1951


W G. Taggart

Follow this and additional works at: http://digitalcommons.lsu.edu/agexp

Part of the Agriculture Commons

Recommended Citation
Research in Agriculture

1949-50

★ ★ ★

ANNUAL REPORT

★ ★ ★

AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE
BATON ROUGE, LOUISIANA

W. G. Taggart, Director

★ ★ ★

Compiled by I. L. Forbes from Reports of Heads of Departments and Project Leaders

Year Ended June 30, 1950
# Table of Contents

Letter of Transmittal ........................................... 3
The Cover ......................................................... 4
Agricultural Chemistry and Biochemistry .................... 5
Agricultural Economics .......................................... 12
Agricultural Engineering ....................................... 28
Animal Industry .................................................. 35
Crops and Soils .................................................. 41
Dairy Research .................................................... 55
Entomology ......................................................... 60
Fertilizer and Feedstuffs Laboratory ......................... 67
Forestry ............................................................ 68
Home Economics .................................................. 70
Horticulture Research ........................................... 74
Plant Pathology .................................................... 86
Poultry Research .................................................. 101
Rural Sociology ................................................... 109
Sugar Cane ......................................................... 114
Veterinary Science ................................................ 116
Substations ........................................................ 120
U. S. Department of Agriculture Progress Reports .......... 180
Financial Statement—Agricultural Research Funds ......... 185
Agricultural Experiment Station Staff ......................... 186
Index ............................................................... 191
Letter of Transmittal

Baton Rouge, Louisiana
April 1, 1951

Governor Earl K. Long
Baton Rouge, Louisiana

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1950, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. Taggart, Director
Louisiana Agricultural Experiment Station
Johnson grass infestations on many sugarcane plantations of Louisiana have become very serious in recent years. Research by members of the Sugar Industry, and by the Experiment Station, has shown that a combination of cultivation, chemicals, and some hand labor can bring these infestations to a reasonable level.

The use of fallow plowing, or summer plowing, in the year no cane is grown has been very successful in destroying the large Johnson grass plants and their rhizomes. It is then necessary to use chemicals to prevent reinfestations from seedlings, as many plantations have large numbers of viable Johnson grass seed in the soil. 2, 4-D as a preemergence spray followed by flame cultivation, and TCA as a preemergence spray, each has given as high as 95 per cent control of seedlings. Either of these practices together with hand rogueing will permit the growing of a much cleaner plant cane crop after fallow plowing than will the customary hoeing.

The use of TCA on the drill, immediately after shaving and off barring, and before the rhizomes have sprouted in the spring, has suppressed Johnson grass sufficiently in badly infested stubble cane, to raise an economic crop. The picture on the cover shows hoed stubble cane on the left and TCA-treated stubble cane on the right in a test on Evergreen Plantation in 1950. Johnson grass suppression in the treated plot was very good and yields were increased approximately 6 tons to the acre.
Agricultural Chemistry
and Biochemistry

Human Nutritional Utilization of Carotene
from Sweet Potatoes

One objective of this department is to include in its nutrition studies problems directly applicable to human nutrition. A study of the factors affecting the human nutritional utilization of carotene in sweet potatoes was started in 1948. In the Annual Report for 1948-49 a description was given of a two-months controlled metabolism study in which eight LSU student volunteers were used as subjects. Since then, the work has been continued along similar lines. Early in 1950 a group of four men and two women ranging in age from 19 to 25 years was selected from LSU student volunteers, none of whom had participated in the 1949 experiment. The 1950 experiment covered a period of 92 days and involved comparisons of the effects of adding eight dietary supplements to a medium-carbohydrate basal diet devoid of carotene and vitamin A but otherwise complete. The eight dietary supplements were: casein, thiamine, lactalbumin, casein plus cystine, skim milk, skim milk and sweet potatoes, sweet potatoes cooked with fat, and sweet potatoes cooked without fat. Complete records of daily food intake, carotene and vitamin A values of blood samples taken every three days, quantitative daily collection of excreta, fortnightly measurements of the basal metabolic rate, and daily records of physical activity were obtained. These materials for 1949 and 1950 from fourteen human subjects represent a total of 1,056 “subject-days” of controlled metabolism experiments. All of the pertinent chemical analyses have not yet (December, 1950) been finished, but the partial data so far obtained indicate the following: (1) A direct relationship between the blood values of carotene and vitamin A does not exist. (2) The blood values of vitamin A are greatly influenced by the quality and the quantity of protein in the diet. For example, in human beings on a diet devoid of carotene and vitamin A but otherwise complete, the addition of skim milk or lactalbumin to the diet immediately caused a sharp increase in the blood vitamin A; casein was without effect, while casein supplemented with cystine produced a decrease in the blood values of vitamin A. Some of the evidence suggests that chocolate augments the effect of skim milk. (3) With sweet potatoes furnishing the only source of a constant daily carotene intake, a change from a high-meat diet to a medium-
carbohydrate diet was accompanied by a sharp decrease in both carotene and vitamin A blood values. (4) About 55 per cent of the carotene in ingested sweet potatoes is excreted in the feces. This value varied, however, from subject to subject and ranged from 44 to 63 per cent for different individuals. (5) The availability of carotene in sweet potatoes for human nutrition compares favorably with that reported in the literature for other vegetables such as carrots and spinach.

—William H. James, Martha E. Hollinger, Marie E. Satmary, and Bobbie Delaney.

The Use of Fluoride Ion in the Photometric Determination of Blood Glucose Using Alkaline Ferricyanide as the Oxidizing Agent

A major difficulty in the determination of blood glucose using alkaline ferricyanide as the oxidizing agent has been the uncertain development of stable sols of Prussian blue. Methods commonly used require a relatively long period of time for development of maximum absorption. Reproducibility is usually poor, and high and variable blank values are common. It was found that variable and high blanks disappear when tubes are routinely cleaned with hot trisodium phosphate solution. Maximum color development in five minutes with no decrease for one hour or longer can be obtained by the addition of potassium fluoride to the alkaline ferricyanide solution. Other fluorides are less satisfactory. Best results are obtained with ferric sulphate as the source of the ferric ion. All reagents are quite stable. The range, relative error, etc., with these reagents is equal or superior to any other method using this principle.

—J. G. Lee.

APF Supplements in the Ration of the Growing Chick

It is well known that protein supplements obtained from animal sources will improve rations made from vegetable feeds. Recent research work indicates that this improvement may be caused by vitamin B\textsubscript{12}, and related factors contained in these feeds. Feeds of vegetable origin, on the other hand, are as a rule a poor source. Materials containing high amounts of vitamin B\textsubscript{12} are available for general use and are sold under the name APF supplements. As research work elsewhere has indicated that straight vegetable diets properly supplemented with certain APF materials will give excellent growth when fed to chicks, additional research on this problem was needed.

In the first phase of this experiment it was found that an all-vegetable protein ration (high in corn and soybean meals) was improved by supplementing with: (1) 0.16 per cent APF; (2) 0.32 per
of promoting Turbidimetric-Titrimetric prevention of growth ism.

The formation occurrence difference Stimulation to and sex protein diet from no improve protein in vitamin. Further APF; the advantage to be taken from eggs contained by hens receiving neither APF nor animal protein had a more critical requirement for APF than chicks obtained from hens receiving an animal protein in their diet.

The fourth phase of this experiment indicated that there was no advantage in adding either B vitamins or APF supplement if the diet contained sufficient animal protein and a natural source of the B vitamin. The ration used in this trial contained 7.5 per cent animal protein and a substance high in the B vitamin.

The APF used in this experiment did not contain an antibiotic.

Further Observations on Experimental Lathyrism Induced by Feeding Singletary Pea Seed

Albino rats were again used as the experimental animal. No sex difference with respect to susceptibility could be found. A difference has been reported on clinical lathyrism in man. The calcium and phosphorus content of fat free tibias of both sexes were found to be the same in both control and experimental animals. The malformation of the bones apparently does not extend to calcification. The addition of methionine to the experimental diet prevented the occurrence of the paralysis. This confirms the claim of Diaz. Lathyrism is then to be included in that group of toxicities which can be prevented by either methionine or alpha-tocopherol.

Turbidimetric-Titrmetric Discrepancy in Oleic Acid Stimulation of Lactobacillus casei

Previous reports from this laboratory have described the growth promoting effect of oleic acid as a biotin substitute in the nutrition of Lactobacillus casei. Also reported were certain peculiarities of growth in the presence of oleic acid, i.e., high cell production accompanied by low acid production. The removal of this discrepancy
has been the object of recent experiments. Of the many substances and variations in procedure tested, none proved completely effective in overcoming the disparity. The use of an oleate ester produced comparable cell and acid production at pH 5.0-6.0. Under other conditions, the ratio of cell production to acid production was usually approximately 2.0 when both were expressed as micromicrograms of apparent biotin. At high pH values the ratios were much higher. Since a similar phenomenon was observed in cultures grown on lipide-free medium of abnormally low glucose content, it is suggested that the depressed acidity is caused by interference of glucose absorption by the lipide.

—Virginia R. Williams and E. Anne Andrews.

Shrimp Studies

Black Spot or Melanotic Shrimp—Black spot of shrimp, or black shrimp, is a condition which develops in shrimp, both whole and headless, during refrigerated storage. It results in the formation of pronounced black bands where shell segments of the tail overlap, giving a banded or zebra appearance to the tail. The tail and head fins become black, the crawling legs change color first at the joints, and this finally progresses over the entire leg, while the swimming legs become black at the tip ends. The carapace or head shell and gills also become black. The liquid which exudes from the shrimp is black and alkaline in reaction.

The variation in the extent and location of the development of black spots on different lots of shrimp suggested that microorganisms were involved. After a preliminary investigation yielded a mold that would cause a blackened area on heat sterilized shrimp held at room temperature, an intensive study of the microbial flora in relation to black spot development was undertaken.

Although eighteen different media were inoculated with material from several hundred samples of black spots, no microorganisms were isolated that would produce a blackening on the media or when inoculated onto fresh shrimp stored in cracked ice. The mold that had been isolated grew so slowly at 32-35° F. that it was considered of doubtful importance. It was also found that black spots would not develop on shrimp stored under anaerobic conditions at 32-35° F., although numerous anaerobic bacteria were present. The possibility of sulfide production by microorganisms as the cause of the blackening was discounted when it was found that the concentration of hydrogen sulfide producing bacteria was no greater in the black spots than in unspotted areas of the shrimp. Paraffin sections of black spots did not reveal any bacteria or fungi in the tissue in any appreciable numbers. It was not possible to show an increased rate or amount of spot development on fresh shrimp that were heavily inoculated with black spots from other shrimp. Dip-
ping of fresh shrimp in solutions of Roccal, peracetic acid, the sodium salt of dehydroacetic acid, sodium propionate and Krimo-Ko gel plus ascorbic acid did not affect the rate or extent of black spot de-
velopment, although the bacterial count after treatment by the first three materials was appreciably lowered. Treatment with sodium bisulfite and propylene oxide were the only chemical means found that would prevent black spots, and the propylene oxide caused the development of the pink color typical of cooked shrimp.

The failure to isolate any microorganism of possible significance
from black spots, the development of black spots on shrimp with a
very low microbial count, and the inability to transmit the black
spots even with heavily spotted tissue as the inoculum, strongly
suggested that the black spots are not caused by microorganisms
and do not result from chemical changes in the shrimp brought
about by microbial activity. This led to an investigation of the im-
portance of enzyme systems inherent in the shrimp.

Whole shrimp suspended in water in flasks stoppered by rubber
or cotton plugs and stored in crushed ice for 5 days do not develop
black spots, but if air or oxygen is bubbled through the system they
will develop black spots in 3 to 4 days. These results prove that oxy-
gen is necessary for black spot development, and strongly suggest
an oxidative enzyme system is involved. Further research has shown
that dihydroxyphenylalanine (dopa) is rapidly oxidized by whole
shrimp and extracts of shrimp. In the case of the former typical
black spots develop. Catechol is likewise oxidized, red spots devel-
oping however instead of black spots. Further evidence that an
enzyme system is involved are: boiling over a free flame for one
minute either a water suspension of shrimp membranes or shells or
a water extract of shells and membranes completely prevents de-
velopment of black spots even in the presence of dopa; optimum pH
for development of spots is approximately 7; development is inhib-
ited by chemicals known to inhibit oxidase enzymes. The enzyme
system has been shown present in the head, fins, legs, shell and
membrane of the tail, but is not present in the tail flesh.

Since the brown and black pigments found widely distributed
in nature and caused by oxidation of various phenols have long been
known as melanin it is suggested that the terms black spots and
black shrimp be discarded and that these be designated as melanotic
shrimp, the formation of the pigments as melanogenesis and the
abnormal pigmentation as melanosis.

With the cause of melanotic shrimp known, control measures
can be recommended. In order to have melanosis three conditions
must be fulfilled, namely, the enzyme system and the chemical
substance which is changed to a pigment must be present and lastly
air or oxygen must be available.

If any one of these three is lacking melanogenesis can not occur.
Since the former two are naturally present in shrimp, preventive measures consist in limiting availability of or exposure to oxygen. This can be accomplished either by keeping the shrimp out of contact with air or by treatment with sodium sulfite or sodium bisulfite or other reducing substances which compete for the oxygen and thereby prevent melanogenesis.

—E. A. Fieger, Harvye Lewis, and J. Alford.

Frozen Cooked Shrimp—Boiled shrimp are a delicacy when served with various cocktail sauces, as salad, in gumbo, or as an entree but these entail time consuming and unpleasant preparation. Shrimp which have been boiled and peeled before freezing would certainly be welcomed by those engaged in meal preparation, providing they compare favorably with the fresh cooked product in quality.

Since frozen cooked shrimp become less tender during storage at 0° F., a series of studies was conducted in an endeavor to overcome this difficulty. Of the 22 different treatments used the following two gave superior products: cooking shrimp in a solution containing in addition to salt a small quantity of disodium hydrogen phosphate, and cooking in the usual manner and freezing with the shrimp immersed in the cooking liquid. All the shrimp were cooked until palatable, which required eight minutes of boiling in a solution containing 5 per cent salt and 1 gram of Rex Crab Boil for each 100 grams of shrimp.

The samples packed in cooking liquid were excellent in flavor and not tough after 12 months frozen storage. The spice flavor had penetrated into the flesh and they were delicious when eaten without addition of further seasoning. The only objectionable feature was the light yellow to gray color of the surface of the meat. Those samples cooked in the phosphate solution were likewise tender but were not so flavorful as those packed in the cooking liquid. Their color however was normal.

—E. A. Fieger.

"Aphythatosis"—a New Process for Drying Food and Other Products Affected by High Temperatures

This process consists in the use of dehumidified air at room temperature or at temperatures below those used in ordinary dehydration to dehydrate vegetables and other foods susceptible to higher temperatures. The process has been applied on a semi-plant basis in the laboratory for treatment of eggs to be frozen in the shell. Preliminary tests with other foods, especially vegetables, showed it to be very promising. The products dried by this method look and taste better, retain more ascorbic acid, and absorb more water during reconstitution than those dehydrated by the usual method of using higher temperatures. The length of time of drying and the
cost are about the same for the two processes. No denaturation of protein or case hardening occurs during the treatment as usually occurs in high temperature dehydration. Experiments are being conducted on a variety of Louisiana grown vegetables.

—Socrates Kaloyereas.

New Tests for Detecting the Addition of Heated Milk to Raw Milk

The present methods of differentiating raw milk from heated milk are based on enzymatic tests. These tests are very sensitive in detecting small amounts of raw milk in mixtures with heated milk. But when the problem is reversed, that is, when a quantitative test is desired to check whether or not heated milk has been added to raw milk, the enzymatic tests (phosphatase, etc.) cannot be used safely. To deal with such cases two methods have been developed. One is microscopical and deals with the examination of crystallization patterns of lactalbumin when treated with copper chloride, and the other is a spectrophotometric test for lactalbumin in the heated milk.

—Socrates Kaloyereas.

Storage Experiments with Brown Rice

The storage of whole brown rice in air-tight laminated foil bags has in the past proved successful in preventing rancidity and preserving vitamin content of the rice (see Annual Report for 1948-49, 1947-48). Similar treatment in the storage of finely ground brown rice was not successful in preventing rancidity for any appreciable length of time. After four months storage all samples on cooking had a bitter taste and displeasing odor.

—E. A. Fieger and Virginia R. Williams.
Agricultural Economics

Milk Supply and Utilization in Louisiana

At the request of dairy farmers in early 1950, a study is being made to determine the source and utilization of the milk consumed in Louisiana. The Department of Agricultural Economics of the Louisiana Agricultural Experiment Station is cooperating with the Louisiana Department of Agriculture and Immigration in this research. The major objectives of the study are: (1) to determine the source, grade, type, volume, and price of whole milk marketed in Louisiana in 1949; (2) to determine the production of fluid milk and milk products in Louisiana in relation to consumption; (3) to estimate the potential demand for milk and milk products; and (4) to determine the adequacy of present processing facilities for handling the milk produced in Louisiana. The data were collected on a monthly basis in order that the seasonality of production and consumption could be studied.

**TABLE 1. Number of Milk Plants by Type and the Volume of Milk Distributed, 1949, Louisiana**

<table>
<thead>
<tr>
<th>Type of plant</th>
<th>Number of plants</th>
<th>Pounds milk distributed</th>
<th>Per cent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor-Distributor</td>
<td>105</td>
<td>432.092, 87</td>
<td>97.0</td>
</tr>
<tr>
<td>Producer-Distributor</td>
<td>85</td>
<td>12.663, 503</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>190</strong></td>
<td><strong>444.755, 690</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Although analysis of the information collected to January, 1951, has not been completed, it has been found that there is a substantial economic loss to the dairy industry because of inadequate facilities for processing the milk produced by farmers in excess of requirements for fluid use. This problem will receive further study in order that economically sound recommendations for its solution may be made.


Tung Nuts as a Farm Enterprise in Louisiana

The commercial production of tung nuts for oil is a relatively new farm enterprise in Louisiana. Although 41 orchards with more than 200,000 tung trees were reported in 1935, the 1940 crop was the first of sufficient size to be considered of commercial impor-
tance in the state. Since 1940 the production of tung nuts has increased at a rapid rate. By 1948, the farm value of the crop in Louisiana was almost three-quarters of a million dollars.

Tung orchard development is a comparatively long-time investment. The trees do not produce in commercial quantities before the fourth year and do not reach peak production until after the fifteenth year. Approximately 36.7 man hours and 10.5 tractor hours are required to develop one acre of tung trees to the commercial production stage. At 1948 prices, the cost of establishing and developing an acre of tung trees for three years was $65.94. Man labor, tractor work, fertilizer, and interest on the investment were the major items of expense during the development period.

The cost of producing tung nuts varied inversely with yields per acre. In 1948, the average cost of producing a ton of tung nuts was $115.20 with 500-pound yields, $62.60 with 1,100-pound yields, and $45.60 when a ton of nuts was produced per acre. The cost of man labor is one of the major items of expense in tung nut production, and reducing the amount of man labor required per acre affords one of the best opportunities for reducing production costs. Much of the hand labor for cutting weeds, briars, and tung sprouts can be eliminated by timely cultivations. The development of machines for harvesting tung nuts (now in the experimental stage) will provide additional opportunities for reducing production costs.

The cattle enterprise is well adapted to a farm organization built around tung nuts as a major cash crop. Cattle are able to utilize the grass in tung orchards with no appreciable damage to the trees. Grazing cattle in tung orchards makes it possible to reduce the number of cultivations, and also provides an additional source of cash farm income.

—James A. McDaniel and Felix E. Stanley.

Costs and Returns on Family-Type Sugar Cane Farms

The net cost for growing and harvesting a ton of sugar cane on family-type sugar cane farms in Louisiana increased from $5.94 in 1948 to $6.62 in 1949—an advance of almost 70 cents per ton. This cost included all direct and indirect items of expense in producing the sugar cane crop except for a charge for the value of the farmer's labor. The increase in the average cost per ton in 1949 made the cost for the year approximately the same as in 1946 and 1947, the two high-cost years immediately after the end of World War II. The increase in 1949 as compared with 1948 was due to declining yields per acre and somewhat higher costs for labor and materials. The sugar cane yield on the 500 farms studied for 1949 averaged 19 tons per acre as compared with 21 tons in 1948.

The average net return per ton to pay the operator for his labor declined from $1.26 per ton in 1948 to $0.72 per ton in 1949. The net
return per ton declined in spite of an increase in gross income of $0.14 per ton, since advances in most cost items more than offset this slight increase in price. The average gross income per ton of cane sold, including conditional payments and molasses bonuses, varied from $8.51 in 1947 to $7.20 in 1948 and $7.34 in 1949.

In the 1946-49 period, the cash return per hour of labor earned by family-type sugar cane farmers varied from 16 cents in 1946 to 28 cents in 1947, 26 cents in 1948, and 16 cents in 1949. In all years, these net cash returns per hour of labor as earned by the farm operator were below the minimum wage rates paid hired farm laborers in the area. In addition to cash returns, however, the farm operator had additional earnings in the form of non-cash perquisites. Total return per hour of labor, including both cash and non-cash income, varied from 37 cents per hour in 1946 to 55 cents in 1947, 52 cents in 1948, and 44 cents in 1949. The wage rate paid hired labor in this area averaged about 40 cents per hour during this period.

The 500 family-type sugar cane producers studied in 1949 had an average of 56 acres of crops per farm, produced 32 acres of sugar cane, and sold 572 tons of cane per farm. Fifty-five per cent of the farm operators owned all or a major part of the farms they cultivated, 15 per cent were cash tenants, and 30 per cent were share renters.

—J. Norman Efferson.

Costs and Returns for Raw Sugar Mills

The costs of manufacturing 100 pounds of raw sugar in Louisiana varied from $3.59 for the 1943-45 period to $5.63 in 1946, $6.33 in 1947, $5.87 in 1948, and $5.53 in 1949. The net profit per hundred pounds varied from a gain of 13 cents in the 1943-45 period to 41 cents in 1946, a loss of 13 cents in 1947, a loss of 24 cents in 1948, and a gain of 28 cents in 1949. The relatively high costs and low returns in 1947 and 1948 were a result of stable to declining prices for raw sugar, increasing costs for labor and materials, and relatively low recoveries of sugar per ton of cane as compared with the wartime and prewar period. The change from a net loss to a net gain position in 1949 was caused mainly by a major increase in the recovery rate of raw sugar per ton of cane ground. The 26 mills studied for the 1949 grinding season averaged 168.6 pounds of raw sugar per ton as compared with 151 for the 1948 season. The 1949 recovery rate was the highest since 1942.

During the 13-year period 1937-49 in which annual financial studies have been made of the Louisiana raw sugar mill industry, certain major changes have occurred. The number of raw sugar mills in Louisiana has declined from approximately 75 in the 1937-39 period to 56 in 1949. The annual studies of costs and returns indicate that a major factor affecting returns has been the volume of business; most of the low-volume mills lost so consistently that
they were forced out of business. The remaining mills have been forced to make major capital improvements and increase grinding capacity in order to keep costs as low as possible. The average grinding capacity for the season has increased about 20,000 tons from 1937 to 1949 for the mills remaining in operation. The capital investment per mill has increased from less than $400,000 in 1937 to more than $650,000 in 1949. The increased volume ground was not sufficient to offset the higher capital costs. The capital investment per ton of sugar cane processed averaged $4.73 in the 1937-39 period and increased to about $7.00 per ton in 1949.

—J. Norman Efferson.

Mechanization of Cotton Picking in Louisiana, 1948 and 1949

Depending upon the level of mechanization used in preharvest operations, the labor required to hand-pick cotton constitutes from 50 to 75 per cent of the total man labor hours required to grow and harvest the cotton crop. Because of the large amount of labor required to pick the cotton crop by hand, development of mechanical means for harvesting cotton is significant. The number of one-row, spindle-type mechanical cotton pickers in the delta cotton areas of Louisiana increased from 65 in 1948 to 111 in 1949, an increase of 71 per cent.

Data on cost of operation were obtained from 38 mechanical pickers in 1948 and 83 in 1949. The number of acres harvested per picker was 170 in 1948 and 123 in 1949. The annual use per machine was 241 hours in 1948 and 213 hours in 1949 and the average number of bales harvested per 10-hour day was 7.4 in 1948 and 5.4 in 1949.

The average cash cost of operating a mechanical cotton picker per 10-hour day was $85.48 in 1948 and $89.68 in 1949. The average cost for labor, power, and machinery per bale was $11.55 and $16.61 for the two years, respectively. The variation in cash costs per bale between the two years was due primarily to spreading fixed costs over a smaller number of bales harvested per machine in 1949 as compared to 1948.

Loss in grade for machine-picked cotton as compared with hand-picked cotton amounted to $11.25 per bale in 1948 and $8.03 per bale in 1949. There was approximately one full grade differential between machine- and hand-picked cotton. The grade differential was pronounced early in the harvesting period in both years and as the seasons progressed, the quality differences tended to disappear. In some cases late machine-picked cotton was higher in quality than hand-picked cotton for the same period.

The average increase in the amount of cotton left in the field by a mechanical picker as compared with hand pickers was estimated to be 5 per cent in both 1948 and 1949. Since cotton left in the field is an economic loss to the producer, a charge was made
against the machines for this loss. The loss of lint and cottonseed, valued at the average price of machine-picked cotton, was $8.92 in 1948 and $8.03 in 1949.

TABLE 1. Total Cost of Mechanical Picking as Compared to Hand Picking in the Delta Cotton Areas of Louisiana, 1948 and 1949

<table>
<thead>
<tr>
<th>Item</th>
<th>1948</th>
<th>1949</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total labor, power, and machinery cost</td>
<td>$11.55</td>
<td>$16.61</td>
</tr>
<tr>
<td>Adjustment for loss in grade</td>
<td>11.25</td>
<td>9.35</td>
</tr>
<tr>
<td>Waste (average 5 per cent)</td>
<td>8.92</td>
<td>8.03</td>
</tr>
<tr>
<td>Total cost of picking mechanically</td>
<td>$31.72</td>
<td>$33.99</td>
</tr>
<tr>
<td>Cost of picking by hand</td>
<td>44.80</td>
<td>40.33</td>
</tr>
<tr>
<td>Margin in favor of mechanical picking per bale</td>
<td>13.08</td>
<td>6.34</td>
</tr>
</tbody>
</table>

Possibilities for further decreasing the costs of mechanical harvesting include greater utilization of the machine, the use of skillful operators, better maintenance, proper storage, and ginning at specially-equipped gins.

—Warner L. Bruner, Jr., and Felix E. Stanley.

Fluctuations and Trends in Production on Louisiana Farms

Although final data are not available, the production of sugar cane in Louisiana in 1950 was greater than in 1949, while rice production was slightly less and cotton production was materially lower than in 1949. Preliminary data indicate that sugar cane farmers in 1950 had the best year experienced in recent years—owing largely to weather conditions which resulted in a sucrose content considerably above the average, combined with favorable yield per acre.

There have been changes in the relative volume of production among the various agricultural commodities during the last 25 years. Changes in quantity produced are due in part to shifts in the utilization of production resources and in part to variations in annual yield per acre due to such factors as the weather, diseases, and pests.

The volume of production of livestock and livestock products increased materially during the last 25 years. The five-year 1925-29 average index of volume of production was 78 as compared with an average index of 116 in the latest five-year period (1945-49). This represents an increase of 38 points, or 48 per cent. The index of production of meat animals averaged 64 from 1925 through 1929 and 119 from 1945 through 1949, an increase of 55 points, or 86 per cent.

The index of production of all crops averaged 81 from 1925
through 1929 and 85 from 1945 through 1949, an increase of four points, or five per cent. The average of the index of production of cotton for the first five years was 100 as compared with 66 in the last five years, a decline of 34 points, or 34 per cent. The average for rice in the comparative periods was 87 and 116, an increase of 29 points, or 35 per cent. Sugar cane shows a gain from an average index of 45 in 1925-29 to an average of 99 in 1945-49, or an increase of 113 per cent. For detailed data on agricultural production, refer to Louisiana Bulletin No. 444, “Agricultural Statistics for Louisiana, 1909-1949.”

—J. P. Montgomery.

Cotton Production Practices in the Upland Area of Northern Louisiana

A cooperative cotton production practices study was conducted in all of the major cotton-producing states in 1948. This report summarizes production practices found in the upland cotton area of Louisiana. Delta and Pine Land 14 was the most common variety of cotton planted. Cotton was seeded at an average rate of 21 pounds per acre with regular seed and 16 pounds per acre with delinted seed. More than 75 per cent of the farmers spaced their cotton by hill-dropping. Cotton planted solid in the drill was spaced by handchopping.

With one exception, all farms included in the survey used a complete fertilizer, of which 5-10-5 was the most common. Side-dressing with either nitrate of soda or ammonium nitrate was done on 22 per cent of the farms. The use of poison was closely related to the size of the cotton enterprise on each farm. Twenty-four per cent of the cotton acreage was poisoned on small farms, 45 per cent on medium, and 60 per cent on large farms. Calcium arsenate was the principal poison used and was applied at an average rate of six pounds per acre.

The average yield of cotton for all farms surveyed was 184 pounds of lint per acre. All cotton on these farms was picked by hand, and most of the acreage was picked over at least twice. Approximately 1,290 pounds of seed cotton were required to produce a 500-pound bale of lint. Workstock was the only source of power on small cotton farms and provided most of the power on the medium-sized farms. Almost three-quarters of the large farms reported tractors as the major source of power. The man labor requirements for producing cotton varied with the size of power unit used. With one-half row, mule-drawn equipment and yields of 184 pounds of cotton lint per acre, 84 man hours were required per acre of cotton. With similar yields, man labor requirements were 73 hours per acre for one-row, mule-drawn equipment, 61 hours for one-row, tractor-drawn equipment, and 58 hours for two-row, tractor-drawn equipment. Average wages paid for specific
farm operations were: cotton chopping, $2.50 per day; cotton picking, $2.15 per hundredweight of seed cotton; regular farm work, $2.00 per day; and tractor drivers, $3.00 per day.


Hogging-Off Corn and Soybeans

The practice of hogging-off corn and interplanted soybeans has been adopted by a large number of farmers in the delta cotton areas of Louisiana since 1944. A preliminary study of the economic aspects of the practice was made in 1948. Results of the study indicated that hogging-off corn and soybeans not only was a practical and economical method of harvesting the corn and soybeans, but also provided a profitable alternative source of cash income for delta farmers.

In view of the drastic decline in pork prices during 1949 and additional interest in hogging-off corn and soybeans resulting from cotton acreage restrictions in 1950, a more detailed study was conducted in the delta areas relating to 1949 conditions. In the course of this survey, data concerning costs, returns, and practices were collected from 38 farmers who had adopted the practice.

TABLE 1. Average Cost and Returns per Acre of Corn and Soybeans Hogged-Off, Louisiana, 1949

<table>
<thead>
<tr>
<th>Item</th>
<th>Number dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average total receipts per acre</td>
<td>$321.28</td>
</tr>
<tr>
<td>Expenses:</td>
<td></td>
</tr>
<tr>
<td>Cost of hogs purchased</td>
<td>128.24</td>
</tr>
<tr>
<td>Pasture cost</td>
<td>8.00</td>
</tr>
<tr>
<td>Feed while on pasture</td>
<td>41.04</td>
</tr>
<tr>
<td>Fence cost</td>
<td>8.15</td>
</tr>
<tr>
<td>Worming, vaccination, tankage, minerals and transportation</td>
<td>26.56</td>
</tr>
<tr>
<td>Cost of producing an acre of corn and soybeans</td>
<td>23.45</td>
</tr>
<tr>
<td>Selling costs</td>
<td>15.10</td>
</tr>
<tr>
<td>Interest on hogs</td>
<td>1.60</td>
</tr>
<tr>
<td>Miscellaneous (water, medicine, death loss)</td>
<td>7.15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$259.29</strong></td>
</tr>
<tr>
<td>Net return to land and management per acre of corn and soybeans hogged-off</td>
<td><strong>$ 61.99</strong></td>
</tr>
</tbody>
</table>

An average gain of 822.4 pounds of pork was made per acre hogged-off in 1949. Eight hogs were finished per acre, with an average gain of 102.8 pounds per hog in 45 days. In other words, 6.46 bushels of corn were required per 100 pounds of pork gain when this practice was followed. In most cases, the farmers who were successful with this practice used top quality feeder hogs, and followed recommended feeding and sanitation methods.
The farmers interviewed planted corn at an average rate of 10 pounds per acre and soybeans at 32.4 pounds per acre. Strains of Funk’s hybrid corn and Ogden soybeans were the most popular varieties used. Fertilizer was applied at the rate of 47 pounds of available nitrogen per acre. Estimated yields of 53 bushels of corn and 20 bushels of soybeans were obtained per acre. Practices followed by most of the 38 farmers interviewed were worming, mange and lice treatment, use of minerals, salt and tankage, vaccination, and provision of clean drinking water, wallows and shade for the hogs while in the corn fields.

