubach and Minden.

In the early part of August the Director was called to Washington by Secretary Houston for the purpose of discussing agricultural conditions in Louisiana with particular reference to the readjustment of the agriculture of South Louisiana to the conditions that would arise under the new tariff bill.

In October, Mr. W. A. Taylor, Chief of the Bureau of Plant Industry, and Mr. B. H. Rawl, Chief of the Dairy Division of the Bureau of Animal Industry, came to Louisiana as the personal representatives of the Secretary of Agriculture, to study the agricultural conditions of the state. They were accompanied by Senator Jos. E. Ransdell and Senator-elect Robt. F. Broussard, and the Director of the Stations, at the request of the Secretary of Agriculture and the Senators, accompanied the party through the state.

On the report of Mr. Taylor and Mr. Rawl, the Secretary has requested in his estimate to Congress that they appropriate $50,000 for carrying on experimental and demonstration work along the lines of live stock production in Louisiana. If this appropriation is secured the plan will be to establish a demonstration farm of not less than four or five hundred acres, where demonstration work in live stock production and feeding may be conducted on a sufficiently large scale to involve all of the ordinary commercial problems to be dealt with in an enterprise of this kind.

Eight formal addresses were given by the Director to scientific and literary societies and high school commencements and
numerous articles have been written for the agricultural press, particularly for the Progressive Farmer, Farm and Ranch, Gulf States Farmer, Item Farmer, Country Review, Shreveport Times. The "Question Box" has also been prepared each week for publishing answers to questions sent to the Country Review.

A considerable portion of the time of the Director is consumed by prospective purchasers of land from outside the state. These parties want first-hand information from disinterested individuals who have had practical experience in crop production and in the handling of live stock, and who are conversant with climatic conditions and know the soil types throughout the state. Most of the men seeking such information look to the Experiment Stations as the most reliable source from which to secure it. There is scarcely a day during the fall and winter that we do not have one or more visitors who wish to take from a half hour to two hours of the Director's time for discussing agricultural problems and the possibilities of crop and live stock production. Correspondence directed to the station on these topics during the winter period will total probably twenty-five to thirty per cent of the total correspondence. The stations answer from 2500 to 3000 letters per year coming from out-of-state parties who are seeking information regarding Louisiana.

During the year the Director has, in addition to his other duties, looked after a considerable portion of the work ordinarily cared for by the Assistant Director at the station. The work, however, has become so heavy that it will be necessary to reestablish the position of Assistant Director to take care of the farm work at Baton Rouge.

4. The work that may be classed as pertaining to regulatory affairs is that of inspecting nursery stock for the prevention of the introduction or distribution of destructive insects, and participating in the work of fertilizer and feed stuff control. The report of Mr. E. S. Tucker shows what has been done in the line of inspection of nurseries and of imported plants. More adequate provision should be made for taking care of this work. The Experiment Stations should either be relieved of looking
after the technical part of this service or be given full control of it. It would be to the welfare of the stations to have no part in it.

The fertilizer and feed stuff control work has its business year extend from September 1 to August 31. Report of the laboratory work for the season 1912-13 has recently been published. The year for the feed stuff control work ends August 31. Report of the laboratory work in this line has been in the hands of the printer about two months, and we hope may be printed at an early date.

The fertilizer and feed stuffs control work should be re-organized if the best results are to be secured.

Legislative enactments from time to time have so entangled the duties of those engaged in the agricultural activities of the state that some of the old laws should be repealed and new laws enacted that will clearly set forth the fields of activity in which the state is to engage in promoting agricultural development, and more clearly define the responsibilities of those who may be elected or employed to do the work, as well as the authority of the boards to whom responsibilities are entrusted. As an illustration of this entanglement, I cite you to the fact that the Board of Supervisors of the Louisiana State University elects the professor of agriculture at the State University, who, ex-officio, becomes Director of the Experiment Stations. The work of the stations is under the supervision of the State Board of Agriculture and Immigration. We thus have one board electing a man to have charge of work over which they have no control, and another board having control of work without authority to employ or discharge men to do the work. Again, agricultural instruction has developed since the enactment of the legislation referred to, until the title of professor of agriculture is retained only to comply with the law, and is not recognized in fact.

Again, there is division of authority in the inspection and analysis of fertilizers and feed stuffs that is detrimental to the best service. In the third paragraph of this report attempt is made to classify the kinds of agricultural work that may be done by the state. Those engaged in these activities will have their duties and opportunities overlap to some extent, but in the main they may be segregated.
Scientific investigation is pre-eminently the first function of the Experiment Stations. For the best results, those engaged in this work should be relieved very largely of other responsibilities.

The dissemination of useful information on agricultural topics is teaching. This is pre-eminently the function of the Agricultural College. The most efficient man in this service should not be overburdened with other responsibilities.

The administration of regulatory affairs does not necessarily overlap the work of either research or teaching. There are but two reasons that I know of from the farmer's viewpoint why the work of fertilizer and feed stuff inspection should in any way be participated in by the Experiment Stations, since we have passed through the pioneer stages of investigation along these lines. One reason that has been advanced for such participation is that the analytical work is scientifically technical, and only technically trained men should be employed to do the work; and that such men being out of the realm of politics would not be employed by political officers. The other reason is that the stations have received pecuniary aid in carrying on their work by the net revenue remaining after paying the expenses of the inspection and analytical service.

It would seem that the Legislature could provide for keeping the service free of politics, if they so desired. It would be more satisfactory to the Experiment Station workers to have by direct appropriation the amount of money that is to be spent on their work than to have a fluctuating and uncertain income from indirect sources.

The only reason that I know of from the viewpoint of others for continuing the service as it is now conducted is that it affords a goodly number of positions to which politicians may be appointed, in the inspection service, and the salary and traveling expense accounts constitute a valuable asset to a political organization.

The State Board of Agriculture and Immigration is designated by the Constitution of Louisiana, Article No. 306, as the proper organization to have control of the execution of the laws pertaining to fertilizers. The acts of the Legislature have divested the board of any direct participation in the administra-
tion of such laws. The Commissioner of Agriculture and Immigration has supervision of the inspection and the Experiment Stations the analysis of fertilizers, Paris green and feed stuffs.

The State Board of Agriculture is no longer an active organization, the last meeting having been held nearly six years ago. Whether this is because they have been legislated out of a function I am unable to say.

The Legislature of 1912 was requested by you to pass an act revising the laws governing the inspection of fertilizers and feed stuffs, placing the work under the supervision of the State Board of Agriculture and Immigration, as provided in the constitution.

At your request, I gave assistance in framing a bill after the suggestions of the Association of Fertilizer and Feed Stuffs Control Officials of the Southern States. This bill was passed by the House, but failed to reach the Senate in time to have a vote in the regular course of the calendar. Two-thirds vote to suspend the rules for the consideration of the bill was not obtained and the measure was lost. The existence of the present situation is not due to the efforts of any one individual. It has been cumulative for many years. During the administration of Col. Charles Schuler, the matter of revising the inspection service was fully discussed. He was personally in favor of a revision, but found so much political opposition to taking up the matter that his efforts in that direction were abandoned.

On page 710-711 of the Official Journal of the House of Representatives, of the session of 1910, you will find a report of a special committee appointed to look into this question. I am taking the liberty of copying the report in full. I know nothing of the immediate reason for the appointment of the committee. I feel very sure that the criticism referred to was not a reflection on Col. Schuler, but a criticism of a system that had grown up under successive administrations.
House of Representatives,
State of Louisiana,
Baton Rouge, La.,
June 27, 1910.

To the Honorable the Speaker, and Members of the House of Representatives of the State of Louisiana:

Gentlemen:

I am directed by your Committee on Appropriations to submit the following report of the sub-committee appointed by the Committee on Appropriations to investigate the charges relative to the management and conduct of the Affairs of the Commission of Agriculture, Immigration and Commerce:

June 27, 1910.

REPORT APPROPRIATION COMMITTEE.

To the Chairman and Members of the Committee on Appropriations:

Gentlemen:

We, your sub-committee appointed to investigate the Department of Agriculture as to receipts and disbursements, and especially as to the funds growing out of commercial feed stuffs, fertilizer, Paris green, and as to the collection of the same, respectfully submit the following report:

Our report is based upon the information given by officials and employees of the Department with the assistance of the Department of the Traveling Auditor.

Our investigations convinced us that all moneys received have been credited as per the report of the Traveling Auditor, to the proper accounts, and there appears no shortage either in the office of the Department of Agriculture or in that of the Director of the Experimental Station. Our investigations, however, further convinced us that the expense of conducting the inspection branch of the Agricultural Department, with reference to the collection of commercial feed stuffs and fertilizer for subsequent analysis, are so large as to amount almost, in our opinion, to extravagance, as will appear by the following figures:
From January 1, 1909, to March 31, 1910, inclusive, there were collected by the sale of tags the following amounts:

- Commercial Feed Stuffs: $60,224.29
- Commercial Fertilizer: 36,259.32
- Paris green: 1,245.82

Making a total of: $97,729.43

The cost of inspection and the conduct of this Department, which is paid out of this fund, amounted to $49,767.86, which may be apportioned as follows:

- Expenses in general office: $4,125.00
- Expenses in four branch offices: 2,450.48
- Expenses in Chief Inspector's office: 3,837.58
- Salaries of inspectors and traveling expenses in the field: 39,354.80

There are other miscellaneous items paid out of this fund, which would make the figures exceed those herein set forth, but they are not given as we have been unable to classify the items.

