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Thirtieth annual report of the agricultural experiment stations of the Louisiana State University and Agricultural and Mechanical College.

William Rufus Dodson

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THIRTIETH ANNUAL REPORT

OF THE

Agricultural Experiment Stations

OF THE

Louisiana State University and Agricultural
and Mechanical College

FOR 1917

TO THE GOVERNOR

By W. R. DODSON, Director

Ramires-Jones Printing Co., Baton Rouge
Louisiana State University and
A. & M College

Louisiana State Board of Agriculture and Immigration

EX-OFFICIO
GOVERNOR RUFFIN G. PLEASANT, President.
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HARRY D. WILSON, Commissioner of Agriculture and Immigration.
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W. R. DODSON, Director Experiment Station.

STATION STAFF
W. R. DODSON, A. B., B. S., Director, Baton Rouge.
W. G. TAGGART, B. S., Assistant Director, Audubon Park, New Orleans.
A. P. KERR, M. S., Assistant Director, Baton Rouge.
C. E. HESTER, B. S., Assistant Director, Calhoun.
J. M. JENKINS, B. S., Superintendent of Rice Station, Crowley.
W. H. DALRYMPLE, M. R. C. V. S., Vice-Director and Veterenarian, Baton Rouge.
H. MORRIS, D. V. M., Bacteriologist and Assistant Veterinarian, Baton Rouge.
C. W. EDGERTON, Ph. D., Plant Pathologist, Baton Rouge.
C. C. MORELAND, B. S., Assistant Plant Pathologist, Baton Rouge.
F. V. EMERSON, Ph. D., in charge of Soil Survey Work, Baton Rouge.
G. L. TIEBOUT, B. S., Horticulturist, Baton Rouge.
N. KOPELOFF, Ph. D., Bacteriologist, Audubon Park, New Orleans.
F. W. ZERBAN, Ph. D., Chemist, Audubon Park, New Orleans.
G. D. CAIN, B. S., Chemist, in charge of Fertilizer and Feedstuffs Laboratory, Baton Rouge.
W. M. HALL, B. S., Assistant Chemist, Baton Rouge.
W. P. DENSON, B. S., Assistant Chemist, Baton Rouge.
J. H. JOLLY, B. S., Assistant Chemist, Baton Rouge.
S. S. WALKER, M. S., Soil Chemist, Baton Rouge.
MISS MAYME DWORAK, M. A., Scientific Assistant in charge of Seed Laboratory, detailed by United States Department of Agriculture, Baton Rouge.

MRS. EDITH STRONG, Secretary to the Director, Baton Rouge.
J. K. McHUGH, Clerk and Stenographer, Audubon Park, New Orleans.
R. P. SWIRE, A. B., Treasurer, Baton Rouge.
R. C. CALLOWAY, B. S., in charge of Dairy, Baton Rouge.
J. A. WEDGEWORTH, Mailing Secretary, Baton Rouge.
To His Excellency, Ruffin G. Pleasant,
Governor of Louisiana:

Sir—I am pleased to submit herewith the annual report of the Experiment Stations of the Louisiana State University and Agricultural and Mechanical College for the year 1917. As required by act of the National Congress of March 2, 1887, providing federal aid for experiment stations of the several states, and in accordance with act of March 2, 1906, providing additional funds for research work at the experiment stations of the several states, a financial statement is submitted for the year beginning July 1, 1916, and ending June 30, 1917.
FINANCIAL STATEMENT.

The state appropriation for the experiment stations is kept in a separate account from that of the federal funds, as will be shown by the complete financial statement submitted herewith.

HATCH AND ADAMS FUNDS.

Dr. Hatch Fund Adams Fund

To receipt from the Treasurer of the United States as per appropriation for fiscal year ending June 30, 1917, under Acts of Congress approved March 2, 1887 (Hatch Fund), and of March 16, 1906 (Adams Fund) ....$15,000.00 $15,000.00

Cr.
By salaries $7,464.88 $10,814.26
Labor 2,474.82 438.70
Publications 1,183.66 ....
Postage and stationery 23.51 30.28
Freight and express 100.67 28.38
Heat, light and water and power 16.08 165.32
Chemicals and laboratory supplies .... 152.53
Seeds, plants and sundry supplies 275.07 254.89
Fertilizers 32.00 ....
Feeding stuffs 2,354.49 632.90
Library 28.97 72.08
Tools, machinery and appliances 269.84 65.50
Furniture and fixtures 59.74 542.45
Scientific apparatus and specimens .... 862.07
Live stock .... 43.60
Traveling expenses .... 149.75
Contingent expenses 20.00 ....
Buildings and land 696.27 747.29

STATE FUND.