—WARNER L. BRUNER, JR.

Farmer Business Cooperatives in Louisiana

During 1950, a survey of farmers’ cooperative business associations in Louisiana was started. Visitations were made and pertinent information obtained from 114 cooperatives. Preliminary tabulations of members and patrons in the 114 cooperatives total 115,078. From observation and the limited data available on farmers participating in more than one business unit, it is estimated that roughly 50 per cent of the farm operators in Louisiana obtain marketing, processing, purchasing, livestock breeding, credit, or electric power services through a cooperative organization.

Sixty-seven processing, marketing, and purchasing organizations were found with an accumulated investment of approximately $14,500,000. They had facility loans in the amount of $2,582,247 borrowed from the Bank for Cooperatives in New Orleans. Thirteen electric power associations were supplying electric current to 73,691 rural establishments, and four freezer-locker plants were serving 2,067 rural patrons. The Louisiana Artificial Breeding Cooperative had 38 breeding circuits in which 5,276 farmers had registered 64,164 cows in the livestock improvement program. Credit was obtained by 18,597 farmers through the facilities of the 21 National Farm Loan Associations and the 9 Production Credit Associations located in Louisiana.

—BUERFORD M. GILE AND OLIN B. QUINN.

Economic Studies of the Louisiana Vegetable Industry

General Trends—The area planted to commercial truck crops, excluding potatoes, sweet potatoes and strawberries, in Louisiana has averaged about 32,000 acres since 1928. Acreage increased to nearly 40,000 acres in the late 1930’s and averaged about 33,000 from 1940 to 1946, but has declined to less than 30,000 since then. Total production has followed about the same trend, varying from year to year as a result of weather conditions, diseases, insects, and other causes. Some vegetables have increased in importance, while others have declined. Shifts have occurred in the location of producing areas for some crops, and new areas have come into production.
Most vegetable prices have followed the trend of other agricultural prices, falling from the 1920's to a very low level in the early 1930's, then remaining low or rising slowly until World War II. During the war, most prices rose rapidly. Since then prices of some products have fluctuated about the high wartime level, while others have declined. Favorable prices have been accompanied by high costs of production and marketing, and have not always resulted in profits to growers.

Major market outlets are northern and eastern terminal markets in the large cities, nearby towns and cities, and local canning and freezing plants. The volume of shipments to out-of-state markets has been large in recent years, and the composition has changed. Sweet potato shipments have increased but there has been a decline in the movement of mixed vegetables and a tendency for producers to specialize in fewer crops. One factor responsible for this change has been the development of new vegetable areas in the irrigated sections of the West which grow a variety of vegetables in volume and assemble mixed cars with comparative ease. Trucks are moving an increasing proportion of vegetable shipments. Canning and freezing plants continue to be important outlets to many growers. The Louisiana vegetable industry can greatly increase its output to help meet the food needs of a nation mobilizing for defense if growers are given reasonable incentives and the supply of labor and materials is adequate.

—M. D. Woodin.

Commercial Canning—Twenty of the 22 canning plants in the state operated during the 1949-50 season, processing 1,533,447 cases of fruits and vegetables valued at $4,194,000. This was an increase of 51 per cent in volume and 61 per cent in value over the 1948-49 pack. Twenty-four fruits and vegetables, or combinations of them, were packed, although a few items made up the major part of the output. Fifteen of the 20 plants canned sweet potatoes. Sweet potatoes continued to be the most important product, comprising 72 per cent of the pack; okra and okra mixtures made up 16 per cent; snap beans, 4 per cent; and beets and tomatoes, 2 per cent each. No other individual product amounted to as much as 2 per cent of total output.

Few Louisiana canneries have ever operated at full capacity for extended periods of time. Normally they process fruits and vegetables only during the harvest seasons for these products, but some plants extend their operations by canning sweet potatoes, dry peas and beans, syrup, or sea foods. During the off-season the canning machinery and handling facilities usually remain idle. This unused capacity is available for the preservation of foods that might be needed during a period of national mobilization or war. Therefore, these canning plants represent a very valuable asset to the nation's economy which can be put into greater use without diverting equipment from other programs.

—G. E. King and M. D. Woodin.
Shallot Production and Marketing—Louisiana produces nearly all of the shallots entering the major markets of the country. Commercial production is largely concentrated in the St. James Parish area and in the parishes along the Mississippi River to the south. Smaller acreages are found in the Pointe Coupee area, around Thibodaux, and in the Breaux Bridge section.

In 1950 a study of shallots was made in St. James Parish to determine the economic conditions and relationships under which the crop is produced and marketed. During the 1949-50 season, 1,075 acres of shallots were grown by the 61 commercial producers in the parish. Production amounted to about 18,300 barrels, and the average yield for the area was 17.1 barrels per acre. Preharvest costs averaged $2.45 per barrel, and harvesting and farm marketing expenses amounted to $2.60, or a total cost to growers of $5.05 per barrel. Growers received an average price for the season of $9.06 per barrel and had a net return of $4.01 per barrel, or $68.46 per acre.

Yield was the most important factor affecting per barrel costs and net returns per acre. As a general rule, farmers who made better yields followed these practices: (1) preceded shallots with a cover crop; (2) planted early; and (3) applied relatively large amounts of commercial fertilizers per 1,000 plants set. Quality of seed planted probably was closely related to yield, although accurate measurement of this factor was difficult.

Under usual conditions during the 1949-50 season, 33 hours of man labor and 6.5 hours of tractor time were required to grow an acre of shallots. Labor and power requirements for harvest and marketing varied with yield; during the 1949-50 season, 19 hours of man labor, 1.7 tractor hours, and 5.5 truck hours were required for harvesting and marketing under average conditions.

Marketing margins between the farmer and the terminal market dealer averaged $8.76 per barrel. Local shippers took a margin of $3.41 per barrel over the farm price, and terminal market wholesalers took a $5.35 margin. The price spread between farmers and local shippers remained fairly constant throughout the season, while the spread between local shippers and terminal market dealers fluctuated with the market price of shallots. Of the consumer’s dollar spent for shallots at the retail store, 35 cents went to the farmer and 65 cents to the various marketing agencies handling the product between the farmer and the consumer. This distribution of the consumer’s dollar is about the same as the average for all fruits and vegetables in the United States.

—Olin B. Quinn.

Green Pepper Production and Marketing—Commercial green pepper growers in Louisiana sold 246,000 bushels from the 1,700 acres harvested during the 1950 season. About half of the state’s pepper acreage was in St. James Parish. A study of the operations of the 83 commercial growers in the parish in 1950 showed an aver-
age cost of production and marketing of $1.27 per bushel sold, or $100.74 per acre. Adverse weather conditions resulted in a smaller acreage harvested than in recent years, unfavorable yields, lower quality, and reduced returns. Growers averaged a net return of only $9.50 per acre.

The cost of assembling and packing peppers and transporting them to major terminal markets amounted to about 90 cents a bushel. During the period when Louisiana peppers were on the market, the spread between the price growers received and the terminal market price averaged $1.79 per bushel. —RANDALL STELLY.

Marketing and Ginning Cotton in Louisiana

Cotton Quality Statistics—The Department of Agricultural Economics cooperates with the Cotton Branch of the Production and Marketing Administration in obtaining annual data on cotton quality. Quality reports for ginnings through November 30, 1950, indicate that the 1950 crop in Louisiana will average higher in grade than the 1949 crop. The grade index (middling white is 100) for ginnings through November 30 was 97.4 as compared with 95.5 for 1949, and the percentage of total ginnings tenderable on futures contracts was 92.4 as compared with 89.9 for 1949.

Grades of middling and higher accounted for 60 per cent of the 1950 crop as compared with 48 per cent for the corresponding period in 1949. The largest increase was in the proportion of cotton grading middling which accounted for 51.4 per cent of the 1950 ginnings and 40.4 per cent of the 1949 crop. The largest decrease was in the grade of low middling which accounted for only 4.7 per cent of the 1950 crop as compared with 12.3 per cent for 1949. The percentage of spotted cotton increased from 2.8 in 1949 to 4.6 in 1950.

The percentage of cotton ginned in Louisiana reduced in grade because of rough preparation during 1950 was 4.5 as compared with 5.8 for the corresponding period in 1949. Louisiana is the only state in the South Central area which had a decrease in the proportion of cotton reduced in grade because of rough preparation.

The average staple length in thirty-seconds inches is expected to be longer for the 1950 crop, 34.1 as compared with 33.9 for 1949, 33.5 for 1948, and 33.1 for 1947. Staple lengths of 1-1/32 inches through 1-3/32 inches comprised 97 per cent of the ginnings in 1950 and 93 per cent for the same period in 1949. The largest increase was in the proportion of ginnings 1-1/16 inches which accounted for 63 per cent as compared with 51 per cent in 1949. —JAMES F. HUDSON AND R. O. SLAY.

Cotton Classing and Market News—The Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration in providing a free cotton classing and market news
service for eligible producers in Louisiana. The service is provided for by a federal law, commonly known as the Smith-Doxey Act, and has been available to Louisiana growers since 1938. Use of the service has increased the effectiveness of farmers in bargaining for the sale of their cotton, and has encouraged the production of improved varieties.

Membership in Smith-Doxey cotton improvement groups increased from 1,444 in 1939 to 28,468 in 1950. These members planted 648,624 acres of cotton in 1950, of which 586,728 acres were of the approved variety.

There were 36 approved producer groups in Louisiana in 1950. Through these groups the majority of the producers in the state were eligible to receive free cotton classing and market news service. The groups were located in 31 parishes, of which 23 had single parish-wide groups; four had parish-wide groups consisting of two groups; one had two small community groups; and three parishes had one small community group each.

The percentage of the total state cotton production classed for eligible groups increased from 0.1 per cent in 1939 to a high of 48 per cent in 1949. Estimates based on actual participation to January 8, 1951, indicate that approximately 25 per cent of the total ginnings of the 1950 crop will be classed. The decrease in 1950 was due to a short crop and a very favorable price situation during the harvesting season. —James F. Hudson and R. O. Slay.

Cotton Ginning—The results of a study of cotton ginning made during the 1948 and 1949 seasons in South Louisiana in cooperation with the United States Ginning Laboratory emphasize the necessity for adequate drying capacity in this area. The findings of the study indicate that every gin in the area should be equipped with a 24-shelf tower drier or its equivalent in drying capacity. Gins that handle appreciable amounts of green, very damp cotton should also have an additional drier or at least an additional heater for applying heat to the seed cotton in the overhead cleaners or feeders, depending on the equipment in use. From a cleaning standpoint, gins should be equipped with modern huller front gin stands, extractor feeders or multiple unit extractors, and one overhead cleaner. Drying and cleaning combinations of this type could perform a creditable job of ginning on most of the cotton harvested in the South Louisiana area. However, it was found that potential benefits from drying, cleaning, and extracting cannot be fully realized unless timely repairs and replacement of saws, ribs, and the doffing mechanism of the gin stands are made, and unless the producer and management insist upon operating practices that insure loose seed rolls which are basic to smooth ginning.

Results of the study show that under normal weather conditions in the area standard or modern gins equipped with drying
facilities and auxiliary cleaning equipment produced lint with a seasonal average value per bale of $2.50 higher than cotton ginned at substandard gins equipped with big drum feeders and without driers. By adjusting bale values to measure the difference due to rough preparation alone, it was found that standard gins produced lint with a per bale value of $3.36 higher than gins without driers. The increased cost of ginning incurred by the standard gins in providing the additional facilities necessary to obtain the higher values ranged from $0.30 to $3.50 per bale depending upon the volume of cotton ginned. However, because of the larger volumes of cotton ginned by the standard plants, they were able to more than offset these additional costs and operated as a group at somewhat lower cost than did the substandard gins.

Results of the study emphasize the direct relationship which exists between the size of plant, volume of cotton ginned, and ginning cost per bale. In view of this relationship it is essential that gin owners carefully weigh any projected capital outlay against anticipated ginning volumes. In addition, gin operators should be on the alert to take advantage of every possible means to reduce operating costs through more efficient operation.

—JAMES F. HUDSON AND ROBERT A. MONTGOMERY.

Adjusting Retail Outlets to Consumer Demand

Peaches—One of the points stressed in peach marketing during the 1950 season was to study the effect of size of prepackaged units on consumer demand during periods of high peach prices. Retail store sales of four-peach packages were compared with sales of eight-peach packages. When peaches were retailed at 23 cents a pound, the sales ratio in number of smaller packages to the larger was 1.4 to 1.0, and in pounds, conversely, 1.0 to 1.1. At 19 cents per pound both the number of packages and pounds purchased were favorable to the larger size in the ratios of 1.0 to 1.3 and 1.0 to 2.0, respectively. At either price the eight-peach package resulted in a larger volume of peaches being sold.

—J. M. BAKER AND P. L. HAWTHORNE.

Field Peas—During the summer of 1950, a group of North Louisiana peach producers tried growing field peas as a supplementary cash crop. The project was sponsored by a local cooperative association. The yield was good and the quality of the peas was excellent for table use, but available markets were inadequate. Four cents a pound at the cannery less two cents for hauling left little for the producer. Eight cents at the retail store was better but the quantity taken was too limited. It was obvious that the problem was to

* Agricultural Economist, Research and Testing Division, Cotton Branch, Production and Marketing Administration, Stoneville, Mississippi.
increase effective consumer demand. Based somewhat on the popularity of fresh field peas as a food item and the averseness of housewives to shelling peas, a project was initiated comprising three objectives: (1) to explore retail markets with new types of packages and displays with the view of increasing consumer demand; (2) to determine the best methods to use in preparing the peas for market and delivering them to the stores; and (3) to evaluate the different methods of marketing in terms of benefits to the pea growers.

The peas were shelled by mechanical means and prepackaged in units of popular size, as indicated by the accompanying picture, and placed in selected retail food stores. To keep the product properly refrigerated was difficult. A continuous temperature ranging from 33° to 40° F. was needed. When transporting the packaged peas in open truck it was necessary to use large insulated boxes containing both dry and moist ice, or to put the packages in master cardboard containers with dry ice enclosed.

The prepackaged shelled peas were favorably received by merchants and consumers. Benefits to producers are indicated by these comparisons: (1) bulk peas delivered to cannery netted two cents a pound, or $40.00 a ton; (2) bulk peas at the retail stores (containers being returned to producer) netted eight cents, or $160.00 a ton; and (3) the same quantity of bulk peas when converted to 900 pounds of shelled peas and prepackaged netted the producer, deducting marketing costs, 19.3 cents a pound, or a total of $173.70. Additional study should contribute further to the improvement of methods and the efficiency of marketing field peas through the fresh market channels.

—J. M. Baker.

Sweet Potatoes—During January, 1950, a study was conducted in selected food stores in Chicago to determine the effect of sizing sweet potatoes on consumer demand. For experimental tests the U.S. No. 1 grade was divided into three prescribed sizes, namely, small, medium, and large. Sixteen stores were carefully selected to give a good cross-section of the retail trade with respect to purchasing power, industry, type of community life, and race. Four were
designated as control stores, and 12 as test stores with four being assigned to each of the respective sizes. During the first week, or pre-test week, U.S. No. 1 sweet potatoes were displayed in all 16 stores and records kept of the value of gross store sales, fruit and vegetable sales, and sweet potato sales. During the second, or test week, U.S. No. 1's were continued in the control stores while each of the sizes was displayed in four test stores.

The influence of sizing sweet potatoes on retail sales was calculated by comparative changes in sales from the first week to the second week. Sales for the three different items measured declined from the first week to the second week. In the four control stores, gross store sales declined 7 per cent, fruit and vegetable sales 15 per cent, and sweet potato sales 35 per cent. The decline of sales in the 12 test stores during the same period and for the same items was 8 per cent, 16 per cent, and 27 per cent, respectively.

The decline in sweet potato sales was much less than the decline in gross sales and fruit and vegetable sales. It was noted also that the decline in sales of the medium size of sweet potatoes was 1 per cent less than that in the sales of the small and large sizes, all of which indicates favorable effects of sizing on sweet potato consumer demand.

—J. M. Baker.

Meat Consumption and Marketing in Baton Rouge

A study of meat distribution in Baton Rouge showed a total consumption in 1949 of nearly 23 million pounds, or about 182 pounds per person. The national average was 173 pounds. About 85 per cent of the meat used in the city moved through local retail markets and food stores; the remainder was purchased directly from wholesale sources by restaurants, institutions, and other large users. Of the 197 markets handling fresh meats, only 17 per cent are classed as very large stores, yet they account for 63 per cent of retail meat sales.

One characteristic of meat consumption in Baton Rouge is the large amount of veal and baby beef eaten in relation to the consumption of heavy beef and other meats. While Baton Rouge consumers used 65 pounds of veal per person in 1949, the average United States consumer ate only about 9 pounds. On the other hand, United States consumption of beef was 64 pounds, but in Baton Rouge only 27 pounds. This large difference is accounted for in part by the preference for veal and baby beef in this area, the scarcity of well-finished heavy beef, and the custom of the local meat trade to call most baby beef "veal." Baton Rouge consumers also ate 63 pounds of fresh and cured pork, 25 pounds of poultry, and about 1 pound of lamb and mutton. United States consumption for these items was 68, 29, and 4 pounds, respectively. About 41 per cent of the beef and veal handled by retail distributors in Baton Rouge is
slaughtered locally, while 59 per cent comes from plants outside the area, mainly national packers. —Henry J. Casso.

The Demand for and the Supply of Farms for Sale

The demand for farm real estate in Louisiana has increased since the outbreak of war in Korea and is likely to continue above normal until the outlook for peace has improved. In addition to the normal demand for farms from tenant farmers who reach the farm acquisition stage in their financial progress, many owner operators want to buy adjoining lands in order to utilize more efficiently their increased input of capital in the form of machinery and livestock. Urban residents with savings available for investment are interested frequently in buying land as a hedge against the anticipated further decreased purchasing power of the dollar. There is also a current demand from people living in industrial centers for small rural tracts to use as a haven of refuge. The wide publicity given to the devastating power of atomic weapons suggests the advantage of a place in the country where women and children might live, if a major war should come.

On the supply side, the number of farms for sale is below normal because farming is profitable, provides protection from inflation, and the farm home provides a relatively safe place to live. The supply of tracts in the country suitable for residence purposes is expansible, but the supply of tracts having habitable dwellings and for sale is limited.

As a result of increased demands for farm real estate and the less than normal supply, the farms sold in Louisiana, as in most other states, commanded higher prices during 1950. Lands in Louisiana that were sold during 1950 cost more than two times the price they would have brought in 1939. Land prices may be expected to rise still higher, depending to a considerable extent on the relation of the controls imposed on prices received by farmers to the cost of goods and services farmers must buy in order to produce. However, the number of sales of commercial farms under present conditions is expected to be very low. Government controls on the price of farm lands are not anticipated. —Bueford M. Gile.
Agricultural Engineering

Anhydrous Ammonia Fertilizer Equipment

Laboratory tests during the past year have brought out many of the reasons for inaccuracies in the application of anhydrous ammonia. The size of the opening in commercial applicator feet as measured this past season was found to vary from 3/64 to 1/4 inch. Inserting unions or their fittings into a hose line, thereby reducing the diameter, and using hose lines of different size and length between regulator manifold and applicator feet, each gave uneven delivery of anhydrous ammonia. Manifolds made up of pipe nipples and tees gave unequal distribution. Variations as high as 60 per cent were found between the different applicator feet when six different makes were used on a pasture unit. Tests of regulators on quantities above the capacity for which they were calibrated showed inaccuracies of from 50 to 100 per cent.

In order to remove some of the causes of inaccuracies, drill holes in applicator feet out to at least 1/4 inch and have all delivery hoses of the same length and diameter and free of loose particles; be sure that the diameter of the delivery line at no point is smaller than the orifice diameter. Before starting the season, be sure that metering valve is working properly and that there is no scale in valve and pipe lines.

Spring-trip applicator feet have not been found necessary for side-dressing of row crops. When applying anhydrous ammonia in orchards, meadows or new ground a spring-trip applicator is desirable.

Cotton Mechanization

Experimental work conducted in cooperation with the Department of Plant Pathology has included pre-emergence sprays, post-emergence directed sprays, and flame cultivation as weed control in cotton production. The necessity for careful cultivation was apparent in all tests. Any disturbance of treated area of the drill exposes new weed seeds and reduces the effectiveness of the chemical sprays.

Mechanical tillage of the middles, or untreated portion of the row, should be frequent enough so that very shallow cultivation will give complete kill of the weeds present. Ordinarily, two or three cultivations will be required between the time the pre-emergence spray is applied and the first post-emergence spray. These and all subsequent operations should be conducted so that the seedbed will maintain its original shape as nearly as possible.
Particular emphasis should be given to the shoulder area of the row to prevent formation of ridges or depressions that will interfere with the application of post-emergence sprays and flame cultivation. At no time should fresh soil be thrown on the treated area of the seedbed.

As soon as the cotton reaches the size permitting flame cultivation, flaming should be utilized for continued control of weeds in the drill area.

—Lawrence E. Creasy and L. E. Cowart.

Seed-Piece and Mechanization Studies of Industrial Sweet Potatoes

In 1950 industrial type varieties were increased and tested at Chase, Louisiana. Seedlings and varieties transplanted from vine cuttings on May 31 yielded over 500 bushels of sweet potatoes per acre. Small whole-root plantings of Whitestar and L-244 yielded significantly less than slips of the same variety or seedlings. L-244 was found unsuitable to plant as small whole roots or seed-pieces because it sprouts much later than other industrial type varieties. Storage studies were made using two-ounce seed-pieces of Heartogold and Whitestar. Semesan Bel and Semesan Bel plus wax dip gave a very low incidence of rots, whereas the checks (untreated) had over 30 per cent of the seed pieces rotted.

A machine for digging, cleaning, and loading, all in one operation, the industrial type of sweet potato was designed, built, and tested this past season. The machine utilizes a standard Irish potato digger shovel and elevator chain, but deposits the potatoes from the elevator chain into a rotary barrel tumbler that completely separates the dirt from the potatoes. From the tumbler the potatoes go to a side elevator where they are delivered to a cart or wagon pulled alongside the harvester. The harvester also incorporates a shaver and disks that remove the vines from the row before digging. The machine is tractor mounted and hydraulically controlled. It is estimated that this harvester will do the work of 30 men when compared to the present methods of digging, hand gathering, and loading.

Testing on the second model of this harvester will be done next season so that all minor difficulties can be eliminated before the design is released for manufacture.

—Wiley D. Poole and Teme Hernandez.*

Sweet Potato Machinery and Equipment

Tests were conducted to determine a suitable method to replace the hand operation of hoeing sweet potato plants. The following

---

*A staff member of the Department of Horticulture, Experiment Station, collaborating with the Department of Agricultural Engineering.
methods were tried: flame cultivation, pre-emergence sprays, and post-emergence sprays.

Results of the flame cultivation tests showed that sweet potato plants cannot stand the heat from the flame burners required to kill grass and weeds in the row.

For pre-planting weed and grass control, tests were conducted using a chemical weed killer ("Pre-merge," manufactured by Dow Chemical Co.). The spray was applied at the rate of six pounds per acre in 50 gallons of water six days before setting the plants. Treated plots showed an increase in yield of 25 per cent as compared to unhoed check plots. Disadvantage of this method is that transplanting must be done by hand, as a transplanter opener would disturb too much of the soil between plants, thereby nullifying the effects of the chemical.

As a post-emergence spray a light oil (LHH1 by Lyon Oil Co.) was applied on the ground in the drill adjacent to sweet potato plants approximately 10 days after setting. Applications of 5, 10, and 15 gallons per acre were made as a drill spray.

One year's results indicate that a light oil spray can replace hoeing of sweet potato plants. One treatment of 10 gallons per acre gave complete control and two treatments of 10 gallons per acre were applied without damage to plants. One application of 15 gallons per acre gave complete weed control but also some stem damage to the plants. A treatment of 5 gallons per acre gave a fairly good
control but not complete control over all weeds. Two treatments of 5 gallons per acre gave good weed control.

First factory production model of the small sweet potato digger was tested and some small corrections were recommended for the final machine. The hydraulic control features coupled with the complete tractor-mounted idea provided excellent handling in small fields.

—WILEY D. POOLE.

Harvesting and Curing of Hay

Tests were conducted on the harvesting and barn curing of hay. It was found advisable to dry hay in the field down to about 35 per cent moisture before chopping it for barn drying. This means that hay must be cut in the afternoon of one day and picked up and chopped in the afternoon of the following day. The hay was blown into the curing chamber where warm air was used to cure it. The quantity of air blown through the hay amounted to about 20 CFM per sq. ft. of floor area. It was found that chopped hay can be put on the drier to a depth of about 10 feet if not walked on while loading. Handling and curing hay in the chopped form shows promise of success with little labor, but this method requires a higher investment in machinery. The best method for emptying the drier seemed to be to use the blower and blow hay into an adjacent barn for storage or feeding.

Barn curing tests were made on baled Alyce clover hay. An automatic one-man baler was used and set to bale as loose bales as possible and still allow some handling without breaking up of the bales. Hay of two different moisture contents was tried on the barn drier using heated air at a rate of about 20 CFM per sq. ft. of floor area. Slatted floor type of drier was used.

Hay that had a moisture content of 42 per cent when baled molded during the barn curing process. This was particularly true at the spots where the bales touched each other. Two-inch air spaces were left on the sides and ends of each bale and the tiers staggered. Hay baled at 25 to 28 per cent moisture showed no mold during barn curing and resulted in a fine quality of hay. In both cases heated air was blown through the hay for approximately 75 to 85 hours, with the bales stacked five tiers high. Difficulty was experienced with the baler in baling the 42 per cent moisture hay.

—WILEY D. POOLE AND H. T. BARR.

The Use of Ozone for Processing Small Grains

Experiments were started during 1950 to obtain data on the effects of ozone on rough rice when applied during drying and storage. The value as a drying agent and effect on milling quality, germination, and rodent and insect control are each under study.
The first year's data reveal that ozone has very little or no effect on drying, little or no effect on germination, and some effect on the milling quality of rice. There was a slight increase in the milling quality of ozone-dried rice over ordinary air-dried rice. The increase ranged from 2.4 per cent to 4.86 per cent whole kernels, or an average increase of 3.67 per cent whole kernels for five tests on Rexoro rice. For four tests on Blue Rose rice, the increase ranged from 2.50 per cent to 5.02 per cent, or an average increase of 3.29 per cent whole kernels. The over-all average increase for the nine tests was 3.51 per cent whole kernels after milling. The rice used in each of these tests was dried to about 14 per cent moisture, wet basis.

Further investigations on other small grains, clovers, and grasses will be made during the next year, with some checks on the effect of ozone on molds, fungi, insects, and rodents.


Rice Drying with Radio-Frequency Heat

This project is a joint undertaking of the Louisiana Experiment Station and the U. S. Department of Agriculture, Agricultural Engineering Research. A study of the effects of the radio-frequency electric field upon rough rice is being conducted to determine the worth of applied dielectric heating in the rice drying and storage processes.

Some advantage in drying rates is indicated by the work thus far; however, these results are not as yet conclusive, and economics of a practical application are yet to be investigated. Germination and milling quality of the dried rice appear to be influenced by temperature and drying rates in much the same way as the conventional warm air drying methods. Effects of the electric field upon mold spores and bacteria are also being studied.

—Finis T. Wratten.

Dallis Grass and Clover Seed Drying

A laboratory study was made of different methods of drying Dallis grass and clover seed and the effect on germination. Also, a study was made on present harvesting and processing methods and troubles.

Air temperatures up to 130 degrees F. in a forced heated air drying system can be used for drying Dallis grass seed without injury to the seed. Preliminary results indicate that infrared and high frequency drying decreases germination slightly.

The methods used to harvest Dallis grass seed are: (1) Cut with a mower, allow to dry one or two days, then combine from the swath or windrow. Disadvantages are that with the high and
frequent rainfall in Louisiana, the farmer takes a great risk of losing all of his seed or obtaining poor quality seed; also shattering and high cost of harvesting. (2) Straight combining. Disadvantages are: the seed contain a high moisture content at harvest, particularly the first and second harvests, and in bulk will heat up in less than an hour. The seed have to be spread out on a floor or tarp to dry, and require stirring every two or three hours to prevent overheating until the seed are dry enough for storage.

Temperatures up to 150 degrees F. can be used to dry white clover seed with little detrimental effect on the germination. Samples of clover hay containing florets were run through a hammer mill after artificially drying, and the regular germination of these samples averaged considerably higher than the check samples which were sun dried. However, there was very little difference in the total germination.

—Joseph C. Newell.

Drainage for Sugar Cane Land

Research work on drainage for sugar land is being conducted jointly by the U.S.D.A. Soil Conservation Service Research and the Louisiana Agricultural Experiment Station. This year concludes four years of data on the grading of land for sugar cane by turtle-backing.

One hundred and five acres have been under test on black land, light land and sandy land. Sugar cane varieties grown were C.P.
Nos. 34-120, 29-120, 36-105, and 36-13. The average increase of cane per acre on these test areas for the four years has been 5.81 standard tons of cane.

The importance of precision grading is again evidenced in the yield data for 1950. For three years there has been an average of 5.5 standard tons per acre increase from areas with no pondage over that with 52 per cent ponded two inches and over.

In order to get more precision in grading of sugar cane land, we experimented with the use of a floating type land leveler this past season, supplementing the land leveler with some scraper work. Techniques have been developed where a precision job of grading can be accomplished with 4½ hours of equipment operation per acre.

Work was continued with a specially equipped wheel-type trencher for cutting lateral sugar cane ditches. Tests this past season showed the following on new ditches: on heavy soil the machine cut 7.7 feet per minute and on lighter soils 10 feet per minute. This is a new ditch 36 inches deep, 52 inches wide at the top, and 20 inches wide at the bottom.

—Irwin L. Saveson.

Research in Building Materials from Farm Residues

The studies during the past year on farm residues for building materials were confined to bagasse, sawdust, and rice hulls. Sugar cane bagasse received most attention. Structural boards, specimens 3/8 inch and 1/4 inch thick, were made using thermosetting resins in various proportions with bagasse, sawdust, and shavings. Tensile strengths ranged from 430 to 3,725 P.S.I., with flexural strength following the same trend but ranging 65 per cent higher than the tensile strength. The nail holding ability was comparatively high for lateral movement of nails but low for direct withdrawal. Panels containing less than 15 per cent resin were unable to withstand the "Forest Products Laboratory" accelerated aging test.

The different panels show promise for such purposes as interior panelling, cabinet making, furniture manufacturing, and other uses that do not require excessive loads.

—John S. Norton.
Animal Industry

Breeding a Meat Type Hog for Louisiana

In a changing economy competition from vegetable fats has reduced the price of lard until it is not economically feasible to produce more than the minimum amount necessary for the health of the animal and to make the lean cuts attractive. This is particularly true in Louisiana where a mild winter and warm summer climate further reduces the desire and necessity for fat in the human diet.

In 1949 two “meat type” hogs, a boar and a bred sow, developed by the Bureau of Animal Industry at Beltsville, Maryland, were obtained. These animals were derived from a Danish Landrace-English Large Black cross and now breed true. They are ¾ Landrace-¼ Large Black. Maintained as purebreds at this station, they make rapid gains and produce a desirable carcass but have not been very prolific. These animals are being maintained and selection for greater fecundity practiced.