The Experimental Station laboratory handling these samples shows an expenditure of $19,067.89 for the same period.

The above figures speak for themselves, and your committee believes that a more economical system can be organized.

Your committee believes that the Department of Fertilizer and Feed Inspection should be transferred to the Experiment Department, and all field inspection as well as laboratory analysis be conducted by that department. The value of this suggestion may be indicated by a reference to the present method and a reasonable conjuncture of the result of a change. As presently conducted, the inspectors in the field gather the samples of feeds and fertilizers and subject the same to no examination as to their constituents, but send the samples to the Chief Inspector's office in Baton Rouge, who, in turn, transmits the same to the Experimental Station, where they are analyzed, the result of such analyses being transmitted back again to the office of the Inspector, thence to the shipper or buyer. The cost of gathering the samples is shown in the figures herein
submitted to be about $2.25 per sample, and the cost of analysis by graduate chemists is about $1.1-2 cents per sample.

Should the transfer as recommended be made, your committee believes, after a careful consideration of all presentations for and against, that the chemical or analytical sections should be organized so as to include the field inspection, and the chemists alternate field with laboratory work. Good and sufficient reasons for this change are—first, that a physical examination by a chemist is of great value for immediate action concerning a shipment of inspected stuff, and, secondly, a better selection of samples for inspection and analysis may be made. Again, the delay caused by the transmission of samples through another department works a hardship often to shipper and consumer alike.

Your committee further believes that the organization as outlined here could be handled by fifteen men, including field and laboratory, instead of as presently organized, twenty-five men, sixteen of whom are inspectors and eight are chemists. Our investigations show that the salary of the technical man, the chemist, is lower than that of the field inspector. It now appears that the field men collect twice as many samples as the chemical department are able to analyze, and at present, with the exception of tankage, few analyses are made of specific samples, but samples purporting to be the same grade are often combined for one analysis.

The itinerary of these field inspectors should, in our judgment, be changed frequently, in order to acquaint the inspectors with new conditions and new situations and enable the department to keep a better check on the work of the inspectors in the field.

Your committee further believes that the analytical and inspection work can be conducted, if organized in accordance with the recommendations herein, at a cost not to exceed the present cost of the field work alone, thereby saving several thousand dollars for other needed agricultural work.

At the request of the committee, Mr. Dupuy, Chief Inspector, furnished a list of the cases in which legal proceedings were instituted against violators of the fertilizer law, this being but six
cases for failure to attach tags, all these cases were dismissed upon defendant paying cost of court and purchasing tags. We have no evidence of the department's having taken proceedings against manufacturers offering for sale grade of fertilizer inferior to the guarantee, yet the State Chemist's report shows that during the years 1908 and 1909 in the one item of cotton seed meal, 44.39 per cent of the meals inspected fell below the guarantee in nitrogen, and of 2523 samples of fertilizers, 1053 fell below the guarantee in one or more elements. No case of prosecution to penalty for violation of the law is shown.

The committee has in its possession detailed statements, as far as possible it has been able to secure them, and they may be examined at any time.

We respectfully recommend that the Committee on Appropriations suggest to the Governor that, should an extraordinary session of the General Assembly be called, that one of the purposes embrace the subject matter in this report.

Your committee expresses its thanks for the able aid rendered in compilation of accounts by Mr. Sandoz, of the Public Accountant's Department.

Respectfully submitted,

J. S. Atkinson,
Isaac D. Wall,
Leon Locke,
Jos. E. Generelly,
Sub-committee.'
types and in aiding in securing knowledge of the distribution of soil types throughout the State and the correlation of accumulated data regarding soils and fertilizers.

My personal judgment is that it would be better for the experimental work of the stations if they had no direct responsibility for any part of the fertilizer and feed stuff control service. Should the matter be put into the hands of the Board of Agriculture, I would respectfully suggest that adequate provision be made for centralizing the responsibility for the entire work under one head.

STATE STATION, BATON ROUGE.

Experiment Station Farm.

The field work during the past year has been very largely a continuation of experiments outlined in previous reports. It is necessary to continue these experiments over a long period to secure the most reliable data from them. These experiments cover tests in the spacing of corn, different methods of cultivating corn, times of applying fertilizer, removal and non-removal of suckers, seed selection, ear to row tests, rotation experiments, variety tests, etc. Experiments with forage crops embrace a comparative study of the most promising crops that can be used for feeding, silage crops and for hay, such as sorghums, clovers, grasses, soy beans, cow peas, velvet beans of different strains, kudzu, etc.

The dasheen, a new substitute for the Irish potato, was grown on the station this year for the first time.

About one acre has been devoted to small plantings of new plants secured through the Division of Seed and Plant Introduction of the United States Department of Agriculture.

An experiment in determining the relative availability of phosphorus in slag meal, as compared to other forms of phosphorus has been conducted in co-operation with five other experiment stations.

The field experiments in grazing hogs have been continued with satisfactory results.

A series of experiments was planned in co-operation with the Department of Agronomy of the University to make a study
of the soil moisture in plots given different preparation and
different culture, planted in corn. These plots were on the
ground recently acquired by the Experiment Stations and condi-
tions developed that indicated that results would not be satis-
factory and the experiments were discontinued, in June. We
have planned, however, to renew the effort to secure data along
these lines.

Additional land available to the station this year has enabled
us to take up several new lines of experimental work. The land
on which these experiments are to be conducted was poorly
drained, had not been cultivated for a good many years and was
badly infested with grasses and weeds. During the year 1913
it has been devoted to crops to put it in good tilth for experi-
mental work for 1914. Part of the land is suited only for pas-
turage and will enable us to enlarge our work in live stock
production.

During the year, Harry Bros., of New Orleans, erected for
experimental work a galvanized iron silo on the station farm,
which was filled with corn and sorghum silage to be fed during
the winter of 1913-14. If the silo is not satisfactory in every
respect, the station will not be at any expense for the construc-
tion; if it is found to be satisfactory, the station will pay the
factory cost of the material and the freight.

Two acres were devoted to ramie with the view of testing
out a decorticating machine that was thought to be an improve-
ment over machines previously tried. Mr. Lyster H. Dewey, in
charge of fiber investigations of the United States Department
of Agriculture, came to Baton Rouge to conduct the harvesting
experiments. The ramie crop was good, but the machine was
not found to meet all of the requirements. We have not yet
despaired, however, of finding a machine that will successfully
decorticate ramie, and the crop will be grown for further trials
of modified machinery.

Some new experiments were inaugurated in the use of rock
phosphate in combination with red clover turned under during
June. These experiments embrace the application of various
quantities of phosphate rock with and without lime at the time
the clover is turned under.
DEPARTMENT OF SOILS.

F. V. Emerson, Geologist.

The Louisiana Soil Survey has for its purpose the classification and mapping of soils; the making of chemical analyses in order to ascertain if any important elements of soil fertility are lacking; the investigation of the physical properties of soils by mechanical analyses and by experiments in order to study the texture of soils and the means by which the tilth may be improved.

In co-operation with other departments of the Experiment Stations, it is planned to carry on investigations on the adaptations of crops to different types of soils, the collection of information as to crop cultivation and methods on different soil types and the study of farm management and statistics.

The ultimate aim is to acquaint the farmer with the different kinds of soils and to help him handle each soil type in the best way; also to map the soils in the different parishes and publish descriptions to be sent to prospective immigrants and investors.

The work has been begun by a preliminary study of the alluvial soils of the sugar district. About seven plantations were surveyed and several hundred borings were made and noted. Samples of each soil type were collected and these are being analyzed both physically and chemically. Detailed information will be obtained to the end the definite and reliable information may be obtained about the different types. On two large plantations detailed chemical analyses have been, or will be, placed at our disposal and on several others information as to crop yields and methods will be compiled. This information will be recorded on cards so that it will be readily available.

Work has been started on a comparison of virgin soils and cultivated soils of the same type, so that we may know something of the changes brought about by cultivation. Arrangements have been made with several planters to try out on their plots various recommendations to be made and to observe and report the results.
INVESTIGATIONS IN SUGAR ENGINEERING.

E. W. Kerr.

In January, Bulletin 138, entitled "An Experimental Study of Heat Transmission and Entrainment in a Vacuum Evaporator," came from the press. This bulletin is a progress report of results from some 160 tests made in 1912 upon the experimental evaporator in the laboratory. These tests were made for the purpose of securing data regarding the effect of hydrostatic head, circulation tubes, length and diameter of heating tubes, varying the vacuum or the steam pressure, the presence of incondensible gases in the steam, the density of the juice, quality of the heating steam, etc., upon the transmission of heat, also to study conditions which affect entrainment in evaporators of the type used in sugar factories. This bulletin contains 72 pages of matter.

The data obtained in the tests of Adeline during the grinding season of 1912 were also worked into shape for publication during the early part of the year, though this matter has not as yet been printed in bulletin form for the reason that some of the tests had to be made over, and for the further reason that another series of tests along somewhat similar lines was yet to be made in other houses. During the spring and early summer, the experiments upon the laboratory evaporator were continued, some 170 tests being made in addition to those recorded in Bulletin 138.

These tests were made upon two types of evaporators designed with especial reference to the removal of incondensible gases from the heating steam and for obtaining high velocities of the heating steam. The results of these tests have been worked up and will be printed in bulletin form. The calandrias of the two types tested were built and donated for the experiments by the Sanborn Evaporator Company of New York, and Mr. A. L. Weber of New Orleans.