Statement of receipts and expenditures of the State Fund from December 1, 1916, to November 30, 1917:

Receipts:
State Treasurer $24,500.00
Miscellaneous sales 12,107.59
Refunds 1,141.23
Interest on daily balance 197.34—$37,946.16
Expenditures:
SALARIES ............................................. $9,695.86
Labor ................................................. 7,227.10
Postage and stationery .......................... 443.09
Freight and express ............................ 458.36
Heat, water and light .......................... 392.39
Chemicals ........................................... 56.59
Seeds and sundries ............................ 3,184.17
Fertilizers ......................................... 432.75
Feeds .................................................. 1,770.75
Library ............................................. 66.03
Tools, implements and machinery .............. 1,385.86
Furniture and fixtures ......................... 209.33
Scientific apparatus ............................ 81.16
Live stock .......................................... 4,164.12
Traveling expenses ............................. 1,580.30
Contingent expenses ............................ 3,292.14
Buildings and repairs .......................... 643.37
Deficit ............................................. 2,807.94
Publications ......................................... 54.85—$37,946.16

FERTILIZER FUND.
Statement of the Fertilizer and Feed Stuffs Funds from June 1, 1916, to November 30, 1917:

Receipts:
Commissioner of Agriculture ................. $21,703.29
Refunds ............................................. 177.00
Deficit ............................................. 886.11—$22,766.40

Expenditures:
SALARIES ............................................. $11,771.51
Labor ................................................. 1,145.90
Postage and stationery .......................... 415.21
Freight and express ............................ 144.39
Heat, water and light .......................... 1,068.19
Chemicals ........................................... 2,016.88
Seeds and sundries ............................ 261.94
Library ............................................. 37.05
Tools, implements and machinery .............. 63.72
Furniture and fixtures ......................... 205.30
Scientific apparatus ............................ 1,641.77
Live stock .......................................... 1,163.40
Traveling expenses ............................. 553.70
Contingent expenses ............................ 87.74
Buildings and repairs .......................... 1,741.62
Publications ......................................... 29.00
Old deficit ......................................... 419.05—$22,766.40
ADMINISTRATION.

I have continued to act as Dean of the College of Agriculture and Director of the Agricultural Extension work up to July 1, 1917, at which date Mr. W. R. Perkins was appointed to relieve me as Director of Agricultural Extension. I have also served as a member of the committee of three directing officials for the Live Stock Extension Service conducted by the United States Department of Agriculture in cooperation with the Louisiana State University.

FERTILIZER AND FEED STUFFS LABORATORY.

During the past season the laboratory analyzed 3,820 samples of feed stuffs and 2,651 samples of fertilizers for the State Board of Agriculture and Immigration.

The following chemists have resigned and are now engaged in war work:

- R. G. Scott is now a lieutenant in the army.
- Sam Byall is now a student in the Third Officers Training Camp.
- J. M. Jennings is engaged in chemical work at a Government laboratory.

FIELD WORK.

The field work of the Sugar Experiment Station was conducted along lines which have been previously outlined. Weather conditions during spring and summer were adverse to crop growth and disastrous to some experiments. The average rainfall at this station for past fifteen years was 65.59 inches; the annual rainfall for 1917 was 32.27 inches, or less than half of an average for one year. Serious drouths occurred in the early spring, again from April 5 to July 3, and once more from the middle of that same month to latter part of August. This lack of water very seriously affected fertilizer experiments on sugar cane.

SUGAR CANE WORK.

A number of new seedlings were secured and planted to the nursery rows. Of the older varieties that have been under test for two or more years, L-511 continues to be the most promising. First year stubble from this variety came up early, stooled well, and, comparatively, grew well. In the early days of the past
sugar campaign this variety, from analysis, should have yielded in the sugar house fifty-six per cent more sugar than the standard varieties now growing on the ordinary plantation. Demands for seed cane of this variety were, as usual, heavy, and were filled as far as possible. A good number of those canes that were promising in 1916 again showed good qualities, and all such canes were planted in larger quantities.

COVER CROPS ON FALL PLANT CANE.

Both Crimson clover and Mellilotus indica were used on fall plant cane. A good growth of both was secured by March 15. Yields from the plat on which Crimson clover was grown were double that on which no clover was grown. The rows on which Mellilotus was grown were alongside a ditch, and this cane suffered from lack of water. All soil in which the cover crops had been incorporated worked easier and remained in a better state of tilth than the check plats.

Cane on which nitrogenous materials were experimented with, suffering from lack of rain, did not come up to a stand, and the resulting yields were too much influenced by this factor to be of value.

CORN.

Unusually good yields of corn from the new white flint variety were secured.