The Beltsville boar was bred to a Hampshire-Poland China-Duroc sow, to produce a litter in March, 1950. Of 10 pigs farrowed, 8 were raised to maturity. At 56 days this litter weighed 390 pounds, or an average of 48.7 pounds per pig. Seven selected purebred litters had an average 56-day litter weight of 35.6 pounds per pig. The mating was repeated and in September a litter of 9 pigs was farrowed and raised. This 56-day weight was 344 pounds, or an average of 38.2 pounds per pig.

Four of the best gilts and the best boar were saved from the first litter. The boar was bred to his sisters to farrow in March, 1951. The best gilts are being retained from the fall litter. From this nucleus an attempt will be made to develop a meat type hog adapted to Louisiana. —J. F. Kidwell and C. B. Singletary.

The Value of Shelters and Wallows in Fattening Swine in Summer

The two trials conducted during the summers of 1948 and 1949 proved that providing sanitary wallows as a cooling system for fattening hogs in summer lowered the body temperatures and increased the rate of gain and economy of feed utilization. The unsanitary mud wallows produced definite detrimental effects on the health of the pigs. Serious skin eruptions were prevalent among all the pigs in the mud wallow lot.

In 1950 a similar trial was run with one exception. A wet
shade type shelter was substituted for the mud wallow lot. This type of cooling system was produced by installing fine mist-producing nozzles attached to a water pipe suspended from the ceiling of a temporary shelter with a straw covered roof that was set up over a well-drained concrete floor. The following results were noted:

1. The average body temperature of the pigs provided with a wet shade type shelter was two degrees lower than that of the pigs in the dry lot (no wallow).

2. Hogs having access to the wet shade shelter (fine mist spray) made greater gains and more economical gains than those in the sanitary wallow lot and the dry lot.

3. Hogs without artificial cooling facilities had an extremely high respiration rate as compared to those with the wallow and fine spray system.

4. Hogs not provided with some method of cooling lie in the shade during the day and feed at night. Consequently very unsatisfactory gains are produced.

—C. B. Singletary.

Improvement of Beef Cattle for the Southern Area

Thirteen southern states and the Bureau of Animal Industry, USDA, are cooperatively engaged in a project seeking to genetically improve beef cattle in the southern region by application of breeding practices. Work in Louisiana is aimed at discovering the maximum efficiency of crossbreeding with particular emphasis on the
optimum use of Brahman cattle. Breeding experiments with cattle are necessarily slow, and therefore no experimental results are available. However, considerable progress has been made in the acquisition of cattle and facilities. The project is presently being conducted at four locations in Louisiana.

The Iberia Livestock Experiment Farm at Jeanerette is cooperating with this station. A herd of purebred Brahmans as well as various Brahman-Angus crosses are maintained and compared. Promising bull calves are individually fed and future herd sires selected on the basis of rate and economy of gain. Steer calves from this herd are fed at Baton Rouge and tested for rate of gain and carcass quality.

At Baton Rouge a 300-acre pasture area has been divided into six 50-acre breeding and calving pastures. A herd of approximately 160 cows is allotted among six bulls, each of a different purebred or cross. These include Hereford, Angus, Shorthorn, Brahman, Charbray and Africander-Angus crosses. High grade or purebred lines of Hereford, Angus and Brahman and an inter se bred line of Africander-Angus are maintained for comparison. The 1951 breeding season will be the first year of complete operation of this project.

The North Louisiana Experiment Station at Calhoun maintains a small herd of Devon cattle and a small herd derived from an Africander-Angus cross. Last year reciprocal crosses were made and these calves will be available for study this year.

The North Louisiana Hill Farm Experiment Station at Homer has fenced an area of about 300 acres for beef cattle work. No definite breeding program has been formulated yet for this Station. However, this question will be decided and work initiated during the coming year.


Alluvial Land Pastures

A comparative study of the grazing value of Dallis and carpet grasses was conducted on two 6-acre pastures of river bottom land at Baton Rouge during the spring and summer of 1950. Lot 1 had a 90 per cent stand of Dallis grass as compared to a solid stand of carpet grass in Lot 2. The details of this test are as follows:

<table>
<thead>
<tr>
<th>Lot</th>
<th>Cattle</th>
<th>No. of Days Grazed</th>
<th>Gain per Head</th>
<th>Ave. Daily Gain per Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dallis grass</td>
<td>4</td>
<td>138</td>
<td>212 lbs.</td>
</tr>
<tr>
<td>2</td>
<td>Carpet grass</td>
<td>4</td>
<td>138</td>
<td>183 lbs.</td>
</tr>
</tbody>
</table>
A third 6-acre pasture in this river bottom plot which had been our highest producing clover pasture through 1946, was non-productive from a clover standpoint in 1947. No response was obtained from a top-dressing of phosphate and potash in 1948. The pasture was practically all carpet grass. In the fall of 1949 this plot was plowed and fertilized with 300 pounds of 4-12-8 per acre before seeding to oats, alsike clover, Ladino clover and Red Top. An excellent stand of clover was evident in the spring of 1950, and 10 head of 600-pound steers made high gains from March 30 through June 28. The number of steers grazing was reduced to 6 head on this date, and the pasture continued to produce satisfactory gains until October 11. The information obtained from this project is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total gain per acre</td>
<td>385 lbs.</td>
</tr>
<tr>
<td>Animal days per acre</td>
<td>260</td>
</tr>
<tr>
<td>Average daily gain per head</td>
<td>1.48 lbs.</td>
</tr>
</tbody>
</table>

It is evident that a top-dressing of fertilizer on old sod is not economical. The heavy type soils of the river bottoms should be completely broken and reseeded every fourth year to produce the maximum benefits. —C. B. Singletary and S. E. McCraine.

**Sweet Sudan Grass as a Supplementary Pasture for Beef Cattle**

A six-acre check pasture that had produced very low gains on beef cattle for the past three years was broken and seeded to 30 pounds of sweet Sudan on May 1, 1950. No fertilizer treatment was used on this plot, and the cost of seed was $3.08 per acre.

In spite of an unusually dry season from June through Sep-
tember this pasture produced a large yield of forage that was very palatable to the livestock.

Sweet Sudan produces a heavy yield of palatable forage during dry summer months.

An average of six yearling steers grazed from June 12, 1950, to August 1, and again from September 7 through October 11, 1950.

Complete results of this trial are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of cattle</td>
<td>6.00</td>
</tr>
<tr>
<td>Number of days grazed</td>
<td>84.00</td>
</tr>
<tr>
<td>Average initial weight</td>
<td>503.00 pounds</td>
</tr>
<tr>
<td>Average final weight</td>
<td>699.00 pounds</td>
</tr>
<tr>
<td>Average gain per head</td>
<td>196.00 pounds</td>
</tr>
<tr>
<td>Average daily gain</td>
<td>2.33 pounds</td>
</tr>
<tr>
<td>Cost of establishing pasture</td>
<td>$10.00 per acre</td>
</tr>
<tr>
<td>Net profit</td>
<td>$36.84 per acre</td>
</tr>
</tbody>
</table>

—C. B. Singletary and S. E. McCraine.

Crossbreeding Swine

A continuous three-way crossbreeding program was initiated by the late Dr. C. I. Bray and has been in effect for ten years. The three breeds are Hampshire, Poland China and Duroc. An example of the first cycle of the cross follows:
Thus only the crossbred sows are saved for breeding. A purebred boar is used each time. In this way hybrid vigor is utilized twice. First, the crossbred sows themselves exhibit hybrid vigor in bearing larger litters, giving more milk, and “mothering” the pigs to better advantage. Secondly, the crossbred pigs they bear are larger, stronger, more vigorous and tend to grow faster.

A continuous three-way cross would appear to show possibilities of greater profit in commercial pork production if prudent judgment is exercised.

A comparison of the records of our three-way crossbreds and our best purebred Durocs from 1945 through 1950 follows:

<table>
<thead>
<tr>
<th></th>
<th>Ave. No. Farrowed</th>
<th>Ave. No. Raised</th>
<th>Ave. 56-Day Pig Weight</th>
<th>Ave. 56-Day Litter Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossbred Litters</td>
<td>9.7</td>
<td>8.9</td>
<td>39.4</td>
<td>351</td>
</tr>
<tr>
<td>Production Registry</td>
<td>9.8</td>
<td>8.6</td>
<td>37.5</td>
<td>323</td>
</tr>
</tbody>
</table>

—J. F. KIDWELL and C. B. SINGLETARY.

Selection and Improvement of Duroc Swine

The Duroc herd of 12 sows made an excellent record for the fall farrowing season of 1950. Out of 12 litters farrowed 66.6 per cent qualified as Production Registry litters. This achievement is identical with the record made in 1947 when the Duroc herd was acclaimed the first production accredited herd of any breed. Ninety per cent of the pigs farrowed were raised to weaning age of eight weeks. This record can be attributed to sound management and selective breeding practices.

A certificate of special merit was received from the Duroc Association for the herd improvement record made in 1950.

—C. B. SINGLETARY.
Crops and Soils

Fertilizers for Sugar Cane

The areas selected in 1950 for the study of the effect of various mixtures of fertilizer on the growth of sugar cane were principally those where responses to phosphorus and potassium had not been obtained in previous studies. These soils were primarily the heavier, more fertile ones.

The response to nitrogen was the outstanding feature in all of these tests. Even where yields as high as 30 to 40 tons were obtained without fertilizer, there was still a response to 60 pounds of nitrogen. In cases such as on a Sharkey clay where yields were very low there was an even greater increase in yield due to the addition of 60 pounds of nitrogen per acre.

Eighty pounds of nitrogen were used with good effects on Commerce silty clay loam on the Mississippi River.

Levels as high as 100 pounds of nitrogen with 40 pounds of phosphate and 60 pounds of potassium were used to good effect on Mhoon clay loam at Little Texas plantation.

Where second stubble cane was grown on an intermediate textured soil, an Iberia silt loam at Katy plantation, the addition of phosphorus and potassium resulted in a 3.5-ton increase in yield above that obtained from 80 pounds of nitrogen alone. Cane grown on this soil responded favorably to the application of more than 60 pounds of nitrogen.

Minor elements did not affect the yield of cane on a heavy organic soil at Lockport. Dolomite lime was of no value, and while yields were high, there was no response to any form of fertilization.

Two source of nitrogen tests were conducted in 1950. One was on Iberia silt loam at Franklin, the other on Mhoon clay loam at Napoleonville. So far as this and previous tests have shown, there appears to be little difference in the yield of sugar cane due to the source of nitrogen. Price and availability, so far as is now known, are the most important factors to be considered in selecting the nitrogen material to be used.

—Jack D. DeMent and M. B. Sturgis.

The Effect of Split Applications of Nitrogen as Anhydrous Ammonia on the Yield of Sugar Cane

The value of split applications of nitrogen was tested at four locations on pleistocene terrace and old alluvial soils of the sugar
cane area. Stubble cane was used in all experiments. Applications of nitrogen were at the 60 and 100 pound levels. The treatments applied at each location included: half of the nitrogen as ammonium nitrate applied in the early spring, followed by the remainder as anhydrous ammonia at layby; half of the nitrogen as ammonium nitrate and the remainder as anhydrous ammonia in early spring; all of the nitrogen as ammonium nitrate in the early spring. Forty pounds of phosphate (P₂O₅) and 60 pounds of potash (K₂O) were included in some of the treatments at both the 60 and 100 pound per acre levels of nitrogen. Where phosphorus and potassium were used they were applied in the early spring.

The highest yielding treatment on a Lintonia silt loam at Youngsville was 100-40-60 with half of the nitrogen applied at layby. This practice yielded slightly more than a four-ton increase over the yield obtained from a 100-40-60 mixture applied early in the spring. The addition of phosphorus and potassium resulted in increased yields, especially at the 100 pound level of nitrogen.

The results of the experiment on Baldwin silt loam indicated strongly that where as much as 100 pounds of nitrogen were applied, there was a more efficient use of the nitrogen from split applications. Where 100 pounds of nitrogen were used, good results were obtained from the use of 40 pounds of phosphate (P₂O₅) and 60 pounds of potassium (K₂O).

Responses to phosphorus and potassium where high levels of nitrogen were applied were especially noticeable in the data from Iberia silty clay loam at St. Martinville. Increases of as much as 19 tons of cane per acre were obtained where phosphorus and potassium were applied with 100 pounds of nitrogen, as compared to a 14-ton increase obtained from 100 pounds of nitrogen alone. Split application of nitrogen was the highest yielding treatment in the test, but splitting the application did not increase the yield of cane statistically over the conventional method of application.

The highest yielding treatment on Iberia silty clay loam at Orange Grove plantation again was from the 100-40-60 mixture in a split application. The increase over the 100-40-60 applied early was very small. There was no statistically significant response to phosphorus and potassium, and the responses to nitrogen were not so pronounced as in the previous studies.

The results of one year's study, while not conclusive, do show that where as much as 100 pounds of nitrogen are used on light and medium textured soils, a split application may be of value. When amounts as small as 60 pounds of nitrogen were used, there was little or no response to splitting the application.

These tests also indicate very clearly that where as much as 80-100 pounds of nitrogen are used on light and medium textured soils, phosphorus and potassium should be applied for best results.

—Jack D. DeMent and M. B. Sturgis.
Cotton Investigations

Trials of commercial cotton varieties, advanced strains, and new strains were conducted in 1940 on five Louisiana Experiment Station farms. These tests were located at Bossier City, Calhoun, Homer, St. Joseph, and Baton Rouge, Louisiana. Detailed reports of each of these tests at these five locations are available and may be obtained by requesting the information from either one of the stations mentioned above.

In a summary of acre yield of lint at three locations—Red River

Three new strains shown in the picture above from the Baton Rouge test in 1950 show the response to selection in a comparative yield trial. The middle row (Deltapine 231-1) produced 1,167 pounds of lint per acre, the left row (D x S-7-39-2) produced 1,001 pounds, and the right row (Stoneville 62-3163) produced 546 pounds. The check variety in the same test produced 816 pounds of lint per acre.

Valley Experiment Station, Bossier City; Northeast Louisiana Experiment Station, St. Joseph; and Louisiana Agricultural Experi-
ement Station, Baton Rouge—it was noted that the relative performance of all varieties at any one station was not the same as at the other two stations. On the other hand, Deltapine 15, Fox and Plains (CSS9) were the most consistent high yielding varieties at these three stations.

A large number of new strains were tested in 1950. In many cases, some of the new strains produced very high acre yield of lint. These high yielding strains appear to offer an excellent opportunity for cotton improvement. —F. W. Self and Jack E. Jones.

Outfield Experiments on Cotton, Corn and Oats

Cotton—The projects on the fertilization of cotton included experiments using commercial grades now recommended for cotton fertilization, experiments on the sodium-potassium relationship in the nutrition of cotton, studies of the effects of calcium and magnesium in the growth of cotton, and studies of the effects of lime, sulphur, and minor elements on cotton.

Increases in yield of seed cotton have been obtained on Almont very fine sandy loam at Oak Ridge, Louisiana, from the application of 600 pounds of 8-8-8 per acre plus 600 pounds of dolomitic lime. At this location the plots receiving no fertilizer produced 806 pounds of seed cotton per acre. From the application of 600 pounds of 8-8-8 the yield was increased 436 pounds. When 600 pounds of 8-8-8 per acre were applied plus 600 pounds of dolomitic lime, the yield was raised to 1,304 pounds per acre. The dolomitic lime was applied before the complete mixture.

Results from an experiment conducted on Lintonia silt loam at Winnsboro, Louisiana, indicate there is a definite deficiency of P₂O₅ and K₂O at this location. It has been the general practice in the area where this experiment was established to apply nitrogen alone in the fertilization of cotton. As a result of this experiment and three years work prior to this, it has been found that complete mixtures of 6-8-8 or 8-8-8, at the rate of 600 pounds per acre, have given the highest yields. Further increases in yields have also been obtained from applying dolomitic lime at the rate of 600 pounds per acre in addition to the complete mixtures.

Experiments for studying the role of sodium as a nutrient element in the growth of cotton, particularly the ability of sodium to substitute for potassium, have been conducted for four years on six different soil types at eleven locations. On soils deficient in potassium, nitrate of soda gave higher yields than ammonium nitrate when applied alone or in combination with phosphate. In nine out of the eleven experiments, nitrate of soda in combination with phosphate and potash gave higher yields than ammonium nitrate. In 1950 the addition of sodium to complete mixtures containing ammo-
nium nitrate, superphosphate, and muriate of potash did not increase the yield of cotton significantly.

The results of the study in 1949 on the effects of lime, sulphur, and minor elements on cotton, conducted at the North Louisiana Hill Farm Experiment Station on Norfolk loamy sand, show that liming with the application of sulphur, borax, and copper sulfate in the 8-8-8 mixture produced the highest yield of seed cotton. At this location 422 pounds of seed cotton per acre were obtained from the application of 600 pounds of 8-8-8. When 600 pounds of 8-8-8 plus 1,000 pounds of dolomitic lime, 320 pounds of sulphur, 5 pounds of borax, and 5 pounds of copper sulfate per acre were applied, the yield was increased 866 pounds per acre. The average yield of seed cotton per acre obtained from this treatment was 1,288 pounds. The data obtained in 1950 from the second-year study show no response from any of the minor elements applied.

**Corn**—Field experiments on corn were conducted in cooperation with individual growers under ordinary farm conditions. Four different soil types were selected in establishing these experiments. The nitrogen was applied at the rates of 48, 72, and 96 pounds per acre. The nitrogen was applied as side-dressing, and with complete mixtures of 5-10-10 applied before planting.

The highest yield obtained in 1950 was 96.7 bushels from the application of 300 pounds of 5-10-10 per acre, plus 81 pounds of nitrogen as side-dressing to corn on Olivier silt loam at Opelousas. Nitrogen applications profitably increased the yield in all experiments; however, in all the tests the highest yields resulted where phosphate and potash were also added. In two experiments, one on Olivier silt loam at Opelousas and the other on Olivier silt loam at Winnboro, there were significant responses to phosphate and potash. Only in one other experiment conducted several years ago was a response to potash reported in corn fertilization in this state.

**Oats**—A five-year study has been made on the fertilizer recommendations for four soil types in this state. The results of these experiments have shown that high yields of oats have been obtained on alluvial soils by applying 48 to 64 pounds of nitrogen as top-dressing. On soils of the coastal plains, coastal prairies, Mississippi terrace and on the lighter alluvial soils, the best yields have been obtained from the application of 300 pounds of an 8-8-8, 6-8-8, or 5-10-10 mixture per acre, plus 32 pounds of nitrogen.


**The Soil Testing Laboratory**

During 1950 the laboratory received and analyzed 6,400 samples of soil. This was an increase of about 50 per cent over the number received the previous year. The laboratory will be able to handle
a greater number of samples in 1951 because of addition of some new equipment and changes in methods of analyzing samples. These changes and additions will enable the laboratory to get the results and recommendations to the farmer more quickly and help meet the demand for soil testing.

Experiments are being continued in the Red and Mississippi River bottom soils to determine the response of winter legumes to applications of phosphorus and potassium in these alluvial soils and to correlate this response with the analysis of soils. Two tests were conducted in Avoyelles Parish near Moreauville in the 1949-50 season on Yahola very fine sandy loam soil. Good growths of legumes were obtained in these tests, but there was no response from the use of phosphorus or potassium. The soil in these tests contained 150 p.p.m. of available phosphorus and 66 and 96 p.p.m. of available potassium.

On a Yahola very fine sandy loam soil at Alexandria, good response was obtained from the application of phosphorus, but none was obtained from the use of potassium. The soil contained 100 p.p.m. of available phosphorus in the surface soil and 50 p.p.m. in the subsoil. The available potassium was 81 and 77 p.p.m. in the surface and subsoil, respectively.

On a Mhoon silty clay loam soil at Batchelor in Pointe Coupee Parish, good response was obtained from the use of phosphorus on pasture clovers, but no response was obtained from the use of potassium. The soil contained 50 p.p.m. of available phosphorus, which is low for this soil type. The available potassium was 125 p.p.m., which was sufficient for this soil type.


Microorganisms Involved in Nitrogen Transformations in Soils

The study of microorganisms isolated on nitrogen-free media from soils of the Louisiana rice area has been continued. Tests concluded this year showed that none of the organisms fixed nitrogen in association with the roots of rice seedlings in semi-solid nutrient solution in the laboratory, although some prolonged the life of the seedlings.

The numbers of fungi, bacteria, and algae have been estimated in the soil in immediate contact with the roots of growing rice plants, in the same flooded soil a few feet away from the plants, and in the same soil nearby, but not flooded. Fungi were present in largest numbers in the non-flooded soil; however there were about 200,000 per gram of soil in contact with the rice roots. Most of the fungi were of the genera *Penicillium*, *Fusarium*, and *Aspergillus*. The largest number of bacteria capable of growing on a nitrogen-free medium was found in the flooded soil where plant roots were
not present. Practically all of these were of the genus Clostridium. Azotobacter were not found at any of the three locations. The presence of the rice roots and flooding had no effect on the numbers of algae. The algae present were largely Chlorophyceae; these are not considered important in nitrogen fixation.

Studies are in progress to determine whether the fungi isolated from the soil in contact with the rice roots are capable of utilizing atmospheric nitrogen in soil when supplied with an abundant source of energy. Initial results indicate that small amounts of such nitrogen may be used by some of the fungi.

—W. H. WILLIS AND JOE E. SEDBERRY.

Responses of Cotton, Soybeans, and Lespedeza to
Minor Elements on Ruston Loamy Fine Sand
and Memphis Silt Loam

The limited availability of certain minor elements has been shown to be increasingly important in recent years in the production of larger yields of many crops. In comparison with some of the southeastern states, Louisiana has done very little toward determining these needs. This work is being done to further determine the need for additions of minor elements to Louisiana soils.

Greenhouse experiments were conducted with Ruston loamy fine sand using cotton and soybeans as indicator plants and with Memphis silt loam using lespedeza as an indicator plant to determine responses of these plants to additions of fertilizer, lime, sulphur, zinc, copper, boron, manganese, and other elements. Two-gallon stoneware pots were used, each containing 14.8 pounds of air-dry soil which had passed a one-quarter inch screen. The fertilizers, lime, and other materials used were made from chemically pure reagents and mixed with all of the soil in each pot. The amount was calculated on the acre basis, using 2,000,000 pounds of soil per acre. At the end of the growth period the plants were harvested and the dry weights determined. Three replicates of each treatment were made, and an analysis of variance was determined on the data.

Cotton on Ruston loamy fine sand showed a significant increase in growth from the use of 5 pounds of borax added with an 8-8-8 fertilizer and dolomitic lime. A significant response was also shown from the addition of 400 pounds of magnesium sulphate when the source of lime was calcium carbonate. Higher yields were obtained from the use of sulphur when lime was also added, but a following crop was depressed and the soil was made strongly acid. The benefits from boron and magnesium showed up in the second crop.

Soybeans on Ruston loamy fine sand were less responsive to the use of fertilizer and lime than was cotton. Esminel added with
3-12-12 fertilizer and lime gave a highly significant increase in yield over the check. The use of boron or sulphur together with fertilizer and lime gave an increase in yield over the check that was significant at the 5 per cent level.

Lespedeza on Memphis silt loam showed a highly significant increase in yield from the use of Esminel added with a 3-12-12 fertilizer. Esminel is a commercial mixture of minerals containing 7.81 per cent CuO, 18.41 per cent MnO, 4.46 per cent ZnO, 2.85 per cent Fe₂O₃ and 0.54 per cent B₂O₃. The addition of zinc, copper, boron, molybdenum, iron, and manganese gave a significant increase in yield at the 5 per cent level over fertilizer alone. This increase is due to the addition of manganese to the mixture, since these other elements added together without manganese did not give any increase in yield.

—CHARLES W. McMICHAEL.

A Soil Survey Study of the Soils of St. Mary Parish

Land owners and operators are continually searching for more information on how to improve their crops, increase their crop yields, and profitably utilize all their acres. As the knowledge of soils, crops, and fertilizer uses has increased at a rapid pace during the past 30 years, so have farming practices, crop varieties, and fertilizer uses changed.

A soil survey is now in progress in St. Mary Parish for the purpose of collecting needed, exact physical and chemical information on the soils of this parish. This information may be used for determining the most profitable agricultural uses of the land. It may be incorporated in the recommendations to farmers so that each acre of land may be profitably utilized. This soils information includes the color, texture, and depth of the soils, the areas needing drainage, the land slope, the crop adaptability and crop yields, and other important, observable soil features. Two surveyors are now in the field mapping soils; 113,000 acres of the parish have been surveyed to date.

St. Mary Parish has an area of 605 square miles and is one of the coastal parishes of southern Louisiana. It is one of the largest sugar cane producing parishes of the state. The land area is nearly level, except the gently sloping area along Bayou Teche. Most of the land area of St. Mary Parish, excluding the marshes and swamps, is represented by soils somewhat older than the recent Mississippi River bottom land soils on the east of the Atchafalaya River. This is evidenced in more pronounced development in the layers or horizons that make up the soil profiles. Profile development is not so evident in the more recent Mississippi River bottom land soils. Most of the cultivated soils of St. Mary Parish represent natural levee deposits of older distributaries of the Mississippi or Red Rivers, built
up during the time they followed the course now occupied by Bayou Teche.

In cooperation with the soil survey of St. Mary Parish, C. E. Scarsbrook is conducting experimental studies on the structure and permeability of some of the heavy soils.

A study of the soil minerals of the different soil series is being conducted by B. N. Driskell. This study is to determine the characteristics and origin of the soil materials which make up the profiles. Total analyses of the constituents are also being made. These data are to be used in the correlation of the soil series.

When the soil survey and studies are completed, all information obtained will be published in a report of the United States Department of Agriculture, Bureau of Plant Industry. This report will include a complete, detailed soil map of St. Mary Parish, chemical analyses of the soils, and farm management and fertilizer recommendations. —S. A. Lytle, B. F. Grafton, and A. Ritchie.

Some Chemical and X-Ray Soil Profile Characteristics of the Baldwin, Iberia, and Buxin Series in Relation to Field Classification

There is much interest in the classification of the soils of the lower Mississippi flood plain. Occurring within the same field, side by side, there may be several soil series. The farmers find it difficult to change their fertilization and cultural practices with all of these soil changes. This investigation has been confined to the soils of St. Mary Parish in an attempt to better define and correlate the soil series chemically and mineralogically. In short, the purpose of the investigation has been to determine whether there is any justification for making series separations as shown by field characteristic differences, or whether some of these separations can be combined.

A chemical analysis of the soil constituents in the profiles of Baldwin, Iberia, and Buxin silty clay loams has indicated that these soils are chemically different. The oxides of iron, titanium, and manganese of the Buxin series, in general, occurred in greater amounts than in Iberia. These oxides were lower in all horizons of the Baldwin than in either Buxin or Iberia. The Iberia was highest in calcium oxide, Buxin was highest in magnesium oxide, and the Baldwin was highest in the oxides of potassium and sodium. This indicates that these series are derived from different materials.

Base exchange studies also indicate a difference between these soils. Exchangeable calcium was highest in the Iberia, magnesium highest in the Buxin, and potassium highest in the Baldwin. The base saturation and pH were highest in the Iberia and lowest in the Baldwin. The order of the characteristics also indicates that the
series have originated from different materials or are in different stages of profile development.

The X-ray patterns of the clay fraction of various horizons of the Baldwin, Iberia, and Buxin silty clay loams show the predominating minerals to be quartz and montmorillonite. Small quantities of kaolinite, hydrous-mica and chlorite are detectable.

—B. N. Driskell.

Experiments with New Species, Varieties and Strains of Forage Crops

Red Clover—Soil and climatic conditions greatly influence the growth of red clover. Much greater forage yields were obtained on all varieties and strains of red clover in 1950 as compared to the yields of 1949. The same plots were used in 1950, but were better drained during the latter year. Kenland and Louisiana experimental strains 79 and 714 were outstanding for forage and hay production. Ohio van atta was low in forage production when clipped at intervals during the season to simulate grazing, but produced a better hay and seed crop than the other varieties and strains. Other entries included were: Louisiana red clover, Cumberland, Midland, Wisconsin mildew resistant, and Louisiana strains 717 and 795. There were no appreciable differences between locally adapted strains and varieties introduced from other areas for forage and seed production.

Grass for Winter Grazing—The search for better adapted species, varieties, and strains of grass for winter grazing has been continued. Among those tested during 1950 were rye grass and certain strains of tall fescue. Rye grass was the most productive of forage. The principal weakness of this grass is its susceptibility to rusts which lower the quality of the forage produced. Also it is an annual which does not reseed in this area; consequently it has to be planted each year. Of the strains of tall fescue, a new strain from Kentucky known as Glasgow appeared to be better adapted than either Kentucky 31 or alta. Other species included were chewings fescue and creeping fescue. Neither of these is suitable for pastures in this area. At present it appears that the lack of an adapted winter grass is one of the principal problems for consideration in making plans for year-round pasture. All strains of tall fescue appear to be susceptible to forage diseases which may become serious as this species is more widespread over the state.

Grass for Summer Grazing—Eight different species and strains of summer grasses were harvested six times for forage yields during 1950. These grasses were planted in the spring of 1949, but yields were not taken during that year. From the results of forage harvests in 1950, rhodes grass and Dallis grass (new strain B230) were superior to other entries. Other varieties and strains included were
bahia grass, carpet grass, giant blue panicum, K.R. bluestem, and Dallis grass (strain 430 and strain A). Dallis grass seems to be the only entry in this test that is able to withstand a light freeze and continue to grow. A good stand has not been obtained with giant blue panicum or K.R. bluestem.

**Crimson Clover**—Nine strains of reseeding crimson clover and common crimson clover were harvested twice for forage yields. A hay and seed harvest was made on all entries. From the results of the forage harvests, Watson and Talladega were superior to other entries. Others included were Allen, Thorsby, Dixie, Hardy, Thornton, Common, Autauga, and Auburn.

There were significant differences among the varieties and strains for seed production. Autauga produced an outstanding yield of seed but was low in forage. Watson, while producing excellent forage, was below the average for seed production. Autauga produced 355 pounds of seed per acre, while Watson produced only 134 pounds. The seed was threshed with a nursery thresher, and sampled. The samples were later germinated. There was no difference apparent for germination per cent between any of the strains. Observations are being made on the plots for reseeding during the current season. It has been recognized for some time that the principal criterion for measuring the reseeding ability of crimson clover is field observation following a successful crop.

—C. L. Mondart, Jr., and C. R. Owen.

**New Varieties of White Clover for Louisiana**

Breeding work for the improvement of Louisiana white clover for pasture has been continued. During 1950 the first experiments were conducted for comparing the forage yield of recently developed varieties with that of other known strains of white clover. The results indicate that the two new synthetic varieties that have been formed are better forage producers than either Louisiana white clover or Ladino. As would be expected, there was also a difference between these new varieties in forage production. The variety designated as Synthetic 1 produced 24 per cent more forage than Louisiana white “Dutch,” the parent variety. The total green weight of forage produced by Ladino did not differ significantly from that produced by Louisiana white “Dutch.” These results are for only one season.

A synthetic variety is defined as a variety produced by the combination of selected lines or plants, after which it is allowed to interpollinate normally. The term is especially applied to normally crossfertilized crops. The synthetic varieties of white clover were formed by crossing a number of superior clonal lines which originally were selected from native Louisiana stocks of white clover. A clonal line is the vegetative increase from a single plant selection.
Seed increase block of Louisiana Synthetic variety of white clover which was seeded November 15, 1949, in rows at the rate of less than one pound of seed per acre. Top, left, photographed January, 1950; top, right, same block in following April; lower, the same block in January, 1951.
Tests conducted during 1947, 1948, and 1949 with the clonal lines, which were used to form the synthetic varieties, showed clearly that they were superior to the parent strain. From these tests it was possible to predict fairly well the performance of the variety resulting from the combination. An effort is now being made to increase the seed of Synthetic 1 in such quantities as to be available to farmers as foundation seed for commercial seed production. About 150 pounds of seed were produced at Baton Rouge during 1950. This seed has been planted on the farms of five of the Branch Experiment Stations. The total acreage planted amounts to about 40 acres.