During the grinding season just ended, an extensive series of tests were made in various Louisiana sugar houses on different types of vacuum pans, multiple evaporators, and juice heaters, the object being to get first hand data regarding the transmission of heat in sugar house heating and evaporating apparatus under
actual operating conditions. The different types tested were selected so as to include as much variety in design as possible. Some twenty sugar houses were visited at which more than fifty tests were made. This department is now in possession of a large mass of data which can now be worked up into permanent form for publication.

In addition to Bulletin 138, eight illustrated articles on sugar engineering subjects, averaging 2500 words each, have been written for sugar journals during the year. A paper of 2500 words, entitled "Tests on the Performance of Sugar House Machinery," was read before the Louisiana Planters' Association in February. A discussion of some 2000 words relating to the "Factors Affecting the Capacity of Evaporators" was made before the Louisiana Engineering Society in October. A paper of 12,000 words, entitled "Tests upon the Transmission of Heat in Vacuum Evaporators," was presented at the annual meeting of the American Society of Mechanical Engineers in December. This paper has already been published in the Journal of this society. The articles and papers mentioned above have been widely abstracted and in some cases reprinted in various sugar and chemical journals.

The amount of correspondence in this department is steadily increasing, some 400 letters having been written during the past year. Special exhibits, showing the work done by this department have been prepared and shown at the National Corn Exposition and at the Shreveport State Fair during the year.

The work of the year has been carried on with the assistance of Messrs. J. F. Gunther, A. J. Isaacks and others, and much of the success obtained is due to their painstaking and faithful work.

SEED LABORATORY.

Cora C. Jacobs, Scientific Assistant in Charge.

The Seed Laboratory of the United States Department of Agriculture, co-operating with the Agricultural Experiment Station, was established in November, 1911, for the purpose of making purity and germination tests of farm seeds, for the farmers of the lower Mississippi Valley. During the year 1913, five hundred and seventy-three samples were sent to the la-
laboratory. Of these, 138 were for purity tests, 53 for identification, 7 for examination and 513 for germination tests. The samples consisted chiefly of lespedeza, rice, cotton, and vegetable seeds, nearly all of which were submitted by farmers and seedsmen within the state.

This year the laboratory had an exhibit at the State Fair at Shreveport. Mounted samples showing the percentage of pure seed, weeds, and inert matter, in good and bad seed on the Louisiana markets, made apparent the benefits to be derived from purity tests. Germination tests showing the presence of old, immature, or damaged seeds in field and garden seeds were also shown.

Besides making purity and germination tests for planters and seedsmen, all seeds entering port at New Orleans are examined before they are landed. This prevents the importation of foreign weedy or adulterated seeds.

VETERINARY DEPARTMENT.

W. H. Dalrymple, Veterinarian.

Owing to a large share of the writers' duties having been taken up with teaching in the College of Agriculture, the carrying out of the purely research work has been attended to by Dr. Harry Morris, Assistant Veterinarian and Bacteriologist of the Experiment Station. The writer, however, has attended to a voluminous correspondence along veterinary and animal husbandry lines which have either come to him direct, or been referred by the director.

Such correspondence has included, not only inquiries from over the state regarding animal diseases of all kinds, but about breeds, feeding, and general care of live stock.

During the year response has been made to many requests for newspaper and scientific articles on topics of interest to the farmer and stockowner, as well as others.

A week was spent on an agricultural demonstration train operated jointly by the Texas & Pacific Railway Company, and the Experiment Station of the State University, the writer lecturing several times daily on the subject of improvement in our beef cattle, and the importance of the work of tick eradication.
A number of meetings throughout the state have been attended with the object of affording information along lines that would stimulate interest in the live stock industry generally, and as a result of some of these, several parishes have been induced to take up systematic tick eradication work.

The writer was present at the annual meeting of the Louisiana Lespedeza Growers' Association at Tallulah, and addressed the members on the nutritative value of lespedeza hay and its importance as a forage for both home consumption and for exportation.

In addition to state gatherings, the writer has attended meetings of a sectional and national character and delivered addresses.

Among these may be mentioned the meeting in New Orleans of the Association of Commissioners of Agriculture of the Southern States. An address was delivered at this meeting on "Southern Live Stock Possibilities," which was afterwards made a part of the annual report of the Louisiana State Board of Agriculture and Immigration, and was reproduced in a number of agricultural and other journals.

The writer attended the fiftieth anniversary meeting of the American Veterinary Medical Association in New York City, and took an active part in the proceedings. Returning to New York a few weeks later, he attended a joint conference between representatives of the great trans-Atlantic steamship lines and commercial bodies of the Mississippi Valley states, with the object of trying to induce immigration through the port of New Orleans, and he addressed the conference on that occasion. As a result of this conference, the Mississippi Valley Immigration Association was subsequently organized in the city of New Orleans, and at this meeting the writer delivered an address on Immigration, Foreign and Domestic, and How It Might be Secured. The address was published in a number of papers, and was prepared in folder form by the Baton Rouge Chamber of Commerce for general distribution.

The writer also attended the annual meeting, in Chicago, of the United States Live Stock Sanitary Association, and being on the program and some important committees, took an active
part in the convention; and he represented the State University and Experiment Stations at the 1913 International Live Stock Exposition in the same city.

The interest manifested by our people in this department, including animal husbandry, as evidenced by the increasing number of inquiries and requests for general information, seems to indicate that they are devoting much more attention and serious thought to the betterment of live stock conditions throughout the state.

DEPARTMENT OF ANIMAL PATHOLOGY.
Harry Morris, Assistant Veterinarian and Bacteriologist.

ANTHRAX.

A general study of the subject has been continued both in the laboratory and field. Considerable data has been obtained on the life history of the organism while in the soil, water, and decomposing anthrax carcasses. During a severe local outbreak of anthrax, we were able to make a study of the methods of infection and dissemination. Special attention was paid to some of the blood sucking flies as possible carriers of infection and some valuable data was obtained. The milk from cows suffering with the disease was tested to determine whether or not the bacillus of anthrax was present in the milk before death, and if so, at what period of development of the disease it entered the milk glands.

By observing strict sanitary rules and the use of vaccines, not a case of anthrax developed among the station live stock during the past year, although the station farms have been infected with the organism in past years.

COTTON SEED MEAL POISONING.

With the Department of Plant Pathology, the study of the problems of cotton seed meal poisoning has been continued. This work has included feeding experiments with cotton seed meal and cotton seed kernels treated in various ways. By experimenting with rabbits we were able to discover ways by which the toxicity of the meal could be reduced to such an extent that it could be fed for long periods of time without injury to the ani-
mal. Hogs were then used in the tests and the same results obtained. Some of the feeding experiments have run for one hundred days with the hogs making good gains in weight and showing no signs of poisoning. This subject is being continued and we hope to make a report of the work during the coming year.

Some attention has been paid to the dog disease commonly known as "sore mouth," or "black tongue."

Besides the diseases mentioned in the above paragraphs, we have had the usual work of a bacteriological laboratory. During the last year we have diagnosed several cases of rabies and tuberculosis in animals, and have examined several hundred blood smears for anthrax. We are perfectly willing to do this work for the people of the state, but such information should be obtained from the Secretary of the Live Stock Sanitary Board, for which purpose the board was created. The Secretary makes a general survey of the diseases in the state and quite often his work is interfered with and valuable time is lost because communications are sent to the station instead of the Sanitary Board.

HORTICULTURAL DEPARTMENT.

*George L. Tiebout, Horticulturist.*

Investigations and demonstrations in the production and marketing of various truck crops have been continued during the year. The growing and marketing of winter cauliflower has received special attention. As a result of farmers and truckers observing our former efforts of last year, over fifty growers planted cauliflower this year for the first time. Much individual attention was given the new growers through correspondence, demonstration, lectures at the association meetings and visits to the fields. Unfortunately, our plantings this season, as well as those of many growers, were very seriously damaged by the abnormally rainy weather of August and September.

A quantity of our damaged stock not fit for shipment was put up in salt brine for pickles, with the view of testing the practicability of using inferior stock in this way. Experiments in the production of spring cauliflower have so far been unsatisfactory.
Results indicate that bell peppers are a profitable summer truck crop with a somewhat limited demand in the North. In mid-summer when shipments become unprofitable, large quantities of fruits go to waste and we hope to find an outlet for this surplus in "pickled mango peppers."

Our department has continued to assist other departments in their work by helping to provide material for experimental purposes and for carrying out practical demonstrations in the control of plant diseases.

Data regarding the cost of producing and marketing various truck crops is being furnished for compilation by the Department of Commerce, Louisiana State University.

Correspondence has been mostly regarding truck crops, especially cauliflower. Demands for special lectures before truck associations and visits to trucking sections to investigate special problems, have been consistently met. We were represented at the convention of the Vegetable Growers of America, at Toledo, Ohio, and assisted in installing and caring for the exhibit of the stations at the State Fair and in judging the general vegetable exhibits.


DEPARTMENT OF PLANT PATHOLOGY.


The work in the Department of Plant Pathology has continued along the same lines as in previous years. Several of the particularly troublesome diseases of the state are being carefully studied.

THE DISEASES OF THE BEAN.