Of the well-known "prolific" varieties of corn, those that are considered most promising for South Louisiana were tested against Yellow Creole and Calhoun Red Cob. Mosby's Prolific yielded about as well as Yellow Creole and slightly better than Calhoun Red Cob.

The work of improving Yellow Creole corn was continued, and a crop was grown that averaged close to two ears per stalk, and yielded fifty bushels per acre.

An opportunity presented itself for a comparison of corn grown after sugar cane in the ordinary three-year rotation, and corn grown after six years of alfalfa. Corn grown after sugar cane gave a yield of 38.3 bushels per acre, whereas corn grown after alfalfa yielded 71 bushels.

The residual effect of potash which had been applied to two
crops of sugar cane (1914-15) on a following crop of corn was tried without effect. All work with alfalfa, clover and other legumes was continued. An extraordinarily late freeze (March) severely damaged clover and alfalfa. The Barchest bean grew exceedingly well where it was planted in rows and cultivated, but poorly where planted broadcast in corn at the time of layby. Very few beans matured in either case.

FIELD DAY.

The tenth annual field day of the Louisiana Sugar Planters' Association was held on the station ground on June 14 and was, admittedly, the most successful in the history of these annual gatherings.

CHANGES IN STATION STAFF.

Mr. W. L. Owen, in charge of the Department of Bacteriology, resigned, and has been succeeded by Dr. Nicholas Kopeloff. Dr. Max Schneller, chemist in charge of the research laboratory, also resigned, and has been succeeded by Dr. F. W. Zerban. Mr. C. J. Barrilleaux, farm manager, resigned to accept a position in Trinidad, P. W. I., and was succeeded by Mr. E. J. O’Dowd, and Mr. O’Dowd lately resigned to enter college.

ENTOMOLOGICAL WORK.

The Bureau of Entomology, United States Department of Agriculture, continues to cooperate with the Sugar Experiment Station. During the year, work on the life-history of the pseudo coccus calceolariae was continued, and control experiments were carried through. It was definitely proved that the control of the Argentine ant will eliminate the pseudo coccus as a serious cane pest. Further work was done to demonstrate the efficacy of slow poison to control the Argentine ant. The heavy infestation of cottony cushion scale in New Orleans was brought under control by combating it with the Australian lady-beetle (Vedalia cardinalis). The Federal, State and city governments contributed to a fund for this work.

The effort to secure parasitic control of the cane moth borer was continued. New parasites were secured and tried without success. Cooperative experiments with sugar planters, along this line, were made and some good results obtained.
In the past year, investigations on the sulphonation process were continued. Special attention was paid to the development of efficient decolorizers, particularly vegetable decolorizing carbons. It was found that natural vegetable substances, in order to furnish highly active carbons, should either contain large amounts of infusion ash—viz., lime salt, or phosphates, or silica—or else should first be impregnated with such or similar substances. They serve as a skeleton on which the carbon particles are deposited in a very finely divided state. The high decolorizing effect of the resulting carbon only appears after the impregnating substances have been removed by means of suitable solvents.

Very active carbons from natural sources were prepared, for instance, by charring the highly silicious parts of certain grasses, like rice hulls or leaves, barley awns, etc., heating the char to high temperatures in the absence of air, and dissolving out the silica by boiling with caustic soda, preferably under pressure. The resulting carbons were as good or better than Norit.

As regards artificial impregnation methods, highly active carbons were made from ordinary pine or other sawdusts by charring them in a mixture with lime, acetate of lime, lime and phosphoric acid, etc. In these cases hydrochloric acid is used to remove the impregnating substance after thorough carbonization. Equal parts of pine sawdust and lime gave a carbon superior to Norit. Very good results were obtained by using certain metallic chlorides as impregnating substances. Zinc chloride and stannous chloride were found very efficient in this respect, but the best carbon was made by means of anhydrous magnesium chloride, with which we were able to prepare a carbon fifteen times as effective as Norit.

A practical sugar house test in the refining of raw sugar by means of rice hull carbon was made in the summer, with satisfactory results from the standpoint of feasibility.
During the grinding season laboratory and sugar house experiments were carried out on cane juices and syrups with Norit and rice hull carbon. A bulletin on the results of these tests is now in preparation.

During the month of November we also collected raw material for a further study of the polyphenols of the cane, in the shape of cane tops and eyes, which have been suitably preserved and will be worked up later.

**PROJECT No. 2.**

*The Molecular Rearrangement of the Reducing Sugars.*

A satisfactory method for the determination of sucrose in the presence of reducing sugars by means of a lead-alkali has been worked out, and the results of this investigation will be published.