Further experimental work will be necessary to fully evaluate these varieties. During the current season Synthetic 1 will be planted by experiment stations in each of the southern states in a uniform test with other white clover varieties. No grazing trials have been conducted with these varieties. Naturally the value of forage crops can be definitely determined only in terms of animal production. It is hoped this will be possible very soon.

Breeding work is being continued with this species in an effort to make further improvements. A space-planted nursery was transplanted last spring. From this material selections were made during the adverse weather last fall. An effort is being made to develop varieties with more heat resistance than is present in Synthetic 1. This variety exhibits considerably more ability to remain alive during the summer months than the parent variety. Further improvement for this important character is considered desirable and entirely possible.

—C. R. Owen.

New Strains of Dallis Grass to Be Released

Two new strains of Dallis grass which have been developed during the improvement program are ready to be released to farmers for seed production. These strains originated through selection from native grass. Their performance has been superior to other native material for the production of better quality seed and more forage. The performance tests were conducted over a period of five years at Baton Rouge. The quantity of seed on hand for distribution is limited. There will be enough of both strains to plant approximately 150 acres.

Breeding work with Dallis grass is being continued. Plant selection with subsequent progeny testing is under way within certain new strains. The objective is for further improvement in seed quality. Plants were selected for vegetative vigor from three-year-old sod in the spring of 1949. The plants were removed and clonal portions of each were transplanted into separate rows. Seed was harvested from each row during the late summer, threshed, cleaned, and analyzed. Rows producing superior seed were planted in space-planted progeny tests the following spring. Seed was harvested
from these progenies and analyzed for pure seed content. Seed from each progeny are now being germinated to determine the viability of the pure seed.

In the breeding work which has led to the development of the superior strains, the source of the material was fields of native grass. The value of native grass as a source of material for use in improvement programs is recognized. However, it is considered worth while to explore other sources; hence, the experiments with selecting within improved strains. Obviously it is too early to predict the outcome from the experiments under way at this time. The results will no doubt be of help in determining the course to follow in planning the program in the future.

Experiments have been under way during the past two seasons to determine the per cent of florets of Dallis grass which develop seed in the absence of infection from ergot. Clones from five plants each of ten lines were transplanted into the greenhouse in November. They were grown under artificial light during the winter and early spring. The first seed harvest was made February 16 and a second June 3. Counts were made of the total florets on each head and the per cent of florets forming caryopses determined. A wide range existed between the lines for the per cent of florets forming seed. Certain of the lines formed seed in 43 per cent of the florets in February, while others produced seed in only 18 per cent during the same period. The average for the group in February was 27.4 per cent. Seed heads harvested in June were lower in fertility than those harvested in February for all lines. The range in per cent caryopses filled for June was from 5.3 to 26.8. The average per cent florets forming seed for June was 21.4. As was the case the previous year, significant variation existed among the lines for seed set per 100 florets. Most lines were consistent for this factor at both harvest dates. This would indicate further that significant variation for fertility is present within the species. Field experiments with progenies of individual plants selected within strains, which originated from a single plant selection, will give additional information regarding the inherent stability of the individual plants.—C. R. Owen.
Effect of Calcium on Reproduction and Milk Production in Dairy Cows

This phase of nutritional studies with dairy animals was started in 1947. Four grade Jersey cows and 6 grade Jersey heifers were fed a limited amount (6 pounds) of low quality (low Ca, low P) native grass hay along with a simple grain ration containing 3 parts of yellow corn meal, 1 part cottonseed meal, and 1 per cent salt. This ration was fed at a 10 per cent higher level than recommended by Morrison’s standards. Shark liver oil supplied vitamin A, since the animals had no access to pasture. They were bred by artificial insemination. It took three to six services for conception for all animals on this basal ration which resulted in 50 per cent abortions for 1947 and 66 per cent in 1948. All animals were free of Bang’s disease. Heifers having first calves and which did not abort, had calves born dead or very weak. This ration also produced some stiffness in walking, and in some cases, humped back, bent hind leg, swollen leg joints, depression at the base of the tail, and constant tongue licking. The blood picture for plasma Ca, plasma inorganic P, and hemoglobin was normal. In 1949 Ca (oyster shell flour) was supplemented daily to all animals. Only one to two services per conception were required resulting in normal births. The administration of Ca also increased milk production as much as 50 per cent in some cases and maintained this high production until advanced lactation. This year Ca has been fed to milking animals every other month, resulting in an increase in 4 per cent fat corrected milk (F.C.M.) yield for most animals when Ca was fed and a decrease in 4 per cent F.C.M. when Ca was not given.

—L. L. Rusoff.

Crossbred Jersey-Red Sindhi vs. Jersey and Holstein Cattle

Red Sindhi X Jersey crossbred yearlings were compared with purebred Jerseys and Holsteins of the same age as to their reactions to summer weather on the University farm at Baton Rouge. The study was conducted for eight days when air temperatures and relative humidity taken at 2:00 p.m. averaged 89.8° F. and 47.4 per cent, respectively. Body temperatures were recorded and pasture performance was noted on two days.

Results showed the average body temperature of the crossbreds to be significantly lower than that of the Holsteins but not lower
than that of the Jerseys. The Jerseys averaged slightly lower, 0.21° F., than the crossbreds. The crossbred animals were not as sensitive to the direct rays of the sun as were the Holsteins and Jerseys, for they would often lie in the sunshine when the others sought the shade. The Red Sindhi X Jersey animals grazed more than the Jerseys and Holsteins during the daytime but less at night. However, statistical analysis did not reveal any significant difference between the grazing time of the crossbreds and the grazing time of either of the other two breeds. This study is being continued in order to obtain more conclusive data.


Effect of Cooling Cows by Sprinkling on Grazing Performance and Milk Production

Experimental work with cooling dairy cows by sprinkling consistently shows that cows will graze more during the summer months when they have the benefit of a shower. The increased grazing occurs only during the daytime, as the cows without the shower tend to recover the lost grazing time of the daylight hours when allowed to graze at night. During the summer of 1950 (June, July, and August), cows using the shower grazed an average of 31 minutes more per 24 hours than a similar group without the shower.

Sprinkling has been more effective for the Holsteins than for the Jerseys in increasing grazing. The effect on milk yield has not been significant for Jerseys, but the sprinkled Holsteins in 1950 averaged 3.5 pounds more per day than those not sprinkled. Since many factors are uncontrollable under field conditions it can not be said definitely just how much of this increase was due to cooling by sprinkling.


The Effect of a Vitamin B₁₂ Supplement in a Calf Starter for Calves Weaned from Milk at an Early Age

A 19.4 per cent digestible protein calf starter containing additional thiamine, riboflavin, calcium pantothenate, and niacin, but no animal protein, was compared with a similar ration plus a vitamin B₁₂ supplement (A.P.F.) so that the ration contained 10 mg. of vitamin B₁₂ per ton. The vitamin B₁₂ had no effect on Jersey and Holstein calves weaned from whole milk at 28 days of age when gains in weight, height at withers, and feed efficiency were compared at 90 days of age. The average daily gain for the Holstein calves on the basal ration was 1.09 pounds and on the A.P.F. supplemented ration 1.10 pounds; for the Jerseys the values were 0.79
pound and 0.78 pound, respectively. The decrease in growth rate which sometimes occurs after weaning calves from milk at an early age was not prevented by the addition of a vitamin $B_{12}$ supplement.

—L. L. Rusoff and M. O. Haq.

**Antibiotic Feed Supplement (Aureomycin) for Calves**

A 2 per cent level of aureomycin supplement (2.5 mg. of aureomycin per gram) in a simple all-plant protein basal ration increased the growth of Jersey calves, 3½ months of age, by approximately 35 per cent over the control group for the first 6 weeks of the experiment, after which the rate of growth gradually declined. The aureomycin group showed an improved appearance throughout the experimental period.

In this research two groups of 5 Jersey calves each, 14 weeks of age were used. The control group received a basal ration consisting of 1 part cottonseed meal, 3 parts yellow corn meal, 2 per cent bonemeal and 1 per cent salt without aureomycin. The aureomycin group was fed the basal ration containing 2 per cent aureomycin supplement. The animals were allowed some pasture and some medium grade lespedeza hay. The average daily gain per calf after 6 weeks was 1.43 pounds for the aureomycin group and 1.09 pounds for the control group. After 20 weeks the average daily gains were similar for both groups, being 1.66 and 1.65 pounds, respectively.

—L. L. Rusoff.

**Control of Oxidized Flavor Development in Stored Frozen Cream**

The utilization of sweet cream in the manufacture of ice cream is by far the most profitable way of disposing of surplus milk. In Louisiana the production of surplus milk is mostly seasonal and local, and since practically all surplus is produced in city milksheds, the disposal of this milk presents an important economic problem both to producer and manufacturer. The converting of surplus milk into fluid cream (40 to 50 per cent fat) to be stored in the frozen state for future use by the ice cream industry is both practical and profitable. Frozen cream, however, often develops characteristic off-flavors which in most cases are attributed to fat oxidation.

Experiments to control oxidation of fat in stored frozen cream using certain relatively new antioxidants are being conducted. Results of preliminary trials with butylated hydroxyanisol (Tenox, BHA) have been favorable. Pasteurized cream of average quality to which copper was added to induce oxidation was treated with butylated hydroxyanisol and stored at $-10^\circ$ F. for 6 months. Trials with nordihydroguaiaretic acid and other antioxidants are now in progress.

—A. J. Gelpi, Jr. and L. L. Rusoff.

57
Streptomycin and Penicillin Increase the Fertility of Bull Semen

Twenty-nine split ejaculates from eight bulls relatively low in fertility were shipped to 36 technicians who were divided into two equal groups. The semen treatments, which were alternated between the two groups, were as follows: (1) Egg yolk-citrate-sulfanilamide (300 mg. per 100 ml.) and (2) egg yolk-citrate-streptomycin-penicillin (1,000 units of streptomycin and of penicillin per ml.).

Table 1 is a summary of the fertility data on the eight bulls.

<table>
<thead>
<tr>
<th>Bulls</th>
<th>Treatment 1</th>
<th>Treatment 2</th>
<th>Change in Fertility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Services</td>
<td>Per Cent 60-90 Day Non-Retur's</td>
<td>Number Services</td>
</tr>
<tr>
<td>J103</td>
<td>55</td>
<td>47.3</td>
<td>52</td>
</tr>
<tr>
<td>J107</td>
<td>97</td>
<td>57.3</td>
<td>82</td>
</tr>
<tr>
<td>J114</td>
<td>43</td>
<td>44.2</td>
<td>39</td>
</tr>
<tr>
<td>H201</td>
<td>40</td>
<td>47.5</td>
<td>40</td>
</tr>
<tr>
<td>H202</td>
<td>27</td>
<td>48.1</td>
<td>17</td>
</tr>
<tr>
<td>G304</td>
<td>48</td>
<td>66.7</td>
<td>38</td>
</tr>
<tr>
<td>G305</td>
<td>51</td>
<td>54.9</td>
<td>49</td>
</tr>
<tr>
<td>G312</td>
<td>73</td>
<td>54.8</td>
<td>49</td>
</tr>
<tr>
<td>Totals</td>
<td>434</td>
<td>53.6</td>
<td>366</td>
</tr>
</tbody>
</table>

As is shown in Table 1, based on 60-90 day non-returns to 800 first services the fertility level of the semen treated with 300 mg. of sulfanilamide per 100 ml. of extended semen was 53.6 per cent and that which was treated with 1,000 units each of penicillin (Crystalline penicillin G) and streptomycin sulfate per ml. of extended semen was 69.9 per cent. Not only was this difference highly significant statistically under experimental conditions, but it demonstrates the practical importance of adding streptomycin and penicillin to the semen of relatively infertile bulls.

Since the completion of this study streptomycin and penicillin have been added routinely to the semen of all bulls used in artificial breeding at the Dairy Improvement Center. It is a matter of record that this has aided materially in giving the highest levels of fertility since the initiation of the artificial breeding program in Louisiana. Further studies along this line are in progress.

—Cecil Branton, T. E. Patrick, Denis E. Simon, Jr., and M. H. Newsom.

Different Sites of Semen Deposition in the Cow Compared

A study involving 2,014 first services, four sites of semen deposit,
10 experienced technicians, and 34 dairy bulls was made to determine the effect of different sites of semen deposit upon breeding efficiency of dairy cattle. The sites of deposit were as follows:

A. Two-thirds of the semen deposited in the body of the uterus and one-third in the second or third fold of the cervix.
B. Semen deposited in the second or third fold of the cervix.
C. Semen deposited in the body of the uterus.
D. One-half of the semen deposited in each horn of the uterus.
A summary of the fertility data is shown in Table 1.

<table>
<thead>
<tr>
<th>Site of Deposit</th>
<th>Total First Services</th>
<th>Per Cent 60-90 Day Non-Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>503</td>
<td>62.4</td>
</tr>
<tr>
<td>B</td>
<td>500</td>
<td>58.4</td>
</tr>
<tr>
<td>C</td>
<td>500</td>
<td>64.8</td>
</tr>
<tr>
<td>D</td>
<td>511</td>
<td>62.6</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2,014</td>
<td>. .</td>
</tr>
</tbody>
</table>

The differences between treatments (sites of deposit) were not significant when tested statistically.

Sugar Cane Insects

The most vigorous campaign ever waged against the sugar cane borer suppressed perhaps the heaviest infestation of this insect in history. A catastrophe due to borer destruction may have been averted through this extensive control program.

Sugar Cane Borer Infestation in 1950 Potentially Great—The carry-over of overwintering borers from the heavy infestation of 1949 was the largest in recent years. Population studies in fields of all representative areas of the cane belt revealed that there was an average of 2,737 live borers per acre in these fields in January and February. As many as 15,000 per acre were found in fields of summer-planted cane. Large numbers overwintered not only in cane pieces, stubbles, and summer-planted cane but also in shoots growing from early cut cane and early fall-planted. In a normal fall, borer egg deposition ceases before fall-planted cane produces sufficient growth to attract moths. The first generation in the spring of 1950 was the heaviest and most widespread observed in the last decade. It was even heavier than was anticipated from the extremely large population successfully surviving the second mild winter in succession.

State Assistance Program for Borer Control—The borer situation was so acute in early spring that the Louisiana Legislature appropriated $250,000 to aid sugar cane growers in purchasing insecticides for fighting the pest. The Louisiana Department of Agriculture and Immigration, the Louisiana Agricultural Experiment Station, the Louisiana Agricultural Extension Division, and the U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, cooperated in administering the extensive chemical control program. Approximately 62,300 acres of cane were treated for first generation control under the State-assistance program. Adding to this the acreage which the farmers dusted on their own for control of the first and second generation gives a total of about 68,000 acres treated at a cost of more than a half million dollars. The chemical control program together with the general application of various cultural control practices was very successful in reducing the borer population to a relatively low level in the whole cane area. On farms where growers continued the program and dusted the acreage needing second generation treatment very little damage was evident at harvesttime. The annual survey of borer losses revealed that
12.87 per cent of the joints were bored as compared to 22.00 per cent in 1949, a very significant reduction in damage.

**Insecticidal Studies**—In 1950, our efforts were concentrated on studies involving the comparative effectiveness of cryolite and Ryania, the two insecticides recommended for control of the borer. Undiluted cryolite and 40 per cent Ryania were compared in seven different tests against the second generation. The results were comparable to those of previous years in that Ryania proved to be somewhat superior to cryolite against this generation, exhibiting a lasting effect which aided in preventing damage from later generations.

In one test in the West Baton Rouge area cryolite and Ryania were compared against the second generation, the second and third, and the third generation alone. Although control of the second generation with cryolite and Ryania resulted in increased yields of 4.82 and 5.26 tons, respectively, increases of 2.48 and 2.37 tons resulted from control of the third generation. Various tests have shown that gains from third generation control are governed to a large extent by the degree of second generation injury already inflicted and the conditions of cane growth at the time. A heavy application of Ryania on both second and third generations at the rate of about 20 pounds per acre per application reduced the borer infestation to 10 per cent of the joints bored as compared to 58 per cent in the untreated checks. The yield of cane was increased by 8.39 tons per acre. This demonstrated the possibilities of obtaining a higher degree of control through heavier applications.

In another test it was found that reduced concentrations of Ryania of 15 and 7.5 per cent with n-propyl isome and with piperonyl cyclonene as activators were not as effective as 40 per cent Ryania without the activators.

Since many growers had alternated or used applications of cryolite and Ryania in various combinations, a test was conducted on fall generations of borers in summer-planted cane to study the possible effect of such a procedure on degree of control. The results showed that there were no significant differences in control from straight applications of each of the two materials and different combinations of the two.

In airplane and ground machine tests, cryolite spray compared favorably with cryolite dust for borer control. There appears to be no particular advantage in spraying instead of dusting.


**Chlordane as a Soil Treatment Continues to Offer Promise for Control of the Sweet Potato Weevil**

Three seasons of experimentation using chlordane as a soil treatment previous to planting have shown that this insecticide
offers excellent promise as a practical and economical method of controlling the sweet potato weevil in the field. Experiments in 1948 and 1949 were conducted by applying the chlordane mixed with old sawdust in the row just previous to setting the slips. In the 1950 tests the chlordane was pre-mixed with the fertilizer, thus eliminating one field operation by applying the two at the same time. The chemical was used at 2, 5, and 10 pounds of technical material per acre. Seventeen per cent of the potatoes in the untreated plots were infested as compared to three per cent in the treated plots at harvest. There was little difference in infestation among the three dosages tested, the lightest dosage being almost as effective as the heaviest dosage used. Calcium arsenate dust applied eight times during the season reduced the infestation approximately the same as the soil treatments with chlordane.

To date no undesirable off-flavor has been found in potatoes produced on chlordane treated soil. Also no plant injury has been observed in any of the experiments where this chemical has been used.

Since this method of sweet potato weevil control shows promise and is both economical and practical, the studies should be continued in an effort to develop a supplementary method of weevil control in the field.

—E. H. FLOYD AND C. E. SMITH.

**Insecticide Tests for Control of Cotton Pests During 1950**

A study of 3-5-40 dust, 3-5 spray, toxaphene dust, toxaphene spray, special calcium arsenate plus one per cent gamma BHC, special calcium arsenate plus two per cent gamma BHC, aldrin spray and dieldrin spray showed these materials to be equally effective for control of the boll weevil when used at recommended dosage rates. Aldrin and dieldrin, like BHC, failed to control bollworms without the addition of DDT. The special calcium arsenate plus one per cent and two per cent gamma BHC failed to give adequate control of bollworms. Damaging infestations of spider mites developed following applications of 3-5, aldrin, and dieldrin sprays.

Calcium arsenate spray, and mixtures of BHC and DDT applied as a dust, as a spray from dry wettable concentrates, and as a spray from emulsifiable concentrates were studied. The sprays were applied with a ground machine at the recommended dosage rates in 8 to 9 gallons of finished spray per acre per application. The dust was applied with a ground machine at approximately 12 pounds per acre per application. All materials gave about equal control of the boll weevil but the calcium arsenate spray failed to control the bollworm.

Results of insecticide tests during 1950 brought out the following points:

1. There is a wide choice of insecticides which will give satis-
factory control of the major cotton pests when applied properly.
2. DDT is superior to the other available insecticides for bollworm control.
3. Sprays and dusts are equally effective for the control of cotton pests when used at the same rate.
4. A material which will control spider mites should be included in mixtures of the newer synthetic organic insecticides.
5. Proper timing of the initial application, maintaining the correct interval between applications, and thoroughness of application of insecticide are essential for effective control of cotton pests. —J. S. ROUSSEL, L. D. NEWSOM, C. E. SMITH, W. W. DRY, D. M. JOHNS, AND C. R. JORDAN.

The Tobacco Thrips as a Pest of Seedling Cotton

A study of the tobacco thrips as a pest of cotton during the last three seasons shows that injury to the seedling plant by this pest results in a reduction in height and in amount of leaf area, produces excessive branching of the main stem, and causes a slight delay in maturity of a part of the crop. This injury is usually outgrown as the season advances so that there is little difference in either vegetative growth or yield of seed cotton by the end of the season.

In addition to the direct effects of thrips injury to seedling cotton it has also been observed that plants damaged by thrips are more severely injured by the disease known as "damping-off" or "soreshin." Leaf area may be reduced as much as 80 per cent when seedling cotton plants are attacked by thrips. This reduction in leaf area suggests that photosynthetic activity and translocation of elaborated food are probably greatly reduced, resulting in a weakened plant much more susceptible to attack by the organism causing "damping-off" or "soreshin."

The tobacco thrips appears on cotton planted about the middle of April as soon as the seedling plants emerge from the soil. A peak in population is reached about the middle of May, and the insects practically disappear from cotton one month later.

A study of migration of the tobacco thrips shows that it starts in early March, reaches a peak during the last week in April and the first three weeks of May (when they have been trapped at the rate of as many as one million thrips per acre per day), and gradually decreases during the remainder of the year.

Important winter and early spring host plants of the tobacco thrips include white clover, crimson clover, bur clover, alfalfa, Persian clover, hop clover, and oats. Late spring and summer host plants include lespedeza, peanuts, Johnson grass, sprangletop, and Brachiaria sp. The vetches, winter peas, and roughpea seem to be of little importance as host plants.
These studies indicate that there is no advantage in thrips control from the standpoint of total yield produced. A majority of the tests have shown a slight decrease in total yield as a result of controlling this pest. However, the more normal, uniform and rapid growth of seedling cotton resulting from thrips control allows for more rapid and efficient cultivation of the crop when the plants are small. The efficiency gained in cultivation may make thrips control a profitable practice especially on highly mechanized farms.

In order to obtain maximum benefits from control of this pest the first application of insecticide must be made as soon as the plants come up to a stand. This should be followed by a second application 7 to 10 days later.


The Effect of Infestation by a Spider Mite on Growth and Yield of Cotton

Heavy infestation of cotton by a spider mite in plots where all other pests were controlled reduced the yield of seed cotton by 45 per cent. The size of infested plants was reduced 26 per cent, as measured by dry weight, and the leaf area of infested plants was reduced by 36 per cent.

This infestation also produced adverse effects on seed and fiber characteristics. It caused a reduction in length of fiber, increased the percentage of immature fibers, decreased the weight of seed and lint, and caused a reduction in seed germination.


DDT Dust Effective in Control of Corn Earworm in Sweet Corn

Experiments in 1948 and 1949 in which a mineral oil-DDT spray was used (See Annual Report, 1948-49, La. Agric. Exp. Station) showed that excellent control of the corn earworm was possible. However, during the 1950 sweet-corn season the same materials caused severe stalk and ear damage. This was apparently due to different climatic conditions existing during the 1950 season from those of the previous seasons. As a result it was considered advisable not to continue further the studies with an oil type spray for sweet corn.

Previous tests using DDT dust had not proved successful; however, these dust applications were not begun until the silks had matured. In the 1950 dust experiment the plots were dusted with 10 per cent DDT beginning when approximately 20 per cent of the silks were showing, and continuing at 2-day intervals for 4 and 6 applications.
Plots receiving 4 applications contained an average of 41 per cent of the ears entirely free of earworm damage, and plots which received 6 applications contained an average of 48 per cent of the ears entirely free of earworm damage. Untreated plots contained only 1 per cent of the ears free of damage. There was no sign of plant or ear injury from the use of the DDT dust. Ears were normal with the grains being filled to the tips.

—E. H. FLOYD AND C. E. SMITH.

Control of Soil Insects Affecting Corn in Louisiana

A study of the soil insects affecting corn has been in progress since about 1940. Experiments at several points over the state have shown that excellent control of the sand wireworm is possible with dosages as low as 2 ounces of the gamma isomer of benzene hexachloride per acre applied in the row at planting time or broadcast over the field in the fall or spring. Chlordane applied at the rate of 2 pounds technical material per acre is also highly effective against this wireworm.

Tests in 1950 included the study of the residual action of these chemicals in the soil, as well as the possibilities of using them as seed treatments to replace their use as soil treatments. Plots treated in 1947, 1948, and 1949 with benzene hexachloride and chlordane still gave complete protection from wireworm damage to the 1950 corn crop. Seed treatment experiments using chlordane also gave excellent results in 1950. Plots left untreated yielded approximately 40 per cent less corn than plots where the seed were treated with chlordane or the chlordane was pre-mixed with the fertilizer. Since benzene hexachloride imparts objectionable odors and tastes to certain crops following its application to the soil, the use of this material to control soil insects is not recommended except on land devoted solely to cotton or field corn production. Chlordane, on the other hand, has not been found to possess this objectionable characteristic.

Because of the unusual, mild temperature of the winter of 1949-50, the seed-corn maggot and the Southern corn rootworm emerged from the soil several weeks before the planting season, thus largely eliminating these insects as enemies of seedling corn in the spring of 1950. No insect control data were obtained in any of the several experiments conducted in South Louisiana during 1950. However, since damage by these insects was naturally eliminated, it was possible to study the effects of the chemicals on the germination and development of the corn seedlings. It was found that both chlordane and benzene hexachloride delayed the germination and early development of the softer corns when used in excess as a seed treatment. When used at lower dosages the damage was practically eliminated. No detrimental effect could be observed
when they were applied as a soil treatment in the row even at abnormally high dosages.

Lindane, the pure gamma isomer of benzene hexachloride, was also used as a seed treatment for corn for the control of the seed-corn maggot and the rootworm. No detrimental effect on germination or development of the seedlings could be observed from the use of this material.

Further studies concerning the use of these chemicals as seed treatments, especially Lindane, is warranted, since this method of soil insect control is far more economical and practical than any other method studied to date. —E. H. FLOYD AND C. E. SMITH.

Control of Onion Thrips with DDT

An experiment was conducted in 1950 on the control of thrips infesting onions, comparing DDT as an emulsion spray with a 5 per cent DDT dust. A total of seven applications of each treatment was made at weekly intervals. A 0.5 per cent DDT emulsion spray was used at the rate of 12 gallons per acre per application. This dosage was equivalent to one quart of 25 per cent DDT emulsion concentrate per acre per application. The spray was applied at both weekly and two-week intervals. Dust applications were made weekly at the rate of 10 pounds per acre per application.

Detailed thrips counts throughout the season showed that the DDT spray applied at weekly intervals kept the number of thrips per plant down to less than one. The same spray applied at two-week intervals averaged approximately three thrips per plant; whereas the dust treated plots contained an average of over eight thrips per plant. Untreated plots contained an average of 22 thrips per plant.

Unfortunately this field of onions was attacked by mildew which seriously affected the yield. The yields of uncured mature onions were as follows: DDT dust, 2,761 pounds per acre; DDT emulsion spray at weekly intervals, 2,969 pounds per acre; same spray at two-week intervals, 2,927 pounds per acre; and untreated, 2,413 pounds per acre.

Results of this experiment definitely show the superiority of DDT spray over DDT dust for thrips control on onions. The spray when applied at two-week intervals gave sufficient residual toxicity to adequately protect the plants from a build-up of the insects.

A combination spray using a fungicide with the insecticide should be studied in order to combat or prevent mildew of onions at the same time the thrips are being controlled.

—E. H. FLOYD AND C. E. SMITH.
Fertilizer and Feedstuffs Laboratory

Activities of Laboratory

The past year has again seen an increase in the activities of the laboratory. Official samples analyzed for the State Department of Agriculture increased to 4,070. Particular emphasis has been given to analysis of cotton insecticides, such as the 3-5-40 mixture. These analyses were run as a check on manufacturers of feedstuffs, fertilizers and economic poisons. While the check analysis of the cotton poisons have in general been satisfactory, it is suspected that some of them are not in suitable physical condition and it is planned to make the tests by physical methods on insecticides in the coming year. As a result of this checking, the quality of these commodities is maintained and farmers may buy with confidence.

Though the primary function of the laboratory is to make analyses as above, 400 samples were analyzed last year for other departments of the Experiment Station and for people of the state. These analyses were concerned with such materials as silage, mixed feeds, fertilizers, insecticides, herbicides, limestone, range forage, water, etc.

Various laboratory personnel carried on projects directed toward improving the analytical methods in cooperation with the Association of Official Chemists. A new and shorter method for the determination of available phosphoric acid in fertilizer was developed and published in “Analytical Chemistry.”

Race Horse Analysis for “Dope” Detection—Through the kindness of the New York Racing Commission and Mr. Charles Morgan of their laboratory, services of Mr. Harry Peterson were made available to the Louisiana Agricultural Experiment Station to assist in setting up a laboratory for the detection of drugs from specimens obtained from race horses. Work for the Louisiana Racing Commission was begun on Thanksgiving Day, 1949.

During the year 1950, 918 samples were analyzed, with two positives being found. The laboratory analyzes twelve samples a day, results being reported the same day samples are received.

Saliva samples and as many urine samples as possible are taken from the winning horses each day. All urine samples are analyzed and usually three to five saliva samples per day. The analyses are made by the same procedure as followed by the New York Racing Commission, with purification by the Stass-Otto process and identification of drugs by micro-crystaline and color tests. A Beckman UV spectrophotometer is used for confirmatory test.—E. A. Epps.
Forestry

Thinning Methods in Stands of Planted Slash Pine

Further results are available from the slash pine thinning study at Bogalusa. The heavy crown and selection methods were applied in 1938 when the plantation was 13 years old, and the light crown and low plots were first thinned in 1939. The check plots have never been thinned. All measurements are as of ten years after thinning, at age 23 or 24. Variations in effects brought about by the treatments are summarized as follows:

### TABLE 1. Stand Structure and Productivity of Planted Slash Pine Ten Years After Thinning by Various Methods

<table>
<thead>
<tr>
<th>Thinning Method</th>
<th>Trees Per Acre</th>
<th>Basal Area Production (per acre)</th>
<th>Average Diameter</th>
<th>Average Total Height</th>
<th>Crown-Height Ratio</th>
<th>Volume Production (per acre)</th>
<th>Sawlog trees (per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unthinned</td>
<td>562</td>
<td>156</td>
<td>7.2</td>
<td>56</td>
<td>28</td>
<td>46</td>
<td>18</td>
</tr>
<tr>
<td>Heavy Crown</td>
<td>270</td>
<td>148</td>
<td>8.5</td>
<td>60</td>
<td>34</td>
<td>40</td>
<td>52</td>
</tr>
<tr>
<td>Light Crown</td>
<td>410</td>
<td>159</td>
<td>7.8</td>
<td>59</td>
<td>30</td>
<td>45</td>
<td>36</td>
</tr>
<tr>
<td>Selection</td>
<td>282</td>
<td>151</td>
<td>7.9</td>
<td>55</td>
<td>38</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>Light Low</td>
<td>466</td>
<td>167</td>
<td>7.5</td>
<td>59</td>
<td>26</td>
<td>47</td>
<td>22</td>
</tr>
</tbody>
</table>

Perhaps the chief fact revealed by these data is that even at this early age (about 24 years) each treatment has brought about a stand structure characteristic of the method. For example, light low thinning has resulted in moderate diameter increase, high cordwood volume, and relatively few trees of sawlog size (9.6 inches and up). Heavy crown thinning has concentrated growth on fewer trees, many of which are already big enough to produce sawlogs. No thinning at all has resulted in relatively small trees with short crowns, but there are many of them and in basal area and cordwood production they nearly equal the best of the thinned plots.

Practical aspect of these findings is that each forest owner should apply the method or modification best suited to his economic needs. A pulpwood company could probably produce the most wood over a short period of time by practicing low, light crown, or perhaps no thinning at all. Sawtimber operators, seeking to grow the largest and highest quality timber in the shortest possible time, should use heavy crown thinnings. A farmer, depending on availability of markets, might have a wide variety of choices. Assuming he is able to market most any product, integrated production of
posts, pulpwood, poles, piling, and sawtimber in approximately that order could readily be attained by a conservative low or light crown thinning program applied every five years. Or, if the farmer wanted to cut and use sawtimber on his own place, he could adopt the selection thinning system which has the added advantage of encouraging growth of grass for cattle grazing in the openings left after large trees are cut. In all thinning methods poorer and slower growing trees are removed so that there is a rapid rise in volume and value as the stand approaches maturity. —A. B. Crow.