The diseases of the bean have been studied for several years and the results which have been obtained have been published from time to time. During the early part of 1913, Bulletin 139 on the "Bean Blight and the Preservation and Treatment of Bean Seed," was published. This gave the results which had
been obtained during the past two seasons. Not much time is now being spent upon these diseases, although we expect to carry on a few experiments the coming year to get some data on a few points not yet settled. Our work has shown that the bean anthracnose can be entirely eradicated and the bean blight greatly reduced under Louisiana conditions.

COTTON BOLL ROTS.

The study of the boll rot diseases was practically completed in 1912, but a few experiments on the cotton anthracnose are still in progress and will be continued during the coming season.

SUGAR CANE DISEASES.

Much attention has been given to sugar cane diseases during the past season, especially to the red rot, the stem rot, and to the fungi which decrease the germination of cane. An article entitled, "The Stem Rot or the Hawaiian 'Iliau' Disease of Sugar Cane," was published in Phytopathology during the year. This is the first published report of this disease in the United States. The work on all of these troubles will be continued.

TOMATO DISEASES.

Two diseases of the tomato, the wilt and the early blight are particularly troublesome in this state. Attempts to select wilt resistant strains for use in wilt infected land have given some promising results. We have procured a strain which is very resistant, though it is not just the type of tomato which we desire in this state. Successful crosses of this strain with the Earliana have been obtained and we hope to obtain a variety that is not only wilt resistant, but is also early and prolific. Bulletin 142 on "The Diseases of the Tomato in Louisiana," was published in October, 1913.

EGG PLANT DISEASE.

The eggplant disease, caused by *Phyllosticta hortorum*, is often troublesome in the state and a study of it has been made during the past two years. We have obtained considerable data regarding the life history of the fungus and also the methods of control. This study, however, will have to be continued at least another year before the data will be ready for publication.
Besides the diseases mentioned in the above paragraphs, some attention has been paid to the *Sclerotium Wilt Disease*, the Damping Off Disease, the Cotton Wilt and to a general study of the various anthracnose diseases.

The study of the problem of cotton seed meal poisoning has been continued during the past year in co-operation with the Department of Animal Pathology. This project will be continued during the coming year.

A small amount of time has been spent on a plant disease survey of the State, on correspondence and on the preparation of exhibits. Exhibits were prepared for the State Fair at Shreveport, and also for the National Corn Exposition at Columbia, S. C. The writer was with the station exhibit at the National Corn Exposition and he also attended the meetings of the American Association for the Advancement of Science at Atlanta, Georgia, in December. At the latter place a paper was presented before the Botanical Society of America. This paper will be published during the coming year.

**DEPARTMENT OF ENTOMOLOGY.**

*E. S. Tucker, Associate Entomologist.*

The investigation of insects infesting stored rice and its by-products was continued from the preceding year and comprised the principal project for entomological research work. A considerable amount of information and material has been obtained relating mainly to the life history of the rice weevil, lesser grain borer, cadelle, rust-red flour beetle, and Angoumois grain moth. Observations have also been made upon other species, including the rearing of different parasites. When all of the specimens on hand become fully identified, the list of primary infesting species will then somewhat exceed the number formerly reported. For reference, see author's articles Nos. 1 and 2.

The assistance of an artist has proved to be quite advantageous, but the consideration of the many species occurring in rice stock has by no means reached a perfect conclusion in any case. A long time will be required for the thorough completion of the work.
One other project was proposed as an exigency and it met with approval. Under the title of "Investigation of the southern corn root worm and distinction of other root-attacking forms of insects occurring in association," it is outlined as follows:

1. A study of the development, habits, seasonal history, distribution, and possible parasites and other enemies of the species, with reference to the occurrence and destructiveness of the larva on corn and other cultivated plants grown under Louisiana conditions.

2. Identification and account of associated forms of insects occurring with the above root worm under similar circumstances in which they are liable to be mistaken by farmers for the species mentioned.

Owing to the prevalence of this insect in various sections of the state during the past spring, planters and gardeners suffered extensive losses caused by attacks of the pest in both its larval and adult stages. The discovery of larval borings in potato tubers revealed a new habit of the foe. In giving information and a record of complaints, together with personal observations regarding this enemy, the entomologist has issued three papers, which are listed under his contributions for the year as Nos. 3, 5 and 9.

Appeals for information concerning injurious insects in general and means of controlling them has called for quite an amount of correspondence in efforts to give helpful replies. Determination and preservation of specimens received, with preparation of records of same, have necessarily occupied much of the entomologist's time. The numerous demands made upon the entomologist show that the people of the state are earnestly seeking advice to apply for protection against insect enemies.

In response to urgent requests, the entomologist has made field trips in localities to investigate occurrences of destructive insects and to determine if possible what methods for combating them could be most practically employed. Exhibits have also been furnished for fairs and visitors.

Among the several duties falling upon the entomological department, the incumbent's service rendered in compliance with the Fruit and Crop Pest law has interfered heavily with Ex-
periment Station work. Legislative Act No. 36, of 1910, makes the entomologist of the Louisiana State Experiment Stations to be entomologist of the Louisiana State Board of Agriculture and Immigration, and charges him with the inspection of nurseries, execution of plant quarantine work and all matters of an entomological nature as specified by the Act, Rules and Regulations. Mr. J. B. Garrett, who formerly acted in this capacity, was transferred on February 1, taking charge of the Calhoun Station.

As many as 94 certificates have been issued with a limit expiring September 1, 1914, and the entomologist has traveled over the greater part of the state to visit the places for inspection before granting a certificate in each case. A rather unusual amount of imported stock has also been duly inspected on its arrival in New Orleans.

Since the law aims to prevent introduction and distribution of enemies on nursery stock, and requires extermination of dangerous pests when possible, the entomologist has had to deal with some occurrences of serious foes. Common among these is the San Jose scale, against which treatment for eradication was directed in the instances, and in one case, a certificate was refused.

A grave menace in the form of the cottony cushion scale was discovered near New Orleans. Although the entomologist took prompt action for the suppression of this insect, he had considerable difficulty in getting owners of the infested orange groves to fight the pest according to instructions. Final compliance with orders, however, has resulted in the vanquishment of the foe.

Owing to the dangerous nature of the scale, its spread if permitted to extend beyond the bounds of control in Louisiana, would unquestionably inflict another very serious blow upon the agricultural interests of the state. The discovery that it thrives on pecan, mulberry, and a number of heretofore unrecorded host plants, makes it especially perilous. Should it gain a hold on cypress and pine, on which it is said to live, our timbered regions would be endangered.

Better provision than is at present afforded for the protection of the forestry, horticultural and other crop growing interests of Louisiana is of great importance. While the law is
fairly adequate in giving police power to the entomologist, yet he cannot divide his services between two offices sufficiently to give proper attention to work on either side. The duties of his department in the Experiment Stations alone are more than one man can handle with full satisfaction. Some means of providing relief, particularly in the way of capable assistance, to meet the pressing situations cannot be too strongly advocated.

With the opening of the Panama Canal, the risk of introductions of pests on products brought aboard ships docking at our ports will be greatly increased. The only protection now furnished against such danger depends on the United States Customs officers acting under the Federal Quarantine Act, except as the State Entomologist can certify to importations entered under permit.

The entomological contributions prepared under the authorship of the writer and printed during 1913, are as follows:

The Injury of Stored Rice by Insects. (Rice Journal and Southern Farmer.* April.)
The Southern Corn Root-worm. (La. Agri. Exp. Sta. Press Cir.)
Pests of the Household. (Country Review, 11 weekly parts.)
Prevalence of Southern Corn Root-worm in Louisiana. (Rice Journal and Southern Farmer.)
Rice Water-weevil at Lights and in Stored Grain. (Rice Journal and Southern Farmer.)
Controlling Rice Weevil in Grain. (Country Review.)
Leaf-cutting or Parasol Ant. (Country Review.)
Additional Reports Concerning the Southern Corn Root-worm. (Rice Journal and Southern Farmer.)
A system of Notation Applied to Entomological Accessions. (Trans. Kan. Acad. Sci., v.25.)
The work of the laboratories for the analyses of samples of feed stuffs and fertilizers is largely routine work. The results of analyses of fertilizers has been published in regular form, making a bulletin of 102 pages. The material for the bulletin on feed stuffs analyses has been in the hands of the printer for about two months and will soon be ready for distribution. This report is more voluminous than the fertilizer report.

We have made 2372 separate analyses, not counting the repeats, for fertilizers, representing 9,230 samples sent to the laboratory.

The total number of feed stuffs analyzed was 3,467, representing 12,226 samples sent to the laboratory.

Fifty-four samples of Paris green and 106 miscellaneous samples have been analyzed.

The methods followed by other states in this work and by the Federal Government in food and drug inspection, seems to be by far less expensive and just as efficient. We are the only state having a law for the inspection of fertilizers and feed stuffs that does not go out into the open market and get the samples.

I earnestly suggest that you give consideration to this matter so as to have the Legislature take it up in whatever manner seems most expedient.

DAIRY DEPARTMENT.

C. H. Staples, in charge.

The work at the Experiment Station dairy for this year has consisted of feeding experiments for milk production, rearing calves, determining the amount of fertilizer produced by the dairy herd for a given length of time, the advantages of grinding feeds, such as hay and corn.