**BACTERIOLOGICAL DEPARTMENT**

*W. L. OWEN.*

**PROJECT No. 1.**

*A Study of the Deterioration of Sugars and Principal Factors Affecting Same.*

Observations upon the changes in chemical composition of sugar samples revealed the fact that a solid non-sucrose moisture ratio 3:1 (known as the "Factor of Safety") does not invariably prevent a sugar from deteriorating and that there is a successive increase and decrease in reducing sugars of the same sample at different periods of storage. The effect of high temperatures and humidities upon sugar deterioration was studied. It was found that the number of micro-organisms per gram of sugar was no criterion for deterioration. In developing methods in this connection syrup dilution proved superior to water dilution for quantitative results. The power of each species isolated to destroy sucrose was determined and a wide variation obtained. Cultures which had been previously acclimatized to sugar proved to be most vigorous. The limit of sucrose concentration in which the cultures seem capable of inducing any appreciable action is between 45-55° Brix, and in general they have a low tolerance—

*Resigned. Succeeded by Dr. N. Kopeloff, Nov. 1, 1917.*
towards acid and alkali when grown in sucrose solution. The comparatively low maximum density in which these bacteria are capable of developing suggests that their deteriorative action upon sugars is largely confined to fairly moist sugars, in which the molasses films have been much diluted by the absorption of addition of moisture.

In studying the influence of the density of the molasses film upon the deterioration of sugars, the general conclusion was established that there is no destruction where the moisture content of the sugar is not abnormal, emphasizing again the importance of this factor in the storage of sugar.

While investigating the comparative value of various culture media for the quantitative bacteriological analysis of sugars, it was found that the use of ordinary 10% sucrose agar prevented a very important group of micro-organisms in sugars from developing on the plates. The use of sucrose media of higher densities resulted in the isolation of a fairly large number of torula, most sugars containing a larger group of these micro-organisms than of bacteria. Seventeen species were isolated and described in detail. These organisms, however, exhibit a slight power of destruction of sucrose, levulose, or dextrose.

The fungi group, which appears to be the most important causative agent in deterioration, was isolated on a 50% sucrose agar at 34°C. Practically all of the species identified were Aspergilli, and were found to have a great destructive effect on sucrose, even at high concentrations. The limit was reached at 72° Brix. Torula when grown in association with molds decreased the effectiveness of the latter in the destruction of sucrose. There does not appear to be any symbiotic relationship between bacteria and torula. Molds alone proved more destructive than bacteria alone.

In observations on the limit of density for these microorganisms it was found that the molds are capable of rapid deterioration in 69° Brix, while torula are only moderate at 64°, and bacteria are rapid at 52°, but not at 60°. Thus the fungi may be regarded as especially significant in sugar deterioration because of their activity at such high concentrations, which approximate the concentration of the moisture film surrounding
the sugar crystals. The addition of nitrogen and ash nutriments does not markedly increase the activity of torula or bacteria and does not seem to have much effect on the keeping quality of sugar. It was found that the addition of impurities—i. e., compounds of calcium, etc.—reduced the destructive activity of the microorganisms because of the effect upon density. It was found that increasing the acidity of the molasses film does not appreciably extend the maximum limit of density at which the sucrose-destroying power of torula is suppressed. Molds are adapted to a wide range of reaction. An inverse ratio exists between the density of the molasses film and sugar deterioration.

The application of these results to actual practice is to be found in emphasizing the importance of maintaining the composition of the molasses film—that is, not permitting any dilution. Further, it is desirable to have a large and hard grain. The method of manufacturing sugar affects the solubility, hence the "Factor of Safety." The "Factor of Safety" holds good for unwashed 96° sugar, but varies with other kinds. Dry and cold storage is especially necessary in preventing sugar deterioration. Little benefit results from the practice of disinfecting sacks. Finally, the importance of fungi in sugar deterioration makes it imperative to investigate more extensively in that direction.

STATION No. 2, BATON ROUGE
A. P. KERR, Assistant Director.

The work of this station has been continued on about the same lines as previously outlined.

On account of drouths during the summer, the corn, sorghum, and soy bean silage project was discontinued for 1917. This left only the Japanese cane for a silage crop. It yielded 28 tons per acre.

FEEDING AND GRAZING STEERS.

For the steer feeding project, 20 steers were fed as usual for ninety days. A lot of 10 steers fed on palm kernel meal and Japanese cane silage made an average gain of 1.55 pounds a head a day, while the 10 steers which were given peanut meal and Japanese cane silage made an average gain of 1.19 pounds a head a day. These steers were placed on the market in New Orleans on June 14 and sold for an average of 10 cents per pound.
The grazing of steers on corn and velvet beans was carried out again during November and part of December. The steers looked to be in good condition in the feeding lot, yet the gains were very unsatisfactory.

