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Report of the agricultural experiment stations for the years 1928-1929.

W R. Odson

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REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS FOR THE YEARS 1928-1929

BY

C. T. DOWELL, Dean and Director

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATIONS
AGRICULTURAL EXPERIMENT STATION STAFF

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W. G. Taggart, B. S., Assistant Director

Ruth Heidelberg, Secretary
J. K. McHugh, Librarian

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John P. Gray, M. S., Associate Agronomist.
A. H. Meyer, Ph. D., Associate in Soil Science.

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J. B. Francioni, M. S., Assistant Professor Animal Industry.
M. G. Snell, Ph. D., Assistant Professor Animal Industry.

Animal Pathology
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M. B. Sturgis, M. S., Assistant Professor Research in Soil Bacteriology.
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E. C. Tims, Ph. D., Associate Professor Research in Plant Pathology.
T. C. Ryker, B. S., Assistant.

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Sugar Cane
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S. T. Breaux, B. S., Assistant in Outfield Work.
E. C. Simon, B. S., Assistant.

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C. C. Moreland, B. S., Assistant Chemist.

Detailed by United States Department of Agriculture

Apiculture
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E. Oertel, Ph. D., Asst. Apiculturist.

Cereal Investigations
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SUB-STATIONS
Cotton Station, St. Joseph, La.................C. B. Haddon, B. S., Supt.
Fruit and Truck Station, Hammond, La........B. Szymoniak, Supt.
North Louisiana Station, Calhoun, La..........Sidney Stewart, Supt.
Rice Station, Crowley, La........................J. M. Jenkins, Supt.
ANNUAL REPORT OF EXPERIMENT STATIONS

Dr. C. T. Dowell
Director

The purpose of an agricultural experiment station is to get information in order to be able to answer questions that have come up in regard to farming. Our aim at the Louisiana Experiment Station is to keep in close touch with the farmers of the State through the Extension Division and in other ways so that we may have as much information as is possible for us to obtain about problems that present themselves on various phases of agriculture. We are trying to work out a symmetrical research program so as to not to neglect any of the major agricultural interests of the State. This thought has been constantly in mind for the last year and will be the guiding principle in the work of the Station.

The results given in this report should not all be taken as final. It is our aim to give out results as promptly as possible by means of the annual report and reports of a preliminary nature to the newspapers. What I wish to do here is to give a statement of some of the changes and additions that have been made in the work during the past year and a half.

NEW BUILDINGS

DAIRY BUILDING

The dairy industry has been growing very rapidly during recent years. On this account we were very fortunate in getting a new dairy building last year. While the building is not a large one, yet it is large enough to accommodate the Institution in its teaching and research for a number of years to come. It has added very much to the efficiency of the teaching and research.

DALRYMPLE MEMORIAL

The plan that was drawn for the University for its new campus included a group of buildings for teaching and
research in animal pathology. The original plan called for four small buildings; two of these are in process of construction at this time. When these buildings are completed and equipped as planned they will add very much to our teaching and research in animal pathology. These buildings are being named in honor of Dr. W. H. Dalrymple, who was connected for a long time with the Experiment Stations.

**BEEF CATTLE FEEDING SHED**

The Experiment Station was not provided until this last summer with a building and lots which would enable it to carry on feeding experiments with beef cattle. A shed was put up providing for five lots and a two story part which will enable us to conduct digestion trials with various feeds.

**SEED HOUSE**

The Department of Agronomy is doing considerable work in the way of testing and breeding seed for field crops. An inexpensive seed house was put up last summer which is a great help in storing different varieties of cotton, corn, etc.

**HORTICULTURAL SHED**

A new line of work was undertaken by the Experiment Station this last summer. A fairly comprehensive program of investigation of fruits and vegetables has been started. This made it necessary to have some place on the horticultural grounds for the storage of vegetables, fertilizer, machinery, etc. A building suitable for this purpose was completed last summer.

**POULTRY BROODER HOUSE**

The Department of Poultry has been very much handicapped on account of not having a brooder house. The brooding of chicks had been carried on in small buildings. It was found that these were needed for other purposes and they were not satisfactory for breeding purposes, so a brooder house was constructed last summer. It is provided with a hot water heating system and it has a room at one
end for battery broodings. The runways are made of concrete and covered over with screens. This has added very much to the facilities for teaching and research in poultry.

**DAIRY BUILDING AT CALHOUN**

Interest in dairying in the northern part of the State has increased a great deal during the last few years. For that reason it was decided to put in a small dairy herd at the sub-station at Calhoun. We built a small barn. Equipment has been put in for testing milk and a small electric refrigeration plant has been provided.

**OTHER IMPROVEMENTS**

The facilities for carrying on research with hogs was not at all adequate so a number of pens has been built this past winter and they have been provided with self-feeders. This will enable us to carry on our work with hogs much more satisfactorily.

A small stock of common sheep was bought this last winter and a small shed was built for them and the pasture fenced in order to keep them.

It has been found that we had great difficulty in keeping our chickens free from disease, so two things have been done looking toward improvement in that respect. Six acres of land was fenced and is known as a growing range. Small portable houses were provided. The chicks will be kept in brooder houses under screens until they are six or eight weeks old and will then be transferred to the growing range. It is our plan to use two acres each year. The other four acres will be under cultivation. Rotation will be practiced so that the land will be in cultivation two years and used as a growing range one year. The other step that has been taken looking towards prevention of diseases of poultry is the putting in of double yards in connection with the long poultry house. The house was built with a yard on the south side only; this past year provision was made for yards on the north side of the house. This will allow a rotation of yards which will tend to keep down diseases.
DELTA EXPERIMENT STATION, ST. JOSEPH

A law was passed at the last regular session of the Legislature providing for the establishment of a sub-station at St. Joseph, which is located in what is known as the Delta section of the State, a section devoted very largely to the production of cotton. The law provides that 160 acres of land should be furnished and that when the University accepted title to the land it was obligated to set aside not less than $10,000 a year for the maintenance of the work at that Station. Title to the land was not secured in time for us to do very much research last year. This year the Experiment Station bought another 25 acres of land to be used by the Delta Station for the purpose of building sites, lots, etc. This 25 acres is on the opposite side of the road from the 160 acres. The residence and quite a few other buildings have been completed at this Station and it is expected that a fairly good program will be under way this year.

Mr. C. B. Haddon, who had been District Agent in the northeastern section of the State, was elected Superintendent of this sub-station.

PROGRAMS FOR THE SUB-STATIONS

Conferences have been held during the year for the purpose of outlining a program for each of the sub-stations. The Superintendents of the sub-stations, representatives of the central staff and representatives of the Extension Division, participated in these conferences. It was thought that by having members of the Extension Division present at these conferences we would become acquainted with the more urgent problems in the district served by each of these sub-stations. What is thought to be adequate programs have been outlined.

NEW LINES OF WORK

It is a well known fact that it is impossible for a central station, representing the entire State, or a sub-station, representing a certain section, to give information in regard to varieties of field crops, fertilizers and rotations that
will be applicable to all sections. For that reason what we have called "outfield work" was started last year at nine different places in the State. This work is in cooperation with farmers. The farmer is paid for the extra labor that is required in connection with the work.

The outfields have been located so as to have them on the different soil types. Mr. John Gray was employed to have supervision of this work. He will continue to have charge of it but Mr. John R. Cotton, who was graduated from this Institution this winter, will be in immediate charge of it in the future.

Variety tests of cotton, corn and soybeans are being made. Fertilizer tests for cotton, and in some cases with corn, are being conducted. Fertilizer tests with oats are being made in those sections of the State where oats are being grown. A report has been issued giving results of tests this last year.

AGRICULTURAL ECONOMICS

No one was employed to do work in agricultural economics last year. However, the Experiment Station cooperated with the Federal Government by paying one-half of the salary of two of its employees in connection with a grade, staple and price study of cotton. This cooperation is being continued this year.

The Station financed a project that was carried on by Dr. R. L. Thompson, of the College of Commerce, which had for its purpose a study of the agricultural credit situation in the State. The results of this study have been put in manuscript form and are ready for publication.

Beginning with this year, work was undertaken in farm management. A study is being made of the farms of the rice territory and sugar section and we are cooperating with the Bureau of Agricultural Economics of the United States Department of Agriculture in a study of farm power in the sugar section of the State.

HOME ECONOMICS

Investigations were started last last year in connection with home economics. There are two projects under way;
ole of these has for its purpose a study of the anti-rachitic effect of acidophilus milk; the other is a study of the home canning of meat under conditions in Louisiana. Fairly conclusive results have been got on the canning project but the work on the other project has not been in process long enough to arrive at any definite conclusions.

**HORTICULTURE**

I have already mentioned under the heading of buildings that investigations were started last summer on vegetables and horticultural crops. A fairly comprehensive program with this line of work has been outlined.

**DAIRYING**

Four or five projects were outlined this year in connection with dairy production. Special attention is being given to a study of pastures. Investigations on pastures are being undertaken both at Baton Rouge and at Calhoun. A study of the production of cows on pasture, with grain and without grain, is being made. The cost of raising heifers is being determined.

**PARASITOLOGY**

Work in this line was undertaken in the fall of 1928. Dr. R. L. Mayhew, who was connected with the Department of Zoology, was employed for part time during the year 1928-29. Beginning with the year 1929-30 he was employed for full time by the Experiment Station; he has devoted his entire attention this last year to a study of coccidiosis in chickens.

**FELLOWSHIPS**

During this year three fellowships have been established in connection with the Experiment Station. The Chilean Nitrate Company gave $2,000 for the establishment of a fellowship for carrying on investigations in the use of sodium nitrate as a fertilizer for cotton, corn, and oats. This work is being put under way at four or five different places.
Mr. Frederick A. Mitchell, who was graduated from this Institution in '29, was elected to this fellowship.

The Amôorg Trading Company gave $1,500 to establish a fellowship for the purpose of a study of the control of round worms by the use of Santonin as an anthelmintic. Mr. J. A. Martin, a senior in the College of Agriculture, was elected to this scholarship.

The American Cyanamid Company gave $1,500 for the establishment of a fellowship for the purpose of investigating cyanamid as a fertilizer for sugar cane. Mr. A. K. Smith, who was graduated from this Institution with the class of '29, has been elected to this fellowship.

CHANGES AND ADDITIONS TO STAFF

AGRONOMY

Mr. D. N. Barrow died in December, 1928.

Mr. John Gray, who has a master's degree from Oklahoma A. & M. College, was elected to succeed him. Mr. Barrow had had charge of the work with sugar beets and soy beans. Dr. H. B. Brown took over the work with sugar beets and Mr. John Gray continued the work with soy beans and has supervision of outfield work.

Dr. A. H. Meyer was added to the staff of this department in the summer of 1929. Dr. Meyer took his doctor's degree at the University of Wisconsin, majoring in soils. He has had a great deal of experience in connection with soil survey work in the South and also with soil investigations. He will devote his entire time to soil investigations.

It has already been mentioned that Mr. John R. Cotton is to have charge of the outfield work under the direction of Mr. Gray.