Development of Timber Volume Tables for Use with Aerial Photographs

The first phase of investigating volume correlations with measurable factors on aerial photographs was to determine the relation, or association, of tree stem diameter (breast high) with visible crown diameter.

One-half acre square plots have been established in 45 southern pine sawlog-size stands of varying age, density, and composition. On these plots measurements of crown diameter, stem diameter, Girard form class, merchantable length, and total height have been made on each tree with a crown diameter of 4 feet or larger. Of the 45 plots, 38 were in stands of loblolly pine, either in pure stands or with mixtures of shortleaf, spruce, slash, or longleaf pines, and miscellaneous hardwoods. All of the stands sampled were second growth and ranged in age from 30 to 70 years.

In analyzing results a strong linear relation has been found between crown diameter and stem diameter. The correlation coefficient \( r_{xy} \) between stem diameter and crown diameter was calculated as 0.98, or nearly perfect positive correlation. A linear regression coefficient \( b_{xy} \) of 0.55 was computed and the following linear regression equation was derived:

\[
\text{stem diameter (inches)} = 4.78 + 0.55 \times \text{crown diameter (feet)}
\]

The high degree of correlation between stem and crown diameters appears to lend much promise to the possible determination of gross volumes of trees through aerial photographic interpretation. Preliminary volume tables have been prepared, but will require further analysis and ground checking before publication.

For rapid approximation of tree diameter from crown diameters as measured on aerial photographs the following rule of thumb is suggested: "the stem diameter (inches) is equal to five plus one-half the crown diameter in feet." This rule has been shown to give satisfactory results in sawlog-size southern pine stands (excluding longleaf pine), regardless of stand age or density.

—Charles O. Minor.
Nutritional Status of Pre-Adolescent Boys and Girls in Selected Areas of Louisiana

This study is the fourth in a series planned to determine the nutritional status of Louisiana people, and has been expanded to include the following: (1) to evaluate means of assessing nutritional status and (2) to determine the weekly variation of hemoglobin levels, plasma ascorbic acid, vitamin A, and carotene within subjects.

The actual collection of data was begun on February 1, 1950. The subjects have been selected from white elementary public school children ranging in age from 7 years 5 months to 11 years 6 months. As of November 15, 1950, 156 boys and 161 girls, or a total of 317 children, have been examined. The locations of these subjects with number from each school included are: Highland Elementary School, 65, and Woodlawn Elementary, 53, of East Baton Rouge Parish; Crescent, 71, and Plaquemine Elementary, 27, of Iberville Parish; and Covington Grammar School, 101, of St. Tammany Parish. The representation of each group has been approximately the same. Examinations of another 100 subjects from Gentilly Terrace School, New Orleans, were started on November 27.

The procedures used and results tabulated to date are as follows:

**Biochemical Measurements**—Blood samples were collected by finger tip puncture. Replicate determinations were made on each subject after a seven-day interval to determine the variation within subjects. All collections were made on Wednesday forenoon between 9 and 11:30. Analyses were made for hemoglobin, plasma ascorbic, vitamin A and carotene by microchemical determinations. The results to date are shown in Table 1. The variability between two determinations of each of the values (Table 1) for 300 subjects has been tabulated for study.

**Physical Measurements**—Height was recorded to the nearest tenth of a centimeter. The Iowa Child Welfare Research Station measuring scale was used. Weights were taken in the morning, after removal of all clothing except weighing garment, not sooner than one hour after breakfast. They were recorded in pounds and ounces. Fifty-three per cent of the children were of normal weight for height, with 37 per cent falling below the standards used. Only 10 per cent were found to be over weight.

**Clinical Examinations**—The subjects were examined by Dr. Grace Goldsmith and two of her associates from Tulane School of
TABLE 1. Average Hemoglobin Levels, Plasma Ascorbic Acid, Vitamin A and Carotene Values of 316 Elementary School Children

<table>
<thead>
<tr>
<th>Schools</th>
<th>No. of Subjects</th>
<th>Blood Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hemoglobin gms/100</td>
</tr>
<tr>
<td>East Baton Rouge Parish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highland</td>
<td>66</td>
<td>12.3</td>
</tr>
<tr>
<td>Woodlawn</td>
<td>52</td>
<td>12.1</td>
</tr>
<tr>
<td>Iberville Parish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crescent</td>
<td>71</td>
<td>13.4</td>
</tr>
<tr>
<td>Plaquemine</td>
<td>27</td>
<td>13.0</td>
</tr>
<tr>
<td>St. Tammany Parish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covington</td>
<td>100</td>
<td>13.0</td>
</tr>
<tr>
<td>Total Number</td>
<td>316</td>
<td></td>
</tr>
<tr>
<td>Average for Group</td>
<td></td>
<td>12.8</td>
</tr>
</tbody>
</table>

Medicine. The indices used are those that have been set up by Dr. Goldsmith for use in assessing nutritional status.

A tabulation of results indicated there was wide variation, in the prevalence of signs and symptoms associated with vitamin deficiencies, among children in each school and between schools. Changes in the gum tissues, and papillae of the tongue were present in approximately one-third of the children. Abnormal conditions of the skin and eyes associated with a lack of vitamin A were noted in approximately 20 per cent of the subjects. Signs of a past history of rickets were quite prevalent. Poor posture was very much in evidence among the group. As high as 30 per cent of the children in one school were judged to have poor posture while in another only 7 per cent were so classified.

Dietary Records—Seven-day diet records were obtained for each subject during the week between the drawing of the replicate blood samples. For the 8-year-old group the mothers were visited by the research worker responsible for obtaining the dietary records. They were given instructions in the keeping of the records and determining quantities for all food eaten at home. The school lunch was recorded by the research worker.

The 9-, 10-, and 11-year-olds kept their own records after having been given specific instructions.

Two hundred of these seven-day records are tabulated ready for setting up for I.B.M. calculations. The others are being coded.

The reported data are preliminary; when completed they are to
be statistically analyzed. In view of the importance of the application of the findings of these studies to the health of Louisiana boys and girls efforts have been made to have them used. Reports of the results of the clinical and biochemical examinations were given in lay language to the school authorities, the health committees of the Parent-Teachers Association, and the local parish health officers and nurses following the examinations.

The dietary needs based on findings from the diet records and blood values were presented to Louisiana Public School teachers and Parish Agricultural Extension workers in attendance at the Louisiana Teachers Association for use in planning their nutrition work.

—DOROTHY S. MOSCHETTE, ECHO P. CHEELEY, AND LAUREAME C. McBRIDE.

Nutrition Education Research

Tests designed to measure school children's understanding of nutrition have been developed for grades 1-4 and 4-8. Cooperation has been given by the State Department of Education in encouraging certain selected schools throughout the state to administer these tests in their schools. The scores of about 2,500 school children are at present being used to obtain tentative norms for the test and to obtain an estimation of the reliability of the test. The validity of the tests as a means of comparing Louisiana school children's understanding of nutrition has been insured through the method by which the tests were constructed. It is planned to make these tests available for schools throughout the state.

Tests to determine pupils' food attitudes have been constructed. Nicholson Elementary School in Baton Rouge has cooperated in a separate study designed to provide an estimate of the validity and reliability of these tests.

The Nutrition Understandings tests, the Attitude tests and Food Habit records have been administered to 1,180 school children in grades 2-8 in Iberville Parish as one step in evaluating the effectiveness of the comprehensive nutrition education program that has been developed in Iberville Parish under the leadership of Dr. L. P. Terrebonne, Superintendent, and S. L. Crownover, Supervisor. The personnel of the nutrition education research project have assumed as their major function the evaluation of this program rather than the development of the program. The data obtained through the extensive testing program conducted in Iberville Parish are at present being analyzed.

A separate study was conducted to determine the effectiveness of using the school lunch for nutrition education purposes. Crescent School in Iberville Parish was used as the experimental school. This school has endeavored to correlate the classroom experiences of
pupils with their school lunch program in a number of ways. Two other elementary schools in the state were selected for control purposes in this experiment. These schools were judged to be very good schools but were not making any systematic effort to integrate the classroom experiences of their pupils with the lunch program. The economic status of the parents of the children from the control schools was higher than the economic status of the pupils from the experimental school. It was found in this experiment that the children from the experimental school definitely performed better on nutrition understanding tests than did the pupils from the two control schools. There was also some evidence of superiority of the pupils in the experimental school in their food attitudes and food habits as measured by the tests used in the experiment.

A study undertaken of the food practices in a rural southeastern Louisiana community is near completion. The planning of this phase of the research has been done by Drs. Clara Tucker and Ray Loree. Seventy-four families were visited and the homemaker interviewed concerning the frequency of preparation of various classes of foods, the method of preparation, resources for preparation, income available for food, food preferences of members of the family, and the eating routine of members of the family. These data are at present being analyzed in order to identify the major nutritional problems of the community investigated. An attempt was made to obtain data that would enable the researchers to explore the nature of the problems that would be encountered in a community nutrition education program designed to improve food practices. The data obtained have not been completely analyzed. However a few of the generalizations that the data analyzed do support are:

1. Problems that would seem likely to be encountered in changing food practices differ from family to family to such an extent that an individual approach would seem more promising than any overall program approach.

2. Existing agencies that are concerned with improving food practices of families are reaching the families that least need improvement in their food practices more than they are reaching the families that most need improvement.

3. A lack of a feeling of need for improving food practices seems to be a major general problem that would be encountered in a community nutrition education program.

—Ray Loree.
Horticultural Research

During the past year greater strides have been made in horticultural research in this state than in any previous year. Contributions have been made by the horticulturists at the various substations as well as those at the main station. The ornamental horticulture program has been organized and is now under way. The department is completely staffed for the first time since the beginning of World War II. The latest staff member to be added was Dr. Stewart L. Dallyn as plant physiologist.

Lima Bean Breeding and Yield Tests

Twenty-seven superior selections were made in 1950 in addition to the two superior selections of 1949, L 1-1-1 and L 39-11F. These selections will be further evaluated in 1951. Many of these selections show great promise. The L 39-11F is now being increased for release and has been named "Easyshell."

Variety Tests—Because of unfavorable weather only three harvests were made. Under these conditions the Carolina Sieva produced the highest yields. The L 39-11F did recover from adverse weather and produced beans until killed by frost, while other varieties produced very few beans. Owing to its rapid recovery and continuous fruiting ability, it is a very desirable bean for home as well as for commercial use.

<table>
<thead>
<tr>
<th>TABLE 1. Yield Data from Three Pickings at Baton Rouge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
</tr>
<tr>
<td>Carolina Sieva</td>
</tr>
<tr>
<td>Willow Leaf</td>
</tr>
<tr>
<td>L 39-11F</td>
</tr>
<tr>
<td>L 1-1-1</td>
</tr>
</tbody>
</table>

The yield data in Table 1 show that the Carolina Sieva gave the highest yield (the probable reason being that it is slightly earlier than the L 39-11F), followed by L 39-11F. The two Louisiana bred seedlings are better in table quality than the older varieties. The L 39-11F is definitely more resistant to foliage and pod diseases than the Carolina Sieva.

—Julian C. Miller, Raymon E. Webb, and John C. Noonan.
Sweet Corn Investigations

The sweet corn work for 1950 consisted of a field variety trial of 16 varieties, canning and freezing samples of each variety, and organoleptic testing of canned and frozen samples after seven months of storage.

The three top varieties in yield, freeness from ear worm damage, general appearance, and fresh qualities were Golden Security, Aristogold Bantam Evergreen, and Selection K.V.F. 47-10.

Taste tests on frozen samples cooked after thawing indicated that the four outstanding varieties were Golden Sweet, Huron, Golden Hybrid 1734, and Aristogold Bantam Evergreen. Selection K.V.F. 47-10 rated good but not superior. Taste tests on canned samples showed Golden Sweet, Golden Hybrid 1734, Selection K.V.F. 47-10, and Aristogold Bantam Evergreen rated excellent.

The best varieties for home and market use as shown above are Aristogold Bantam Evergreen and Selection K.V.F. 47-10. Golden Security produced well but rated only fair as cooked, canned, and frozen corn.


Pole Bean Variety Yield Tests

In the Annual Report of 1947-48 we announced two new varieties of pole beans, namely, the Canfreezer and Green Savage. Both of these new stringless varieties are being received well throughout Louisiana and the rest of the South. Since their introduction, spring and fall yield tests comparing these two new selections with other standard varieties have been conducted. The yield data are given in Table 2.

These results show that Green Savage and Canfreezer, intro-
ductions of the Louisiana Agricultural Experiment Station, out-yielded all other varieties in the trials. The yield of Green Savage

excelled that of Canfreezer in the spring. However, Canfreezer is earlier, more rust resistant, and of better quality. The fall yields show Canfreezer to be superior to Green Savage.

—JAMES F. FONTENOT, JULIAN C. MILLER, W. F. WILSON, JR., AND H. K. RILEY.

Onion Breeding to Improve the Creole Variety

The Creole onion breeding project in cooperation with the National Onion Improvement Program has been set up with eight objectives: (1) breeding for resistance to onion diseases, with special emphasis on the downy mildew disease which threatens to wipe out the onion and shallot industry in Louisiana; (2) breeding for higher soluble solids in order to still further improve the keeping qualities of the Creole onion; (3) development of hybrid onion seed
for higher yields and greater uniformity of the product; (4) breeding for resistance to thrips, the most serious onion insect pest; (5) a study of environmental factors affecting onions (including storage tests) to learn the causes of early bolting and splitting; (6) yield trials to select superior onion lines; (7) developing a program of improved onion seed in mildew-free areas; and (8) testing foreign introductions for their adaptability and disease resistance under Louisiana conditions.

The following genetic stocks are now being grown: 44 named domestic varieties, 85 foreign introductions, 6 thrips resistant lines, 9 yellow dwarf resistant lines, 15 inbred Creole lines, 201 male sterile lines for hybrid seed production, 8 lines of Creoles exposed to 200 to 1600 Roentgen units of X rays, and 67 Allium species.

The Creole onion, well known as a good keeper in storage, derives most of its good storage qualities from its high soluble solids content. By use of the refractometer and the dry weight methods, solids were determined in 425 clones of onions during the 1950 season. Each clone consisted of all the bulbs arising from the vegetative division of a single bulb. Soluble solids ranged from 9.8 to 26.0 per cent as shown in the graph below.

Seed increase is being made of those lines with soluble solids of 19.0 per cent or higher. Bulbs for seed increase were sent to the North Louisiana Experiment Station at Calhoun and the Sweet
Potato Farm at Chase. No mildew has ever been reported from either of these areas. Further seed increase in cooperation with commercial seed producers is being done in California.

In preparation for future improvement work a collection of garlic types has been assembled. Cytological studies are under way to learn the nature of sterility in garlic.

—August E. Kehr and E. C. Tims.

Chemically Controlled Peach Maturity

Work was initiated in 1950 to determine the effect of 2,4,5-T on rate of maturity of the peach. Five varieties, Golden Jubilee, Fireglow, Sunhigh, July Elberta and Summer Crest, were used in the test. Three rates of application of 40 p.p.m. of 2,4,5-T were applied to each variety about 22 to 24 days before they normally matured. Additional applications were made to the Golden Jubilee variety at about 36, 29 and 15 days before normal maturity.

All treatments hastened maturity, but growth was so abnormal that the fruits were rough, cracked and of such uneven maturity that they were unfit for commercial packing. Total and soluble solids analyses of the fruits showed that as the amount of 2,4,5-T applied to the trees increased, the solids content of the peach fruits decreased.


Sweet Potato Investigations

The work on sweet potatoes for the past year includes that conducted at Baton Rouge, Chase, and seven other locations in the state. Since one of the primary purposes of the Louisiana Sweet Potato Farm at Chase, Louisiana, is to grow foundation stock seed, over 500 bushels of each reselected Unit I Porto Rico and L-241 were grown for distribution throughout Louisiana. Other promising seedlings were increased for further testing.

Breeding—Plants in the breeding nursery were evaluated as to their fertility level when used as parents. Certain lines, such as L-130, L-21 and L-240, are more fertile when used as female parents than L-241, L-201 and L-224. Preliminary studies suggest that the lack of fertility may be due to the styles being deficient in an unknown substance which may initiate pollen germination or contain a substance which acts as an inhibitor to pollen germination.

There is also a considerable difference in plants with regard to their ability to produce viable pollen. L-3, L-131, and L-139 are poor pollen producers when compared with L-21, L-240, and L-130. As a result of this information, planned crosses were made using very fertile females and good pollen producing plants as parents.
The seed production was thereby increased to approximately 40,000 seed. Emphasis was placed on the use of wilt resistant material as parents in the breeding program. Backcrossing and intercrossing were also practiced throughout the pollination period.

Over 10,000 first-year seedlings were grown at Chase, Louisiana, and from these 187 were selected for further testing. This material was selected on the basis of skin and flesh color and potential yielding ability. Promising seedlings selected in previous years were increased for further testing. These include 8-24, 8-31, and 6-84.

Yield Trials—Yield data on the standard varieties and some promising seedlings are found in Table 3.

Heartgold, L-240, and Unit I produced the highest average yields in southwest Louisiana. L-240 and Queen Mary yielded the highest in north Louisiana. Although L-241 was third in the yield test, because of its wilt resistance its importance may be felt where wilt is prevalent.

In advanced yield tests at Chase, Louisiana, Unit I Porto Rico and L-241 gave comparable yields. Heartgold and L-240 were early and produced high yields. The yield of U.S. No. 1 roots for Texas Bunch and Allgold were significantly lower than those of Unit I Porto Rico and L-241.

Analytical Studies—Approximately 180 of the 1950 seedlings were analyzed for dry weight and total pigment. Twenty-five had more than 35 per cent dry matter and 63 had more than 50 mg. of total pigment per 100 gram dry sample. Six of the seedlings had both the high per cent dry matter and total pigment.

Baking tests run on advanced seedlings resulted in keeping the following for further study: 8-24, 8-32, 9-2, 9-18, 9-26, 9-39, 9-65, and 9-65A. Chemical analyses were run on these seedlings and all except 9-2, 9-18, and 9-65A had a dry weight of 30 per cent or more, with 9-65 having the highest, 35.9 per cent. All had a higher carotene content than Unit I Porto Rico, with 9-65 having the highest, 43.1 mg. of carotene per 100 gram dry sample. With the exception of 8-32, analysis showed all had a higher total sugar content than Unit I Porto Rico.

Samples of six varieties and selections, Unit I, Queen Mary, Heartgold, L-224, L-240, and L-241, grown in three localities, Baton Rouge, Scott, and Oak Grove, were analyzed for dry weight, carotene, ascorbic acid, and total sugars. In all cases the potatoes from Baton Rouge had a higher per cent of dry matter than those from Scott and Oak Grove. Those from Oak Grove showed higher ascorbic acid, carotene and total sugars than those from the other two localities.

Root Development Studies—The apparent optimum temperature for root development of sweet potatoes was found to be 70° F.
### TABLE 3. Combined Data of Some Promising Seedlings and Standard Varieties of Sweet Potatoes Grown at Different Locations in 1948, 1949, and 1950

<table>
<thead>
<tr>
<th>Variety or Seedling</th>
<th>Skin color</th>
<th>Sprout Plants per bushel (55 lbs.)</th>
<th>Marketable Sweet Potatoes — Bushels per Acre (55 pounds per bushel)</th>
<th>Disease Reading</th>
<th>Per cent dry matter</th>
<th>Carotene mg/100g dry weight</th>
<th>Cooking test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porto Rico</td>
<td>Cu</td>
<td>1987</td>
<td>271.8 478.4 303.5 193.7 224.7 21.8 220.0 433.1 160.0 388.4 202.7 185.2</td>
<td>V.S.</td>
<td>32.53</td>
<td>6.0</td>
<td>1</td>
</tr>
<tr>
<td>Queen Mary</td>
<td>Cu</td>
<td>1096</td>
<td>191.2 311.6 244.3 152.1 231.3 228.8 234.2 209.3 182.7</td>
<td>V.S.</td>
<td>28.97</td>
<td>9.3</td>
<td>1</td>
</tr>
<tr>
<td>Heartgold</td>
<td>Flesh</td>
<td>2363</td>
<td>319.3 548.4 339.0 276.7 310.5 247.8 319.8 286.8 413.4 255.7 212.5</td>
<td>V.S.</td>
<td>28.34</td>
<td>7.7</td>
<td>1</td>
</tr>
<tr>
<td>L-224</td>
<td>Flesh</td>
<td>1450</td>
<td>210.1 485.6 277.0 142.0 202.0 183.7 232.7</td>
<td>V.S.</td>
<td>22.9</td>
<td>38.3</td>
<td>3</td>
</tr>
<tr>
<td>L-240</td>
<td>Cu</td>
<td>1704</td>
<td>286.1 591.5 311.5 217.6 308.4 223.2 272.3 565.0 257.5 415.5 313.1</td>
<td>V.S.</td>
<td>30.51</td>
<td>7.2</td>
<td>2</td>
</tr>
<tr>
<td>L-241</td>
<td>Cu</td>
<td>2666</td>
<td>237.5 403.6 281.2 146.5 210.9 196.6 203.5 245.0 179.0 315.7 208.5</td>
<td>R.</td>
<td>28.4</td>
<td>12.1</td>
<td>1</td>
</tr>
</tbody>
</table>

‡Three-year average  
†Two-year average  
*One-year average  
V.S.—very susceptible  
S.—susceptible  
M.S.—moderately susceptible  
R.—resistant  
1—excellent  
2—good  
3—fair  
4—poor
in water media and between 70° and 80° F. in sand media. In general, Unit I Porto Rico produced the largest number and greatest weight of roots. Heartogold produced the fewest number and smallest roots; while L-241 was intermediate in root development. Varieties differed significantly in their response to different temperatures, indicating that they may have different optimum rooting temperatures.

—JULIAN C. MILLER, T. P. HERNANDEZ, J. J. MIKELL, JAMES F. FONTENOT, RITA BELLE ATTAYA, A. E. KEHR, ROBERT E. WRIGHT, JOHN C. TAYLOR, AND H. K. RILEY.

Irish Potato Investigations

During the fall of 1949 approximately 10,000 seedlings were grown in the greenhouse at Baton Rouge. Selections were made at harvesttime in December and January on the basis of color, size, and number of tubers. Approximately 4,000 red and white tuber selections were kept and divided into two lots. One lot was sent to Crossville, Tennessee, and the second lot was sent to South Dakota. From those sent to Tennessee, 365 seedlings were saved, and 400 seedlings were saved from those sent to South Dakota.

The spring planting at Baton Rouge in 1950 consisted of 166 first year, 27 second year and 13 third year seedlings, all from Tennessee; 146 first year seedlings from South Dakota; and 68 second year, 21 third year and 13 fourth year seedlings, all from Louisiana. Total solid determinations, storage relationship, and quality tests were made on all varieties and promising seedlings.

Advanced yield tests were conducted at various locations in the state to better evaluate varieties when grown in different areas.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Diamond</th>
<th>Thibodaux</th>
<th>Hammond</th>
<th>New Roads</th>
<th>Calhoun</th>
<th>Baton Rouge</th>
</tr>
</thead>
<tbody>
<tr>
<td>LaSoda</td>
<td>159.8</td>
<td>167.7</td>
<td>229.3</td>
<td>262.4</td>
<td>147.0</td>
<td>200.0</td>
</tr>
<tr>
<td>DeSoto</td>
<td>178.9</td>
<td>159.7</td>
<td>226.5</td>
<td>270.8</td>
<td>167.9</td>
<td>213.0</td>
</tr>
<tr>
<td>Katahdin</td>
<td>128.9</td>
<td>162.6</td>
<td>160.3</td>
<td>259.2</td>
<td>89.9</td>
<td>137.1</td>
</tr>
<tr>
<td>Triumph</td>
<td>84.4</td>
<td>90.8</td>
<td>211.6</td>
<td>200.4</td>
<td>107.3</td>
<td>146.0</td>
</tr>
<tr>
<td>Kennebec</td>
<td>166.2</td>
<td>154.6</td>
<td>196.6</td>
<td>266.4</td>
<td>123.1</td>
<td>178.0</td>
</tr>
</tbody>
</table>

Based on the performance of the varieties it would be difficult to recommend one variety to be grown at all seven locations, although it appears that DeSoto and LaSoda would probably give the better over-all yields. Both are better in quality than Triumph. The DeSoto appears to be particularly adapted to the sandier type of soils. The tubers are well shaped, very smooth and retain
their color well even during a wet season. LaSoda appears to be more adapted to the medium and heavy soil types, with no enlarged lenticels. In light soils the tubers are smooth but tend to fade in color during wet seasons.


Shallot Breeding and Improvement

Shallots sold in 1949 added nearly a million dollars to the income of Louisiana farmers. The most serious threats to this million-dollar business are the three diseases yellow dwarf, mildew, and pink root. The nature of these three diseases is such that the only practical control known at present is to develop disease resistant varieties, and consequently this is the primary objective of the present breeding program.

Genetic stocks growing in Baton Rouge include 131 fertile Nebuka-shallot emphidiploids, 23 selected shallot seedlings, 6 shallot varieties collected at different locations in the state, 2 lines of foreign introductions, and one line found to be resistant to yellow dwarf.

—August E. Kehr and E. C. Tims.

Ecological Influences upon Qualities of Strawberries

Studies were made to determine the effect of environmental influences upon ascorbic acid, firmness, soluble solids and total solids of six varieties and selections of strawberries: Klonmore, Konvoy, Marion Bell, 117-1-45-3, 7-90, and 7-42.

Temperature, relative humidity, rainfall, soil moisture, and intensity of sunlight were recorded by automatic instruments in the area where the strawberries were grown.

Laboratory determinations of ascorbic acid, firmness, soluble solids and total solids were made daily immediately after harvesting for 30 consecutive days.

A positive correlation was found between ascorbic acid and intensity of sunlight the day before harvest, two days before harvest, and three days before harvest. No association was found between ascorbic acid and any other factors studied.

A negative correlation was found between firmness and relative humidity, the higher the humidity the less firm the fruit. There were significant differences between varieties.

No correlation was found between firmness and per cent dry weight.

—Mike Giamalva, Rita Belle Attaya, and P. L. Hawthorne.
Tomato Breeding and Variety Trials

Emphasis was placed on the selection of plants resistant to Fusarium wilt. These selections were made from hybrid lines and established varieties. Several lines containing red, globe-shaped fruit looked promising, and these are to be subjected to further trials.

In the spring trial, Gulf State, Earliana, and Dixie produced the highest early yield in the variety trial. Highest total yields were obtained from Southland, Gulf State, Early Market, Lake-land, and Jefferson varieties. Louisiana Allseason gave the highest yields in the fall trials and seems to be the best adapted for setting fruit during high temperatures.

In cooperation with the U.S. Regional Vegetable Breeding Laboratory, additional tomato trials have been conducted with emphasis placed on yield, fruit color, and adaptability to Louisiana conditions.


Ornamental Horticulture

Construction for this phase of the horticultural program has been about completed according to present plans. During the past year three small prefabricated greenhouses, each of a different type, have been added in the greenhouse area. There is considerable interest in the cheaper types of greenhouses, so it was thought best to add them rather than another of the more expensive kind. Humidi-fiers were installed in the larger greenhouses. A soil and pot storage and potting shed was constructed. A lumite plastic screen house has also been completed. Both cloth and sash covered propagation beds were built in the lath-house. Several concrete constructed cold frames are also now available for use. An irrigation system has been installed to water field plots. The facilities for conducting experiments with ornamental plants are now very good. Those interested in ornamental plants are invited to come and see what is being done here.

Rose Investigations—The rose planting has now been designated as one of the official Experimental and/or Display Gardens of the American Rose Society. Thirty more varieties were added to the variety test plots. Owing to unfavorable weather conditions, these plants did not make satisfactory growth until late in the growing season. The older, established plants, however, made excellent growth and bloomed very profusely and have at least indicated that many varieties of roses can be successfully grown in this area. Varieties that seemed best last season again were best. There was still no appreciable effect on growth from the application of commercial fertilizer, but the application of manure, either chicken
or cow, did increase growth sufficiently to be noticeable late in the season.

A number of rose stocks have been assembled and when they can be increased and varieties propagated on them, it is planned to test adaptation of the stocks to this area and other areas in the state.

Gladiolus Investigations—A large number of gladiolus seedlings were grown again this year. Numerous selections which seemed promising were made from seedlings grown in the last two years. A few selections are being increased for further trial and possible introduction.

A number of varieties were tested for the first time, some being rather recent introductions. Of these the following seemed promising: Evangeline, Florence Nightengale, Daisy Mae, Blue Bonnet, Miss Chicago, and Cynthia. Some of these are expensive at present, but, if they prove really good, the price will fall rapidly because of increased production.

Propagation of Camellia Japonica by Cuttings—A time of cutting test was set up to determine how soon camellia cuttings could be made satisfactorily after the initiation of spring growth and to compare the rooting response of cuttings made at different dates. July and August are the months recommended for taking camellia cuttings in the South. One hundred cuttings of the variety Sarah Frost were made at weekly intervals, beginning May 17, 1949, and extending through September 13, 1949.

Results of the test indicate that cuttings can safely be made earlier than July and August in Louisiana. Of the 1,200 cuttings put out from May 17 through August 2, 1949, 99.7 per cent formed roots.

A rooting medium test was set up on July 7, 1949, to study the effect of six rooting mediums on the rooting response of seven camellia varieties. The rooting mediums used were sand, vermiculite, one-half peat plus one-half sand, one-half vermiculite plus one-half peat, one-half sand plus one-half vermiculite, and one-third sand plus one-third vermiculite plus one-third peat. The mixtures were by volume. The varieties used in the various mediums were Sarah Frost, Governor Mouton, Floraplena Paeoniflora, Glorie de Nantes, Professor Sargent, Pink Perfection, and Rubra Virginalis.

The results of this test suggest that vermiculite alone and one-half vermiculite plus one-half sand by volume would be preferable to the other mediums used if a large number of varieties were to be propagated. It appears that easy-to-root varieties show little difference in root formation due to the medium used, whereas some other varieties show a decided difference.

A test was set up July 8, 1949, to study the effect of 12 com-
mercial growth promoting substances on the rooting response of Sarah Frost camellia cuttings.

Results indicate that all the materials used were beneficial in obtaining faster rooting of the cuttings.

Cuttings treated with Hormodin No. 3, Quick Root No. 2, and Stim Root produced the most desirable type of root systems. Cuttings treated with Ree-Root No. 2 consistently formed gall-like structures on the treated portion of the stems.

—W. D. KIMBROUGH AND R. H. HANCEY.
Sugar Cane Breeding

In 1950, 53,000 seedlings were grown in pots from seed obtained from Canal Point, Fla. Of these, 14,000 were eliminated because of susceptibility to mosaic, and nearly 36,000 were transplanted to the field.

In addition, promising canes from the 1948 crosses were selected and replanted at Baton Rouge, a total of 500 from 40,000 in the field.

In 1949, a number of seedlings were planted at Columbia Plantation, Franklin, in cooperation with Mr. John Caffery and the United States Department of Agriculture. Selections were made from these canes and were replanted in the fall of 1950. Approximately 70 new seedlings were also planted for the first time at Franklin.


Seed Treatment of Sugar Cane

Three-year tests from 1947 through 1949 have indicated that dipping canes, before planting, in 1 per cent solutions or suspensions of Puratized N5E, Phygon and Tersan gave increases both in stands and yields of cane. Tests of the 1949-50 season also showed increases.

Preliminary tests on the cost per acre for seed treatments indicate these will be sufficiently cheap for field use.

—P. J. Mills and S. J. P. Chilton.

Sugar Cane Varieties and Red Rot

Each year, released and unreleased varieties are tested for their resistance and susceptibility to the fungus causing the disease known as red rot. Of the varieties released in the last few years, C.P. 44-101, 44-155, 43-47, 36-105, 36-183, and 36-13 are resistant to this disease. Of the older varieties grown, Co. 290 and C.P. 34-120 are susceptible, and C.P. 29-320 is intermediate.

—P. J. Mills and S. J. P. Chilton.