**HOG GRAZING CROPS.**

The project to determine the effect of feed on bodies of hogs was carried out again this year. On account of the poor railroad facilities during the fall of the year, it was impossible to ship our grazing hogs to a packing house, and we could not follow them through and see how they killed out. They were sold on the open market in New Orleans. Therefore the results of last year, as to the effects of these feeds on the bodies of hogs, could not be compared with this year’s results.* However, another experiment was carried out on dry lot feeding to determine whether feeding hogs on peanut meal after the oil had been extracted would produce hard or soft hogs. A lot of 10 hogs were fed on a ration of palm kernel meal and corn chops and compared with a lot receiving a ration of peanut meal and corn chops. While the 10 hogs receiving the balanced ration of peanut meal and corn chops made better gains than the 10 hogs getting a ration of palm kernel meal and corn chops, the bodies of the hogs were not as firm; therefore, the class of meat was not as good.

A project for grazing hogs on corn and velvet beans was started, but it was impossible to get the hogs to eat the beans until they were dry. For this reason they consumed all the corn before they started eating the beans. They made fairly good gains, however, but not nearly what was expected. From this one year’s results it would seem that corn and velvet beans is inferior to any other grazing crop that we have tried, such as velvet beans, peanuts, corn and sweet potatoes.

We carried on experiments, in cooperation with the Department of Agriculture, with regard to the variety tests of soy beans and cow peas, also with the selection of soy beans with high oil and protein content. The results have been tabulated and reported to the Bureau of Plant Industry, Washington.

Pulling suckers from corn has also been carried out again
this year. The results confirmed the results of previous years, and, while the yield was a little higher when the suckers were removed, it was not enough to compensate for the labor involved.

FERTILIZING CORN.

The use of commercial fertilizer alone on corn has also been tried out again this year, and as the same results have been obtained for the last twenty-five years, this will be discontinued throughout the coming year. I think that this experiment proves conclusively that unless commercial fertilizer is used in connection with green crops and stable manure, it is unprofitable in this kind of soil.

We also made a test to determine whether or not potash alone was profitable in commercial fertilizer for corn. It matters not whether it is applied in the spring or fall, we could not see that it gave any material yields over using acid phosphate and cotton-seed meal. We also tested out the yields of the following crops: cowpeas, velvet beans, and soy beans, harvesting one-half of the crop for hay, and turning under the other half. The first year's results have not shown that the yield will be increased where the vines of any of these crops are turned under over the yield where they have been cut for hay.

The two-year rotation has been carried on for several years, giving a fair yield of cotton, corn and oats, beginning with this year. It is impossible to compute the average results from this kind of experiment unless the figures of a long number of years are at hand.

The experiment with lespedeza this year was a complete failure on account of the dry weather and the lespedeza being killed before it was of any height.

DEPARTMENT OF PLANT PATHOLOGY
C. W. EDGERTON.

The work of the Department has proceeded along the same lines as in the previous year. There has been no change in the projects under investigation. On account of the campaign for an increased food production, however, there has been a heavy increase in the requests from over the state for information on various plant diseases and allied subjects. This has resulted in a
much heavier correspondence than in previous years. The force of the Department has also been short on account of the difficulty in obtaining men to take the places left vacant by those who have gone into the army or other government work.

The project on sugar cane diseases received considerable attention throughout the year. The investigations at Audubon Park to test out the effect of the Red Rot disease on the germination of cane were continued. Observations on the loss caused by Root Rot disease were also made. This disease was very severe in 1917, due probably to the dry season, and was responsible for much of the cane shortage.

The experiments on the tomato wilt were carried on as in previous years. These included studies of the life history of the organism causing the disease and the testing out and selection of hybrids resistant to the disease. An article on a seed bed method of selecting for wilt resistance was prepared and sent in to Phytopathology for publication. Some of the hybrids which have been selected for wilt resistance show considerable promise.

The wilt resistant cottons which have been selected during the past several years were tried out on a larger scale during 1917. Some of these produced as high as three quarters of a bale to the acre on badly infested land, the highest yield that has been obtained on the Station grounds for several years.

Investigations on the Eggplant Blight were mostly confined to spraying experiments. The spraying tests did not give any positive results. The very dry season resulting in a light infection of the disease may have been partly responsible for the results obtained.

Investigations on alfalfa diseases, Sclerotium wilt disease, and rice diseases were largely confined to field observations.

DEPARTMENT OF ANIMAL PATHOLOGY
HARRY MORRIS.

The work in the Department of Animal Pathology has been continued along the same lines as in previous years and includes a study of some of the most important animal diseases.

The final results of the study of the blood-sucking insects as transmitters of anthrax charbon are being published in Bulletin
163. This work should show the necessity of protecting animals from the ravages of blood-sucking insects during outbreaks of this disease, also a more strict observance on the part of the farmers of the rules and regulations of the State Live Stock Sanitary Board.