Root crops have been grown and fed to the dairy herd in comparison to pasturage for milk production, with satisfactory results. The principal root crops grown are the mangel wurzel, sugar beets, rutabagas, and sweet potatoes. The mangel wurzel proved to be the best milk producer of all the roots, and is equal to good pasture grass. It was found that where a small area of land is available, such as is the case at the dairy, it is
more profitable to grow roots for feeding than to use the land for pasturage, as more succulent feed can be grown. It was found that sweet potatoes are good milk producers, but unless a very large yield can be obtained the price of the potatoes on the market will prohibit their being fed to dairy cows.

Silage has been fed to a considerable extent. The principal crops used for silage were, corn, soy beans, and sorghum. Corn was found to be the best single crop to grow for silage, while corn and soy beans combined proved to be the best two crops to grow together for silage, and these two crops when put in the silo together make the best silage that has been fed. Sorghum has proven to be a good crop for silage; making a larger tonnage to the acre than corn, but being less valuable as a feed for the cows.

Six of the cows in the dairy herd have been put on authenticated test with the American Jersey Cattle Club of New York, two of which have already made sufficient amount of butter-fat to enter the register of merit, and the others will produce enough to enter the record by the time their test period closes.

By experiment conducted by the writer to determine the amount of manure and urine produced by the dairy herd in one year, it was found to be, 175 tons of manure and 70 tons of urine. The average amount of manure produced by one cow in a year was 17,520 pounds, and the average amount of urine produced by one cow in a year was 6,935 pounds. This experiment shows the value of the farm manure to the dairyman.

Considerable attention was given to feeding dairy calves, and ten heifer calves have been raised during the year which are kept by the dairy for increasing the size of the herd. Seven pure bred Jersey bull calves have been sold to the dairymen of the State.

The work carried on in the field has consisted of building silos, dairy barns, attending fairs for the purpose of judging dairy cattle, giving demonstrations in making the Babcock test, keeping records of the dairy herd, making butter, etc. Several of the agricultural high schools have been visited and the herd record work taken up with the students with home herds.

During the year, and since July 1, when the field work was started in co-operation with the Bureau of Animal Industry, U.
S. Department of Agriculture, the writer has assisted by furnishing plans and specifications, and personal visits, in building ten silos and five dairy barns, has kept a record of the milk and butter-fat production of four dairy herds by doing the actual work, and has assisted in the keeping of records of a number of herds with the students of the agricultural high schools.

A large number of plans for building dairy barns and silos have been sent out during the latter part of the year for 1914 construction.

A dairy cow demonstration was conducted for seven days at the State Fair with the dairy cows there, by keeping a daily record of the feed fed each cow, and the milk and butter-fat produced. The object of this demonstration was to show the value of keeping such records of the dairy herd to eliminate the poor cows. Demonstrations in judging dairy cows and filling silos were also given. The interest manifested in these demonstrations by the dairymen was very satisfactory, and sufficient to warrant their being continued each year.

The work carried on by the Louisiana Jersey Breeders' and Dixie Dairymens' Associations has been very good. These meetings have afforded the dairymen an opportunity to discuss problems of mutual interest. The meetings have all been well attended by the dairymen and many new names have been added to the rolls of membership.

The value of the dairy herd at the station has been increased to a considerable extent during the year, and by proper breeding and elimination of the poor cows a very valuable herd of dairy cows will be obtained in a few years.

The field work for 1914 promises to equal that carried on in many of the other states where the work has been in progress for a number of years.

During the year a stave silo was erected at the dairy farm.

SUGAR EXPERIMENT STATION, AUDUBON PARK, NEW ORLEANS.

W. G. Taggart, Assistant Director.

I submit herewith a report of the Sugar Experiment Station for the year 1913.

At the beginning of this year, Director Dodson formulated a plan for all the work at this station. This plan incorporated
in it the experiments which had not been carried to a satisfactory conclusion, or all that had previously shown some feature to make us think that they might yield results of a beneficial nature.

All of the fertilizer experiments were continued, and the unusually good weather at the harvest time aided us in getting much data which we think will be of benefit, and which helped to fix some of the new fertilizing materials in their proper place. New fertilizer tests consist of adding Norges Nitrate (nitrate of lime) to the list of nitrogenous materials as a cane fertilizer, and various mixtures on plots planted to corn. On cane, Calcium cyanamid continued to give good results, but in case it was desirable to use it as the only source of nitrogen in a cane fertilizer, it has one drawback—two applications of fertilizer would be necessary. Calcium Cyanamid cannot be mixed in large enough quantities with acid phosphate, without damage to the mixture, to make a fertilizer with the proper percentage of ammonia, and for that reason where these two materials are to be used, first, acid phosphate must be applied, and then Calcium Cyanamid at a later date. Norges Nitrate gave results that indicated that it, too, would prove a satisfactory source of ammonia. At present this material has to be secured from Norway, and it is only of interest to us as a possible source of ammonia when the present supplies of that important plant food have been so exhausted that we can no longer afford to buy them for use as fertilizer. The experiments with varying amounts of phosphoric acid checked nicely with the figures secured last year, and we will continue them at least another year before we will have data enough to be satisfied.

All of the 143 foreign cane varieties are retained in small quantities, and while many of them will never be of commercial value to Louisiana, we are able to supply cuttings of them to many of the experiment stations and others in foreign countries in return for similar favors. Three new foreign varieties were secured this year, and one of them has already shown that there is some commercial value attached to it.

One hundred and forty-eight of the Louisiana grown seedlings are retained as promising, and the ten most promising of these
are planted in some quantity, and we expect to send out cuttings of these to some of our plantations next fall.

Twenty-five new Louisiana seedlings were transferred from the hot house to the field, and we now have about four hundred more growing under the care of Mr. A. E. Weller. These will be put in the nursery beds during the spring of 1914.

During the year, cane seed and cane cuttings were received from the following persons: Experiment Station, Santiago de las Vegas, Cuba; Prof. J. R. Bovell, Superintendent of Agriculture, Bridgetown, Barbados, B. W. I.; H. W. Cousins, Dept. of Agriculture, Kingston, Jamaica; S. M. Bowman, Ganahl, Mexico; Francis Eschauzier, Rascon, Mexico; Sugar Experiment Station, Pasoeroean, Java; Dr. Longfield Smith, St. Croix, D. W. I.; Harvard Experiment Station, Cienfuegos, Cuba.

Further fertilizer tests on corn go to show the necessity of applying nitrogen to our heavy soils. The use of bagasse and green manure, were other experiments started on corn, but they have not been carried far enough yet to yield results.

Realizing the advantage to be had from growing a white flint corn in the southern section of this state, an attempt was made to get such a corn by means of seed selection, and the result was even better than we could have expected. We are now fairly sure of growing a white weevil-proof corn, practically within a short time.

A good deal of attention was given to forage crops, especially legumes. Alfalfa, crimson clover, red clover, soy beans, and several varieties of velvet beans, and kudzu were grown.

By the use of a special appropriation by the last Legislature, we have made some valuable repairs to our sugar house, and this has enabled us to do better and cheaper work during the grinding season.

The "Luce" cane harvester was tried out and demonstrated before some of the leading sugar planters. The step forward that Mr. Luce has made cannot be overestimated. For twelve years he has been at work on a machine to harvest sugar cane and now he has a machine which cuts, strips, and tops cane, on a commercial scale, almost as well as it can be done by hand.
Besides the research work reported elsewhere, the chemical department has made forty-six analyses of soils, waters, fertilizers, etc., for citizens of Louisiana.

The United States Bureau of Entomology has added one man to their force, and they co-operate with us. Their work consists of studies of the life history of sugar cane insects, damage suffered by crops, distribution of insects, experiments with methods of controlling the ant, symbiosis between the ant and certain injurious insects, such as the sugar cane mealy-bug. Field examinations have resulted in the discovery of at least one egg parasite which, at least for one season, gives strong evidence of being a great aid in controlling the destructive cane-borer. Experiments under Mr. Holloway on our grounds showed that where this parasite was encouraged, it decreased the infestation of cane by the borer from 67.5 to about 15.5 per cent. While on two adjoining plantations in Texas, the same gentleman found that the infestation was reduced from 76 to 50.5 per cent. The bureau also took the advantage offered by our grounds to carry on some special experiments to control the house fly.

As usual, the fourth-year students from the State University spent the grinding season here. The demand throughout Louisiana for chemists proved so great that those in authority allowed a large percentage of the students to go out on plantations.

The annual field day meeting of the Louisiana Sugar Planters' Association was held on our grounds on June 12th. A good attendance was had and papers were read by Dr. W. C. Stubbs, Director Dodson and Mr. I. H. Morse of the Louisiana Sugar Co. An exhibit of agricultural implements and sugar house machinery was gotten up for the occasion, and unusual interest was shown in this especially the tractions plows operated by the Minn. Steel and Machinery Co.

The station has sent out on request, cuttings of cane to Mexico, India, Paraguay, St. Croix, D. W. I., Java, Mississippi, Florida, New York, and to a number of Louisiana planters.

The station mailed 1194 letters on station business and answers to inquiries, 1299 bulletins on request, 1015 postal cards, and 35 packages of miscellaneous samples and specimens.
REPORT OF THE CHEMICAL DEPARTMENT.

W. E. Cross, Research Chemist.

The work of the chemical department has been carried out in continuation of the work of the previous year, the projects being (1) the clarification of cane juice; (2) the analyses of cane products; (3) the utilization of by-products in the manufacture of cane sugar.