Johnson Grass and Sugar Cane

In large-scale tests made in 1950, the use of 2,4-D + flame cultivation or of TCA at low rates gave good control of Johnson grass seedlings in plant cane after fallow plowing. Even with the most
efficient treatments some hand rogueing was necessary, but costs were low. Increases in plant cane and first stubble yields far exceeded the expense of the Johnson grass control program.

In addition, low rates of TCA applied immediately after shaving and off-barring badly infested stubble gave very good increases in yields and reduction of Johnson grass.

There seems little doubt that the use of chemicals for Johnson grass control, when combined with certain modifications of the cultural practices commonly employed, is economically feasible.

—E. R. Stamper and S. J. P. Chilton.

87
Internal Cork of Sweet Potatoes

Although internal cork has not increased to serious proportions in Louisiana since it was first found in 1946, the disease is known to occur rather generally in at least one section of the state, near Shuteston in St. Landry Parish. Sweet potato crops on two infested farms in that section have shown relatively little increase in severity of internal cork since 1948. Examination of potatoes at the time of harvest showed the presence of a “trace” to “slight” cork in 1.3 per cent and 2.0 per cent of the potatoes in the 1949 and 1950 crops, respectively. However, cork severity increased during storage of the 1949 crop, so that after storage 3.5 per cent of the potatoes examined had cork which was classified mostly as “severe” cork.

Extensive studies are in progress on transmission of the virus by insects and other means under field conditions in the affected area. Similar studies are being made under controlled conditions in the laboratory and greenhouse.

Artificial inoculation of newer varieties and seedlings with internal cork virus indicate that Queen Mary, Oklahoma 24, and L-241 are just as susceptible to internal cork as is the Porto Rico variety.

—W. J. Martin and George Feazell.
Chemical Weed Control in Cotton

In the last three years a large number of chemicals have been tested for their weed-killing properties in cotton fields. These tests were made at Baton Rouge, St. Joseph, and Curtis, and include the three major soil types on which cotton is grown in Louisiana.

Very good weed control was obtained by a combination of (1) a pre-emergence spray with chemicals in the dinitro group, (2) post-emergence sprays with certain oils directed at the base of the young cotton plants, and (3) flame cultivation until layby.

Recommendations for trial by cotton planters are now available.


Seed Treatment for Drilled Rice

Seed treatments using Arasan, Experimental Fungicide KF-467, and Ceresan gave equally significant increases in rice stands when compared with stands from untreated seed.

The results obtained indicate, as in past years, that seed treatment for assured adequate stands is of value to the rice grower.

Sweet Potato Disease Development in Nematocide-Treated Soils

Certain soils used for growing sweet potatoes are infested with root-knot nematodes as well as with the Fusarium wilt organism and various fungi causing rots of sweet potatoes. Although sweet potatoes are considered as fairly resistant to root knot, they commonly are invaded by the nematodes. In order to determine the effects of eliminating nematodes in such disease-infested soils on the subsequent development of disease, two field experiments were made in which plots of soil on two farms were treated with the nematocides DD-mixture and Dowfume W-40.

In the first experiment the soil was known to be heavily infested with both nematodes and the sweet potato wilt organism. Sweet potatoes grown in the plots treated with the nematocides were as severely affected with wilt as those grown in the untreated plots. Thus, eliminating the nematodes in this soil did not affect the development of wilt.

In the second experiment the soil was infested with sweet potato rot organisms. Some of the sweet potatoes grown in all replicates of the untreated plots were affected with minor rots at harvest. Sweet potatoes grown in the plots treated with nematocides were not affected with such rots. The lesions on the potatoes grown in the untreated plots were of the "circular spot" type, and the fungus Fusarium sp. was isolated from them.

The above results indicate that nematodes may be important in making avenues of entrance for various fungi which are known to cause lesions on sweet potatoes at points of injury.

—W. J. Martin.

Late Blight of Irish Potatoes and Tomatoes

Late blight was not reported on fall potatoes in 1949 nor on the spring crop of potatoes in 1950. Yet in June, 1950, the disease appeared on tomatoes in Lafourche, Pointe Coupee, East Feliciana, Livingston and East Baton Rouge parishes. The outbreak of late blight on tomatoes was unexpected, since the disease had not been reported on the spring crop of potatoes. Occurrence of the disease on tomatoes at that time suggested that other sources of inoculum were present in the state to initiate the disease. A possible source was discovered in fresh-market tomato fruit imported into the state. Active late blight lesions were found in various samples of such fresh-market fruit.

Epidemics of late blight were observed in plantings of fall tomatoes in West Carroll and Ouachita parishes in early October. This was the first record of occurrence of late blight in fields of fall tomatoes in Louisiana.

—W. J. Martin.
Control of Tomato Foliage Diseases

In Louisiana tomato foliage may be damaged by any of the following diseases caused by different fungi as given in parentheses: late blight (Phytophthora infestans), early blight (Alternaria solani), Phoma leaf spot (Phoma destructiva), gray leaf spot (Stemphyllium solani), and leaf spot (Septoria lycopersici). Although early and late blights usually are the most destructive, any of the diseases may cause injury to the plants.

Some commercial growers who are equipped with power sprayers protect their plants from these diseases by systematically spraying them with a fungicide. Such growers ordinarily space their rows sufficiently far apart to permit passage of the sprayer between rows. However, many tomato growers do not have the necessary spraying equipment and they plant their crop on four-foot rows. In the past the majority of the latter growers have not applied control measures, and in many cases severe losses were experienced as a result of these diseases.

In the fall of 1950, experiments were started to determine the relative effectiveness of dusting versus spraying fungicides on tomato plants to protect them from the foliage diseases. If dusting were sufficiently effective, considerably less expense would be involved in purchasing the necessary equipment. In the field of tomatoes used for the experiment Phoma leaf spot was the only disease which appeared in severe form. Six fungicidal applications were made at weekly intervals beginning with the appearance of the first cluster of flowers. Results from this test indicate that yields may be increased considerably by either spraying or dusting when Phoma leaf spot is present in severe form. However, with each of the three fungicides used in the test, spraying resulted in higher yields than did dusting. One of the spray treatments gave a 50 per cent increase in yield over the untreated check.

Numerous tests under different conditions for disease development will have to be made before comparative data are available on dusting versus spraying for controlling the five diseases listed above.

—W. J. Martin and L. Roure.

Forage Crop Diseases

Lespedeza Diseases—Observations and preliminary studies indicate that three important causes of Lespedeza dying prior to maturity are Rhizoctonia aerial blight, southern blight (Sclerotium rolfsii), and the three-cornered alfalfa hopper (Stictocephala festina). Each of these three pests has been shown to be capable of killing or severely damaging Lespedeza in controlled tests. In 1950 southern blight was very destructive on Korean Lespedeza in experimental plantings but was not found on Kobe or common. The alfalfa
hopper probably causes more damage, in general, than diseases. Nearly 100 per cent of the plants have been found to be girdled by the feeding of this insect. “Disease” symptoms associated with alfalfa hopper injury are yellowish leaves, sparse foliage, poor vigor, enlarged stems and a slow wilt or dead plants. Girdled plants often exhibit a root or basal stem rot which has been found to be associated with weakly pathogenic soil fungi. —J. G. Atkins.

A New Vetch Anthracnose Disease—During the past two years a species of Colletotrichum has been found on severely diseased common vetch, particularly in the southern part of the state. This anthracnose, when favored by rainy weather during late winter and spring, causes a very destructive foliage blighting. The disease starts as leaf and stem spots but eventually causes a complete dying of leaves and stems. A large number of different vetch species and selections have been tested for resistance in greenhouse inoculation series. Vicia villosa (hairy), and V. atropurpurea (purple) were resistant species. V. sativa (common), V. dasycarpa (woollypod), V. pannonica (Hungarian), V. monantha, V. grandiflora, and V. angustifolia were susceptible. Austrian Winter, Dixie Wonder, and Creole peas were moderately susceptible in greenhouse tests. Under field conditions the disease has been found only on peas growing adjacent to severely diseased common vetch. The fungus causing the new anthracnose disease of common vetch has been studied and found to differ from C. villosum, which causes a similar disease of hairy vetch. —N. L. Horn and J. G. Atkins.

Rhizoctonia Blight of Trefoils—The trefoils, Lotus spp., in small experimental plantings of the Crops and Soils Department, have been observed to make good growth during the cooler months and then exhibit poor growth and dead foliage in late spring or early summer. A Rhizoctonia blight appears to be as important, or more important, than the effect of higher temperatures upon this cool weather legume. Warm, moist weather which often prevails in
late spring and early summer provides ideal conditions for the development of this disease. The trefoils are very susceptible to this fungus. Although the trefoils are perennials, observations indicate that they may not persist as such when Rhizoctonia blight is severe. Due to their extreme susceptibility to Rhizoctonia blight, the trefoils cannot be considered as promising legumes for south Louisiana.

**Winter Legume Nursery and Field Tests**—At Baton Rouge winter legume nursery and variety tests were planted on land where common vetch had been severely diseased the previous year. Through the cooperation of the U.S. Department of Agriculture a total of 65 collections of *Vicia sativa*, common vetch, were evaluated for disease resistance in a nursery planting. Only one of the common vetches, FC 29933, showed any resistance to the new anthracnose disease and root diseases when compared with commercial common vetch. Hairy and purple vetch were resistant to anthracnose and the root-rot complex. In a variety test using commercial seed, Hungarian and four lots of common vetch, including Willamette, were susceptible to these diseases, but hairy vetch was resistant. Although common vetch made an earlier growth than hairy, plots planted with hairy vetch showed excellent growth by late March when common vetch was dead from diseases, chiefly anthracnose and root rots.

Two pea varieties developed by the U.S. Department of Agri-
culture were tested and found to be more resistant to the diseases known as the root-rot complex and the Ascochyta blights, than Austrian Winter and Dixie Wonder peas. These two new winter peas are similar to the Austrian Winter pea in growth type. The 1949-50 tests at Baton Rouge indicated that the Dixie Wonder pea is not superior to the Austrian Winter pea when planted in soil infested with disease organisms.

A test in Franklin Parish was planted on a farm where winter legumes had grown very poorly. Hairy vetch and Singletary peas were disease resistant and gave satisfactory results. Austrian Winter and Dixie Wonder peas, Willamette, domestic common, imported common, and Hungarian vetch showed extremely poor growth in March. Since hairy vetch has been found in greenhouse and field tests to be more resistant to diseases than common vetch or Austrian Winter peas and appears to be capable of producing a very satisfactory growth where the other winter legumes fail, growers may find hairy vetch a satisfactory winter legume. Recommended agronomic practices should be followed.

**Fescue Diseases**—Two fungus diseases are known to attack such fescues as Kentucky 31 in Louisiana. *Helminthosporium dictyloides* causes dark net-like blotches or spots on the leaves during the winter and spring months. Although this disease is often very prevalent and probably causes considerable damage, the fescue plants are generally not killed and continue to grow. In 1950 Rhizoctonia leaf blight or blotch appeared in early June. This fungus completely killed the leaves in areas within a field. Since the fescues are valued for winter and spring grazing, it is probable that Rhizoctonia blight may not be of much importance in affecting their forage value. Observations indicate that diseased plants are completely killed and that second year stands may be poor. Thus, with this disease present, fescue may not behave as a perennial in certain areas of Louisiana.

—J. G. Atkins.

**Oat Disease Research**—In cooperation with the Crops and Soils Department, disease readings were made on nursery plantings containing various old and new oat varieties and promising selections. Crown rust was severe in 1950 throughout the state. Owing to the presence of Race 45 or similar races, the Bond varieties, such as Camellia and Clinton, were severely affected. In 1949 and 1950, crown rust was, in general, the most destructive oat disease. Helminthosporium or Victoria blight was severe on certain susceptible varieties in experimental plantings at Baton Rouge and Crowley. Among the older oat varieties, Alber and its selections were most promising. Although Alber cannot be considered as a crown rust resistant variety, it will probably give more satisfactory yields than many other varieties.

The fungus causing Helminthosporium blight, *H. victoriae*, has
Leaf spot on oats caused by *Helminthosporium victoriae*. Natural infection on two leaves on left; four inoculated leaves on right.

been found to cause a leaf spotting of certain oat varieties, such as Victorgrain, Fulgrain, Letoria, and DeSoto. Susceptible varieties in the heading or dough stage of growth often show extensive leaf spotting. Previously this fungus was known to cause seedling blight with a foliar striping of young leaves and to attack the basal culm tissues with resultant lodging and low yields. However, in Louisiana, leaf spots must also be considered a symptom of this disease of oats.

—J. G. Atkins.

**Quick Decline of Citrus**

Quick decline, or “Tristeza,” is a very destructive virus disease of citrus affecting certain scion-stock combinations, particularly sweet orange on sour orange rootstock. It has destroyed the bulk of citrus culture in Argentina and Brazil and is causing increasingly
severe losses in California since its first appearance there about 1939. A disease fitting the published description of quick decline was first observed in the Boothville area of Plaquemines Parish in June, 1950, but there are indications that the disease had been present in this area for probably one to two years previous to that date. Thus far, the disease has killed about 500 trees, all sweet oranges on sour orange rootstock. Several scientists from the U.S. Department of Agriculture and the Citrus Experiment Station in Florida, who have had experience with the quick decline disease and were familiar with its symptoms, visited Louisiana and examined the affected trees, and all were of the opinion that the disease in Louisiana was in all probability quick decline. The only sure way of determining whether or not the disease is quick decline is to test its transmissibility by budding susceptible rootstocks with budwood from affected trees.

On July 20, 1950, Valencia budwood was taken from the grove in which the disease occurred in Boothville and budded into two-year-old potted sour orange seedlings in Baton Rouge. The budwood was taken from eight different trees, some showing definite disease symptoms and some apparently healthy but growing next to diseased ones. As a check, healthy budwood was taken from Valencia trees growing in the northern extreme of the citrus area (Magnolia) and budded into sour orange seedlings. The budded trees were kept outdoors until November, then placed in the greenhouse.

Transmission has been secured. First indication of transmission appeared 4½ months after budding, when one of the budded trees wilted and died. This was followed 2-3 weeks later by five other trees developing disease symptoms, pale-green color, vein chlorosis, shedding of leaves, and by the sudden wilting and death of another tree. All the trees arising from healthy budwood are still healthy and growing.

—A. G. Plakidas and C. A. Schexnayder

Breeding for Disease Resistance in Onions and Shallots

In 1948, a cooperative breeding project was started between the United States Department of Agriculture (a part of the National Onion Breeding Program) and the Department of Plant Pathology, for the development of disease resistance in onion and shallot. The crosses were made at Beltsville, Maryland, by Dr. H. A. Jones and the actual field testing for disease resistance and selecting for commercial type was done at Baton Rouge.

Onion Breeding—Onion mildew or blight continues to be the limiting factor in the growing of Creole onions in Louisiana. Many farmers have stopped growing onions because of the disastrous mildew epidemics of 1946, 1947, 1949, and 1950. Production of onions for the market was 220,000 sacks (50-pound sacks) in 1945; the yield
was reduced to 130,000 sacks in 1949. This reduction was largely attributed to severe damage from mildew. The development of a mildew-resistant strain of Creole onion would materially aid the onion growers of Louisiana.

The common Creole variety has been crossed with the Calred, a mildew-resistant variety developed in California a few years ago. Several crosses were made at Beltsville and the progenies tested at Baton Rouge. In the 1949-50 season 6,822 \( F_2 \) plants were tested in the field and greenhouse. A heavy mildew epidemic in the spring of 1950 was favorable for testing the disease resistance of a large number of seedlings. Preliminary selections were made of plants showing some apparent resistance to leaf infection. A total of 573 out of 5,142 plants in the field showed some indication of resistance. These bulbs were stored and those that kept through the summer were planted in the fall of 1950 to be tested for seed stalk resistance. In addition about 5,000 \( F_2 \) seedlings of a reciprocal cross Creole X Calred, and 500 plants from the first backcrosses from the Creole-Calred hybrid back to Creole were set in the field for further testing.

**Shallot Breeding**—The two most important diseases at the time the project was started were “pink root” and “yellow dwarf.” Most of the shallots being grown at the present time are susceptible to both diseases. In 1949 and 1950, another disease, “downy mildew,”
caused serious losses in shallots. This is the same mildew disease that also causes heavy losses in onions. The breeding project has been expanded to include resistance to mildew.

The Nebuka onion, Allium fistulosum, is immune from all known strains of the yellow dwarf virus and is highly resistant to the pink root fungus. The first crosses were made between A. fistulosum and the common shallot in 1949. The F₁ diploid seedlings were treated with colchicine and the chromosome number doubled. Ninety-nine lots of these polyploids were tested in the field for resistance to pink root and yellow dwarf in 1950. No yellow dwarf appeared in any of the plants although they were exposed to infected plants for several months. However, a number of the lots showed some susceptibility to pink root. Practically all the plants were large and coarse and divided quite slowly as compared with the ordinary shallot.

The progeny from the first crosses between the Nebuka onion and the common shallot were apparently immune to yellow dwarf and most of them were resistant to pink root; but the plants had few of the desirable shallot characters. Most of them were too large and coarse for commercial use and only three of the 99 lots formed bulbs. The others remained green during the late spring and early summer when the ordinary shallot matures, forms bulbs and the leaves die down. In 1950, a series of backcrosses was made from the shallot-Nebuka amphidiploids to the common shallot in an effort to get the more desirable characters of the shallot into the progeny. Some 33 lots of the backcrosses are being tested in the field in the spring of 1951.—E. C. TIMS AND WARID A. WARID.

Control of Corky Excrescence of Camellias

The cause of this striking but not particularly serious disease, popularly called by such names as "cork," "cork scale," "scurf," etc., has been a puzzle for many years. As information from the study of this trouble gradually accumulated, it became more and more apparent that the disease was of physiogenic rather than parasitic nature, and particularly that it was probably due to fluctuations in soil moisture. This idea was strengthened by the results of a limited test in 1949, in which the disease was prevented by spraying with a wax emulsion. In the summer of 1950, wax emulsion (1 part wax emulsion in 30 parts of water) sprays were applied to a relatively large number of plants in two localities, Baton Rouge and Hammond. The plants in Baton Rouge were sprayed four times —June 14, July 17, Aug. 11, and Sept. 15; in Hammond, the July spray was omitted. Sharply clear-cut results were obtained. Practically 100 per cent control resulted from the wax spray. The non-sprayed check plants developed moderate to severe cork. Spraying with a copper-zinc-manganese formulation (fungicidal-mineral spray) gave no control. These results, besides providing a practical
control for this puzzling disease, gave additional support to the idea that corky excrescence is due to unbalanced water relations. It is believed that the wax spray reduces the transpiration rate by partly sealing the stomata. —A. G. Plakidas.

Relative Susceptibility of Camellia Sasanqua and C. Japonica, Var. Sarah Frost, to Root Rot

Previous work (published) has shown that Phytophthora cinnamomi is capable of causing root rot of camellias, C. sasanqua, and the Sarah Frost variety of C. japonica are among the root stocks most commonly used in grafting camellias. It was, therefore, considered of practical interest to test the relative susceptibility of these two root stocks to Phytophthora root rot. Rooted cuttings were planted in sterilized soil artificially infested with pure cultures of P. cinnamomi. The results showed a sharp difference in the susceptibility of the two root stocks toward this fungus. Under the admittedly drastic conditions of the experiment (the soil was heavily infested with the fungus) 95 per cent of the Sarah Frost plants were killed. In contrast, 95 per cent of the C. sasanqua plants survived and grew, their growth being only slightly less than that of the control plants growing in non-infested soil. —A. G. Plakidas.

The Chemical Control of Chickasaw Rose

In studies on the control of Chickasaw roses in pasture areas, comparisons were made between various forms of 2,4-D, 2,4,5-T and 2,4-D, and between water, oil, and oil emulsions as carriers for the herbicides. In most instances the 2,4-D was more effective than the 2,4,5-T. Of the 2,4-D materials tried, the isopropyl ester was most effective, the triethanole amine salt applied in a 10 per cent non-phytotoxic oil emulsion was somewhat less effective, and the triethanole amine salt applied in water was relatively ineffective. Where blanket applications of 2,4-D were made in the spring the injury to the sod was nominal and recuperation was usually prompt. However, when blanket applications of 2,4-D were made in the fall, the pasture was usually damaged considerably.

By employing the more effective herbicidal treatment, such as 2 or 3 pounds of isopropyl ester of 2,4-D per acre in the fall and spring, considerable reduction in number, size, and vigor of Chickasaw rose plants was obtained.—M. E. Gertsch and E. R. Stamper.

Comparative Pathogenicity of Two Colletotrichums of Easter-Lily Bulbs

In 1944, the writer described Colletotrichum lilii sp. nov. as the cause of "black scale" disease of Easter-lily bulbs. A second Colleto-
trichum, morphologically similar to *C. lilii*, is associated with scale-tip rot of lilies in Oregon, and several inquiries have been received from lily growers, pathologists, and inspectors as to whether or not this is identical with *C. lilii*. Isolates of the Oregon fungus were obtained from Oregon-grown bulbs and were used in pathogenicity tests on Creole lilies (*Lilium longiflorum*) in comparison with cultures of *C. lilii*. The Louisiana Colletotrichum (*C. lilii*) caused severe black scale symptoms on all bulbs grown in soil artificially infested with it. In contrast, the Oregon Colletotrichum did not cause black-scale symptoms. Culturally, the Oregon Colletotrichum differs from *C. lilii* in rate of growth and color of colony, but the conidia of both are similar in shape and size. It is concluded that the Oregon lily fungus is different from *C. lilii*.

—A. G. Plakidas.

**Foot Rot, Leaf Blight, and Stem Canker of Hibiscus**

In recent years, Chinese hibiscus (*H. rosa-sinensis* and *H. schizopetalus*) has become a popular summer flowering shrub in Louisiana and other southern states. At the same time, certain diseases, apparently new and undescribed, have been found affecting this host. One of these is a typical foot rot affecting the crown and main roots and killing the entire plant. This disease has been found occurring outdoors and in lath-houses. The variety Kona appears to be the most susceptible but the disease has been found on about 18 different varieties. Foot rot has been shown experimentally to be caused by a Phytophthora which has been identified as *P. cactorum* var *applanata*.

A leaf blight and stem canker were found under high humidity conditions, for example in houses where the plants were being propagated by aerial layering (Marcottage) and were syringed often. A second Phytophthora has been isolated from the leaf lesions and has been shown by inoculation to be capable of causing leaf blight. The leaf blight Phytophthora is distinctly different from the one causing foot rot. It has been tentatively identified as *P. palmivora*.

*Colletotrichum* sp. has been found fruiting on the stem cankers. It was isolated in pure culture, but failed to cause infection when inoculated into healthy stems.—M. O. James and A. G. Plakidas.
Improvement of the Cornish Breed

Twelve Cornish breeding pens were mated in 1950. Two of these were yearling hens mated to cockerels. A total of 1,379 eggs was set from which 1,142 chicks were hatched, yielding an 82.8 per cent hatch of all eggs set. Good reproductive ability has been maintained in this stock for several years. A new phase of the project was initiated this year, in which two White Cornish males were crossed to Dark Cornish females. Fertility was poor in these two pens, averaging only 71.2 per cent, with a hatchability of 50.1 per cent of all eggs set. In addition a case of White Cornish eggs was purchased and hatched for use in crossbreeding and development of a line of White Cornish. Hatchability was good, 76.8 per cent of all eggs set. Growth rate was improved materially over the previous year. Of the Dark Cornish, males averaged 3.4 pounds and females 2.6 pounds at 12 weeks as compared to 2.8 and 2.25 last year. The crossbreds averaged 3.2 and 2.4 for males and females, respectively. The White Cornish averaged 3.1 pounds for males and 2.5 for females. Although viability was good in the Dark Cornish stock, severe selection was practiced and only 300 pullets were housed. Major consideration was given to growth and feathering in the growing stock. Sixty-three White Cornish and 31 crossbred pullets were housed this fall. Color patterns were extremely varied in the cross of Dark and White Cornish, ranging from white flecked with black to solid black, with a considerable number of barred birds. Rate of feathering was usually fast in the Dark Cornish and generally slow in the pure Whites. Sex-linked feathering was checked this year at 10 days and at 8 weeks. Because of feather picking in the brooder house the results were not accurate at 8 weeks. It is hoped that a better check can be made this year. It appears that good progress is being made toward the development of a broiler strain of Cornish with better than average productive qualities.


Growth Study with Dark Cornish

One portion of the study made with the Dark Cornish breed is an intensive correlative study of growth pattern as indicated by body weight, shank length, anterior body depth, length of sternum, and breast width. Observations were made (using 384 chicks) at weekly intervals to 12 weeks of age and with 197 chicks at 4-week intervals thereafter to 28 weeks of age. Sex differentials were
noted as well as changes during growth as age advanced. One practical conclusion reached was the relatively high correlation of body conformation at 12 and 28 weeks of age. It appears that breeding stock may be selected at the twelfth week for body weight, shank length and keel length, with a relatively high degree of accuracy.

Early indications of sex differentiated growth patterns were observed as indicated by the following results. Weight of the sexes differed significantly at one week of age; and at three weeks of age and after, the differences were highly significant. The sex difference in shank length was highly significant on the date of hatching and thereafter. This observation had not been reported previously.


Inbreeding White Plymouth Rocks

The practical poultryman may question the value of inbreeding chickens since inbreeding usually decreases the productive qualities of the inbred lines themselves. The ultimate objective in inbreeding chickens is the same as the hybrid corn producers have used so successfully, namely the production of “hybrid” chickens by crossing two, three, or four inbred lines. Inbreds may be used also to “topcross” standard breeds of chickens. The ultimate place that hybrid chickens may take in poultry production is not known, as yet. To give some indication of the problems involved in the production of inbred lines, results with inbred White Plymouth Rocks are given, briefly. For the 1950 breeding season, approximately 90 brother-sister inbred White Plymouth Rock matings were made up and housed in special breeding coops. These parents were 25 per cent inbred and produced progeny of 37.5 per cent inbreeding. A total of 1,168 chicks was hatched and pedigreed. Hatchability was approximately 20 per cent lower in the inbreds than in the R.O.P. strain of White Plymouth Rocks. Some individuals as well as whole families of sisters, however, equalled or exceeded the average for the R.O.P. stock. In the matter of fertility, body weight to eight weeks, maturity, and rate of feathering, the inbred stock held its own with the R.O.P. stock. However, losses from all causes for the year 1950 were considerably higher than those of the R.O.P. stock. Average production of the 1949 hatched inbred pullets that finished the laying year in the fall of 1950 was 80.1 as compared to 150.9 eggs, a difference of 70.8 eggs in favor of the R.O.P. stock. It should be pointed out, however, that five inbreds met R.O.P. qualifications while several others lacked just a few eggs. There was no great difference between the inbred and R.O.P. pullets in egg weight and body weight. However, for average age in days at first egg, the 1949 hatched inbred pullets matured at an average of 19 days later than the R.O.P. pullets; and the 1950 hatched inbreds matured an average of 46.5 days later than the R.O.P. pullets. Here again, there
Details of one of 50 individual mating pens in the inbreeding experiment. Note separate pen for the male and female (placed together three times each week), the sloping floor in pen for hen, outside feed and water troughs, and wire floors.

were exceptions, as several dozen of the 1949 and 1950 hatched inbred pullets matured at from 160 to 210 days. Fifty brother-sister matings have been made up for the 1951 season. Several other types of matings are being made also, such as testing several promising inbred lines on each other and on open bred White Plymouth Rocks, as well as crossing them with other breeds. Six small hatches have been taken off for the 1951 season, and it appears as if fertility and hatchability are major problems. It is apparent that problems tend to increase as inbreeding increases.—B. A. Tower and C. W. Upp.

Breeding, Season of Year and Diet Affect Broiler Growth

The breeding back of the stock used is of even more importance than is designation of the breed in determining the rate of growth obtained. For example, one broiler strain of New Hampshires averaged 3.8 pounds at 12 weeks of age and another 3.9 pounds, whereas a third strain of New Hampshires fed the same diet in the same experiments averaged 3.1 pounds. In the same trials one crossbred
stock averaged 3.3 pounds, while a third weighed 2.8 pounds on the average.

The season of the year in which the broilers are grown is also of importance in this state. In one series of experiments lots started in the spring (4 strains on same diet) averaged 3.0, whereas a like number started in the early fall weighed on the average 3.3 pounds and a third series started in late fall averaged 3.6 pounds. In another series of experiments with different stock and diets, spring broilers averaged 2.7 pounds, early fall 2.9, and late fall 3.1 pounds.

These broilers, produced experimentally, illustrate the quality from good stock on adequate rations.

Diet is generally recognized as one of the most important factors influencing growth. Chicks fed the "Connecticut," high efficiency diet averaged 3.0 pounds and a similar diet using Louisiana produced ingredients, produced an average of 3.1, whereas chicks fed a higher fiber, less fortified diet, averaged 2.6 pounds. R.I. Reds bred for egg production were used in these tests.

The various forms of feed (i.e., pellet, granular and mash forms) have all been advocated as producing greater gains. In three trials at this station little consistent advantage was found for any one form of feed when a highly fortified broiler ration was used. Aver-
age weights obtained were 3.0 for mash, 3.0 for pellets, and 3.1 for granular feed.
—C. W. UPP, C. K. ALLEN, W. I. STEWART, AND C. C. WILLIAMS.

Meat Yields of Broilers

Consumers of broilers are interested ultimately in the amount of edible meat obtained rather than gross live weight, N.Y. dressed weight, or eviscerated weight of market birds purchased. It has long been taken for granted that these go hand in hand yet there may be strain and breed differences in percentage of meat yield as well as differences for birds of different ages. In two trials with 12-week-old broilers of seven different strains some indications of differences in meat yield were obtained. The highest percentage of edible meat (exclusive of giblets and neck meat) was 37.5 per cent of the live weight. The lowest figure was 27.4 per cent of live weight. To date the highest yield has been with females of a strain of the Cornish breed and the lowest with males from a strain of New Hampshires. Males of another strain of New Hampshires averaged 33.0 per cent edible meat based on live weight. It is evident that differences in percentage of meat yield may be found in different stock. Further tests are being made.
—G. B. CHAMPAGNE AND H. E. HATHAWAY.

The Inheritance of Morphological Abnormalities

Breeding tests to determine the possible inheritance and methods of eliminating four undesirable characters were continued this year. Some 3,000 birds were hatched from 12 breeding pens in each of which two males were used in sequence; i.e., 24 sires were tested.

The characters under study include spike comb, long lower beak, telescoped comb, and the absence of serrations in the comb.

Of 217 progeny classified from spike to spike comb matings, 203, or 93.5 per cent, were affected. All such progeny would be affected if a completely expressed simple recessive were involved. In matings of normal to normal combed birds, which were offspring of spike to normal matings, 1,014 progeny were classified. Of these, 334, or 32.9 per cent, were spiked. If spike comb were a simple recessive such matings would produce only 253 spiked progeny in a total of 1,014. These results offer conclusive evidence that spike comb is inherited as a recessive character but equally demonstrate that it is not inherited simply, nor is it completely expressed.

The long lower beak condition was present in 74.9 per cent of 283 progeny from matings in which both parents were affected. This is a slight increase over previous years. These two characters, based on results of this and previous years, are inherited as recessives although not as clear cut simple recessives.
In the telescoped by telescoped matings, 85.9 per cent of the progeny were affected, which is a marked increase in the expression of this character as compared to previous matings. The age at which birds are classified is an important breeding factor. From dams classified as normal during the breeding season, but which had been telescoped at a younger age (4 or 8 weeks), 86.9 per cent of 149 progeny had telescoped combs. The mode of inheritance of this character has not been determined as yet.

Two pens each mated in sequence to two males were used in the non-serrated comb study. A summary of the progeny of non-serrated comb females mated to non-serrated comb males shows that 190 progeny, or 72.2 per cent, had non-serrated combs, while 73, or 27.8 per cent, had serrated combs, with the number of points varying from three to eight. This ratio suggests that non-serrated comb may be inherited as a simple autosomal dominant. Matings are being continued during the current year in further study of this trait.