During the past year a number of commercial anthrax vaccines were purchased on the open market and tested in the laboratory. The results show the efficiency of the vaccines has been increased and that a better product is being put on the market than in past years. Greater protection against anthrax should be produced by the use of these vaccines with a decrease in the annual loss by live stock from this disease.

A number of other diseases of live stock have been studied and a large number of specimens have been received for examination.

The increased correspondence has been taken care of as in previous years by Dr. Dalrymple, head of the department.

The equipment of the department has been increased by the addition of a room to the animal house for the holding of post-mortem and general diagnostic work.

**HORTICULTURAL DEPARTMENT**

G. L. TIEBOUT.

Under a joint arrangement the horticulturist has continued his activities, both investigational and extension, through the Experiment Station and Extension Division. The work in the commercial production, shipping, and marketing of bell peppers was continued during the summer. Prices were very satisfactory, but the quality of the crop was very poor and the yield very low owing to the extremely dry weather. The cooperative shipping arrangements by freight that were conducted the year previous with growers at Denham Springs and other points were abandoned, as the high prices did not make this form of transportation attractive. The production of bell peppers among growers, especially at Denham Springs, has been very materially increased and we feel that our activities have helped bring this about.

The winter work with the production, shipping, and market-
ing of cauliflower and Brussels sprouts, and the variety tests of Broccoli was practically a failure due to the severe freezes and continuously cold weather.

The popular publications of this department giving results with truck crops have been issued in the form of mimeograph circulars. Ten have been written.

A great deal of attention has been given the war garden drive. Sixteen circulars have been prepared in this connection.

A four year course in gardening for the girls' canning clubs was prepared.

The horticulturist had charge of the collecting, shipping, and installing of the station exhibits at the State Fair and New Orleans Fair.

He has met demands for special addresses, cooperated with other departments in closely related work, and attended to the usual correspondence.

MECHANICAL ENGINEERING DEPARTMENT
A. GUELL, Mechanical Engineer.

The work of this department, which had been discontinued due to the resignation of Prof. E. W. Kerr, was restarted September, 1917. Responding to the appeal of the National Fuel Administration, and at the request of several owners of Louisiana sugar houses, this department has conducted investigations and has suggested changes in the equipment of twelve sugar factories which have resulted in the savings of hundreds of barrels of fuel oil during the 1917 grinding season. A bulletin will be issued embodying the results of these investigations. Two papers have been read before the Louisiana Sugar Planters' Association; articles have been written for the Louisiana Planter and El Mundo Azucarero. A large number of trips have been made to the sugar factories and two plants, much time has been devoted to the consultation at the University, and hundreds of letters have been written answering questions along engineering lines.

NORTH LOUISIANA EXPERIMENT STATION
CALHOUN, LA.
C. E. HESTER, Assistant Director.

The work at the North Louisiana Experiment Station for 1917 was conducted along lines similar to those of previous years.
Rotation experiments, variety and fertilizer tests with crops suited to this section; pork, beef, and fruit experiments have been continued. More hogs and cattle have been produced. Increased attention has been given experiments with soy beans and velvet beans.

The yields of the various crops during the year have not been satisfactory on account of the drouth. The results from fertilizer tests, etc., have been unsatisfactory on account of dry weather. In the experiments and general crops grown on the station during the year, there were produced about 475 bushels of corn, 21,000 pounds of seed cotton, 200 bushels of sweet potatoes, 18 tons of hay, and a good crop of velvet beans and cow peas.

**RAW ROCK PHOSPHATE VS. ACID PHOSPHATE.**

**IN A THREE-YEAR ROTATION.**

In this experiment, one-third of the area is devoted to cotton, one-third to corn and a legume, and one-third to crimson clover followed by velvet beans. The velvet beans are plowed under in the fall with raw rock phosphate applied to one-half of plot at rate of 2700 pounds per acre. Each plot receives an application of raw rock phosphate every three years, while acid phosphate is applied to the cotton and corn crops at the rate of 300 pounds per acre.

The results show that the acid phosphate gave a slightly better yield in both cotton and corn than the raw rock phosphate.

**CORNFLOWER TEST.**

In the corn variety test, Sentell's White Dent, with a yield of 29.2 bushels per acre, led all other varieties. Hastings Prolific was second with 28.7 bushels and Gandy's Prolific third with 28.3 bushels. In percentage of grain, Rogers led with 88.2%, Calhoun Red Cob (Crumpton) second with 87.7%, and Calhoun Red Cob (supple) third with 87.3%.