Mr. W. L. Owen, who was in charge of research in soil bacteriology, resigned the first of last October. Mr. M. B. Sturgis, who took his bachelor's degree at Texas A. & M. College and his master's degree at Iowa State College, was elected to succeed Mr. Owen. Mr. Sturgis has done considerable graduate work beyond his master's degree. He will continue the investigations started by Mr. Owen, but
will be connected with the Department of Agronomy, so that there may be close contact in the work with soils done by Dr. Meyer and Mr. Sturgis.

**AGRICULTURAL ENGINEERING**

Mr. Carl Nadler, who had charge of sugar cane engineering, resigned last summer and Mr. Wm. Whipple was elected to succeed him. Mr. Whipple is a graduate of Massachusetts Institute of Technology and has been connected with Cinclare Factory for a number of years.

Mr. C. L. Osterberger resigned last summer and Mr. H. T. Barr of the University of Arkansas was elected to succeed him. Mr. Barr did his under-graduate work at the University of Missouri and took his master’s degree at Iowa State College.

**ANIMAL HUSBANDRY**

Until this past summer Dr. C. I. Bray was the only member of the Experiment Station staff representing animal husbandry. Professor J. B. Francioni and Dr. M. G. Snell had been doing some work but were not officially members of the Experiment Station Staff. Arrangements were made this last summer by which less of Dr. Bray’s salary would be paid by the Station and a part of the salaries of Professor Francioni and Dr. Snell would be paid, thus making them members of the Experiment Station Staff.

**ENTOMOLOGY**

Until this past summer Dr. W. E. Hinds had devoted a part of his time to extension work. At the beginning of this fiscal year Mr. C. O. Hopkins, who was a member of the entomological staff, was made extension entomologist, and Dr. Hinds is now devoting his full time to research in entomology.

**DAIRYING**

It has already been mentioned that work was started this year in dairying. Mr. R. H. Lush was elected to undertake this work. Mr. Lush is a graduate of Kansas Agri-
cultural College. He took his master's degree at the University of Minnesota and has finished all of his work for the doctor's degree at the University of Wisconsin with the exception of completing his thesis.

FARM MANAGEMENT

I have mentioned that work in agricultural economics was started last year. Included in this is farm management. Mr. R. J. Saville of North Carolina Agricultural College was employed for the purpose of beginning investigations in farm management this past summer. Mr. Saville took his bachelor's degree at the University of Missouri and his master's degree at North Carolina Agricultural College. He has completed all of his work for the doctor's degree at Cornell University with the exception of his thesis.

Mr. G. B. Reuss was employed last fall to undertake farm management studies in connection with sugar cane. Mr. Reuss received his bachelor and master's degrees at the University of Illinois.

HORTICULTURE

Dr. J. C. Miller of Oklahoma A. & M. College, was elected last year to begin work with horticultural crops, particularly with vegetables. Dr. Miller took his doctor's degree at Cornell University. After finishing his work at Cornell he went to Oklahoma A. & M. College, where he remained a year. He was made head of the department of horticulture at this Institution last summer.

PARASITOLOGY

I have already mentioned that Dr. R. L. Mayhew began work in parasitology in the fall of 1928. Dr. Mayhew took his doctor's degree at the University of Illinois, majoring in parasitology.

PLANT PATHOLOGY

Mr. H. H. Flor resigned in June, 1929. He was succeeded by Mr. L. H. Person. Mr. Person has a master's degree from the University of Minnesota.

Mr. T. C. Ryker was added to the staff October 1, 1929, as assistant, in a new project on a study of the root system.
of sugar cane. Mr. Ryker is a graduate of Mississippi A. & M. College.

POULTRY

Mr. C. W. Upp, who took his bachelor and master's degrees at Oklahoma A. & M. College, was made head of the department of poultry in the fall of 1928. Mr. G. W. Knox, who was instructor in poultry, was in charge of both teaching and research. He resigned to accept a position at the University of Arkansas. He was succeeded by Mr. W. M. Ginn, who received his bachelor and master's degrees from North Carolina Agricultural College.

SUGAR CANE

Arrangements were made in the fall of 1928 by which this Station would cooperate with the Bureau of Chemistry and Soils in a study of the fertility of soils of the sugar cane section. Mr. S. J. Breaux, a graduate of this Institution, was elected to represent the Experiment Station in this cooperation.

Mr. E. C. Simon, a graduate of this Institution, was elected in the fall of 1929 to assist Mr. W. G. Taggart in his work with sugar cane at this Station.

In the summer of 1928 Dr. Warren Whitcomb and Dr. E. Oertel were sent to this Institution by the United States Department of Agriculture, for the purpose of beginning investigations in bee culture.
A refrigerator was built to freeze standing cane artificially in order to help study the problem of how to lessen the loss of damage from freezing on a crop of sugar cane in Louisiana, and incidentally to determine what temperature is required to kill the eyes at various heights on the stalk, to split standing cane and to cause rapid deterioration for milling; also to determine if this deterioration varies with different varieties of cane, with stage of growth and maturity, with kind of soil and condition of soil moisture, with the duration of low temperature and climatic conditions following the freeze.

A portable refrigerator large enough to freeze a row 18 feet long of standing cane was built and preparations were made to start the experiments on December 3rd. The natural freezes made it necessary to postpone the experiments until the beginning of the 1930 harvest season.

AN INVESTIGATION OF MILLING OF P. O. J. CANES

The milling of high fibered P. O. J. sugar cane in Louisiana has been studied with the idea of suggesting necessary changes to existing equipment and the best type of new machinery to successfully extract the juice without danger of breakage.

Questionnaires were sent to about fifty sugar mills asking for dimensions, settings, pressures and figures showing capacities and extractions obtained. The information furnished has been supplemented by personal visits to many of the mills and a study of the control of the different factories.

A study of results shows the benefits of coarse grooving and special juice grooves as well as the use of revolving cane knives. It also indicates the best settings and hydraulic pressures for different types of grooving. Many changes suggested have resulted in better extractions and increased capacity.
Artificial Curing of Hay

Whipple-Barr

Artificial curing of hay was undertaken because of the large possible yields of hay crops in Louisiana and the enormous loss of these crops from rains during the process of natural curing.

A revolving drum type continuous hay drier was designed and built, which under test had a capacity of one quarter ton dry hay per hour. This machine was successful in producing economically a high grade hay.

During the past year a larger drier with a drum 6'x40' has been built along the same lines as the original drier. To date the following maximum capacities have been obtained: 2600 pounds of dry alfalfa hay, and 1600 pounds of dry soybean hay per hour. An evaporation of 8 pounds of water per pound of oil was obtained which is equivalent to an efficiency of 50 per cent.

Application papers for patent have been filed in the name of the University.

A Study of the Deficiencies of Agricultural Implements Applied to Sugar Cane Culture

Barr

The purpose of this experiment is (a) to test out under Louisiana conditions sugar cane machinery which is being used successfully in other countries; (b) to test out and determine the feasibility of using sugar cane machinery which has proven successful in other row crops. To date little progress has been made on this project.

Producing Corn and Soy Beans with Mechanical Power

Barr

Through this experiment data are to be secured which will help in determining whether or not tractor power can be profitably utilized for producing corn and soybeans under conditions such as found on sugar plantations.

Planters and cultivators for the general purpose tractor have been found only fairly successful and several changes
have been necessary in order to secure better results under conditions as found on the alluvial lands of the cane belt. The costs of production secured are under those as reported by a survey made by the U. S. Department of Agriculture on 25 farms in the alluvial section of Louisiana. The results are best summarized by the following table:
<table>
<thead>
<tr>
<th>OPERATION</th>
<th>Acres</th>
<th>TOTAL HOURS</th>
<th>HOURS PER ACRE</th>
<th>Costs—Acre Basis</th>
<th>Acre Hrs</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M.  Tr.  T.  W.</td>
<td>M.  Tr.  T.  W.</td>
<td>M.  Tr.  T.  W.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discing—Fall</td>
<td>40.05</td>
<td>27.41 27.41</td>
<td>.685  .685</td>
<td>.137 .514</td>
<td>1.46</td>
<td>Scale:</td>
</tr>
<tr>
<td>Plowing—Flat</td>
<td>22.52</td>
<td>56.42 56.42</td>
<td>2.50  2.50</td>
<td>.60  1.88</td>
<td>.40</td>
<td>Tr. Operator.</td>
</tr>
<tr>
<td>Discing—Spring</td>
<td>22.52</td>
<td>15.85 15.85</td>
<td>.705  .705</td>
<td>.141 .529</td>
<td>1.42</td>
<td>Man hr. 1.75</td>
</tr>
<tr>
<td>Bedding</td>
<td>22.52</td>
<td>28.8 28.8</td>
<td>1.28  1.28</td>
<td>.256 .96</td>
<td>.73</td>
<td>Team hr. .16</td>
</tr>
<tr>
<td>Reversing Rows</td>
<td>17.53</td>
<td>20.0 20.0</td>
<td>1.14  1.14</td>
<td>.228 1.14</td>
<td>.88</td>
<td>Woman hr. .10</td>
</tr>
<tr>
<td>Harrowing</td>
<td>48.62</td>
<td>19.18 19.18</td>
<td>.395  .393</td>
<td>.079  .294</td>
<td>2.54</td>
<td>Tr. hr. .75</td>
</tr>
<tr>
<td>Planting</td>
<td>40.05</td>
<td>55.4 27.7</td>
<td>1.33  .69</td>
<td>.258 .517</td>
<td>1.46</td>
<td>Not flat plowed</td>
</tr>
<tr>
<td>Replanting</td>
<td>8.57</td>
<td>11.62 5.81</td>
<td>1.33  .69</td>
<td></td>
<td>1.46</td>
<td>Pegtooth-high gear</td>
</tr>
<tr>
<td>Cultivating</td>
<td>40.05</td>
<td>107.3 107.3</td>
<td>2.68  2.68</td>
<td>.536  2.01</td>
<td>1.49</td>
<td>2 men used</td>
</tr>
<tr>
<td>Thinning</td>
<td>40.05</td>
<td>60.0 368.0</td>
<td>1.50  9.2</td>
<td>.262  .92</td>
<td></td>
<td>Avg. 4 cult.</td>
</tr>
<tr>
<td>Plowing drains</td>
<td>40.05</td>
<td>394.    39.4</td>
<td>.87  .87</td>
<td>.152 1.39</td>
<td>1.15</td>
<td>Necessary 5 times</td>
</tr>
<tr>
<td>Shovelling drains</td>
<td>40.05</td>
<td>4540.   11.35</td>
<td>1.99</td>
<td></td>
<td></td>
<td>Necessary 1 time</td>
</tr>
<tr>
<td>Plowing-ditch bank</td>
<td>40.05</td>
<td>46.9 46.9</td>
<td>1.17  1.17</td>
<td>.205  .187</td>
<td>.85</td>
<td>Av. yield:</td>
</tr>
<tr>
<td>Harvesting</td>
<td>40.05</td>
<td>499.4 108.9</td>
<td>12.47 2.42</td>
<td>2.18  .387</td>
<td></td>
<td>21.88 bu.</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>40.05</td>
<td>108.8</td>
<td>2.72</td>
<td>.476</td>
<td></td>
<td>Cost: .659 bu.</td>
</tr>
<tr>
<td>Total</td>
<td>154.6 308.5 190.7 368.0</td>
<td>38.7  7.71 4.8  3.2  6.96 5.78 .763 .92</td>
<td></td>
<td></td>
<td>$14.42 per A labor &amp; power not inc. ditch maintenance</td>
<td></td>
</tr>
</tbody>
</table>

At present much attention is being given to cotton breeding with the hope of developing or securing a well adapted cotton variety for each of the main cotton growing sections of the State. Numerous individual plant selections are made in fields of certain of the best adapted varieties available. Progenies from these selections are grown and tested for two or more years. Strains that appear promising are increased in isolated fields. Numerous crosses of different varieties are also made each year with the idea of combining in one variety good characters found in two or more varieties. In connection with the breeding work, variety studies were made in twelve different places the past season. In these tests some of the strains that we have developed made a splendid showing. Express-317 ranked first in six of the twelve tests, was third in three, and had an average rank of 3.17 in all the tests of the State. Delfos No. 2, another one of our selections, ranked high, being second in rank for the entire State. Other of our strains also ranked well. It is not to be expected, however, that any one strain will be especially well adapted to various parts of the State. The work thus far indicates that Delfos is the best variety for the alluvial lands of the State if a staple cotton is wanted. Where a short staple variety is wanted, especially in the northern uplands of the State, Delta and Pine Lands No. 4-8 appear to be the best. For wilty soils Dixie-Triumph probably is best.