The work on the analysis of cane products, a bulletin on which was published in December of last year, has been continued, in the endeavor to solve certain difficult problems, e. g., the analysis of sugars containing levan, etc., that confront the sugar chemist. A resume of the work done in the clarification investigations was published in May, and this work is being continued in the present grinding season. In the investigation the clarification of cane juices for the manufacture of white sugar for direct consumption is being thoroughly studied from the chemical and technical points of view, and it has been endeavored to evolve the best methods of applying the carbonation and sulphititation processes to Louisiana juices. Besides this, various new methods of clarification have been taken up and studied. It is intended to publish a full account of this work in bulletin form, immediately after the close of the present grinding season.

In the work on the utilization of sugar cane by-products, we have a subject of extreme importance, as successful methods of utilizing the molasses, filterpress cake and bagasse to greater profit than at present, would be of great service to the sugar industry. The work done was confined mainly to molasses, and possible methods of extracting the sugar contained therein, and methods of preparing organic acids of high market value were investigated with encouraging results. The preparation of lactic acid and butyric acid received special attention and much progress was made in the attempt to evolve new methods which would be commercially profitable.

The publications of the year include a long account of the work of the past two grinding seasons, entitled "Experiments on Clarification," and another entitled "Some Aspects of the Sour Cane Question." The papers were presented on different
occasions to the Louisiana Sugar Planters' Association, and thereafter published in the various scientific journals.

The writer attended the National Corn Show in Columbia, S. C., in January, in charge of an exhibit from the Sugar Station illustrative of the scientific research work of the station. A similar exhibit was prepared and sent to the Louisiana State Fair at Shreveport.

The writer has been appointed Referee on Sugar and Molasses Methods for the Association of Official Agricultural Chemists for the fourth successive year. In the work, the referee receives the co-operation of eminent sugar chemists throughout the country on various problems of analytical sugar chemistry.

The correspondence of the department has been considerable, and we have been able on several occasions to offer useful advice on questions of analytical methods of chemical control, and other problems in sugar house work to many people engaged in the sugar industry in the state.

**BACTERIOLOGIST'S REPORT.**

_W. L. Owen, Bacteriologist._

During the period covered by this report, favorable progress has been made in the several investigations undertaken, some of which having been completed and others having reached a stage where an early completion is to be expected. The scope of the work of this department during the past year has been much broader than in previous years, and the results of the various investigations undertaken furnish a broader basis upon which to establish practical measures for the elimination of losses from sugar deterioration.

**INVESTIGATION OF THE DETERIORATION OF SUGARS.**

This investigation has received much attention during the past year. A large number of experiments were conducted upon the deterioration of various types of sugar, under varying conditions of moisture, and with various types of bacteria used as the inoculating material. Many interesting and significant results were obtained upon the influence of moisture upon the rate of deterioration of various types of sugar. Newly discovered microorganisms in sugars, which seem to have been overlooked in all former investigations, showed a marked ability
to induce a very rapid deterioration of both raw and plantation white sugars. It is believed that the importance of sugar deterioration will be even more fully appreciated when the manufacture of plantation white sugars becomes more general throughout the state. It has been found that soft white sugars, which are allowed to absorb moisture, often deteriorate much more rapidly than lower grade sugars.

INVESTIGATION OF THE COMPARATIVE VALUES OF VARIOUS CULTURE MEDIA FOR THE QUANTITATIVE DETERMINATION OF MICRO-ORGANISMS IN VARIOUS SUGAR HOUSE PRODUCTS.

Owing to the lack of thoroughly tested methods for the determination of the number of microorganisms in sugar house products, and the importance of such determination for the production of sugar of good keeping qualities, an extensive investigation of this subject has recently been completed. Various culture media were tested upon juices, molasses and sugars, and the results obtained will be submitted for publication within the near future.

INVESTIGATION OF THE FERMENTATION OF CANNED SYRUPS.

During the past year an investigation of the causative agent of the fermentation of cane syrup was completed. The annual losses from this source throughout the state are unnecessarily high, and the danger of such losses tends to deter many planters from engaging in the manufacture of syrup on a small scale who otherwise would be attracted by the profits in supplying the northern market. It was found that the principal cause of the fermentation is a species of yeast, characterized by its exceptional ability to withstand high temperature and its power to ferment highly concentrated sugar solutions. The characteristic "puffing" of cans containing syrup results from the large quantity of gas formed during the fermentation, which makes it a particularly destructive type of fermentation owing to the damage to the containers. It was found that an exposure to a temperature of 90° for fifteen minutes was necessary for the destruction of this yeast. As a practical recommendation for the elimination of this trouble, more emphasis should be placed upon the maintenance of cleanliness in the factory by the rational use of suitable disinfectants than in the implicit reliance in any method for the sterilization of the finished article.
INVESTIGATION OF THE RELATIVE VALUE OF VARIOUS DIS-INFECTANTS FOR USE IN SUGAR HOUSES.

The previously ascertained fact that the bacteria causing the deterioration of sugars gain access to these products in the factory and that the extent of infection of sugars is almost invariably referable to the condition of cleanliness of the factory in which it is made, has seemed to warrant an investigation of the most suitable disinfectants to be used for the purpose of preventing the development of destructive bacteria in sugar factories. Investigation of the action of various disinfectants, including formaldehyde, chloride of lime, bisulphide of soda, milk of lime, sodium and ammonium fluoride, upon raw juices, has been in progress throughout the past grinding season. The influence of elevated temperature upon the efficiency of various disinfectants has also been noted. It is proposed to include molasses and raw sugars, as well as distinct species of various organisms, in the list of material upon which the disinfectants are to be tested. The purpose of this investigation is to establish by an intensive investigation the most efficient method for the elimination of destructive bacteria from the sugar house.

INVESTIGATION OF THE MICROORGANISMS IN SUGAR HOUSE PRODUCTS.

Sugar bacteriology being a comparatively undeveloped field of scientific research, little attention has as yet been devoted either here or elsewhere to the classification of the microorganisms constituting the flora of cane juices and molasses. Believing that such an investigation would lead to a better understanding of the relative susceptibility of these products to the various types of fermentation to which they are subject, an effort is being made to determine the various species of microorganisms occurring in these products. With this in view, a large number of samples of raw juices and final molasses have been procured from various parts of the state, and transfers have been made from them to various types of culture media. This work will be continued throughout the coming year.

On the whole, the progress of the investigations of this department during the past year may be considered as quite encouraging as regards the results obtained, and the value that these results promise to be to the sugar industry.
PUBLICATIONS.

"The Occurrence of Saccharomyces Zopfii in Canned Cane Syrup, and Variations in Resistance to Heat When Grown in Solutions of Varying Densities" (Cent. fur Bakt.).

The Relation of Bacteriology to the Cane Sugar Industry. (A paper read before the Am. Bacteriological Society at its annual meeting, December, 1913.)

An Investigation of the Relative Values of Various Culture Media for the Quantitative Determination of the Microorganisms in Sugar House Products.

Station bulletin in course of preparation for publication.

NORTH LOUISIANA STATION, CALHOUN.

J. B. Garrett, Assistant Director.

The work at this station has been of a similar nature to that of previous years with some additions and an extension of the work in general.

The work has included rotation experiments, variety tests of corn, cotton, cow peas, peanuts, sweet potatoes, soy beans and Irish potatoes, and fertilizer experiments with these crops, cultural experiments with the principal crops adapted to this section, pork production by grazing corn and cow peas, peanuts, soy beans and sweet potatoes, soil improvement work, experiments with vegetable and truck crops adapted to this locality and a continuation and extension of the orchard and vineyard work.

COTTON.

Cotton is, and will continue to be, the great cash crop of North Louisiana, and, therefore, this crop has received increased attention. There are two important rotation experiments on the station in which cotton is included. One of these experiments has been in operation since the establishment of the station, and has attracted wide attention. It is a three-year rotation, including corn and cow peas, followed by oats and peas, followed by cotton. A crop of crimson clover follows the oats and peas and is turned under in the spring preceding the cotton crop for soil improvement. A home-made compost which includes stable manure, cotton seed and acid phosphate is applied to one-half
of each of these rotation plots. The yield of all crops on the portions of the plots which have received the compost has averaged much higher than on the portions where no compost was applied.

Another three-year rotation, which was begun this year, includes corn and cow peas, followed by cotton, followed by crimson clover, followed by velvet beans. The velvet bean vines are turned under in the fall and one-half of each plot receives raw rock phosphate, and the other half receives acid phosphate for the improvement of the soil.

In the variety test, twenty-three known varieties of cotton were included. These were varieties that have been bred and selected for earliness and prolificacy, for boll weevil infested sections. A few upland long-staple varieties were also included in the test. On account of unfavorable weather conditions the first planting was lost and the second planting could not be made until May 5. The lowest yield was 676 pounds of seed cotton per acre for Hartsville No. 7, an upland long-staple variety, and the highest was 1398 for Gandy, a variety which has been grown and selected in North Louisiana for several years. It is a selection from Rublee. The seed of the three highest yielding varieties was secured from farmers in North Louisiana who have been selecting their seed for a number of years. This demonstrates that home-grown and carefully selected seed are more productive than seed grown in distant sections where soil and other conditions are probably different.

Fertilizer experiments and experiments with different width rows and different numbers of stalks in the hill were also conducted.

On all cotton experiments on the station 12,936 pounds of seed cotton were produced which gave eight bales averaging over 500 pounds each.

CORN.

A considerable acreage of the station has been devoted to corn experiments.