**CORNFLOWER FERTILIZER EXPERIMENTS.**

In the corn fertilizer experiments, the best yields (25 bu. per acre) were had from an application of 100 lbs. of acid phosphate and 100 lbs. of nitrate of soda per acre; and the poorest
yield (10 bu. per acre) from an application of 300 pounds of acid phosphate alone per acre.

COTTON VARIETY TEST.

In the cotton variety test, Brown's No. 1, with a yield per acre of seed cotton of 1331 lbs. led the other varieties in yield. Its percentage of lint was 27.75. Cleveland's Big Boll, with a yield of 1326 lbs. of seed cotton, second. Its percentage of lint was 25.50. O'Bannon's No Chop (Drilled) with a yield of 1319 lbs. of seed cotton, was third. Its percentage of lint was 30.75.

In the percentage of lint cotton, Half and Half led with 37.50. Its yield of seed cotton was 1188 pounds. Money Maker with 35.50% was second. Its yield of seed cotton was 1211. Cook's Improved, with 35.00%, was third. Its yield of seed cotton was 1209 lbs.

COTTON FERTILIZER EXPERIMENTS.

In the cotton fertilizer experiments, the application of cottonseed meal at the rate of 100 lbs. per acre gave an increase of nearly 200 lbs. of seed cotton per acre in a three-year average. The application of 200, 300, and 400 lbs. of cottonseed meal gave a small increase over the 100 lb. application. Applications of acid phosphate at the rate of 100, 200, 300, and 400 lbs. per acre gave increases of from 136 to 212 lbs. of seed cotton per acre in a three-year average.

CORN AND VELVET BEAN EXPERIMENTS.

These experiments were planned with a view of ascertaining the best method of growing velvet beans with corn. The drouth killed many of the beans where planted among the corn, which accounts for such low yields in these plots. Early Speckled velvet beans were used in these tests.

Experiment 1.

Eight rows corn with velvet beans between each hill of corn on every row. Making eight rows corn and eight rows velvet beans to the experiment.

Yield corn: 18.8 bushels per acre.
Yield velvet beans: 360 pounds per acre.

Experiment 4.

A row of corn and a row of velvet beans alternated, making four rows corn and four rows velvet beans to the experiment.
Yield corn: 11.6 bushels per acre.
Yield velvet beans: 1200 pounds per acre.
The corn and velvet beans were planted in rows three and one-half feet apart. Corn and beans were fertilized with a mixture of two parts cotton seed meal and one part acid phosphate at the rate of 250 pounds per acre.

**Sweet Potato Variety Test.**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield Bushels per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triumph</td>
<td>190.3</td>
</tr>
<tr>
<td>Bunch Yam</td>
<td>175.0</td>
</tr>
<tr>
<td>Bunch Dooley</td>
<td>161.4</td>
</tr>
<tr>
<td>Nancy Hall</td>
<td>155.5</td>
</tr>
<tr>
<td>Southern Queen</td>
<td>155.5</td>
</tr>
<tr>
<td>Key West</td>
<td>154.9</td>
</tr>
<tr>
<td>Jersey Yellow</td>
<td>154.3</td>
</tr>
<tr>
<td>Running Dooley</td>
<td>137.8</td>
</tr>
</tbody>
</table>

The varieties in the above test were grown from slips or draws. They were grown on light gray, sandy loam soil and fertilized with a mixture of equal parts cotton seed meal and acid phosphate applied at the rate of 400 pounds per acre. The slips were set out on May 23.

**Sweet Potato Variety Test.**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield Bushels per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jersey Yellow</td>
<td>84.0</td>
</tr>
<tr>
<td>Nancy Hall</td>
<td>73.1</td>
</tr>
<tr>
<td>Bunch Yam</td>
<td>67.6</td>
</tr>
<tr>
<td>Triumph</td>
<td>42.0</td>
</tr>
<tr>
<td>Southern Queen</td>
<td>32.7</td>
</tr>
<tr>
<td>Key West</td>
<td>23.4</td>
</tr>
</tbody>
</table>

The varieties in the above test were grown from cuttings or vines. They were grown on same type of soil, fertilized and treated identically the same as the varieties grown from slips. The vines were set on July 11. The drouth during the summer materially injured the entire sweet potato crop.

**Pork Production Experiments.**

Good results were obtained from grazing shoats and sows on corn and soy beans, corn and peanuts, and corn and velvet beans.
BEEF CATTLE.

Calves sired by the shorthorn bull from native grade cows continue to do well. The herd of 16 cows, 1 bull, 4 heifers, 12 steers and 15 calves was successfully carried through the winter by feeding about eighty-four tons of corn and soy bean silage and one ton of cotton seed meal, with oat straw and cornstalks for roughage.

HORTICULTURAL WORK.