This year another character, the presence of a black pigment in the abdominal fat and connective tissues of broilers, was added to these breeding experiments. This discoloration is very detracting to the appearance of the dressed carcass and may be of significant economic importance if the area involved is large enough to warrant removal of the abdominal tissue. The pigment is recognized in live birds by the bluish green appearance of the abdomen in the area between the pubic bones and the end of the keel bone on either side of the abdominal feather tract. It is most easily detected externally at 4-12 weeks of age. Breeding tests are under way to determine the possible inheritance of this trait.

—W. D. Blackwell and E. Williams.

Holding Conditions for Market Eggs

The possibility of treating market eggs on the farm and by the first handler or buyer has been investigated at this station. Eggs treated with oil or S-100, a cream like preparation, preserved the quality to a surprising degree. These tests were run on small (simulating farm conditions) and large (processor or first handler) samples of eggs with the eggs held at room temperature for two months and at refrigerated temperatures for longer periods.

There has been great improvement and much interest in the washing of dirty eggs for immediate consumption. It has been impossible for all washed eggs to be funnelled to immediate consumption, and great numbers are going into storage. The poultry industry has suffered, and is suffering, great losses due to a "sour egg" condition and mold which develops during storage of washed and oil treated eggs.

Preliminary work indicates that S-100 and oil treated eggs have
a lower 14-day weight loss when temperature and humidity are controlled by using a conventional type incubator. A greater 14-day weight loss occurred in washed eggs than in non-washed eggs.

Clean or dirty eggs that were washed exhibited no difference in loss from mold or rot when held for 14 days at room temperatures averaging 83° F. and relative humidity averaging 86 per cent.

—H. E. Hathaway and R. J. Champagne.

A Preliminary Report Comparing Lindane* and Nicotine Sulphate in the Control of Poultry Lice

Lindane (1.5 per cent solution in varsol) painted on the roosts and sprayed directly on the birds at night proved more effective in controlling both body lice (Eomenacanthus stramineus) and shaft lice (Menopon gallinae) than nicotine sulphate painted on the roosts. Of the two methods of using Lindane, spraying it directly on the birds at night appears to be the most promising way to use it, as it is very effective, is cheap, and is easier to apply. There was no evidence that irritation to the eyes or other harm was done to the birds that were sprayed with Lindane. There was also no evidence that Lindane caused a loss in egg production. This preliminary work

* The purified gamma isomer of benzene hexachloride (99.6 per cent pure).
with Lindane indicates that both body and shaft lice of poultry can be satisfactorily controlled, on a flock basis, by a treatment every 10 or 12 weeks.—B. A. Tower, Dewey McNiece, and C. W. Upp.

**Storage of Frozen Poultry**

Discoloration of the flesh around the long bones and of the long bones themselves is due to the hemolysis of red blood cells of the bone marrow. The hemoglobin is liberated through the small foramina of the bones and causes the discoloration. This has been a limiting factor in the public acceptance of frozen poultry.

Studies have yielded the following information:

1. Method of slaughter has very little if any influence on the degree of discoloration in fryers.
2. Only slight differences were found in the degree of discoloration in fryers when precooled in tap water (80° F.), ice slush (33° F.), or still air (36°-40° F.).
3. Freezing in an air blast type freezer at 15° F. or in CO₂-alcohol solution at −70° F. does not appreciably affect degree of discoloration.
4. Slight discoloration is present in fryers held without freezing for 24, 36, and 48 hours.
5. There is a slight difference between sexes in degree of discoloration. Females exhibit less discoloration than males.
6. There are indications that cooking increases the degree of discoloration, but no differences exist between frozen cooked and thawed cooked tibia and femur.

The effect of wrapping material and storage time on discoloration of the flesh around the long bones and of the long bones themselves was studied during the past year. Three lots of 20 fryers each, 13 weeks of age, were killed and chilled. The tibias and femurs were removed from the carcass, separated, and wrapped in either aluminum foil, “Double Wound” or Kraft butcher paper (45 pound). These were stored at 15° F. for nine months. They were then cooked and observations made.

The wrapping material affected the appearance, taste, and degree of discoloration. The aluminum foil and “Double Wound” were both superior to Kraft butcher paper in preventing freezer burn and discoloration.

The discoloration scores on these tests were not appreciably different from scores on other tests in which other methods of packaging were used. —H. E. Hathaway and C. W. Upp.
Rural Sociology

The Health Status of the Aged in Rural Louisiana

Although a gradual aging of our population has been going on for many decades, its implications are only now beginning to be understood. The fact that the proportion of old people has been steadily increasing can be observed from census reports. In 1910, for instance, one individual in 22 in the rural United States was 65 years of age or over. By 1940, in contrast, one rural person in 14 was 65 years or over. From 1910 to 1940, our national population increased by less than one and one-half, but during this 30-year period the number of persons 65 years and over more than doubled.

Data for Louisiana show clearly that this state has shared in the national trend toward larger numbers and proportions of elderly people. In 1910, men and women aged 65 and over amounted to one person in 48 in rural Louisiana; in 1940, they numbered one in every 21 persons. By comparison, people over 65 years of age in urban Louisiana numbered one in 28 persons in 1910 and one in 19 persons by 1940. The proportion of the aged in rural Louisiana in 1940 was still smaller than in the cities, while in the nation as a whole the proportions were approximately equal in both rural and urban residential areas. The census data demonstrate further that in both the nation and the state aged men outnumbered aged women in the rural-farm population, whereas there were relatively more women than men in the same age groups in the rural-nonfarm population.

This aging of our population has great social significance for the rural world. The factor of residence has an important effect on the health of older people. Life tables constructed for Louisiana make it clear that rural Louisianians can expect to live longer than the urban people of the state. This difference prevails among both the white and the Negro populations. The life expectancy of urban white males under one year of age in 1940-41 was 57.64 as compared with 64.96 years for rural white males. At ages one through four, urban white males had a life expectancy of 60.04 years, while rural white males could expect to live 67.06 years. For those aged 50 through 54 years, the expectation of life exhibited the same differential in favor of rural people: urban white males had a life expectancy of 18.09 years compared with 23.70 years for rural white males.

Although rural Negroes as compared with urban Negroes enjoy the favorable residential differential in expectation of life, all
Negroes in Louisiana could expect fewer years of life at all ages than white persons. In the age class under one year, for instance, urban white males had a life expectancy 12.17 years greater than urban Negro males. At ages 50 through 54 the difference in life expectancy in favor of urban white males over urban Negro males was much smaller, amounting to only 3.00 years. Rural white males also had a higher expectation of life than rural Negro males, but the differences were smaller: 7.53 years for those under one year of age, and only 1.59 years for men 50 through 54 years of age.

In all cases, women have a greater life expectancy than men. Thus, for ages one through four years urban white females in Louisiana had an expectation of life 8.43 years greater than urban white males in the state. Urban Negro females could expect to live 4.73 years longer than urban Negro males of the one-through-four age group. The differential in favor of females is much lower for rural areas, however. Rural white females had a life expectancy 2.00 years greater than that of rural white males at ages one through four. The life expectancy of rural Negro females was 1.18 years greater than that of rural Negro males in the same age category.

In Louisiana as a whole, the ten major causes of death of persons 65 years old and over in 1949 were heart disease, cancer and other malignant tumors, nephritis and nephrosis, pneumonia and influenza, diseases of the digestive system, accidents (other than motor vehicle), vascular lesions affecting the central nervous system, tuberculosis, syphilis and its sequelae, and motor vehicle accidents. When the data are tabulated so as to permit an analysis of causes of death for people over 65 years on the basis of whether they live in rural or urban environments, it is expected that significant differences for the two residential areas will be found.

In 1949, heart disease took a much greater toll of the aged than of the general population of the state. Over 46 per cent of the aged died as the result of heart disease, compared with about 34 per cent of the general population. Cancer and other malignant tumors ranked second in importance for both groups. Nephritis and nephrosis held third rank for the aged but was in ninth rank for the total population. Nevertheless, nephritis and nephrosis accounted for only 3.6 per cent of the deaths among men and women 65 years of age and over. This was due to the great importance of heart disease and cancer and other malignant tumors, which together accounted for about 60 per cent of the mortality of the aged.

—HOMER L. HITT AND IRVING L. WEBBER.

The Social Effects of Agricultural Mechanization in Louisiana

The study of the social effects of agricultural mechanization in Louisiana has been continued. The data from the Census and other sources that were reported in the preceding Annual Report have
been supplemented with information obtained in a field survey of four sample areas within the state. These areas were selected by means of an index designed to measure the degree of mechanization in the various parishes. Interviews were held with both farm operators and non-operators. Although the field schedules are still in the process of analysis, some important findings have already been forthcoming.

One discovery is that farmers of the state are accepting mechanization with an even greater enthusiasm than had been suspected. The survey data show that even in the least mechanized areas of the state (including parishes in the North Louisiana Upland Areas and in the Cut-Over Areas) 31 per cent of the farm operators perform the majority of their work with power machines. There is, in fact, an actual “technological unemployment” in all areas as far as draft animals are concerned. In this connection, it is of significance that 95 per cent of the farmers who have had experience with mechanized equipment give evidence of being completely “sold” on it.

Several challenging questions have been posed since the recent advent of machines on southern fields. Many persons have speculated as to why farmers turned to mechanization in the first place. Such a query was posed to all interviewees in the operator class. Contrary to the belief of some individuals, farmers of the state do not cite a shortage of labor as the prime cause of their shift away from the long used “one-horse technology.” Instead, they (51 per cent of the persons questioned) point to the more efficient utilization of the tractor and other powered equipment on the farm. Labor shortage has, however, been an important factor in the adoption of machines. This is witnessed by the fact that 19 per cent of the respondents mentioned this as the chief reason for their change. Another important motivating factor has been the economy of power tools as compared with hand labor. Eighteen per cent of the farmers interviewed named this factor as the most important influence in their decision. An additional 11 per cent stated that farm work was made easier with machines, and about one per cent could give no specific reason for changing from draft animals. Interestingly enough, the pattern of responses was similar in all areas.

Much speculation also has been done as to why certain farmers have not utilized technological improvements. The discovery that 39 per cent of the non-mechanized farm operators who were interviewed are planning to shift to machines as soon as possible is, therefore, an important one. The chief deterrent factor listed by this group was lack of the necessary capital. Among those farmers who are not mechanized and have no immediate plans in that direction, the chief reasons given are as follows: Farm too small (28 per cent), operator too old (26 per cent), lack of capital (23 per cent),
preference for animals (4 per cent), and other miscellaneous reasons (19 per cent).

Many additional items of interest to persons who are concerned with rural life are indicated by a cursory review of other material collected during the field survey. There is, to cite a few examples, evidence that mechanization is associated with age and education, that the farmers who have mechanized are more apt to have introduced new farm practices within recent years, that mechanization is associated with changes in workers' housing and pay, that mechanization means more commercialization, and that mechanized farmers enjoy more leisure time. All in all, a preliminary conclusion that the agricultural population is becoming more like the urban population seems justified. —ALVIN L. BERTRAND.

Modifying Dental Attitudes Through Community Programs

Research concerning the attitudes of rural people has shown that dental care for children is not entirely a problem of professional manpower. It indicated that the attitudes of parents play a major role in the discrepancy between what children need and the dental service they actually receive. For some time, the State Department of Health has conducted dental clinics in local communities throughout the state in an attempt to make known to parents, teachers, and children the importance of proper care of teeth. This agency desired to test the procedures and techniques used in these clinics to determine their effectiveness in changing attitudes toward dental care for children. Therefore, the Department of Rural Sociology has been requested to conduct research directed toward this objective. The ultimate findings of this study will be used by the Dental Section as a guide in planning community dental programs for the future.

The method of investigation decided upon jointly by personnel of the Department of Rural Sociology and the Department of Health is that generally referred to as "projected experimental design." This procedure involves four steps: (1) Areas for study are to be selected and a survey made to determine existing attitudes toward dental care for children. (2) The personnel of the Dental Section of the Health Department are to conduct a clinic designed to bring about a change in the attitudes toward care of children's teeth. (3) Following this step, the areas are to be resurveyed at a date approximately one year after the first sampling to determine existing attitudes at that time. (4) A comparison of the results of the two surveys is to be made to determine what changes, if any, have come about in the attitudes examined.

The study is now in the second stage outlined above; that is, the Dental Section is carrying out its program in the selected study
areas. The first survey was completed this summer by personnel of the Department of Rural Sociology, and the data are now being tabulated and analyzed. The resurvey is scheduled for the summer of 1951.

The results of the original survey provide some interesting details concerning attitudes toward dental care for children. In all three communities studied, slightly more than 60 per cent of the persons interviewed are of the opinion that dental care for children is of more importance than similar care for adults. About the same proportion feel that care of the baby teeth is just as important as care of the permanent teeth. Approximately 15 per cent of the interviewees are of the opinion that an aching tooth is beyond repair and that the only remedy is extraction. Diet, neglect, and heredity are the most often mentioned ideas as to the cause of dental cavities among children. The majority of the interviewees report that the cost involved and negligence on the part of parents are the main reasons that people fail to take their children to dentists. In questioning school children in the study areas, it was found that teachers apparently are not concerned with the dental health of their pupils. Over 85 per cent of the students stated that their gums had never been examined by the teachers. In two of the three areas studied, 30 per cent of the pupils reported that they had never been treated by a dentist.

—Paul H. Price.
Sugar Cane

Sugar Cane Test Fields

In the 1950 season, there was a total of 24 sugar cane variety experiments at eight locations in the Louisiana sugar cane belt. In spite of serious freeze conditions occurring Nov. 5, 12, and 25 and Dec. 7, all experiments were successfully completed by Dec. 18. Several of the plant cane tests harvested late in the season gave interesting comparative data on freeze effects on some of the commercial and unreleased varieties. This information will be presented with analyses and field results in the 1950 Sugar Cane Test Field report.

1950 Evaluation of Varieties (Averages of plant cane and stubble)—For each test field, the four highest ranking varieties in the order given performed best from a sugar per acre standpoint during the 1950 season.

Cinclare (Mhoon very fine sandy loam)—C.P. Nos. 44-101, 43-47, 36-105, and 44-155. (Bowdre-Sharkey clays)—C.P. Nos. 44-101, 44-153 (unreleased), 45-184 (unreleased), and 44-155.

Glenwood (Mhoon very fine sandy loam)—C.P. Nos. 44-155, 44-101, 36-105, and 34-120.

Reserve (Mhoon very fine sandy loam)—C.P. Nos. 43-47, 44-155, 36-105, and 44-101.

Meeker (Yahola very fine sand)—C.P. Nos. 44-101, 36-13, 44-155, and 36-105.

Shirley (Yahola very fine sandy loam)—C.P. Nos. 44-101, 43-47, 36-105, and 44-155.

Caffery (Baldwin silty clay loam)—C.P. Nos. 44-101, 43-47, 36-13, and F. 31-762.

Billeaud (Lintonia-Olivier silt loams)—C.P. Nos. 45-184 (unreleased), 36-13, 44-101, and 44-155.

Youngsville (Richland-Olivier silt loams)—C.P. Nos. 44-101, 43-47, 36-105, and Co. 290.

1950 Fall Planting—New experimental plantings were made at the eight locations Sept. 11 to Oct. 5. An average of seven commercial and twelve unreleased varieties were planted at each test field. All of the nine fields amounted to 31.35 acres, or an average of 3½ acres per field. The following eight selected seedlings, C.P. Nos. 48-12, 48-103, 48-110, 48-116, 48-119, 48-120, and 48-126 and N. Co. 310 were planted on a small-plot introductory basis. Seed cane of these varieties was grown at the Louisiana State University Sugar Station.
Performance of Promising Varieties—C.P. 43-3—From the standpoint of averages of stubble results, this variety responded better than C.P. 36-105, at the Reserve, Shirley, and Meeker test fields. At the other five locations it ranked lower than C.P. 36-105.

C.P. 43-9—At Glenwood, Reserve, Shirley, Caffery, Billeaud, and Youngsville test fields, this variety outranked C.P. 36-105 in the stubble averages. It is consistently higher in field yield but lower in sucrose than C.P. 36-105.

C.P. 44-153—This is a vigorous growing cane with a low sucrose rating. It is definitely undesirable for the fertile light soils of the Mississippi River and Red River areas. Averages of stubble results indicate that C.P. 44-153 made a favorable showing by ranking second at each of the following places: Cinclare (Bowdre-Sharkey clays), Caffery, Billeaud, and Youngsville.

C.P. 44-154—Plant cane results indicate that it is a vigorous, high-tonnage cane with a low sucrose rating. Its best performances were at the following test fields: Cinclare (Bowdre-Sharkey clays), Glenwood, Reserve, Billeaud, and Youngsville.

C.P. 45-184—This is a vigorous growing cane of about the same type and appearance as C.P. 34-120. It performed best at the following locations: Cinclare (Bowdre-Sharkey clays), Shirley, Caffery, and Billeaud; while at the other five test fields it was out-ranked by C.P. 36-105.

—C. B. Gouaux.
Control of Brucellosis in Swine

For over three years, we have been carrying on work on the eradication of Brucellosis in a swine herd. The methods of controlling this disease are well defined, and like the control of the disease in cattle, the success in a given enterprise depends upon two main factors. The first is to decide what plan is to be followed and the next is to do everything in a correct and complete fashion, not attempting to cut corners at any place. The herd on which this work was done was composed originally of some animals that carried very valuable pedigrees, so it was not advisable to sell out completely and start anew after slaughter of the entire herd followed by a period of time with no swine on the farm.

The plan used was briefly as follows. A regular testing program was instituted to furnish information that was most essential, in order to know where we were, where we were going, and where we were getting. Many reactor animals were sold directly to slaughter but no animals were sold for breeding purposes. Pigs from the sows in this herd were raised on clean ground and then were tested to see how complete the isolation program had been. No animals were allowed to come in to this herd unless on a clean agglutination test and from a herd certified to be free of this disease. Isolation was practiced and the few animals purchased were not allowed on the part of the farm where infected hogs had been in years past. The agglutination test was used and interpreted as suggested by those best informed on the disease as it occurs in swine.

At the time of preparation of this report, the herd had been free from Brucellosis for almost two years, as determined by the agglutination test and absence of any suspicious symptoms. Even though the herd had been free of the disease a year when the last report was made to the Experiment Station, it was felt that more time should be allowed before making the report, mainly because the farm concerned is in a very low area where isolation was thought to be very difficult, because of frequent heavy rains. The success of this program under the adverse factors of the type of terrain and the necessity for using the farm that was available instead of new ground or houses, shows very vividly that Brucellosis of swine can be eradicated and controlled by a program of testing and sanitation based on recognizing the disease for what it is and not attempting to cut corners at any place no matter what apparent expediency or excuse might arise.

—R. B. Lank and W. T. Oglesby.

116
Johne's Disease (Paratuberculosis)

Johne's disease or paratuberculosis is a chronic infectious disease of cattle, horses, swine, sheep, deer and goats. Although it may occur in any of these animals, it is of primary importance in cattle. The disease is characterized by either a constant or recurrent diarrhea accompanied by loss of weight, usually with the animal maintaining a fair appetite until death. It is caused by an acid-fast rod (bacterium), very similar in appearance to the organism of tuberculosis. On post-mortem examination the most characteristic finding is thickening and corrugation and areas of inflammation of the intestinal lining, especially in the back part of the small intestine, the first part of the large intestine, the blind gut (cecum) and the rectum.

The herd we were working with has been naturally infected since 1925. During the past three years the incidence of clinical cases of the disease has decreased and the number of positive reactors has dropped. One test of the entire herd was completed during the year with very few reactors being found. This low incidence of reactors is unexplainable at the present time. No clinical cases were seen during the year. Owing to the fact that very few reactors were found on the test, no comparative work was attempted with intradermal and intravenous tests for the development of a better diagnostic procedure.

Most emphasis was placed during the year on testing baby calves and young stock. Calves in individual pens were negative to all tests conducted, but when allowed on the ground they began to show some sensitization to the intradermal Johnin test. We are placing more emphasis on the fact that calves are infected early in life and that owing to the slowly progressing nature of the disease, the animals seldom exhibit symptoms until they are adults. With this as a background, we have moved several heifers, negative on all tests, to the branch Experiment Station at Homer, Louisiana, where supposedly no clinical cases have ever been present. We will test these animals periodically and observe closely for sensitization or development of symptoms. If these animals remain free, we will be more certain that infection takes place early in life and that sanitation in calf raising will be the main instrument in the control of the disease. Simultaneous with study of this group of animals, we will study others that have been allowed to run with an infected herd.

It is planned for the coming year to continue testing the calves and follow up with the animals that were put on clean ground at the Homer Station. We will again test the entire herd and if enough good reactors are found, carry out some comparative tests on intradermal and intravenous diagnostic methods in an effort to find a more effective diagnostic procedure. All of this work, as well
as past work done here, will be coordinated with the U.S.D.A., Bureau of Animal Industry Regional Laboratory at Auburn, Alabama.

—R. B. LANK AND W. T. OGLESBY.

Typhoid-Pullorum Complex

Comparative studies were continued on fowl typhoid and pullorum disease hoping to find a relatively simple field test which would serve to differentiate the two diseases. Studies were made specifically on the antigenic properties of cellular constituents of *Salmonella-gallinarum*, and also of metabolic products produced by this micro-organism when grown on several special media. Comparative studies on *Salmonella pullorum* also were made using the same procedures.

The results of this work have not been fruitful, as no method was found to clinically differentiate these infections in the fowl. These results serve to emphasize more strongly the importance of considering both infections and treating them as equals, rather than tending to ignore the *Salmonella gallinarum* infections from a legal standpoint under the National Poultry Improvement Plan.

This project was initially set up because reactors were being found in flocks that were pullorum clean and whose owners had bought only pullorum free birds. Bacteriological examinations on birds from these flocks, where the syndrome of fowl typhoid was lacking, always revealed *Salmonella pullorum*. Fowl typhoid, serious at times, surely is minor to pullorum disease and should not be allowed to deter the satisfactory execution of the Poultry Improvement Plan or of pullorum control in a flock not operating under the plan. In short, it is just as desirable to rid a flock of typhoid carriers as of pullorum carriers.

—CHARLES H. BRIDGES AND HELEN E. LEVY.

Gastro-Intestinal Parasites of Cattle

Previous experiments have shown that very severe symptoms and deaths are caused during the period of larval development and progression in the calf. Because of this fact, prevention of infection, either by proper sanitation or medication, of animals harboring the egg-producing adult worms will lead to the prevention of losses. Previous experiments have shown that ½ and 1½ grams of phenothiazine fed daily for 14 days was effective in stopping egg-production in pure infections of the *nodular worm*. Because of the different ways by which the drug might be administered, it seemed desirable to have additional information on the minimum amount and the minimum time of administration necessary to produce these results. Earlier results indicated that feeding 1½ grams for a week, then
discontinuing for four weeks, then repeating, would be effective in stopping egg production.

Experiments during the past year indicate that as little as ½ gram fed for 14 days stopped egg production, but was not effective when fed for 12 days. Extensive and thorough examinations for eggs showed that the calves getting ½ gram of phenothiazine daily for 14 days were negative for eggs from 14 days to 14 weeks. When egg production is resumed it may reach sufficient proportions to be a source of serious infections in other animals, since nine calves were experimentally infected from one of these animals. From these experiments it would seem that ½ to 1½ grams of phenothiazine fed daily for two full weeks and discontinued for three or four weeks, then repeated, would be effective in controlling nodular worm infections.

Preliminary experiments in which 1½ grams of phenothiazine were fed daily during the first two weeks of the larval period indicate that no protection was offered, since a relatively heavy infection resulted. When fed during the second two weeks of the larval period, no eggs were recovered in three experiments, but in a fourth, a very light infection resulted.

An experiment is being carried on in which cattle are given free access to a phenothiazine-salt mixture in the proportion of 1 to 10. The results to date indicate that there is a wide difference in the amount consumed by different individuals. They also indicate that widely different amounts are consumed at different time intervals. Similar results have been obtained in the case of the animals receiving pure salt. During approximately three months, three of the four animals receiving the phenothiazine-salt mixture consumed less than ½ gram of phenothiazine daily, which is the minimum amount necessary to control nodular and hookworm infection. While as little as ½ gram of the drug daily for two weeks (repeated again after a four-week lapse) should control the nodular worm, at least ½ a gram is necessary continuously to control hookworm infections. These results to date indicate that free access to a 1 to 10 phenothiazine-salt mixture is not effective in controlling nodular worm and hookworm infections, this being due to the variations of intake based on the animal’s desire for salt.

—R. L. Mayhew and Carol T. Ernest.
Strawberry Varieties

In tests conducted for the past several years, the seedling L-27 has out-yielded all other varieties, with an average yield of 239 crates per acre for the past four years. Marion Bell has produced an average yield of 179 crates per acre and Klonmore 140 crates per acre. The 1950 season is the only year in which Klonmore produced better yields, 155 crates per acre, than Marion Bell, which produced 138 crates per acre. This difference was apparent early in the season as late frosts killed a much larger percentage of the fruit produced by Marion Bell. These three varieties have desirable market qualities. Marion Bell and Klonmore remain as the varieties best suited for this area. Plants in any quantity of the seedling L-27 are difficult to obtain as this seedling produces relatively few plants compared to the recommended standard varieties.

Fertilizer Test with Strawberries

During the seasons 1949 and 1950, on soils that have regularly been planted to strawberries with a green manure crop between strawberry crops, a test was conducted involving the application of 1,500 pounds per acre of the formulas 4-4-4, 4-8-4, 4-12-4, and 4-16-4. All the ratios showed significant increases in yields over the 4-4-4, but there were no great differences in yield for the other ratios over the 4-8-4. The formula 4-4-4 produced yields of 149 and 125 crates per acre in comparison with 160 and 137 crates per acre for the formula 4-8-4.

Chemical Weed Control in Strawberries

Results for three seasons (1948 through 1950) show that the number of weeds on the strawberry beds at the time of scraping and mulching can be reduced 40 per cent by a pre-setting spray of two pounds acid equivalent of 2,4-D per acre or four pounds of a di-nitro per acre.

This reduction in number of weeds was not as important as the reduction in the size of the weeds on the sprayed areas which
made it possible to reduce the time of scraping by 60 per cent. This control of weeds has been accomplished without any reduction in the yields of strawberries.

Tests comparing scraping and not scraping of the sprayed areas on which the weeds were controlled have shown that scraping is necessary, as yields were materially reduced when the beds were mulched without scraping.

The control of weeds and grasses in the middles between the strawberry rows has been very effective from the use of two pounds acid equivalent of 2,4-D per acre plus ten pounds of T.C.A. applied at the time of scraping with the plants still under the straw. No hoeing of the middles was necessary during the harvest season.

—W. F. Wilson, Jr., and E. R. Stamper.

Strawberry Top-Dressing Tests

Top-dressing tests were conducted through the seasons of 1945 to 1950. During the six-year period results were very variable, but from the averages best yields have been obtained from the application of 750 pounds of the formula 4-12-4 in the beds before planting and 750 pounds as a top-dressing at the time of scraping and mulching. This treatment produced 243 crates per acre in comparison with 214 crates per acre when the 1,500 pounds of 4-12-4 was applied under the crop prior to setting. During the same period, application of 500 pounds under and 500 pounds as a top-dressing produced an average yield of 231 crates per acre.

1950 Fall Cucumber Variety Test

In the fall of 1950 the highest yielding cucumber variety, with a total crop of 521 bushels per acre, was Burpee's Hybrid. A yield of 464 bushels per acre was obtained from Marketer, which is a variety better adapted for commercial use because of its favorable dark green color. This cucumber produces a fruit about 7½ inches long, 2 inches in diameter and has an average weight of .68 pound.

Palmetto, a new variety which has received quite a bit of attention, is resistant to mildew and produces constant yields; however, it is a blunt-end cucumber and many of the fruits have holes at the points of seed attachment, which makes it objectionable as a market cucumber. In contrast, the Marketer variety has fruits with wedged ends and is free of this objectionable defect.

Other new varieties were included in a Regional variety test, some of which were resistant to mildew. Two of these varieties, S.C. 10 and S.C. 11, showed promise, producing yields of 624 and 578 bushels per acre, respectively, of well-colored fruits of excellent marketable shape in comparison with 461 bushels per acre produced by Marketer when no disease control was practiced.
When diseases were controlled, Marketer produced 687 bushels per acre; S.C. 10, 565 bushels per acre; and S.C. 11, 533 bushels per acre. —W. F. Wilson, Jr., and M. J. Giamalva.

1950 Fall Cucumber Fertilizer Test

In the fall of 1950, which was a very good year for producing cucumbers, nine treatments were used involving variations in the combinations of the three major elements from 32 to 96 pounds of each. It was interesting to note that in a year in which yields were so high the application of 32 pounds N, 96 pounds P, and 32 pounds K produced significantly higher yields than other treatments. Yields were depressed by the addition of nitrogen above the minimum amount of 32 pounds per acre, and increased by the addition of phosphorus above 64 pounds per acre.

Pole Bean Variety Test

In the fall of 1950 highest yields were obtained from Canfreezer, a new variety developed by the L.S.U. Experiment Station, and McCaslan. They produced 287 and 277 bushels, respectively, compared to 227 bushels for Kentucky Wonder. Highest early yields as measured by the first three pickings were from McCaslan. It produced 130 bushels per acre compared to Canfreezer’s 59 bushels for that period.

—W. F. Wilson, Jr., J. F. Fontenot, and M. J. Giamalva.

Cucumber Fungicide Tests

Several fungicides were tested on the fall cucumber crop for the control of the two principal foliage diseases, downy mildew and anthracnose. The fungicides were tested as dusts formulated to contain 20 per cent cryolite and 1 per cent nicotine using Black Leaf Dry Concentrate as the nicotine source. Since there was very little rainfall during the period of the test, anthracnose was a very minor disease and the fungicides could not be evaluated for anthracnose control. Although visual observations indicated that downy mildew was very effectively controlled by all treatments, downy mildew was actually rather light during the 1950 test period for this section of the state. Dusts containing copper fungicides resulted in considerable injury characterized by chlorotic leaves. Each of the fungicides tested gave exceptionally high yields with no significant differences between treatments.

Although anthracnose had previously been found to be a rather sporadic disease, the 1950 tests very clearly demonstrated that anthracnose does not spread and cause serious damage during seasons of low rainfall. Previous tests showed that anthracnose caused seri-
ous damage when favored by periods of rainy weather and that some of the new organic fungicides gave better control than the copper materials. On the basis of the 1950 tests and those of previous years, the preferred fungicides for control of both anthracnose and downy mildew included Dithane Z-78, Fermate and Parzate. A new fungicide, Orthocide 406, was promising. These organic fungicides are recommended in preference to the copper fungicides as "insurance" against the sporadic destructiveness of anthracnose.


North Louisiana Experiment Station, Calhoun

Ralph S. Woodward, Superintendent
James L. Heath, Jr., Research Associate in Animal Industry
John C. Taylor, Research Associate in Horticulture

The program of research work on this Substation continued as in 1949. In addition to the research program, the work of improving the Station facilities was continued, and while receiving no special appropriation for the purpose, a new office building, a residence for an additional technical man, two beef feeding barns, a calf barn, and a large dairy (hay and loafing) barn, were constructed with day labor. In addition to the new buildings the farm shop and tractor shed was enlarged to house all tractors, trucks, and rubber tired implements and an old hay loft was remodeled into a spacious auditorium.

Agronomy Research

Corn Production Affected by Insect Damage—The test plots of corn, with few exceptions, were damaged by the sugar cane beetle or rough headed corn stalk borer, Ligyrus rugiceps. The attack of this insect was so severe in the corn plots that the results of the tests involved are of little value. The damage it causes by cutting into the young seedling below the soil surface depends to a great extent on the planting date and consequent early development of the corn plant. If the insect attacks the plant before it attains sufficient size it will girdle the young seedling, either killing it outright or so badly damaging it that the growth is materially retarded. Its feeding on older, larger plants does not cause as much damage, but the growth is usually retarded. It has been observed that mid-to-late March plantings usually escape serious damage. This early planting is not always feasible since rainfall in late February and early March determines to a great extent the amount of field preparation that can be made, and the earliness of planting.