In cotton spacing experiments at Baton Rouge two stalks per hill twenty inches apart gave best yields on both the Bluff and Alluvial lands. In a date of planting test running from the first of April until the middle of May, April 11 gave best yields. In a plowing test in which deep, medium, and shallow depths were used there seemed to be practically no difference when measured by yields and height of plants. The deep plowing caused much more shedding of forms.
20

CORN INVESTIGATIONS

Brown-Stoneberg In the corn breeding work an effort is being made to secure a strain that is outstanding in yield of grain and which possesses, along with other desirable characters, an ear that is well covered with husks such as will give it good weevil protection. The method being used consists of selection in inbred lines followed crossing. Although hundreds of inbred families have been grown for several years and many crosses made, nothing outstanding has been secured.

Variety studies made in twelve different tests scattered over the State in 1929 showed the prolific varieties to be the best yielders. Cocke's Prolific ranked 1st, Hastings' Prolific 2nd, Whatley 3rd, and Yellow Creole 4th. Sentell's White Dent made the best record of the one-ear varieties.

In corn spacing work on fertile alluvial land with rows four feet wide, stalks twelve inches apart in the drill gave best yields.

Soy beans planted in rows of corn when corn was planted caused a reduction of 23.6% in yield of corn but a yield of 6,044 pounds of soybean hay was obtained. Placing a value of $10.00 a ton on this hay gives a total value per acre for hay and grain of $58.00, while the grain in the corn plats alone was worth only $41.90. Planting soy beans and corn in every row gave a yield of 40.7 bushels of corn, while planting the two in alternate rows gave 36.6 bushels of corn. Where beans and corn were in alternate rows the yield of hay was 324 pounds per acre more than in the other plats.

Planting corn on high beds and cultivating with a turning plow gave slightly more corn than level cultivation.

SOY BEAN INVESTIGATIONS

Gray A limited amount of soy bean breeding has been carried on by the Experiment Station each year for several years. This has resulted in the production of several strains of beans that have decided merits for Louisiana conditions. One of these strains, Biloxi-61, ranked first in production of hay in the various
variety tests conducted over the State the past season. Other selections are being made and the ones we have are being tested and purified. In the eleven variety tests made in the State in 1929, which were just mentioned, Biloxi-61 ranked first in hay production, Otootan second, Biloxi third, Tanloxi fourth, Laredo fifth, Mammoth Yellow sixth, George Washington seventh, and Illinois Ebony eighth. On account of the ravages of the soy bean caterpillar it was impossible to get reliable data on yield of seed.

Soy beans were used in different cultural experiments with corn. These have been mentioned in the corn discussion. In a rate of soy bean seeding experiments 20 pounds per acre gave 15,400 pounds of beans, green weight, 30 pounds gave 14,550 pounds, and 40 pounds gave 13,750 pounds. The corn grain weights were nearly the same on all plats. In this experiment the soy beans were planted in the rows of corn at the time the corn was planted.

SUGAR BEET INVESTIGATIONS

Brown

Ten acres of sugar beets were grown during the past season. This comprised variety and fertilizer tests on both Bluff and Alluvial lands, and about six acres planted on commercial scale. Fair to good crops were made on both types of soil but sclerotium root rot destroyed 60 or 70% of the beets on the Bluff land. The alluvial land produced about ten tons per acre. The beets on the Bluff land were allowed to stand until July so that selections might be made for rot resistance. No consistent results were obtained from any of the fertilizer or variety tests.

MISCELLANEOUS CROP WORK

A limited amount of work is being done on oats, winter cover crops, and different forage crops. Results from these experiments will be reported later.

FERTILIZER INVESTIGATIONS

Meyer

The fertilizer work under the supervision of Dr. Meyer covers technical studies of the comparative nitrogen losses from the soil of a field of soy beans and corn where the crop is turned under at
different times during the year; and the rate of aging of reverted phosphate.

In addition to the more technical work mentioned various fertilizer tests for corn and cotton are being made in different parts of the State to see what fertilizers are needed and how much may be used with profit.

A test on the comparative efficiency of various nitrogen fertilizers which has been conducted on the Bluff land soil at Baton Rouge for three years shows an average gain of 378 pounds of seed cotton per acre from use of 200 pounds of nitrate of soda. Calcium nitrate ranked second in efficiency and gave an increase of 278 pounds of seed cotton per acre. Some twelve different sources were used. Others gave less profitable returns.

One hundred pounds of nitrophoska applied as a fertilizer for cotton gave an average annual yield for a three year period of 1325 pounds of seed cotton per acre, while a home mixed having the same nitrogen, phosphoric acid and potash values gave an average yield of 1499 pounds.

One hundred pounds of calurea gave an average annual yield of 1652 pounds of seed cotton per acre, while 227 pounds of nitrate of soda, containing an equivalent amount of nitrogen, gave an average annual yield of 1713 pounds. This was for a two-year period.

In a general fertilizer experiment on Bluff land at Baton Rouge in which 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 50 pounds of muriate of potash were used as a basic fertilizer, nitrogen gave the greatest gains per unit of plant food. Consistent increases were obtained up to an application of 250 pounds of nitrate of soda. Superphosphate and potash gave less marked increases.

OUTFIELD WORK

Gray-Cotton

In the outfield fertilizer tests 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit were used as a basic fertilizer in all cases except at Calhoun, where 50 pounds of sulphate of potash were substituted for the kainit.
At Calhoun an increase in yield of about 150 pounds seed cotton was obtained from the use of superphosphate in a mixed fertilizer, about 400 pounds from nitrogen, and 250 pounds from potash; 300 pounds of superphosphate, 300 pounds of nitrate of soda, and 125 pounds of sulphate of potash gave the best results.

At Crowley phosphoric acid gave an increase of 400 pounds of seed cotton, nitrogen about 230 pounds and potash about 270 pounds. The most profitable amount of superphosphate was 600 pounds, sodium nitrate 100 pounds, and kainit 150 pounds.

At Dixie, in the Red River valley, an increase of about 200 pounds of seed cotton per acre was obtained from the use of superphosphate, 130 pounds increase from nitrate of soda, and 80 pounds from kainit; 600 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit gave most profitable returns.

At Hammond splendid increases were had from the use of all three fertilizers, 300 pounds of superphosphate, 150 pounds of nitrate of soda, and 200 pounds of kainit were the most economical.

At Homer, on North Louisiana hill land, only phosphoric acid and nitrogen gave an increase in the yield of seed cotton. This may have been due to the fact that the land used had had heavy applications of potash in former years. The use of 150 pounds of superphosphate and 250 pounds of nitrate of soda in a mixed fertilizer was the most profitable.

At Lafayette, on prairie land, the test in 1929 showed no marked increase from the use of phosphoric acid. This was probably due largely to the natural fertility of the land used. Another field in the same locality that was used a previous year gave good returns from phosphoric acid. The use of 250 pounds of nitrate of soda in a mixed fertilizer gave an increase of about 300 pounds of seed cotton in 1929.

At Monroe in the Ouachita valley, no increase in yield of cotton was obtained from the use of phosphoric acid in a mixed fertilizer. Potash gave decided increases. A fer-
tilizer mixture consisting of 300 pounds nitrate of soda and 250 pounds, gave the most economical returns.

At Natchitoches, in the Red River valley, phosphoric acid in a mixed fertilizer gave no additional yield. Nitrogen gave an increase of 222 pounds and potash 109 pounds.

Corn fertilizer tests were conducted on the Bluff Land at Baton Rouge, and on Alluvial Land at Raceland and Thibodaux. There were some gains from the use of fertilizers in nearly every case but in most instances the increase did not pay for the fertilizers used. Nitrogen gave the best returns but its use was not profitable at Baton Rouge in any instance, and not at the other places on several of the plats.
ANIMAL INDUSTRY

The experimental projects here reported in Animal Industry were begun since January 1, 1928, with the exception of the sweet potato work commenced in December, 1927. There was little available material at that time for experimental work with livestock. Since then, the following equipment has been installed.

An experimental feed house, scales and cutting chutes, on the lower beef farm, and four 50 acre pastures for beef cattle work, as planned in 1927 by Prof. E. L. Jordan, were completed early in 1928. Since January, 1929, an experimental steer feeding barn 120x25 has been built, with digestion laboratory and feed lots; a sheep barn 16x46 with two four-acre lots for work with sheep, and six experimental hog lots 50x125 equipped with water, sheds, feeding floors and self feeders. An ultra-violet mercury vapor lamp has been purchased for use in studying rickets in young pigs.

A brief report on experimental work to date is given below:

SWEET POTATOES FOR SWINE

Questions relating to the feeding of sweet potatoes to swine are of considerable interest in Louisiana on account of the large amounts of cull potatoes annually available. Sweet potatoes are particularly lacking in protein, and an important and necessary factor in successful feeding appears to be that of protein supply.

In the fall of 1927, the swine department had available a large supply of cull sweet potatoes. A preliminary experiment with tankage as a supplement showed a feeding value for cull potatoes of 30.7c per 100 pounds when fed with tankage and 14c when fed alone.

In 1928, four acres of sweet potatoes were planted especially for feeding in the field, and the field divided into two equal lots. One lot received tankage in a self feeder, and the second lot had no supplement. The tankage fed pigs produced one pound gain from 21.3 pounds of potatoes,
and one-half (.46) pound tankage. The pigs on potatoes alone required 35.7 pounds per pound gain.

In 1929, sweet potatoes and tankage were compared with sweet potatoes and soy beans, all fed in the field. Feeding was begun while the vines were still green.

Results obtained to date indicate that Lot I, fed tankage, put on one pound gain for 16.7 pounds potatoes with vines, and Lot II, fed soy beans, required 20.4 pounds potatoes with vines for one pound gain.

VITAMIN STUDIES WITH SWINE

To study a possible vitamin deficiency in young pigs in winter and early spring, a series of experiments has been planned to investigate the problem with possible methods of prevention or cure.