In the two rotation experiments mentioned under cotton, corn is included. Seventeen varieties of corn were included in the variety test and the yield varied from 28.5 bushels for Extra
Early to 44.00 bushels for Stewart's White. The highest yielding variety has been grown and selected in North Louisiana for a number of years. All of the seed of these varieties was produced in the South and the majority of the varieties came from Louisiana corn growers who have been giving their attention to the selection and improvement of seed corn. The home-grown seed has proven to be most productive and best adapted to the conditions here.

The experiment in which the different methods of cultivation are tested was again conducted. The results were slightly in favor of planting below the level and cultivating to a ridge or bed.

From our corn experiments 942 bushels were harvested and it was estimated that 111 bushels were grazed by the hogs in pork production experiments.

Crimson Clover.

The work with this crop has been continued, and the acreage devoted to it has been considerably increased the past fall. Home-grown seed were planted exclusively. The growth made in the spring of 1913 was splendid, and an average of about 21/4 tons per acre was secured.

Alfalfa.

A nice growth was made in the spring and summer, but the excessive rainfall in September produced a very heavy growth of crab grass and the alfalfa stand was seriously injured. This necessitates replanting in the fall. This year's results again demonstrated the necessity of inoculation for the production of this crop on the hill lands. From the three one-fourth acre inoculated plots 2.64 tons of hay were harvested, whereas no yield was secured from the plot that was not inoculated.

Sweet Potatoes.

Year by year the acreage in sweet potatoes is being increased in North Louisiana. The demand is increasing for the products for table and canning purposes, and large quantities of potatoes are being grown for pork production. This year our work with this crop has been materially increased. About 61/2 acres were grown for pork production and 11/2 acres were devoted to fertilizer experiments and variety tests.
In the fall, the markets are usually well supplied with sweet potatoes and the price is not so good as in the spring and early summer. The common methods of storage have been wasteful and unsatisfactory. In order to ascertain the best methods of keeping this crop over winter for the higher prices, a modern storage house has been constructed on the station and experiments are being conducted along this line. At the present time there are about 190 bushels stored in this building and they are in a perfect state of preservation. Several bushels are banked in the usual way to test the comparative keeping qualities under the two methods.

This building is 10 feet high, 12 feet wide and 16 feet in length and was constructed at a cost of about $140.00 complete.

GENERAL VARIETY PLOT.

For the purpose of testing the adaptability and probable commercial importance of a large number of crops which have not been grown here before, or are not generally grown, a plot was devoted to crops of this nature. Sixty-three different kinds of crops were grown. This plot was quite interesting to the visitors and furnished considerable data for the records of the station.

HORTICULTURAL WORK.

Mr. E. J. Watson, Horticulturist of this station, has had direct charge of the work and it has been a continuation and expansion of the work which has been in progress for the past few years.

GENERAL WORK WITH FRUITS.

This has included the following:

1. Commercial methods of grape culture. For this work one acre has been set out to Ives, Niagara, Concord and Delaware. These varieties have given best results up to the present time here.

2. Variety work with grapes. Sixty-two varieties are now growing in the vineyard, ranging in age from two to five years.

3. Spraying versus enclosing the bunches of grapes in small paper bags for the control of black rot has been tested. The bagging gave as satisfactory results as spraying with Bordeaux
mixture at a much lower cost. This, however, only represents one year's results.

4. Growing pears of blight-resistant qualities. Twenty trees representing six varieties are now growing in the orchard. Twelve of these are from a very large, prolific tree which stands on the Sugar Experiment Station grounds at Audubon Park. This tree has never shown any indication of blight. Several varieties have already been eliminated from the orchard here by the blight.

5. A continuation of the work with seedling peaches. At present there are 129 seedling peach trees in the orchard and a large number that proved to be of little value have been removed during the year.

6. Commercial work with peaches and variety testing. There are 164 budded trees in the orchard representing eighteen standard varieties.

7. Spraying for insects and fungi.

8. Collecting seedling plums and testing varieties. There are 99 trees representing 12 varieties in the orchard.

9. Testing figs for commercial purposes. There are in the orchard 227 magnolia fig trees which were grown from cuttings set out in March, 1913. Very unfavorable conditions followed their planting, but they made good growth and produced a crop of figs in the late fall, the last ripe fruit having been gathered on November 17. Twelve hundred cuttings will be planted in the orchard this winter.

10. Variety work with pecans. The pecan acreage in the South is rapidly increasing and a great interest is being manifested in this industry. There are 50 grafted trees representing 21 varieties now growing in the orchard.

11. Variety work with apples. A collection of varieties that have proven to be best adapted to this section had been made and 128 trees representing 26 varieties are now in the orchard. Some of these have borne and have given very satisfactory results. A number of young grafted trees representing five other varieties are now growing in the nursery and will be planted in the orchard later.

12. Growing small fruits.
GENERAL WORK WITH VEGETABLES AND TRUCK CROPS.

Irish Potatoes.

1. Variety test. Thirteen varieties have been used in this test for the past three years, and their production, resistance to disease and adaptability to conditions noted. Some varieties have been vigorous, have produced well and have shown themselves well adapted to our conditions, whereas other varieties have shown that they were not adapted and have produced very light crops.

2. Selection work. For the past few years this work has been in progress, and the average yield on the selected plots has been considerably higher than on those where the seed has not been selected. This season the two Triumph plots were about equal, but the selected seed in the Early Ohio gave about 18 bushels per acre more than the unselected seed.

3. Home-grown vs. bought seed. This experiment has been conducted for a number of years, and each year the home-grown seed has given the greatest yield. However, the northern seed this year produced 27 bushels per acre more than the home-grown. This was due to the fact that the home-grown seed was not mature.

4. The Lookout Mountain potato. This variety is especially adapted to the production of a fall crop. Seed may be easily kept from fall until the following July for the fall crop. This variety was planted here on July 26 this year and the cut tubers produced 75 bushels per acre and the whole tubers 144 bushels per acre.

Cantaloupes.

Variety tests have been conducted and the improvement work by seed selection has been continued.

Tomatoes.

Variety tests, canning work, and seed selection for disease-resistant plants.

A considerable amount of work of a general nature was conducted with the most important garden vegetables and truck crops.
CORRESPONDENCE.

During the year 875 letters and 38 postal cards were written from the office in regard to the business of the station and in reply to communications from farmers and other parties who asked for information. About 1000 form letters were written on the multigraph and mailed out, and a great many bulletins were also sent out in connection with the correspondence.

SHORT COURSES.

The Assistant Director of the station visited the Agricultural High Schools in Union, Lincoln, Vernon and Beauregard parishes, and delivered lectures at the Short Courses which were held at these schools.

PARISH FAIRS.

The Assistant Director was also called upon to act as judge of agricultural exhibits at three of the Parish Fairs which were held in the fall.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

This society, one of the oldest agricultural organizations in the state, continued to hold its monthly meetings on the station grounds, and many important subjects were discussed by prominent agricultural authorities during the year. The Experiment Station officials took an active interest in these meetings and were ready at all times to conduct visitors over the station and explain the work to them.

NORTH LOUISIANA CAMP MEETING FAIR.

This fair, under the auspices of the North Louisiana Agricultural Society, was again held on the Experiment Station grounds, September 24, 25 and 26. A nice list of premiums was supplied by the enterprising farmers, merchants, bankers, and other business men of this section, and a most creditable fair was held. It is strictly an agricultural fair in every sense of the word. No entrance fees are charged and no horse racing, gambling, etc., are allowed.

Labor was not plentiful in the vicinity of the station during the year and our work suffered to some extent on that account.
Bulletin 141, containing 28 pages, on "Vegetable Culture in North Louisiana," was written by E. J. Watson and published during the year.

RICE EXPERIMENT STATION, CROWLEY.
F. C. Quereau, Assistant Director.

All experiments inaugurated in 1910 were continued in 1913. This is the fourth year that data have been gathered on these experiments.

In order to learn something of the fertilizer requirements of the rice soils, a series of plots are devoted to different amounts of phosphate; a series to potash alone; a series to potash and phosphate mixed in different quantities; a series to cottonseed meal and potash; a series to cottonseed meal and phosphate; and a series to all three mixed. The maximum application of the complete fertilizer is 1,500 pounds per acre. There are numerous check plots on these experiments. There are plots devoted to the use of stable manure, both with and without commercial fertilizer. This gives a vegetable matter check on the plots on which only chemical fertilizers are used. There are eight plots used to test the cheapest source of phosphate for rice soils. In this experiment, Thomas slag meal, 16% acid phosphate, and raw rock phosphate are used. The raw rock is used with and without stable manure. All plots of this experiment receive 50 pounds muriate of potash.

Another purpose of these fertilizer experiments is to determine the effect of commercial fertilizers when used continuously on the same land without the addition of vegetable matter in the form of manure or turned under green crops. It is a known fact that the use of chemical fertilizer will increase the yield of rice; it is as well established that the continued use of commercial fertilizer without vegetable matter will in the end result in much harm. In other words, more fertilizer must be used each year to maintain constant or increased yields; therefore, a time will come when the cost of the fertilizer will render its use prohibitive. Moreover, lands thus overworked by the use of chemical stimulants will be very difficult to bring back to their former state of productivity. As the average rice farmer, without thought of the future, is prone to overwork his land, it is
reasonable to believe that he will use commercial fertilizer and will not ask the reason why until the matter is brought to his attention by decreased profits. Therefore, the Rice Station by having a series of plots on which the various combinations of commercial fertilizers are used, together with check plots, and plots on which vegetable matter, both in combination with commercial fertilizer and without, will accumulate reliable data showing the effects of these fertilizers on the rice soils. This should be of value to the more conservative of the rice farmers who may desire data that will enable them to adopt better methods in the future with reference to building up their farms.