The one-acre vineyard, including half an acre each of Ives, Niagara, Concord, and Delaware grapes, produced its third crop this season. There was a decrease in yield from last year, which can probably be attributed to dry weather, and injuries inflicted by birds. The vineyard was sprayed at the proper time three times during the season. Quite a bit of rot was noticed, especially in the Delaware grapes.

The peach crop of the past season was very small, many trees bearing nothing at all. Considerable pruning and spraying have been done in an attempt to control the scale and other insects.

Practically the entire apple crop was destroyed by the blight. The pears remaining in the orchard are too young to produce fruit and have not been attacked by blight.

The Magnolia fig produced a small crop of fruit, but it still possesses the large opening at apex that admits insects, causing the fruit to sour before sufficiently ripe to harvest.

NORTH LOUISIANA AGRICULTURAL SOCIETY.

Monthly meetings of this Society were held during the past year. Station officials arranged the programs and entertained visitors during these meetings. The attendance was good and splendid interest was shown by those attending. The annual fair of the Society was dispensed with for this year and the efforts of the Society extended to aid in the organization of a larger and better fair at Monroe.
EXPERIMENT STATION DAIRY

The dairy experiments have been carried on as nearly as possible along lines previously planned. Some new experiments have been started which will require several months before they furnish data for definite conclusions.

A comparison of two dairy breeds—Jersey and Holstein—is being made with respect to the effect of climatic conditions, the cost of milk production, and the amount of care required.

An investigation of the value of velvet beans as a feed for dairy cows has been started recently. The objects of this investigation are (1) to ascertain the best and most practical method of feeding velvet beans, and (2) to determine their nutritive value as compared with some other dairy feeds.

An investigation on calf feeding is being carried on. Various rations are being tried with the purpose of (1) finding out the actual cost of raising a calf up to the age of six months, and (2) of determining what ration will give the largest gains at the least cost.

Good results in herd improvement have been attained during the past year. Several cows whose production is above the average were added to the herd. About twenty head, including both males and females, were sold during the year to farmers in different parts of the State.

THE RICE EXPERIMENT STATION
CROWLEY, LA.
F. C. QUEREAU, Assistant Director.

Conducted in cooperation with the Bureau of Plant Industry, United States Department of Agriculture.

FERTILIZER EXPERIMENTS.

The experiments which have been conducted in fertilizing rice lands may be summarized as follows:

1. Sixteen per cent acid phosphate at the rate of 200 pounds per acre seems to give the best results in the late varieties of rice, such as the Japans and some of the Wright varieties.

2. From these results it would seem that it is not profitable to grow rice longer than five or six years in succession through the use of phosphate fertilizer.
3. Phosphate acid seems to be the best fertilizer for all crops on reclaimed marsh land.
4. Nitrogen can be used to advantage on the early varieties, such as Honduras. Small applications of nitrogen may be of advantage on land that is in a badly run-down condition when planted to other varieties.
5. Potash does not seem to be required in the form of commercial fertilizer.
6. Most rice land needs vegetable matter.
7. Home mixed fertilizers are the most profitable.

**ROTATION EXPERIMENTS.**

Experiments have shown that long rotations are more profitable than short rotations in growing rice. This is not because the rotation crops do not make more profitable yields, but because of the high overhead expense necessitated by the frequent change from rice to highland crops. When highland crops are raised, deep ditches are necessary for drainage. Then when the land is again planted to rice, some of the ditches must be filled and the entire area leveed in contour.

**ERADICATING RED RICE.**

1. *Mowing the Stubbles.*—Mow the stubbles as soon as the rice is threshed. This will aid in germinating the red seed which may be on the surface of the ground. If the stubble is not too heavy on the ground, double-disc the land twice.

2. *Winter Cover Crops.*—It is believed that a winter cover crop is a great aid in the eradication of red rice. Red rice will become embedded in the soil and will not germinate until the soil covering is broken, admitting air and permitting the seed to sprout. The soil is filled with the roots of the winter crop. When these roots disintegrate in the spring, this aids in the germination of the red rice.

3. *Cultivated Crops.*—On land badly infested with red rice, preference should be given to clean cultivated crops until the red rice is under control.

**STRAIGHT HEAD.**

It is not known whether this is a disease or a condition brought about by physical causes. It seems to occur largely on
land that grew a highland crop the previous year and which contains a large amount of vegetable matter.

From observations which have been made, straight head does not often occur on fields which some time during the growing season were drained and allowed to become dry. Again, it does not seem to occur on rice which is watered late and which may have apparently suffered to a certain extent from late flooding. Until more exact information is available it is considered to be safe practice on land which contains considerable vegetable matter to either irrigate late or drain the land and allow to become thoroughly dry once during the growing season. On land that has been in highland crops for several years it is advisable to follow this plan for the first two years that the land is planted to rice.