A preliminary test was made in the spring of 1929 on the value of cod-liver oil in a fattening ration (about 3%). The lot receiving a small amount of cod-liver oil (5% of the supplemental mixture) gained 1.56 pounds per day at 8.5c per pound gain. Those getting no cod-liver oil gained 1.38 pounds per day at 8.7c cost per pound. Measurements of both lots showed a slight increase in size in favor of cod-liver oil. This test will be repeated in 1930.

An experiment just beginning will test various methods of treating brood sows previous to farrowing. Treatment with cod-liver oil and ultra-violet light will be used on both sows and young pigs. The effects of green feed, sunlight, and mineral supplements will be included later.

PROTEIN SUPPLEMENTS FOR SWINE

The object of this series is to compare various Louisiana protein feeds for swine with standard digester tankage, and to discover some of the best and cheapest local combinations of proteins for swine.

A preliminary experiment was conducted in 1928 with the following supplements. The basal ration in each case was corn—three parts and rice polish one part.
<table>
<thead>
<tr>
<th>Lot No.</th>
<th>PROTEIN SUPPLEMENT</th>
<th>Gain Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Swift’s digester tankage</td>
<td>1.8 lb.</td>
</tr>
<tr>
<td>2</td>
<td>Shrimp meal</td>
<td>1.75</td>
</tr>
<tr>
<td>3</td>
<td>Tankage 3, Soybeans 1, Alfalfa 1, Cottonseed meal 1</td>
<td>1.67</td>
</tr>
<tr>
<td>4</td>
<td>Shrimp bran 3, Soy beans 1, Alfalfa 1, Cottonseed meal 1</td>
<td>1.88</td>
</tr>
<tr>
<td>5</td>
<td>Rapides cracklings tankage</td>
<td>1.88</td>
</tr>
</tbody>
</table>

The differences were not very marked, and might have been due in part to variation in individual pigs. It seemed evident, however, that the shrimp bran was improved by mixing with other proteins.

**FATTENING CATTLE WITH GRAIN ON PASTURE**

**Bray**

This experiment was planned primarily to determine whether grain feeding on pasture could be made profitable, and secondarily to test the effect of such feeding on the quality of meat.

Comparison of Grain Feeding with Pasture Only—1928 (Average)

<table>
<thead>
<tr>
<th></th>
<th>LOT I Grain and Pasture</th>
<th>LOT II Pasture Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days on feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial wt. Feb. 22</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>Final wt. Oct. 17</td>
<td>415</td>
<td>402</td>
</tr>
<tr>
<td>Gain per day</td>
<td>791</td>
<td>620</td>
</tr>
<tr>
<td>Initial value @ 8c per lb.</td>
<td>$33.20</td>
<td>$32.16</td>
</tr>
<tr>
<td>Sale weight—St. Louis</td>
<td>$726.1</td>
<td>$562.2</td>
</tr>
<tr>
<td>Sale price per 100 pounds</td>
<td>$10.68</td>
<td>$8.75</td>
</tr>
<tr>
<td>Value at St. Louis</td>
<td>$77.57</td>
<td>$49.19</td>
</tr>
<tr>
<td>Selling cost (freight—commission)</td>
<td>$6.17</td>
<td>$4.78</td>
</tr>
<tr>
<td>Feed cost</td>
<td>$24.11</td>
<td>$1.18</td>
</tr>
<tr>
<td>Charge for pasture</td>
<td>$3.00</td>
<td>$5.00 out</td>
</tr>
<tr>
<td>Charge for labor</td>
<td>$3.00</td>
<td></td>
</tr>
<tr>
<td>Net return</td>
<td>$8.09</td>
<td>$7.25</td>
</tr>
</tbody>
</table>

The market was very low when these cattle were sold, and the returns were unsatisfactory. Returns on Lot I were especially low compared to the grade placed on the carcasses. Due to this low price, the grain feeding showed no appreciable advantage.
SECOND EXPERIMENT—1929

In 1929, twenty two-year-old steers were used; with one lot of yearlings from the University herd fed for comparison. The ration fed was five pounds brewer’s rice and 1.5 pounds cottonseed meal per day.

Summary of Results—1929 (Average)

<table>
<thead>
<tr>
<th></th>
<th>LOT I</th>
<th>LOT II</th>
<th>LOT III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-year old</td>
<td>2-year old</td>
<td>1-year old</td>
</tr>
<tr>
<td></td>
<td>Grain and</td>
<td>Pasture Only</td>
<td>Grain Pasture</td>
</tr>
<tr>
<td>Days on feed</td>
<td>112</td>
<td>112</td>
<td>112</td>
</tr>
<tr>
<td>Initial weight</td>
<td>570.3</td>
<td>573.8</td>
<td>514.7</td>
</tr>
<tr>
<td>Final weight, July 12</td>
<td>818.7</td>
<td>757.3</td>
<td>769.4</td>
</tr>
<tr>
<td>Gain per day</td>
<td>2.2</td>
<td>1.64</td>
<td>2.2</td>
</tr>
<tr>
<td>Initial value @ 11c per lb</td>
<td>$62.73</td>
<td>$63.12</td>
<td>$56.61</td>
</tr>
<tr>
<td>Sale weight New Orleans</td>
<td>777.5*</td>
<td>713.5*</td>
<td>710.0</td>
</tr>
<tr>
<td>Sale price per 100 lbs</td>
<td>$11.94</td>
<td>$9.89</td>
<td>$13.00</td>
</tr>
<tr>
<td>Sale value per head</td>
<td>$92.72</td>
<td>$70.59</td>
<td>$92.41</td>
</tr>
<tr>
<td>Selling cost</td>
<td>$2.50</td>
<td>$2.50</td>
<td>$2.50</td>
</tr>
<tr>
<td>Cost of grain feed</td>
<td>$14.95</td>
<td>$14.70</td>
<td>$14.70</td>
</tr>
<tr>
<td>Est. labor cost</td>
<td>$3.00</td>
<td>$3.00</td>
<td>$3.00</td>
</tr>
<tr>
<td>Charge for pasture</td>
<td>$3.00</td>
<td>$4.00</td>
<td>$3.00</td>
</tr>
<tr>
<td>Profit per head</td>
<td>$6.54</td>
<td>$ .97</td>
<td>$12.59</td>
</tr>
</tbody>
</table>

*Pounds.

The results of this test were considered very satisfactory for pasture feeding.

BRAHMAN CATTLE IN LOUISIANA

A comparison is being made on beef calves by a Hereford sire, and calves by a Brahman sire, out of native and grade Louisiana cows. Two equal groups of cows, twenty-five in each, were bred in 1928, one to each sire, and the calves weighed at regular intervals during the summer of 1929.

On July 15, the Brahman calves weighed 285 pounds, as compared to 232 pounds for the Hereford calves, a difference of 62 pounds. The Hereford calves were valued on this date at 11½c per pound as compared to 11c for the Brahman. On this basis, the Brahman calves were worth $31.35 per head compared to $25.65 for Herefords.
Six Brahman heifers are being retained for further comparison and for crossbreeding. A comparison with six Hereford grade heifers of similar age shows that the Brahman heifers are gradually losing their difference in weight over the Herefords. They being only 30 pounds heavier than the Herefords in December, as compared to 53 pounds heavier in July.

The results to date would indicate that the Brahman cross is very satisfactory for producing calves for market. Whether this advantage is maintained at later ages remains to be proved.

VELVET BEANS FOR WINTERING CALVES

A preliminary study of velvet beans for beef calves was made during the winter of 1928-29. Thirty-one calves were put on 24 acres of corn stalks and velvet beans from November 15, 1928, to February 11, 1929. Gains produced were 93 pounds per head, or 1.06 pounds per day. Estimating the value of the velvet beans at 12c per pound for each pound of beef produced, the value of the beans was $13.92 per acre in addition to 15 bushels of corn per acre. The velvet bean crop was not as heavy as is often produced in this section. The work is being continued this year.

MOLASSES FOR FATTENING CATTLE

A new experimental feeding barn 120'x25' with feeds lots adjoining was erected this summer for experimental work in fattening cattle. This will take care of four test lots of ten steers each, and in addition contains a 24'x25' laboratory for digestion trials, with a basement 18'x25'.

Forty yearling steers were purchased in October, and placed on feed November 23. The following rations are being fed:

Lot I. Corn, cottonseed meal, hay
Lot II. Corn, cottonseed meal, molasses, hay
Lot III. Corn, cottonseed meal, corn and soy bean silage, hay
Lot IV. Corn, cottonseed meal, silage, molasses, hay.
LAMB PRODUCTION

To investigate types of lambs and methods of producing lambs for market in Louisiana, an experiment has been started comparing Hampshire and Southdown rams on native Louisiana ewes. A sheep shed 16'x46' was built during the summer and an eight acre dog proof corral is being completed. Breeding will be begun in June for fall lambs.

MOLASSES FOR WORK MULES

In cooperation with W. G. Taggart of the Sugar Station, investigations were begun this summer dealing with the use of blackstrap molasses in the ration of mules on the experimental sugar farm. A preliminary test was made during the past summer (1929). The molasses-soy bean hay ration cost 19c per day as compared to 41c for corn and soy bean hay. The molasses fed mules did not consume as much feed, and did not hold up as well in hot weather, showing that molasses alone is not satisfactory as the only concentrate for work mules.

Much credit for work done during the past two years must be given to Professor J. B. Francioni, Jr., and Dr. M. G. Snell in the Animal Industry Department. Neither of these men was officially on the Experiment Station staff until July 1, 1929, but each has nevertheless carried on considerable experimental work in addition to his other duties. Prof. Francioni has had immediate supervision of the experimental work with swine, and Dr. Snell is in the molasses feeding work and the work with sheep.
Several cases of anaplasmosis developed in the beef cattle herd during the month of October, 1927. The mortality rate was 50%. Four animals survived the attack and were isolated from the rest of the herd. One animal has been retained for experimental purposes and is still a carrier of the disease. Marginal bodies may be found on the red blood corpuscles and blood transfusions have produced the disease in susceptible animals with an incubation period of nineteen days.

From a limited number of preliminary fly transmission tests the results seem to indicate that infection may be transmitted from an infected animal to a susceptible one through the interrupted feeding of the large black horse fly, Tabanus atratus.

Isolation of carriers of the disease seems to be the best known method of control. This plan has given excellent results on the University farm as the disease has not re-occurred in the herd since the original outbreak.

**BLINDNESS IN CHICKENS**

Blindness in chickens is prevalent throughout the state of Louisiana. In some flocks as high as ten per cent of the chickens have suffered from the condition. From a study of blindness in more than fifty cases results seem to indicate the condition is not associated with paralysis. A blind chicken may become paralyzed through malnutrition. A blind chicken may live to old age if given proper care and attention. Attempts to transmit the disease by contact proved negative.

Post-mortem examination of blind chickens showed 70% of cases to be infected with coccidiosis, 50% with round worms, 55% with tapeworms, 20% with capallaria. No infectious diseases were found.