The results of the past four years have shown that 16% acid phosphate has resulted in a heavier yield of rice at a smaller cost than any other element or mixture. The best and most profitable yields have come from the use of phosphate, potash, and manure. The potash when applied alone to the land has been used at a loss with the exception of the first year, when the first and only profitable yield of rice was made. This would indicate that the salts of kainit are of some value the first year on old and badly worn land. As we have no rice mill it has, of course, been impossible to test the milling quality of the rice, so we do not know how fertilizer may affect the milling.

It has been observed that water crab grass and other weeds grow with remarkable vigor where acid phosphate has been applied. In using acid phosphate, therefore, it is necessary to apply the irrigation water in such a way that the weeds and grass are destroyed.

One of the most important demonstrations in connection with our work is to obtain a successful crop rotation on rice land. Rice will likely always be the best money crop for the rice belt, but as it is impossible to grow the same crop on the same land year after year, it is necessary to find some crop or crops that will be profitable to grow on the land when it is not planted to rice.

In 1910, four crop rotations were established with this end in view.

1. A two-year rotation of corn and cow peas one year, and rice the next without a winter cover crop. The land is fallowed in the winter and all possible vegetable matter is turned under.
2. A two-year rotation similar to the first, except a winter crop is grown. Oats are generally used for this purpose.

3. A three-year rotation of rice, followed by corn and cow peas, followed by cow peas alone, the vines of same being turned under in the fall and followed by rice the third year. Winter cover crops of oats are planted.

4. A four-year rotation of rice two years and grass and lespedeza two years. The grass and lespedeza is pastured or mowed to keep down the red rice. The land is plowed in the fall.

The object of these rotations is to increase the yield of rice, eliminate the red rice by cultural methods, and to produce a crop that will be profitable from the standpoint of feed production.

The land of the station was in the beginning as badly infested with red rice as it is possible for land to be. The land is naturally very poor for the rice belt. The top soil is not over two inches deep.

The same amount of commercial fertilizer is used on all of the rotation plots with the exception of the check plots.

In these experiments, the average yield of rice has been increased from seven and one-half barrels to an average of fifteen barrels per acre. The corn yield has increased from nothing in 1910 to 32 bushels in 1913.

On the three-year rotation and the two-year rotation with the winter cover crop of oats, the red rice has been reduced by cultural methods to a point where seed rice can be raised. On the four-year rotation, and the two-year rotation without winter cover crop, the red rice in the land has not been reduced to any appreciable extent.

The cow pea crops have been uniformly good. Cow peas on rice land must be cultivated. They will not thrive when planted broadcast.

The yield of oats has averaged about 30 bushels per acre. This seems to be one of the best winter crops that can be found for rice lands.

A good crop of sugar cane was grown in 1913. Sugar cane may be grown for syrup making with profit on fairly well drained rice land. It is advisable, however, to turn under at least one crop of cow pea vines before planting the first crop of cane.
The U. S. Bureau of Plant Industry in co-operation with us planted about one-sixth of the farm in soy beans of different varieties. The soy bean makes almost as heavy a crop as cow peas, and on land that contains much red rice, it has the advantage of being a clean cultivated crop, which means that the red rice can be prevented from producing seed by team cultivation.

In 1913, cotton, kaffir corn, millet, highland rice, sorghum, buckwheat, castor beans, German and pearl millet, peanuts, sweet potatoes, giant beggar weed, and three varieties of velvet beans were planted on the area devoted to miscellaneous plantings.

The cotton made a fair crop, but was affected by rains late in July, and by the boll weevil. The latter, however, did not come until very late in the season. The summer rains of the rice belt makes cotton a very uncertain crop.

The millets, sorghum and kaffir corn made a good crop of forage, but produced little if any seed, because of insects.

The castor beans made a heavy growth of stalk, but the yield in beans was light.

The so-called highland rice proved to be no better than the ordinary varieties of the section when grown under similar conditions.

The peanuts were destroyed by the excessive rains during the fall, as, also, were the sweet potatoes.

The velvet beans made a good growth, but no better than the cow peas. The growth of these beans is so slow that the weeds and grass have an excellent opportunity to get a good start. The early running vines prevent proper cultivation to keep the weeds in check.

The oat crop of 1913 was short, due to the cold, wet spring. The average yield was 25 bushels per acre.

All of the rice on the station was planted in the regular eight-inch drill and was not cultivated. The excessive rains of the harvest season, and the root maggot reduced the average yield of rice to about 15 barrels per acre. The average yield last year was over 20 barrels per acre.

The data on the oil experiments is of no value this year. The grade of oil that was used was so heavy that it would not
spread on the water properly, and so much of the rice was killed by the oil. The yields of rice mean little if anything. Examination of the rice while growing, however, indicated that crude oil will in a large measure prevent damage from root maggot. Care must be exercised that the oil is of a light grade, so that it will spread on the surface of the water in a thin film and not collect in "islands" and thus destroy the rice, as it did in our case last year. Rice will stand a large quantity of oil without injury if it spreads evenly.

The corn crop of 1913 was the best ever raised on the station. Mexican June corn planted the first week in July made a fair crop, but was injured by the heavy rains in the fall after it matured.

The Co-operative work with the Bureau of Plant Industry of the National Department has been continued. Mr. J. M. Jenkins has been in charge of this work under the direction of Mr. C. E. Chambliss. Very careful study is being given to the botanical characters of rices, and a very large number of varieties are being tested for their adaptability to the soil and climate of Southwest Louisiana. Head selections are being made from the best strains and several varieties will be distributed in the near future in small quantities so that planters may test their adaptability to field conditions throughout the rice-growing section. Much good should come from the work being done in these lines.

The Bureau of Entomology has continued investigations on the life history of insects injurious to growing rice. Mr. Webb, of the Bureau of Entomology, has been in charge of this work and faithful and efficient service has been rendered by him. Results of various investigations carried on by the Federal Department will be published in their own bulletins.
# FINANCIAL STATEMENT.

## HATCH AND ADAMS FUNDS.

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<th>Dr.</th>
<th>Hatch Fund</th>
<th>Adams Fund</th>
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<td>To receipts from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1913, under Act of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund)</td>
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Total | $15,000.00 | $15,000.00 |

## STATE FUND.

| Receipts: | |
| Received from the State Treasurer | $22,000.00 |
| Miscellaneous sales | 5,258.89 |
| Payment of accounts Fertilizer and Feed Stuffs | 14,000.00 |
| Deficit, November 30, 1913 | 1,811.21 |

| Expenditures: | |
| Salaries | $8,991.81 |
| Labor | 7,438.95 |
| Publications | 365.15 |
| Postage and stationery | 520.16 |
| Freight and express | 523.54 |
| Heat, water and lights | 401.31 |
| Chemicals | 47.30 |
| Seeds and sundries | 1,679.96 |
| Fertilizer | 586.40 |
| Feed stuffs | 744.96 |
| Library | 25.35 |
| Tools, implements and machinery | 1,840.39 |
| Furniture and fixtures | 265.34 |
| Apparatus | 39.76 |
| Live stock | 135.00 |
| Traveling expenses | 1,857.02 |
| Contingent expenses | 2,588.30 |
| Building and repairs | 5,441.50 |
| Deficit, December 1, 1912 | 9,514.90 |

Total | $43,070.10 |
## Repair Fund

**Receipts:**
- Cash on hand December 1, 1912: $1,411.21

**Expenditures:**
- Building and repairs: $1,137.70
- Cash on hand November 30, 1913: 272.51

**Fertilizer and Feed Stuff Fund**

**Receipts:**
- Cash on hand December 1, 1912: $3,322.38
- Received from Commissioner of Agriculture: $25,000.00
- Miscellaneous sales: 14.00

**Expenditures:**
- Salaries: $7,861.53
- Labor: 713.05
- Publications: 687.21
- Postage and stationery: 577.15
- Freight and express: 56.85
- Heat, water and lights: 761.47
- Chemicals: 745.91
- Seeds and sundries: 275.87
- Furniture and fixtures: 30.29
- Library: 2.03
- Apparatus: 64.84
- Traveling expenses: 24.97
- Building and repairs: 417.44
- Expenses of Experiment Station accounts: 14,000.00

**Cash on hand November 30, 1913:** 2,117.77

Total: $28,336.38
CHANGES IN EXPERIMENT STATION STAFF.

J. E. Halligan resigned as Chemist in Charge of the Fertilizer and Feed Stuffs Control Laboratory, and was succeeded by G. D. Cain.

Dr. F. V. Emerson was appointed to have charge of soil survey work.

Miss M. Flower resigned as Mailing Secretary and was succeeded by C. W. Davis.

W. M. Hall was appointed Assistant Chemist.

I. Levin was appointed Assistant Chemist.

G. G. Gremillion resigned as Farm Manager at Audubon Park and was succeeded by C. J. Barrilliaux.

PUBLICATIONS ISSUED DURING 1913.

Twenty-fifth Annual Report.
Bulletin 141, Vegetable Culture in North Louisiana.
Bulletin 142, Diseases of the Tomato in Louisiana.

Report of Analyses of Commercial Feed Stuffs, Season 1912-1913.