As the cause of blindness and method of transmission are not definitely known, it is recommended that the general laws of sanitation be practiced in attempting to control the disease.
THE PRODUCTION OF ALCOHOL FROM CANE BAGASSE

The investigation of the possibilities of recovering the residual sugars in bagasse, by a fermentation process, which was begun in 1927, was continued through 1928 and 1929. The object of the investigation was to determine if the keeping qualities of bagasse could be so improved by the removal of its sugars by fermentation that its deterioration in storage could be entirely prevented or greatly reduced. The results showed that bagasse has a value of from three to six dollars per ton, as a source of alcohol, when used in conjunction with final molasses in the process of fermentation commonly employed in molasses distilleries. However, by using bagasse, much more concentrated mixtures of molasses may be fermented efficiently, and calculated on the increase yields of alcohol, the bagasse under these conditions would have a value of from twelve to fourteen dollars per ton, merely as an aid to fermentation. The spent bagasse would have lost none of its value for fibre board manufacture, for which purpose it could be employed as well as before. While the spent bagasse was found to be still susceptible to deterioration in storage, it could be rendered entirely insusceptible to such changes by subjecting it to a subsequent acetic fermentation.

THE ACCELERATING EFFECT OF INERT SUBSTANCES UPON THE ALCOHOLIC FERMENTATION OF MOLASSES

The accelerating effect of bagasse upon the rate of fermentation of molasses, suggested a more comprehensive study of the underlying causes of this action. An investigation was therefore carried out in which various finely divided substances were tested, and their effect upon the alcoholic fermentation of molasses observed.

THE EFFECT OF TURNING UNDER CANE TRASH UPON THE AVAILABLE NITROGEN OF THE SOIL

This investigation which was begun several years ago, has been very actively prosecuted during the period covered
by this report. The following are the most important facts that have been developed by our investigation. (1) The addition of fresh cane trash to soils results in a very rapid and pronounced depression of soil nitrates. This decrease in nitrates is more often than otherwise accompanied by slight gains in total nitrogen, which indicate that the nitrates are merely transformed into organic nitrogen rather than lost through denitrifying changes. (3) The depressing effect of fresh trash is rather quickly lost and after it has been in contact with the soil for several months it causes a much more gradual immobilization of available nitrogen. (4) The addition of trash which has been in contact with soil for several months, and partially decomposed, to pots planted to corn, gave an increased rate of growth and an increased total yield of dry matter in the plants. (5) The addition of cane trash to soils increases their water holding capacity and decreases their rate of drying, indicating that in periods of drought or insufficient rain fall the presence of trash might be of material benefit to plant growth.
DAIRYING
R. H. Lush

Research work in dairying was started in July, 1929, and this report can only outline the different projects and investigational work started.

FEEDING INVESTIGATIONS

1. Grain as a Supplement to Pasture.

Good pastures aid greatly in maintaining milk production at a low cost. Preliminary investigations indicate that dairy cows of the University herd producing a pound of butterfat per day received over 60 percent of their nutrients from pasture over a period of eight months. To determine then the production possible from pasture and the proper amount of grain to add for most economical milk production, three groups of nine cows each are being fed on pasture or roughage alone, roughage plus limited grain or roughage plus a normal amount of grain. Wire cages are being constructed to determine the amount and composition of grass produced by the pastures in which the cows graze.

2. Rotation System of Grazing.

In order to determine the most profitable use of pasture in milk production, it is planned to alternate one group of cows between two small pastures as compared to another group grazing continuously on the same acreage of pasture.

3. A comparison of the Continuous Feeding of Cottonseed Meal and Soy Bean Oil Meal on Growth and Milk Production.

In view of recent developments in the field of animal nutrition, it appears desirable to test the supplementary effect of protein feeds over a long period of time. As cottonseed meal is readily available and because of the increased interest in soy bean production, these two products are being compared. Two groups of Holstein heifers are fed a succulent roughage, yellow cornmeal and either cotton-
seed meal or soybean oil meal with a mineral supplement of ground oyster shells. This comparison will be continued throughout one lactation period with a reversal of rations for the second period. Growth and milk production will measure the value of the two protein supplements but it is planned that this project shall also give some information on the value of hay in the dairy ration.

4. Effect of Crop Grown and Soil Treatment on Milk Production.

This project has been started at the North Louisiana Experiment Station to measure the value in terms of milk production of various pasture crops. Rye and vetch, oats, and Sudan grass will be grazed as supplementary pasture crops. A native pasture has been divided and seeded with a grass mixture for studying the effect of lime, lime plus manure, manure alone and no treatment. By developing a year round pasture system and gathering data on the milk produced per acre by various crops and treatments, it is felt that the results will be of considerable value to the dairy farmers of North Louisiana in reducing costs of production.

5. Methods and Cost of Raising Dairy Calves and Heifers.

A study of the amount of milk and feed fed to heifer calves in the dairy herd is being made and continued until calving date. A preliminary study of 8 calves shows an average of 1086 pounds whole milk and 1363 pounds skim milk consumed in 239 days, 422 pounds grain, 319 pounds hay and 772 pounds silage to one year of age. This represents an average feed cost of $65.24. In an effort to reduce this cost, part of the calves are changed to skim milk at an early age and fed a grain ration containing 20 percent skim milk powder. The amount of skim milk is reduced as more grain is consumed. Weights and height at withers are maintained to study the growth made. This project should give valuable information on the cost of replacing cows in herds where whole milk is sold.
OTHER INVESTIGATIONS


Ten grade Jerseys were purchased for this project at the North Louisiana Experiment Station. A model dairy barn with room for 10 cows, a feed room and milk room with cooling system have been completed. A hay and shelter shed and a calf shed have been provided. A good Jersey bull is being mated to these cows and each heifer calf will later be given the same opportunity for production on home grown feeds as its mother now receives. It is planned that this project shall also serve as a demonstration of the importance of liberal feeding of home grown feeds and proper care of dairy cattle and milk products.

Other work not included in projects is a study of feed costs and pasture returns in milk production, daughter and dam comparisons of records, weights and gains of dairy cattle on pasture, feed costs of dairy sires and effect of certain fertilizers on pastures.
A number of tests of paradichlorobenzene ("P. D. B."), have been made in corn cribs and small bins, to find out if this material could be used for grain fumigation, in place of carbon-bisulphide ("high life"). A dosage of 20 pounds of the P. D. B. per 1,000 cubic feet of space killed the corn weevils as well as a 15-pound treatment with carbon bisulphide, and the protection lasted longer, but an objectionable flavor was imparted to the grain, and this flavor was pronounced in eggs from hens fed fumigated corn, and in milk from cows receiving this corn in the ration. Experiments with smaller dosages of P. D. B., and with other fumigants, are in progress.

In testing insecticidal materials for borer control, more than fifty brands, modifications or mixtures of silicofluoride dusts have been tested. Among them have been found several giving a substantially higher borer larval mortality than was obtained at the same time from "Jungmann's Extra Light with 10% hydrated lime" which, up to that time, was the dust used most extensively. The burning of cane foliage was not a serious matter in any of these tests.

In trash disposal tests at Cinclare in 1929 the plats burned over thoroughly showed only 17% of borer larvae alive during the first week of March, while plats with trash partially burned showed 52% and those with trash left on the surface of the ground showed 50%.

In a test of the value of using "borer-free" seed at Cinclare, the borer infected seed plat showed in August only 86% of the stand of cane that occurred in the "borer-free" plat.

The 1928 and 1929 work on this project has included a study of the relations of weather, parasites and predators to the control of the sugarcane borer. The predator of most
importance (*Chauliognathus*, a soldier beetle) searches for borer larvae in their burrows, and eats them. Experiments with *Trichogramma Minutum* have shown that this beneficial parasite can be kept over winter in our laboratory, and subsequently can be increased there in great numbers for distribution in sugarcane fields. The Experiment Station reared more than sixteen million *Trichogrammas* in 1928, and a larger number in 1929; the colonizations were made in fields ordinarily severely infested with borers (“front cuts”), and checked the activity of this pest, and a good crop of cane was obtained.

**SOIL ANIMALS ATTACKING SUGAR CANE ROOTS**

An investigation of the soil animals associated with the condition known as “Root-rot” or “Growth Failure” of sugar cane. Field surveys have brought to light a number of species of animals, mostly insects, which live among the sugar cane roots. Most of the species are harmless or beneficial; but laboratory, greenhouse and field experiments have shown that the springtails “*Lepidocyrtus* and *Onychirus* and the *Symphylid Symphylella* “pit” sugar cane roots, eat off the lateral feeding root-branches, and attack the “eyes” of planted cane.

In controlled experiments in the field, the soil animals mentioned above have reduced top growth fourteen percent, have reduced cane weight eighteen per cent, and have slightly lowered the sucrose percentage.

In cooperation with the Plant Pathology Department, large-scale field tests are in progress with the soil animals and soil fungi.
Among recent developments of the Experiment Station is the establishment of the Department of Farm Management. This department is at present devoting attention to research in the economy of farm organization and operation. Two major types of farming, those of rice and sugar cane, are covered in projects outlined for this year and now in the process of execution.

For these studies emphasis is placed upon crop and livestock enterprise combinations, management practices, and their relation to farm returns. Special details concerning individual practices in handling the major enterprises have an important place in this work. It is realized that such studies are successful only to the extent that the individual farmer may improve his organization through the aid of such information. Details of individual farm business practices are being secured in order to determine the most profitable system for an individual farm.

Another significant phase of the studies is that relating to the use of mechanical power and its effect upon changes in farm organization and the management practices.

The problem of mechanical power utilization is being studied in order to determine the adequacy of present types of such power in use, efficiency and capacity of these types, operating costs and causes of variations, and men and workstock displacement.

It is the aim in the research work of this Department, when studying different types of farming and different sizes of farms of a given type, to secure data which will enable individual managers to so organize and operate their business that the highest net income may be secured from the resources at their command. Economy of production and a maximum net return is the goal of achievement.

**THE AGRICULTURAL CREDIT SITUATION IN LOUISIANA**

*Purpose of Project:* To make a cross section analysis of the agricultural credit situation in Louisiana based on 1928 operations, to determine the following:
(1) The factors affecting the agricultural credit needs of the State;
(2) To what extent these needs are met;
(3) Agencies supplying credit to Louisiana farmers;
(4) The conditions of credit as to term, costs, uses, and security required;
(5) Recent changes that have taken place with respect to agricultural credit;
(6) Methods and proper procedure for further study of the problems of rural credits in Louisiana.

Results of the Study:

(1) Types of farming, racial differences and financial status of individual farmers affect the credit needs of the different rural sections of Louisiana.

(1) Economic conditions in Louisiana farm communities would be improved if all credit institutions were to abolish the practice of granting credit without proper security.

(3) While the existing institutions are supplying ample credit to farmers who are in a position to obtain credit, there are many farmers who are unable to negotiate loans and this condition, in cases, is brought about by circumstances over which the farmer has no control. Therefore in small communities where farmers are predominantly tenants and small owner-operators, credit unions organized under the Act of 1924, may be advantageous.

(4) Small inefficient national farm loan associations can be consolidated to an advantage, where it is possible, and competent secretary-treasurers employed.

(5) Merchant credit as supplied at present is too expensive and wherever conditions are suitable, farmers will find it advantageous to borrow cash from the bank or some other lending institution at the going rate of interest and eliminate store credit.

(6) Apparently there is a distinct place for more agricultural credit corporations in the State and farmers can take advantage of this source of intermediate credit at reasonable rates of interest by a closer cooperation among themselves and between farmers and financial agencies.
(7) Farmers will find it advantageous to insist upon a closer cooperation between bankers, extension workers and themselves, so that information and advice from the different agencies working with the farm group may be best available.

(8) Apparently loans are properly timed in the different areas of the State to meet the time requirements. Long term loans and short term loans seem to be adequate, for those who are able to get credit.

(9) A number of non-specialized lending agencies are getting out of the field of mortgage loans and the Federal Land Bank is becoming more important.

This study has brought out the importance of further study which should include such projects as:

(1) A detailed study of agricultural credit corporations in the State with the view of discovering their place in the credit system in different farming areas of Louisiana.

(2) The causes underlying farm foreclosures in Louisiana.

(3) Credit as a factor influencing land utilization in the cut-over pine lands of Louisiana.

(4) A detailed study of how credit can change the tide of tenancy in the State and help the landless farmers to become owners of the land they cultivate.

(5) Factors affecting the efficiency of credit institutions and their effect on Louisiana’s agriculture.
HORTICULTURAL DEPARTMENT
JULIAN C. MILLER

Since the horticulture investigational work was just started in August, 1929, there will be no data presented in the Annual Report of this year. However, a brief outline of the projects started will be given.

A. VEGETABLES

1. CABBAGE BREEDING

Since cabbage is one of the leading truck crops and since considerable loss occurs each year from premature seeding, a project has been outlined to study the mode of inheritance of this particular character. Efforts will also be directed to breeding strains which are resistant to premature seeding and which are also resistant to cold.

2. SELECTION AND BREEDING OF THE CREOLE ONION AND OTHER BULB CROPS

At present, practically all the work on this project will be devoted to the improvement of the Creole onion through breeding and selection. Due to the variability of this onion as to size, shape and date of maturity the demand for Louisiana onions has been on the decline; also it has been hard to find enough good seed for interested onion growers to plant. It is hoped through breeding that a pure strain of Creole onion may be obtained.

Other phases of onion work are also being considered, especially variety and strain tests; also planting distances.

3. SELECTION AND BREEDING OF CAYENNE, SPORT AND TABASCO PEPPERS

The pepper growers around New Iberia and St. Martinsville find it almost impossible to obtain pure strains of the above named peppers. They have called upon the Experiment Station to breed pure strains of these so that they may be able to obtain pure seed. Tabasco pepper wilt has caused considerable losses and efforts will be made to breed resistant strains of this variety.
4. LEGUMES AS A SOIL BUILDER FOR TRUCK CROPS

With the increased acreage planted to truck crops and with the decrease of horses, sources of manure are inadequate to supply the necessary humus to keep up production. It is, therefore, the purpose of this experiment to conduct trials with some of the leading legumes in rotation with truck crops to secure data as to their relative economic value. Comparisons will be made with stable manure alone and with plats receiving neither legumes nor manure.

5. IRISH POTATO INVESTIGATIONS

The following experiments have been outlined:

a. To determine the most desirable percentage of phosphorus, nitrogen and potash.

b. To determine rate of application of complete fertilizers, varying from 2,000 to 400 pounds.

c. Comparisons of nitrophoska 1, 2 and 3 with other standard fertilizers.

d. To determine the effect of ethylene chlorohydrin as a chemical for breaking the rest period in new and old potatoes.

e. To determine the most economic size of seed pieces under Louisiana conditions.

f. To determine the best planting distances in the row.

g. Sources of commercial seed potatoes.

h. Cooperating with the northern Experiment Station in testing new strains of Triumph seed potatoes.

All experiments with potatoes will be conducted both at Houma and at the University Experiment Station.

6. SWEET POTATO INVESTIGATIONS

a. To determine the best percentage of the individual elements, phosphorus, nitrogen and potash.

b. To determine the best rate of application of complete fertilizers.

c. Strain tests of Porto Rican variety to determine the sources of some of the leading strains of the Porto Rican; also the Yellow Jersey and Priestly Jerseys will be tested.
d. To determine the best planting distances for Louisiana conditions.
e. To study the frequency of vegetative mutations occurring with the Porto Rican variety; also the growth performance of various strains of Porto Rican that have already been isolated by means of vegetative mutations.

7. BEAN CROP INVESTIGATIONS

With string beans the following experiments will be conducted:

a. To determine the most economical rate of application, both from the standpoint of truck crop and canning crop, of complete fertilizers.
b. To determine the most desirable percentage of the individual elements, nitrogen, phosphorus and potash.
c. To determine the best planting distances both with the drill and hill method.
d. To conduct variety and strain trials. Comparisons will be made between certified and non-certified bean seed.

8. VARIETY AND STRAIN TESTS

Variety and strain tests will be conducted with most of the leading truck crops, especially beets, carrots, sweet corn, sweet peppers, and other truck crops as will be found desirable.

B. FRUIT

1. ORANGES

A small Satsuma orange grove has been planted and a fertilizer experiment will be outlined to determine the effect of the rate of application of the various elements and rates of application of complete fertilizers. This grove will also be used for conducting spray tests and other experiments to improve the cultivation practices of the Satsuma orange industry.

2. PECANS

For the purpose of determining the best varieties for this particular section of the State a grove has been planted. This grove will also be used for conducting fertilizer ex-
periments and spraying tests for the control of insects and diseases.

3. SUMMER APPELS

An experiment has been started with summer apples at the North Louisiana Experiment Station and partly supplemented at the Louisiana Experiment Station at Baton Rouge; primarily for the purpose of determining, if possible, the advisability of growing early summer apples, especially in North Louisiana. The leading varieties of summer apples have been planted, and the orchard will be handled as a commercial orchard.

CO-OPERATIVE WORK WITH IRISH POTATOES

An arrangement was made last summer by which the Bureau of Plant Industry, the Louisiana Experiment Station and Terrebonne Parish would carry on investigations with Irish potatoes. The Bureau of Plant Industry is interested in testing new strains of potatoes that have been developed in Northern states. The Experiment Station and the parish are cooperating in this work. The Station is interested not only in the testing of new strains but in fertilizer tests, tests of cultural methods and in testing potatoes from different states. All of this work has been started this spring.

Terrebonne Parish is one of the largest producers of beans in the State. Arrangements have been made to do some work on testing varieties of beans and also fertilizer tests for beans.
THE ANTI-RACHITIC EFFECT OF ACIDOPHILUS MILK

A study is being made to determine whether or not acidophilus milk has any greater preventative or curative effect on rickets than milk which is not inoculated. The results are, at the present time, inconclusive.

HOME CANNING OF MEAT UNDER CONDITIONS IN LOUISIANA

The project in home canning of meat was planned to obtain a comparison of the keeping qualities of meats canned in glass jars and in tin cans, meats stored in a warm room and those stored in a basement, and meats processed under 15 pounds pressure for 45 and for 60 minutes with those processed in the boiling water both for 3 and for 4 hours.

192 No. 2 tin cans with composition gaskets and 203 pint glass mason jars with new rubber rings and zinc caps were used to can 395 pounds of beef and pork. The meat was from animals that had been killed less than 24 hours. The cans and jars were stored 7 to 8 months, including the summer months.

No spoilage which was attributed to underprocessing occurred in any of the jars or cans. No imperfect seals or leaks were found in the glass jars. No rubber rings had deteriorated to break the seal. The spoilage due to leaks in tin cans occurred for the most part in those stored in the basement and in those that had been held for the longest processing period. In part, this was due to the dampness of the basement causing pin hole perforations from rust. The explanation for leaks occurring more often in the 60 minute process is being sought.

The experiment will be repeated, using paper gaskets instead of composition gaskets in the tin cans and using a drier basement for the cool storage.

Although the meat processed in the boiling water bath showed no spoilage which was due to underprocessing, we do not, at the present time, recommend this method for use in Louisiana due to the possibility of botulism poisoning.
POULTRY

CONFINEMENT OF CHICKENS

The matter of sanitation with poultry is of paramount importance in Louisiana. One phase of this problem is being given careful attention in a study just started to find out the advantages and disadvantages of rearing chicks in confinement and keeping laying hens and breeding hens in confinement. Confinement, in this sense, means keeping the chickens entirely off the ground. Preliminary results of this study will be given next year.

SIMPLE VS. COMPLEX RATIONS—SHRIMP BRAN AS A PROTEIN FEED FOR LAYING HENS

Two other problems are being studied for the first time this year. The use of shrimp bran as a protein supplement for laying hens is being determined. Shrimp bran is manufactured by a number of companies in Louisiana and is available at reasonable prices. If it proves to be a suitable feed, it should reduce, materially, the cost of the laying ration.

Farm poultry raisers often feel that rations recommended by state universities contain too many ingredients. To be able to definitely answer this question feeding tests are being conducted using simple rations (few ingredients) and complex rations (larger variety of ingredients). No results are, as yet, available.

RICE BY-PRODUCTS IN THE LAYING RATION

Louisiana produces about one-half the rice grown in the United States. This causes rice bran, rice polish, and brewer's rice to be available for feed at reasonable prices. For the past two years experiments have been conducted at Louisiana State University to determine the value of these rice products as feed for laying hens. The tests are being continued, but the results so far indicate that rice products are good feed for laying hens. Those rations which contained from 10% to 30% rice products gave as good results, and in some in-
stances better results, than did the standard ration (containing no rice products) which was used as a check pen. Although not conclusive proof, these results do strongly indicate that Louisiana poultrymen can economically replace some of the other grain products in the laying ration with rice products.

RICE BY-PRODUCTS FOR CHICKS

In experiments conducted last spring rice by-products were used in the rations of growing chicks. Coccidiosis caused the test to be terminated when the chicks were six weeks old, but up to that age, the chickens fed rations containing rice bran, rice polish, and brewer's rice in various combinations grew as rapidly as did those fed a standard chick ration, except in one case in which practically one-half of the ration was rice products. These tests indicate that rice products can be used successfully in chick rations if not fed too heavily, (probably not over 30% of the entire ration).

THE EFFECTS OF HIGH AND LOW EGG PRODUCTION ON HATCHABILITY OF THE EGGS

Many poultry keepers believe that if a hen lays many eggs prior to the hatching season, the eggs will not hatch so well, nor will the chicks be as vigorous as if the hen “rests” before the breeding season. This problem has been studied this past year, and this work will be continued for several years before definite conclusions are drawn. The first year’s work gave the following results. The number of eggs laid previous to the breeding season did not materially affect the fertility of the eggs. For the hens considered, the number of eggs laid prior to hatching time did not materially affect how well the eggs hatched, how rapidly the chicks grew, nor what percentage of the chicks lived.

STORAGE OF LOUISIANA EGGS

For the past three years, the poultry department of Louisiana State University has cooperated with Swift & Company at New Orleans on the problem of cold storage of Louisiana eggs. The
trade has discriminated against southern eggs for storage purposes, maintaining that excessive shrinkage occurs and further objecting to the frequent occurrence of "olive yolked" or "grass" eggs. Some dealers have gone so far as to state that southern eggs cannot be successfully stored. The results of the experiment for the past three years refute this statement, as Louisiana eggs have been successfully stored for the past three seasons. It must be remembered, however, that only high quality, fresh Louisiana eggs have been stored. Any eggs to be successfully stored must be fresh and carefully handled before storing. No new causes of olive yolked eggs have been found, but it appears that causes exist other than those previously recognized. Observations have shown that methods of managing the flocks and the eggs, (prior to placing them in storage) greatly affect the actual loss and loss in quality of all eggs. The percentage shrink of Louisiana eggs was found to be no greater than that of eggs from other sections of the U. S. These tests demonstrate that Louisiana eggs can be successfully stored if the flocks are well cared for and the eggs properly cared for and stored while fresh.
The purpose of this project is to study coccidiosis in fowls. The work was started on September 1, 1929, using S. C. White Leghorn chicks. They were kept under screen and on hardware cloth, and fed from the same feed. The inoculations were made individually with a medicine dropper. The results thus far are concerned with the cycle of the organisms and the effects on the chickens.

The time required for the oocysts to reach the infective stage varies from 19 to 28 hours. Twelve cultures have been accurately studied and it has been observed that if sporulation occurs it usually occurs within 24 hours. Three inoculation experiments were carried out to test out the infective properties of cultures 19, 20.5, and 24.5 hours old. Positive results were obtained in all three with the result that a total of ten chickens became definitely infected. One chicken in each experiment in which the cultures 19 and 20.5 hours old were used developed hemorrhage. Twenty uninoculated chickens kept in the same brooder with part of these and fed the same feed remained free. Hemorrhage occurs on the 5th or 6th days.

In studying the length of time chickens remain infected, it was found that in 37 chickens surviving a number of inoculations one was infected 62 days after hemorrhage had occurred, while 3 were negative after 24 days, 2 of the 3 having had hemorrhage. That reinfection had not occurred is indicated by the fact that 17 which were negative on April 24th were still negative on June 21st, and of the 20 that were positive on April 24th, 19 had become negative on June 31st.

Results of infection upon the weights of infected chickens show that there is usually a failure to gain after infection. Of the chickens surviving a number of inoculations, 17 are females and 22 males. Of the females, 8 had been lightly infected and 9 heavily infected. Of the males, 12
had been lightly infected and 10 heavily infected. The degree of infection was based on the occurrence of hemorrhage and the relative number of oocysts observed in the feces. The average weights of the heavily infected males were nearly 15% less than those of the lightly infected, while the average weights of the heavily infected females were a little over 12% less than the lightly infected at 16 weeks of age. Infection occurred during the 8th and 9th week. Individual chickens usually fail to increase in weight and frequently show considerable loss during the second week after inoculation.
The two wilt resistant tomato varieties, Louisiana Red and Louisiana Pink, which have been developed in Louisiana have been continued and further selections made. Seed of these varieties has been sent from time to time to California where seed has been grown for southern seedsmen.

The value of these two varieties on wilt-infested soil is shown by a variety test which was conducted at Baton Rouge in 1929. The results are given in the following table:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Average No. plants per plat</th>
<th>Average wt. fruit in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norton</td>
<td>45</td>
<td>74.1</td>
</tr>
<tr>
<td>Louisiana Pink</td>
<td>45</td>
<td>136.1</td>
</tr>
<tr>
<td>Earliana</td>
<td>45</td>
<td>71.6</td>
</tr>
<tr>
<td>Kanora</td>
<td>43</td>
<td>94.3</td>
</tr>
<tr>
<td>Marglobe</td>
<td>42</td>
<td>86.1</td>
</tr>
<tr>
<td>Stone</td>
<td>42</td>
<td>51.4</td>
</tr>
<tr>
<td>Louisiana Red</td>
<td>45</td>
<td>140.4</td>
</tr>
</tbody>
</table>

The Sclerotium wilt disease is one of the limiting factors in the growing of sugar beets in Louisiana. If sugar beets are allowed to remain in the field after warm weather begins, losses as a result of the beets rotting may run as high as fifty to seventy-five percent. The addition of lime in large quantities to the soil has failed to reduce the injury although it is known that the parasite prefers an acid soil. As far as tried, fertilizers have no material effect on the severity of the disease.

Investigations carried on over a period of years have shown that it is possible to select strains of certain of the cane varieties which show con-
siderable tolerance to the mosaic disease. Tolerant strains of D 74 and Purple have been grown for a number of years. In 1929, plots of selected D 74 produced at the rate of 23.6 tons per acre, while plots from unselected cane made only 17.3 tons. These yields were very satisfactory considering that the plots were badly affected with seepage water in the spring. In 1928, plots of selected D 74 made as high as 36 tons per acre. This work is now being enlarged to include some of the POJ canes.

In 1929, tests were conducted to determine the effect of mosaic on some of the commercial cane varieties. Replicated plots were planted with mosaic and mosaic-free seed cane of the varieties, Striped, POJ 36, POJ 36 M, and POJ 234. As plant cane, no significant differences were noticed between the plots of the POJ varieties planted with healthy and diseased seed.

2. RED ROT STUDIES

The red rot disease which is quite destructive to certain cane varieties has been found commonly attacking the leaf midribs of certain varieties. To determine whether the leaf parasite is identical with the one found in the stem, a great many different leaf cultures have been obtained. Stalk inoculations have also been made with one of these cultures. This culture was found to be more parasitic on Co 281, CP 177, CP 807, POJ 36 and POJ 36 M than on Purple, a variety which is known to be very susceptible to red rot. Inoculations with a number of different parasitic strains are now under way.

3. POKKAH-BONG STUDIES

Surveys made during the past two years show that POJ 234, POJ 2727, CP 177, Striped, and Purple are the important varieties which are very susceptible to the Pokkah-bong disease.

The organism, *Fusarium moniliforme*, which investigators in Java and Cuba claim to be the cause of the disease
has been isolated and used in inoculation experiments. Pokkah-bong symptoms have been produced with this fungus but the results have not been entirely consistent.

4. BACTERIAL DISEASES

The two bacterial diseases of cane which were found for the first time in Louisiana in 1927 have been studied. These troubles are being called the (a) mottle stripe and the (b) red stripe and top rot.

The mottle stripe disease occurs commonly on such varieties as D 74, SC 12/4, and POJ 2727; while varieties like POJ 213 are quite resistant. Varieties seriously affected by the red stripe and top rot include POJ 2727, POJ 2725, and POJ 826, while the varieties POJ 213, 234 and 36 are moderately susceptible.

A STUDY OF A SPECIES OF PYTHIUM IN ITS ACTION ON SUGAR CANE

I. Species of Pythium have been found to be connected with the disease known as root rot or growth failure. Temperature tests made with some of these Pythiums on agar plates showed that 30°C is about the optimum for growth; while at 36°C and 15°C, growth was very slow. Inoculations, however, on corn showed that the greatest injury occurs at 25°C or below. Soil moisture tests showed that Pythium injury to corn is much more severe in soils with moisture content ranging from 70 to 100% of the water-holding capacity. This showed both in germination and subsequent growth of the corn. The hydrogen-ion relations of the parasitic Pythium was determined. Growth occurred between pH 5.6 and 9.6, but the optimum growth took place between 6.0 and 8.5.

II. Other possible factors concerned in the root rot complex of sugar cane have been considered. No evidence was found that inorganic salts or soluble toxins are concerned in the root rot problem. Washing the soil had no effect on the growth of sugar-
cane, but steaming the soil made conditions more favorable for rapid growth.

The root knot nematode, *Heterodera radicicola* (Mul-ler), and a burrowing nematode, similar to *Tylenchus similis* (Cobb), were found in the roots of sugar cane in Louisiana, but never in sufficient quantities to be a major factor in the root rot problem. *Lepidocyrtus violentus* (Folsom), a soil inhabiting, root pitting insect slightly injured the growth of cane in steamed soil. In Pythium infested soil, this insect seemed to increase the injury caused by Pythium. A species of *Rhizoctonia* produced discolored lesions on the roots of sugar cane, but did not appreciably reduce growth.

III. To determine the effect of soil treatment on the root rot disease of cane and corn, a number of chemical compounds were added to plots in areas known to be seriously affected with the disease. Both cane and corn were planted. Observations were made on the growth of the cane, and at regular intervals root samples were examined for the presence of Pythium. No compound has been found to have a noticeable effect on the growth of cane in the field, or on the prevalence of Pythium on the roots. But the addition of ammonium sulphate and liquid ammonia to corn in root disease infested soil brought about increased yields. In one test where ammonium sulphate and Uspulum were used, an increase of 12 bushels per acre was obtained.

The table shows the comparative yields from the different treatments.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Quantity added per acre</th>
<th>Bushels per Acre Average of 3 plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium sulphate</td>
<td>180 lbs.</td>
<td>26.0</td>
</tr>
<tr>
<td>Uspulum 1-400</td>
<td>400 gals.</td>
<td>21.8</td>
</tr>
<tr>
<td>Ammonium sulphate</td>
<td>600 lbs.</td>
<td>24.5</td>
</tr>
<tr>
<td>Ammonium sulphate + Uspulum 1-400</td>
<td>600 lbs - 400 gals.</td>
<td>30.3</td>
</tr>
<tr>
<td>Check-Water</td>
<td>400 gals.</td>
<td>18.3</td>
</tr>
<tr>
<td>Liquid ammonia</td>
<td>150 lbs.</td>
<td>25.2</td>
</tr>
<tr>
<td>Liquid ammonia</td>
<td>500 lbs.</td>
<td>26.3</td>
</tr>
</tbody>
</table>
ROOT DEVELOPMENT OF SUGAR CANE

Studies on the development and growth of sugar cane roots were commenced in the late fall of 1929. It has been found that from 65 to 70% of the cane roots are in the upper eight inches of soil, and approximately 90% in the upper fourteen inches.

STRAWBERRY DISEASE INVESTIGATIONS

The strawberry diseases known to occur in Louisiana include the leaf spot (rust, bird's eye spot), the scorch, the dwarf (white bud, wild plant), the root-knot (nematode injury), the root-rot and the various berry rots. Investigations in the nature and control of these troubles have been carried on for two years.

The leaf diseases (leaf spot and scorch) have been controlled effectively by spraying with 4-4-50 Bordeaux mixture every week to ten days from about the first of January to the first week in March. In tests made at Hammond in 1929, three sprayings (January 8th, 18th and 28th) resulted in partial check of the leaf diseases, while six sprayings at ten-day intervals (January 8th-March 7th) gave practically complete control. The addition of ammonia to the spray (at the rate of one or two pints in 50 gallons of the spray mixture) had no noticeable effect either on the control of the leaf spots or on the growth of the plants.

While the cause or nature of the dwarf disease has not been definitely established as yet, it can be effectively controlled under Louisiana conditions, where the plants are reset every year, by roguing and plant selection. Experiments have shown that if plants are carefully selected during planting and dwarf plants are rogued out systematically during the summer and early fall, very little dwarf will be found in the new plantings.

The root-knot disease is relatively of very minor importance in Louisiana, due to the fact that strawberries are reset every year and the plants grow during the cold
months when nematodes are inactive. Only occasionally are plants found severely infested with nematodes.

The root rot disease is characterized by the failure of the plants to make a satisfactory growth. The cause, or causes, of root rot are not known and the factors influencing this trouble are imperfectly understood. Studies on this phase of the problem are in progress. Application of lime (2000-4000 pounds per acre), both in the field, at the Fruit and Truck Experiment Station in Hammond, and in pots in the greenhouse stimulated plant growth in 1929. Whether lime will have the same effect in other fields is not known. These experiments are being repeated. The effect of various organisms parasitic on the roots is being studied.

The different fruit rotting diseases exact a heavy toll on the berry crop when conditions are favorable for their development. Wet, warm weather favors these troubles. During the last two years, the weather conditions (dry weather during the picking season) was decidedly unfavorable, and so the damage from fruit rots has been slight.

SUGAR

The work with sugar cane on varieties and general field work has been continued as outlined without any material change.

VARIETIES

More than one thousand new seedling canes grown at Canal Point, Florida, and some new foreign varieties were shipped to us by the Office of Sugar Investigations at Washington, D. C. These were all put under tests in nursery plats and grown for observation in preliminary tests. The most promising were planted in larger acreages for further examination. Some very interesting new varieties were discovered.

Co 290, an Indian cane, bred after the Java principles, has been used for two years. This cane has many desirable qualities. So far, no sign of any disease whatever has
shown up, and it has made a very satisfactory growth of plant and first year stubble. It strips remarkably well and has matured as early as our commercial canes.

CPH 22, which is a seedling containing D 74 blood, also shows considerable promise.

CPH 145, which has been under tests for a year, seems to be an extraordinary early maturing variety, and may be well worthwhile as a substitute for POJ 234. CPH 150, a luxuriantly growing cane, free from disease, with satisfactory sucrose content shows some promise.

In 1928, Co 281, CP 130, CP 177, and CP 807 were sent to the test fields. In 1929, Co 290 and CPH 22 were sent to the test fields. In 1929, POJ 36 M, a selection out of POJ 36, was released for distribution, and the Louisiana Sugar Station grew about one hundred and seventy-five tons for seed cane to be distributed to our people.

During both 1928 and 1929, the Station furnished quantities of seed cane of varieties 234, 36, and 213. Deliveries varying from small bundles to carloads were made to the Louisiana cane growers for planting purposes.

FERTILIZER AND ROTATION WORK

The fertilizer and rotation work continued to bring out the fact that the proper use of legumes is a most essential fact in soil fertility. Where one year crop of legumes had been turned under previous to growing sugar cane, fertilizer on stubble cane at the rate of 36 pounds of nitrogen per acre, gave increased yields of about 10 tons. Whereas, if two crops of legumes had been turned under previous to planting sugar cane, the same quantity of fertilizer on the stubble cane showed an increase of only 6 tons. In neither the three year nor four year rotation did it pay to use fertilizer on the plant cane, but in every case, nitrogen applied to stubble cane gave profitable returns.

The question of effect of harvesting legumes for hay in comparison with turning under the crop was studied, and in every case where hay was taken out of the field, a decreased yield in the crops which followed was shown in
comparison with land where legumes were buried. This decrease in yield continued to show even where nitrogenous fertilizer was applied to the respective plats in the succeeding crop.

In the four year rotation, consisting of two years of corn and legumes, plant cane and stubble cane, land where legume crop was turned under produced 34.67 tons of plant cane; land where a legume crop was harvested showed 32.1 tons; land where the legume crop was harvested and a half of a ration of nitrogen applied to the plant cane showed 32.36 tons; land where the legume crop was harvested and a full ration of nitrogen substituted for the legume crop showed 31.14 tons; or in other words, commercial nitrogen was not successfully substituted for the legume crop. The stubble crop following this plant cane showed as follows: Two years legumes *turned under* with no nitrogen applied to either the plant or the stubble crop produced 24.32 tons; 2 years legumes *harvested* with no nitrogen applied to either the plant or stubble produced 21.96 tons; with Melilotus on the plant cane, the yield was increased to 25.37 tons; with one-half a ration of nitrogen in place of the Melilotus a yield 25.95 tons; with Melilotus on the plant cane and one-half ration of nitrogen on the stubble a yield of 28.23 tons; with a full ration of nitrogen, or 36 pounds, on the stubble crop a yield of 30.71 tons was secured. These figures show the necessity of using nitrogen on stubble crop, and also the comparative value of nitrogen in legumes as compared with commercial fertilizers.

A comparison of cowpeas against the Biloxi beans shows the stubble crop, after Biloxi beans turned under, produced two tons more than stubble crop after cowpeas turned under.

Using corn to measure the effect of the organic nitrogen in legumes, we find that corn following a crop of legumes in comparison to corn grown after stubble cane is increased 17 bushels per acre. Corn grown after one crop of legumes turned under in comparison with legumes harvested for hay is increased 10 bushels per acre.
In the comparison of source of nitrogen tests, six different material were used: Nitrate of soda, sulphate of ammonia, calcium cyanamid, Urea, calcium nitrate, and Leuna saltpeter. Increased yields were profitable in all cases. Nitrate of soda again gave the highest returns; with Leuna saltpeter, sulphate of ammonia, calcium nitrate, cyanamid, and Urea grouped closely together in the order named followed, showing an increase of about 10 tons from an application of 36 pounds of nitrogen per acre.

**SUGARCANE TEST FIELDS**

During the year 1928 the Experiment Station sugar cane test field project consisted of two series of replicated variety plots, viz., (1) plant cane; and (2) first stubble. The work is conducted on established test fields, representing five representative sections of the cane belt as follows: (1) Cinclare, upper Mississippi river; (2) Reserve, lower Mississippi river; (3) Napoleonville, Bayou Lafourche; (4) Franklin, Bayou Teche; and (5) Youngsville, western section. In the fall of the same year a new test field was started at Meeker, representing the extreme northern Red river alluvial section of the cane belt. In the test field project the three field grown varieties: POJ Nos. 36, 213 and 234, along with some of the most promising seedling varieties, such as 36M, Co 281, C.P. 807, C.P. 177, C.P. 130 and POJ 2725, are planted side by side in one-twentieth acre plots according to the checkerboard method and replicated at least five times. The varieties are being tested in order to obtain data and information about the behavior of these canes in representative localities for the benefit of sugar planters of Louisiana. The results for the seasons of 1927 and 1928 have been published in Louisiana Bulletins Nos. 202 and 203.

In the fall of 1929 another series of plant cane plots was planted at each of the six Station test fields. In addition to the regular replicated series, the following promising new seedling canes were planted: C.P.H. 22, Co 290 and C.P. 766.
In 1928 the variety POJ 213 made the best showing as plant cane, and was closely followed by POJ 36. The POJ 213 variety was also superior as first year stubble, followed by 36M. The 36M variety was released for field planting in September, 1929.

The test field variety work for 1929 consisted of the following three projects: (1) plant cane; (2) first stubble; and (3) second stubble. The data, information and final results of this work are being prepared for a bulletin. The plant cane records show that C.P. 807 has surpassed all varieties in tonnage yields, and compares favorably in sugar yields with POJ 213. Co 281, another new variety, is also making a favorable showing. POJ 213 again made an excellent showing, being followed by 36M and POJ 36. POJ 234, as usual, was lower in field yields but higher in sugar per ton yields. The first year stubble results show POJ 213 as the leading cane, followed by 36M and POJ 36. POJ 234 also made an excellent showing, both in tonnage and sugar yields. In the second stubble results POJ 213 was the leading variety in the alluvial section; while POJ 36 was superior in the Teche and western sections.

THE EFFECTS OF FREEZES ON P. O. J. CANES

For the past three years systematic work has been performed on this project in different localities of the cane belt. The results of 1928 show that the bud and most of the eyes of POJ Nos. 36, 213 and 234 have to be completely killed by freezing weather before it is considered advisable to windrow cane for the mill. If the cane is windrowed when the bud is still alive or partially killed, under average weather conditions the cane will undergo rapid deterioration. Standing cane killed by freezes, bud and most of the eyes killed, will remain in a fair state of preservation for a period of about fifteen days. Both standing and windrowed canes on black lands undergo more rapid deterioration than on the lighter soil types. Windrowed cane in poorly drained lands also deteriorate rapidly. Canes with high sugar content are more resistant to freezes, and suf-
fer less deterioration both from the standpoint of standing and windrowed.

The results for 1929 prove very definitely that after the bud and most of the eyes of cane have been completely killed by freezes, that the cane that has to be milled after an interval of 15 to 18 days should be windrowed immediately after the freeze in order to keep in a fair state of preservation. Windrowing cane 10 days to two weeks after killing freezes to protect cane from extreme low temperatures as occurred on December 19 and 20, 22-24, 1929, proved to be very good practice, as cane windrowed under such conditions was much better for milling than standing cane. POJ 36 showed the greatest resistance to freezing weather, and less deterioration both as standing and windrowed cane. POJ 213 plant cane which was immature and in most cases badly bored, was damaged more by the freezes, and showed the greatest amount of deterioration both as standing and windrowed. POJ 234 which naturally runs high in sucrose, was not damaged as much by the freezes and showed less deterioration than POJ 213, both standing and windrowed.

FIELD EXTENSION WORK

In the fifteen sugar parishes comprising the sugar cane belt of the state, the County Agents were visited at regular intervals throughout the year. The following program of work was outlined for these parishes:

(1) Seed Cane Selection.
(2) Land Preparation.
(3) Cultivation.
(4) Fertilization.
(5) Control of Diatraea Saccharalis.
(6) Legume and Fertilizer Demonstrations.
(7) Demonstrations in the proper use of Melilotus indica as a cover crop on fall plant cane.
(8) Sugar cane varieties.
(9) Crop diversification.

In these nine projects excellent progress was made with the following: Sugar cane varieties; planting and turning
under of soy beans, land preparation, cultivation, fertilization, fertilizer demonstrations and crop diversification. The general use of fertilizers on stubble cane can largely be attributed to fertilizer demonstrations conducted during the past three years. A large number of planters was given assistance in figuring fertilizer requirements, and participated in cooperative purchases of fertilizer materials at low prices. In 1929 a total of 75 fertilizer demonstrations were conducted in the 15 sugar cane parishes. The following fertilizer organizations contributed free fertilizer materials: Chilean Nitrate of Soda, Synthetic Nitrogen Corporation and Barrett Company. The final results of these fertilizer demonstrations will be prepared and published in mimeograph or circular form. The results of this work indicate that the Experiment Station recommendation of 35 to 40 pounds per acre of readily available nitrogen on first stubble is the most profitable amounts to use. The 32 pounds of phosphoric acid in the form of Superphosphate applied with 35 to 40 pounds of available nitrogen per acre in a good many cases gave negative results for the phosphoric acid. However, in some cases positive results were also obtained.
### FINANCIAL REPORT OF THE AGRICULTURAL EXPERIMENT STATIONS, LA. STATE UNIVERSITY
#### JULY 1, 1927 TO JULY 1, 1928.

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## FINANCIAL REPORT AGRICULTURAL EXPERIMENT STATIONS, LA. STATE UNIVERSITY — (Continued)
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#### JULY 1, 1928 TO JULY 1, 1929.

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