In 1950 an experiment, planned by Mr. E. H. Floyd of the
Entomology Research Department, using chlordane as a control for this pest was begun. The results of this first year are of no specific importance since the check plots (receiving no treatment) produced the third highest yield of corn and the second best stand, with 97 per cent of all hills surviving. The best treatment for stand and yield was a 10 per cent chlordane emulsion seed treatment (prior to planting) which produced a yield of 50.6 bushels and a 99 per cent stand. The use of chlordane mixed with the fertilizer proved not as effective as seed treatment. In most treated plots the use of chlordane seemed to upset the nutritive balance of the plants, which was shown as a purple coloring in some of the leaves. However, it is thought that this was not sufficient to materially affect the growth.

**Corn Spacing Studies**—In 1950 an old spacing test of several years duration was changed to include various plant populations per acre and different methods of obtaining them. The results are highly inconclusive owing mainly to the attack of the above mentioned insect, most especially in the closely spaced plantings. However they indicate that several plants per hill, widely spaced, will give yields as high as those obtained from closely spaced, single-plant hills.

In an older experiment designed to check the influence of both rate of fertility and plant population, the results are similar to those of past years. The treatments were changed in 1950, eliminating a 30-inch spacing which has always resulted in lower yields and including a 12-inch spacing. Fertilizer treatments remained the same. Generally the 12-inch spacing resulted in higher yields under all fertilizer treatments than did the 18- or 24-inch plantings. The differences, however, were small and probably of little significance between the 12- and 18-inch spacing but were more so between the 12- and 24-inch. 1950 was a year of unusually well distributed rainfall and this was probably a main factor in the performance of the closer planted corn.

It was interesting to note that even under good moisture conditions and heavy plant population the yield from 120 pounds of nitrogen per acre was less than from 90 pounds—a fact that has shown up each year of the test. It seems that there may be a maximum point of fertility beyond which yields do not greatly increase even under optimum conditions.

**Corn-Soybean Experiment**—The second year’s results with this test brought out some interesting, if not conclusive, facts. The plots annually planted to corn alone produced 68 bushels per acre in 1950 as compared to 60 bushels in 1949, a gain of eight bushels, while the plot with corn alone following cotton in a two-year rotation produced 84.6 bushels per acre. The plot annually planted to corn and beans in alternate hills produced 67.2 bushels per acre in 1950 as
compared to 43.7 bushels in 1949, a gain of 23.5 bushels. The plots with corn and beans in alternate rows produced 50.3 bushels in 1950 as compared to 27.4 bushels per acre in 1949, a gain of 22.9 bushels. The cotton plots followed the trend of a general increase. Cotton following corn and beans in alternate hills produced 2,061.8 pounds of seed cotton per acre, while cotton following corn and beans in alternate rows produced 2,136.7 pounds. This, compared with a yield of 1,705.4 pounds from cotton alone annually, reflects a substantial gain when the high price of cotton is considered.

These results should not be considered as conclusive, since it will require at least two or more years to get the full significance of the rotational nature of the experiment. They are listed merely to show the trend of the results.

Corn Variety Trial—The most significant fact to come out of this experiment was the fall of La. 468 from among the top three or four varieties to fifteenth place. This marks an all-time low for the variety at this Station. The Dixie varieties were at the top with Dixie 22 leading the test, followed by Dixie 17, Dixie 18 and Dixie 11 with La. 0009 in third place. The variety recommendation, however, cannot change on just one year's results and still must be governed by the soundness of the ear and other factors. The two leading varieties in 1950, in both yield and soundness of ear, were La. 0009 with 53.4 bushels and 82 per cent sound ears, and Dixie 18 with 53.2 bushels and 83 per cent sound ears.

Cotton Variety Trial—All varieties in the test yielded so well that differences were hardly significant. All varieties produced better than a bale per acre, with top production going to Smith 78 with 659 pounds of lint per acre. Stoneville 2B produced 656 pounds, Deltapine 15, 643 pounds, and Coker 100 Staple, 621 pounds per acre.

Pasture Studies

This phase of the program has caused quite a bit of interest among hill farmers. The work is just getting under way on the Station proper and much remains to be done, both on fertilization and crops.

Sand Hill Pasture—This pasture produced beyond all expectations in 1950. After tentative trials reseeding crimson clover was sown in the fall of 1949 following application of 1,000 pounds dolomitic lime and 100 pounds 20 per cent superphosphate per acre. (Prior treatment was described in last year's report.) Approximately four and one-half (4½) acres of hillside and adjacent low level area were sown to the crimson while the remaining area was sown to subterranean clover. The seed of subterranean were planted a month late owing to a shipping error and thus furnished no graz-
ing until after the crimson had seeded. The entire herd of registered Devon cattle was turned on the field February 17 and allowed to graze the clover to the ground. They were taken off on March 10 and held in another pasture with a little feed until clover had made sufficient regrowth. The group was again turned on the field on March 28 and allowed to remain throughout the seeding period and until all edible forage was exhausted. Final weights were taken on April 28, when observation of the herd indicated that they were grazing other forage (subterranean clover) than the crimson.

Part of the Devon herd at the Calhoun station. The sand hill in the background is where crimson clover produced 388 pounds of beef per acre from seven weeks of grazing in 1950.

The total gain for the first period was 980 pounds and for the second period 765 pounds, for a total gain of 1,745 pounds. This was a gain of 388 pounds per acre over the entire period. The cost of this pasture was calculated at $12.50 per acre exclusive of labor. At a nominal price of 20 cents per pound, the profit per acre from crimson clover alone on this once abandoned hillside was $65.10.

New Pasture Development Work—An area of 37 acres that was used as an overflow pasture for the dairy was divided into two 10-acre areas and a 17-acre area. This land is characterized by a series of knolls some 18 inches to 24 inches higher than the surrounding land. The lower sections are generally wet and waterlogged and heavily sodded to carpet grass and some wild Dallis. The knolls were grown
up to broom sedge, other weeds and briars and furnished very little in the way of forage.

With no attempt to level or correct the poor drainage the entire area was limed with 1,000 pounds of dolomitic lime per acre and fertilized with 300 pounds 3-12-12 per acre as a fall treatment. Most of the knolls were deeply broken, to kill the briars and sprouts, and thoroughly disked prior to planting.

Fescue was sown to the knolls in the entire 37 acres. On the east 10-acre plot crimson clover was sown, on the center 10 acres subterranean clover was sown, and on the 17 acres both crimson and subterranean were planted on the knolls in the area. White Dutch clover was sown to the carpet grass area in the entire 37 acres. Good stands were obtained in all but the low lying carpet grass areas where a spotted stand of white Dutch resulted.

Under competition with crimson the fescue made only a little growth but survived. It did some better with subterranean but still failed to produce appreciable forage. Similar results were experienced in combination with the two clovers.

The crimson-subterranean mixture proved to be outstanding since the tall rank growth of crimson failed to shade out the subterranean underneath. Both progressed well together and when the crimson had seeded, the subterranean provided three to four weeks additional forage.

Both of these clovers merit consideration in North Louisiana, either as separately planted crops or in combination.

In order to check the productivity of the pastures a herd of 13 adult cattle and six baby calves were turned on the crimson-fescue area on March 10 and weighed out on April 4. They produced 485 pounds gain. The same group with three additional calves were put back on April 28 and left until May 4, producing 785 pounds gain or a total of 1,270 pounds, or 127 pounds per acre, for the two periods.

On May 15 the group was turned on the subterranean-fescue area and weighed off on June 7. Gain during the period was 1,040 pounds.

The cattle used were Africander-Angus hybrids. After completion of grazing trials the herd was allowed free run of the 20 acres mentioned and an additional 15-acre area. Winter feeding was started on Dec. 1.

The fescue grass survived and made a fair growth during the fall of 1950. However, it is doubtful whether it will prove to be of much value as a grazing crop on the relatively poor soils in this area unless additional fertilizer is used, over and above the requirements for the clover. Work with the fescue must be continued before a recommendation can be made.

—Ralph S. Woodward.
Horticulture

**Fertilizers for Sweet Potatoes**—In 1950 best results were obtained from the use of a 3-4-4 ratio (30-40-40), as compared to the 1-2-2 ratio (20-40-40 to 30-60-60) during the three preceding seasons. The probable explanation for this was the excessive amount of rainfall throughout the season, creating what is known as a “nitrogen” growing season. After four years’ results it seems that a recommendation of 20-30 pounds of elemental nitrogen, 40-60 pounds of phosphate, and 40-60 pounds of potash per acre for sweet potato production in the hill section of North Louisiana can be made. This amount may be supplied by using 400-600 pounds of 5-10-10 or 500-750 pounds of 4-8-8 per acre.

**Watermelon Research**—The work of several years of watermelon breeding has resulted in the development of a high quality, wilt resistant, Black Diamond type seedling. The rind does not have as good shipping qualities as the commercial Black Diamond but should be good enough to stand trucking, which is the method by which most melons are transported to market in this area. There are several pounds of seed from this seedling available now and plans are to increase this amount considerably within the next year. Work is already under way to try to improve the shipping qualities of this melon through crossing with other varieties.

The Black Diamond variety is recommended for commercial production in North Louisiana.

**Tomato Fertilizers**—The 1949-50 season completed three years of work with tomato fertilizers. Each season the most economical yields were obtained with the use of a fertilizer mixture containing 80 pounds of elemental nitrogen, 120-160 pounds of phosphate, and 80 pounds of potash. The 80-120-80 treatment produced a total yield of 27,075.6 pounds per acre, with 21,810.9 pounds of this yield being marketable during the 1950 season. Based on these three-year results an 80-120-80 mixture is recommended for tomato production in North Louisiana. This should be applied by using 1,200 pounds of 4-10-7 fertilizer before or at planting time and side-dressing with 100 pounds of nitrate of soda two weeks after transplanting and with another 100 pounds of nitrate of soda, or its equivalent, at the time clusters are formed. If a 4-10-7 mixture is not available, 1,300 pounds of 4-8-8 or 1,200 pounds of 5-10-10 per acre may be used.

**Tomato Varieties**—This planting consisted of 13 varieties. The Rutgers produced the highest marketable yield of all commercial varieties in the test, with a production of 14,943.9 pounds. Louisiana Hybrid 187 produced a marketable yield of 17,363.7 pounds for the highest yield of any variety in the test. The Rutgers, Marglobe, and Gulf State varieties are recommended for tomato production in North Louisiana.
Irish Potato Varieties—Six varieties of the Irish potato were grown in this test. Two Louisiana introductions, the LaSoda and DeSoto, led in production of marketable potatoes with yields of 135.2 and 137.9 bushels per acre, respectively. Both are red varieties. The Kennebec variety produced a marketable yield of 109.0 bushels per acre to lead the white varieties. If certified seed are available the above varieties should be grown; otherwise the Triumph and Katahdin varieties should be grown.

Onion and Shallot Work—A small plot of the Creole onion was grown from bulbs in order to see if it is practical to produce Creole onion seed in North Louisiana. Even though the plants made a good yield of seed, they were produced during the mildest winter this area has had in many years, and this was not considered a representative test. The planting is being repeated during the 1950-51 season.

There has been some controversy as to whether it is profitable to transplant shallots. Yield records were taken on both transplanted and non-transplanted. The transplanted plots produced 2,304 pounds, while the non-transplanted produced 4,080 pounds of dry shallot bulbs per acre. Several hundred pounds of shallot bulbs were produced and sold to a grower in South Louisiana for production of green shallots.

Sweet Potato Varieties—Ten varieties and seedlings were included in this test. The highest yields were produced by L-240 and L-250 with a production of 313.0 and 330.6 bushels of marketable potatoes, respectively. Unit 1 produced 185.2 bushels per acre and was closely followed by the wilt resistant seedling L-241, which gave a yield of 172.7 bushels per acre. The Unit 1 and L-241 are recommended for sweet potato production in North Louisiana. Even though L-240 and L-250 make tremendous yields, they are both lacking in other desired qualities.

Cooperative Sweet Potato Fertilizer Test—This test is conducted in most sections of Louisiana by the various stations and involves treatments different from those in our own test. Best yields were obtained by the use of 600 pounds of 6-8-8, 8-8-12, and 8-12-8 per acre.

Peach Varieties—Owing to the very mild winter which prevailed during 1949-50, many of the 24 varieties in this planting did not receive sufficient cold to properly develop the fruit and leaf buds. As a result, only 6 of the 24 varieties produced a near normal crop. Sunhigh, False Fireglow, and Burbank Elberta produced normal crops, while Golden Jubilee, Summercrest, and Georgia Belle were slightly less than normal. The regular Elberta and Dixiegem produced practically no fruit all all, while most of the remaining varieties did not produce any fruit. Recommended varieties are:
Jubilee, Sunhigh, Triogem, Southland, Burbank Elberta, Sullivan's Early Elberta, and Elberta for commercial production. Golden Jubilee is good for home orchards along with the recommended commercial varieties.

**Lesser Peach Borer Control Studies**—For the past several years the lesser peach borer has probably inflicted more damage on older peach trees, in North Louisiana, than any other insect. During this time the peach growers have been following control recommendations which were perfected in one of the northern states where they probably have only one generation of the insect each season. It is believed by many that in this area several generations of the insect are produced each year, and that during mild winters such as 1948-49 and 1949-50 this pest is active most of the 12 months. As a result growers have been getting practically no control and a very heavy buildup of the insect in the older orchards. Even though DDT is an excellent control for the main borer it seems to have no effect on the lesser borer. During the summer of 1950 several insecticides were tried at this station for control of the insect with no favorable results until the month of September. At this time a mixture of emulsified 16 per cent liquid parathion, water, and dormant oil was used. This combination was used at six different ratios varying from 1.25 ounces of parathion in four gallons of water and one gallon of dormant oil to the strongest mixture of 3.50 ounces of parathion in four gallons of water and one gallon of dormant oil. Even though the latter treatment gave excellent results in most cases, further studies show a mixture of 10 ounces of parathion in eight gallons of water and two gallons of dormant oil to be much more effective. This latter mixture has been used in two large commercial orchards as well as the station orchard, with much more favorable results than any other treatment used to date. It was applied by the use of a small shoulder sprayer or by applying the material on and around the wound with a paint brush. The latter method requires less material. It has been observed by all concerned that this material seems to promote tissue growth and greatly accelerates healing around the wounds caused by the borer action. No damage to trees has been observed in any case. It is also evident that the treatment gives better control under certain climatic conditions than others, and is probably influenced by temperature and humidity at the time of application and during the 72 hours following treatment.

This treatment is not perfected by any means. Much work is needed toward determining the life history and number of generations this insect produces in North Louisiana, in order to determine the proper time and frequency of applying the insecticide.

**CAUTION:** Parathion is very toxic and should not be used by any person until he is thoroughly familiar with the precautions to take in handling.
Due credit should be given Mr. Summeral of Ruston and Mr. Storment of Bastrop for conducting a large portion of these studies in their own orchards, and to Mr. Harris of the Cotton States Chemical Co. for supplying the materials along with very helpful advice.)

—John C. Taylor and Ralph S. Woodward.

Poultry

**Beltsville Small White Turkeys**—The “family size” Beltsville Small White breed of turkeys becomes more popular each year with the average family in Monroe and Baton Rouge market areas, although there is a good demand in both areas for the large, broad breasted breed of turkeys.

The Beltsville Small White turkeys grew and utilized their feed well again this year, although the poults were started two weeks too early for the Thanksgiving market. This breed, according to three years’ results, should be sold from 24 to 28 weeks of age to get benefit of maximum utilization of feed.

The livability of the Beltsville Small White has been exceptionally good for the three years grown. Mortality and culling for the first four weeks of 1948 was 5.3 per cent of the 227 poults started in brooders; in 1949 the loss was 4.0 per cent of 174, and in 1950, 12.0 per cent of 233 started in brooders. Mortality on the range (1950) was 3.4 per cent of the 205 for the 20 weeks on range. Total mortality, day old to 28 weeks, was 15.0 per cent of the 233 poults started this year (1950).
When the turkeys were eight weeks of age they were divided into three groups of 63, 63 and 68 and put on separate summer ranges. The three groups received growing mash, corn and oats (free choice). The turkeys on Range 1 had a native grass pasture, consisting mostly of Bermuda grass. Those on Range 2 had soybeans and cowpeas to graze until early summer, when the beans and peas were clipped, as they got too "stemmy"; a good growth of Bermuda grass followed and was grazed until frost in November. Group 3 grazed Sudan until early summer, when the Sudan was clipped; Bermuda grass furnished plenty of grazing through October. The turkeys on the soybeans and cowpeas plot made 18 cents per bird more profit than the turkeys on native pasture, and those on the

On this hillside range native grass has come in to replace the mixture of soybeans and cowpeas used for grazing earlier in the season at the North Louisiana Experiment Station. One of three lots of Beltsville Small Whites grown experimentally in 1950.

Sudan plot made 13 cents more profit than the ones on the Bermuda plot.

The turkeys on Range 1 consumed 5.52 pounds of feed to produce one pound of turkey. The average weight was 13.7 pounds per turkey. On Range 2, 5.34 pounds of feed were used to produce one pound of turkey, and the turkeys averaged 14.3 pounds. The group on Range 3 required 5.43 pounds of feed to produce one pound of turkey, and the turkeys averaged 13.7 pounds each. In 1948 it required 4.8 pounds of feed to produce one pound of turkey, in 1949, 5.3 pounds and in 1950, 5.4 pounds. On Range 1 the feed cost per
turkey was $3.09 and the margin of income over the cost of the feed and of the poults was $1.50 per bird. On Range 2 the cost of feed was $3.14 and income over cost was $1.68 per turkey. In Group 3 the cost of feed was $3.06 and income over cost was $1.53.

Twenty turkeys from each of the three groups (10 males and 10 females) were trucked to Baton Rouge to be graded and dressed to measure the difference, if any, in the three groups at 29½ weeks of age for Thanksgiving market. The drawn weights as per cent of Baton Rouge live weight varied from 77.8 per cent to 80.4 per cent, with little difference for the two sexes. All of the turkeys graded A in fleshing and finish. The per cent of shipping loss from Calhoun to Baton Rouge (by truck) ranged from 3.0 per cent to 4.8 per cent, with the females losing slightly less weight on a percentage basis.

Three years of experience with the Beltsville Small White turkeys has proved that it is one of the best breeds for the producer who sells primarily to householders and to poultry markets that specialize in the "family size" turkey.


Hens Versus Pullets—The purpose of the experiment (hens versus pullets) is to determine the relative profit that may be expected from old hens as compared to pullets in the first year of production. In the first year (1949-50) the margin of profit was in favor of the pullet flock, as the net income was $1.60 per pullet while the hen flock had a net deficit of $1.06 per hen.

Two pens of New Hampshire layers, one containing 100 pullets and the other containing 103 old hens, were housed in separate pens and given the same diet of laying mash and grain fed ad libitum. Alternated outdoor ranges were available with winter, spring and summer green crops.

The pullets (over a period of 10 months) each consumed 40.2 pounds of mash, 38.7 pounds of corn, and 14.0 pounds of oats, or a total consumption of 93.2 pounds, or 9.3 pounds per month. The
average consumption of feed (over a period of 12 months) for the hens was 38.2 pounds of mash, 44.0 pounds of corn, and 17.5 pounds of oats, totaling 99.7 pounds, or 8.3 pounds per month.

The pullets reached their highest production during October through March, as expected. After December there was a gradual decline in production until the experiment ended. The hens reached their highest production during March, April and May. After this there was a sharp decline in production until the experiment ended.

The fertility for both the pullets and old hens was good. However, the eggs of the pullets hatched much better—92.5 per cent of all eggs set, while 78.1 per cent of those from the old hens hatched.

Chicks were hatched and grown from the hens and from the pullets. The mortality and cull chicks from the two flocks were about equal.

The pullets averaged 172 eggs valued at $5.73, while the feed cost per bird was $3.63. The old hens averaged 113 eggs valued at $3.78, while the feed cost per bird was $3.87. When, in addition to income from eggs, the market value of the pullets and of the cull hens was added to the respective pens and the cost of reproducing each flock was charged against the respective pens, the net income was 89 cents per pullet and a net deficit of 14 cents per old hen. The net income for the pullets last year (1949-50) was $1.60 each as compared to 89 cents this year. The decrease in net income is due chiefly to a decrease in return from the fryers and to the increase in feed consumption. The pullets were ranged through 28 weeks this year as compared to 24 weeks last year.


Livestock

Beef Cattle—Of the 12 Red Africander X Angus cows, obtained from the U.S.D.A. Animal Breeding Laboratory, Jeanerette, Louisiana, 11 calved during the period Jan. 18, 1950, through Oct. 18, 1950. Seven of the calves were males and four females. All of the calves were weighed at about five days of age and the average weight per calf was 70 pounds. At five months of age nine of the calves averaged 316.6 pounds. The growth of the Africander X Angus calves compares favorably with that of the Devon and other beef breeds of this section that depend entirely on pastures for feed during spring and summer. To obtain additional information about the Africander X Angus cross, five of the males, born this spring, were trucked to L.S.U. to be used in a feeding experiment. At the end of the feeding experiment the steers will be butchered and a carcass study made of each animal.

A purebred Devon bull was bred to the Africander X Angus cows and an Africander X Angus bull was bred to the Devon cows,
and growth records will be obtained on the calves from the two crosses. The calves (Africander X Angus X Devon) will be compared to purebred Devon calves and the Africander X Angus calves.

The Devon herd is to be maintained as a purebred herd and increased by keeping all female calves. Growth and development records will be kept on the Devon herd as a comparison with the calves of the crosses and other beef breeds of cattle.

All of the cattle will be used to graze and check the productivity of the pastures at the Station.

—J. L. Heath, Jr., and Ralph S. Woodward.

Hogging Off Crops—The “hogging off” program was started in 1943 and during this time corn, corn and soybeans, sweet potatoes and sweet corn have been used to finish spring pigs for the market.

In 1950 the spring pigs and sows grazed oats and alfalfa (interplanted) until July 10. On July 10, 22 pigs averaging 83.6 pounds were put on one acre of Gulf Coast sweet corn. In 14 days (July 10-24) the sweet corn produced 555 pounds of pork gain. On July 24 all of the pigs were put on one and one-half acres of Missouri Hybrid 313 producing 77 bushels per acre. The pigs' average weight was 108 pounds. In 22 days (July 24-Aug. 14) the pigs made a pork gain of 695 pounds.

A producer who is raising his own feeder pigs, or a feeder pig producer, may well consider the use of sweet corn, or Missouri 313 hybrid, to put a quick, economical gain on his pigs. Two years’ work with hybrid sweet corn as an early grazing crop has proved highly satisfactory.

The pigs were dry lot fed from Aug. 14 to Aug. 30 owing to late maturity of field corn. The group was divided into two lots containing 11 pigs. One lot (averaging 139 pounds) was put on two acres of Dixie 11 hybrid field corn, and the second group (averaging 123 pounds) was put on Dixie 11 and Pelican soybeans interplanted. The group grazing corn made a pork gain of 725 pounds on two acres producing 61.6 bushels per acre. The group grazing corn and soybeans made a pork gain of 720 pounds on two acres producing 60.1 bushels per acre.

In 1951 the swine program will be changed from merely a “hogging off” program to include a study of production and management practices and a comparison of two swine breeding systems.

—J. L. Heath, Jr., C. B. Singletary, and Ralph S. Woodward.
The addition of physical facilities and the improvement of such has been continued as a part of the program of work which has been conducted at this station during the past year. Additions to facilities include one dairy bull pen and breeding chute, two dairy heifer feeding sheds, improved watering facilities for the dairy and beef cattle projects, the completion of two farm ponds, the erection of a beef cattle feeding shed, corral quarters, and scales for weighing cattle, scales for weighing hogs, 10 poultry range shelters, fencing of a nine-acre poultry range area, the clearing of approximately 100 acres of land for open pasture and tilled crops, extensive road improvement, and several important items of farm machinery.

Herds of 17 grade beef cattle, 22 registered Jersey cattle, and 15 additional Brown Swiss cattle have been added to the livestock programs of work. The cattle were acquired largely through grants and loans from the Bureau of Dairying, U.S. Department of Agriculture, and the University Departments of Dairying and Animal Industry.

A brief report of the research work follows.

**Cotton Variety Tests**

Data on the comparative yield, lint percentage, staple length, and boll size were collected on 27 different varieties and strains which were of local interest. Fox, Plains, Coker 100 Staple, Miller 610, Empire, Stonewilt, and Deltapine 15 led in the production of lint cotton in the commercial test, and Empire, Stoneville 5A-3202, Hybrid 56-4-M, Bobshaw 1-A, and Deltapine 15-51 were the top yielders in the new strains test. The staple length of these varieties ranged from 1 inch to 1-5/32 inches; the lint ranged from 39 to 43 per cent; and the boll size ranged from 67 to 86 per pound.

—D. M. Johns and F. W. Self.

**Cotton Insect Control**

The Economic Importance of the Tobacco Thrips as a Cotton Pest—Six commercial varieties of cotton were planted in a replicated test and one-half of the plots represented by each variety were sprayed in the seedling stage with toxaphene at the rate of one
Top picture: Cotton which received no insecticidal protection produced 404 pounds of seed cotton per acre at the North Louisiana Hill Farm Station, Homer, in 1950. Bottom picture: Cotton which received 12 applications of insecticide produced 1,272 pounds of seed cotton per acre and an average return of 72 pounds of seed cotton per application of insecticide.
pound of the technical material per acre. Plant height measurements early in the season indicated a benefit from the spray, but measurements which were taken later in the season showed that the plants recovered from any early damage which may have been caused by the thrips, Frankliniella fusca (Hinds).


Time of Beginning Insecticidal Control of Cotton Insect Pests—No measurable benefits were gained from two presquare applications of insecticide which were applied for the control of thrips and to reduce the subsequent population build-up of boll weevils.

After fruiting began, the following three schedules of timing applications for boll weevil and aphid control were used: (1) Beginning with 25 per cent infestation and continuing until late August. (2) Beginning at the same time, but discontinuing applications during the first week in August. (3) Beginning applications during early August and continuing throughout the month. Alternate applications of 2 and 1 per cent benzene hexachloride in calcium arsenate were applied, and an average increase in yield of about 70 pounds of seed cotton per acre was obtained from each application of poison, irrespective of the date of beginning and ending the dusting applications.


Cotton Fertilizer Tests

Sodium as a Substitute for Potassium in the Nutrition of the Cotton Plant—Fertilizers which included different amounts and sources of sodium and varying amounts of potassium and a uniform amount of nitrogen and phosphorus were applied to cotton. Increased yields were obtained from the use of sodium applied with and without the presence of potassium in the fertilizers used. The results have varied, but, in general, support the conclusion that sodium may substitute for potassium to a high degree in the nutrition of the cotton plant or that potassium is used more efficiently by the plant in the presence of a more adequate supply of sodium than was contained in the soil on which the experiment was conducted. —D. M. Johns, M. B. Sturgis, and J. G. Marshall.

Sources of Nitrogen Test—Side-dressing applications of 32 pounds of nitrogen per acre from potash-nitrate, nitrate of soda, and ammonium nitrate were made following an application of 300 pounds of an 8-8-8 fertilizer per acre before planting. The following respective yields of seed cotton were produced: 1101, 1200, and 1232 pounds per acre.

—D. M. Johns.

Minor Elements Benefits from Lignite and the Effects of Soluble Aluminum in Mixed Fertilizers—The experiment included 15 new mixed fertilizer formulations and its objectives were to observe any benefits which might be derived from minor elements present in
lignite when used in fertilizer mixtures and the effect of soluble aluminum in mixed fertilizers. The check was a standard 8-8-8 fertilizer mixture. None of the materials tested produced yields which were significantly greater than those of the check. Depressed yields resulted from the use of the fertilizer which contained di-ammonium imido disulfonate. The plants showed definite symptoms of toxicity as evidenced by poor stand, reddening of the stalks, crazy top, and small rounded bolls which did not fully open. The mixture containing special ammonium chloride was also detrimental to germination.

—D. M. JOHNS, M. B. STURGIS, AND R. L. ARCENEAUX.

Cotton Magnesia-Potash Fertilizer Test—An application of 600 pounds of an 8-8-8 fertilizer increased the yield of seed cotton from 279 to 728 pounds per acre. An addition of 12, 28, and 36 pounds of a water soluble magnesia per acre to the basic application of 8-8-8 fertilizer further increased the yield of seed cotton 73, 95, and 131 pounds per acre, respectively. The yields obtained from smaller amounts of potash and intermediate amounts of magnesia indicate either a replacement value of magnesia for potash in the nutrition of the cotton plant or improved efficiency of the plant in the use of potash with the presence of the magnesia which was applied in the fertilizer.

—D. M. JOHNS.

Corn Variety-Hybrid Test

More than 60 hybrids and varieties were included in these tests. The yields ranged from 30 bushels to slightly over 60 bushels per acre. Coker's Coastal 811, La. 9017, La. 468, Dixie 18, Dixie 22, and Dixie 11 produced the highest yields and, in general, were of the best quality. Texas 20, Texas 28, Shannon, and McMullin's Missouri hybrids either produced low yields or very poor quality grain.

—D. M. JOHNS, HUGO STONEBERG, AND HUGH IVY.

Corn Fertilizer Tests

Large yield increases resulted from applications of nitrogen up to 75 pounds per acre. Further yield responses were obtained from phosphate and potash when nitrogen was applied. A yield of 51.7 bushels per acre resulted from the application of 300 pounds of a 5-10-10 fertilizer and a side-dressing of 60 pounds of nitrogen, as compared with 45.3 bushels where only 75 pounds of nitrogen were applied. The unfertilized plots produced 12.4 bushels per acre.

—D. M. JOHNS.

Small Grains, Forage and Winter Grasses, and Legumes

Sweet Sorghum Variety Test—Five varieties of sweet sorghum were grown and green matter weights were taken as a measure of

139
their value for silage purposes. Texas Seeded Ribbon Cane and Atlas were the most satisfactory varieties and produced 27.3 and 18.9 tons per acre, respectively.

—D. M. JOHNS.

Crimson Clover Variety Test—Green weight data in the full blossom stage of growth were collected on 10 varieties. Talladega, Thorsby, Allen, Auburn, and Common led in production with yields slightly in excess of eight tons per acre.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Annual Clover Test—Ten varieties, including various Subterranean, Ball, Lappa, Alsike, Persian, Hop, Button, and Crimson, were grown and green weight data were collected. Crimson, Ball, and Bacchus Marsh Subterranean were the highest producers.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Winter Grasses—Several varieties of fescue and Harding and American rye were grown. Rye produced the highest tonnage of grass. Alta 144 led the strains of fescue in production.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Red Clover New Strains Test—La. Synthetic No. 2 produced more growth than the Commercial Red Clover or the La. Synthetic No. 1.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Oat Variety Tests—More than 30 varieties, strains, and hybrids were included in yield tests. Stanton, DeSoto, Appier, Letoria, Victoria, Coker, and Ferguson were the best yielders.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Horticulture

Sweet Potato Variety Test—Ten varieties representing those of general interest for table and starch purposes were grown in a yield test. L-241 produced 182 bushels for the highest yield of U.S. No. 1’s in the table stock group. L-127 led in the starch group with a total yield of 398 bushels per acre.

Seed Piece Versus Slip Planting of Sweet Potatoes—Whole seed pieces of the Pelican Processor have produced a two-year average of 402 bushels per acre as compared with 232 bushels from slips. Seed and dehydration costs and storage problems were greater from the seed pieces and offset any value that might appear to be associated with the higher yield.

Sweet Potato Fertilizer Test—Various ratios and rates of nitrogen, phosphate, and potash have been studied. Based on the data at hand, the most economical rate of application would be approximately 30-60-60 pounds of nitrogen, phosphate, and potash per acre, respectively.
Sweet Corn Variety Study—Yield records were obtained from 20 entries. Gulf Coast and Lot No. 29531 from Michael-Leonard Company led in production with yields of 878 and 980 dozens of ears, respectively.

Pole Lima Bean Variety and New Strains Test—Florida Speckled Pole, Carolina Sieva, and L39-11F produced the highest yields, 6,836, 5,899, and 5,262 pounds per acre, respectively. L39-11F appeared to be superior for freezing and canning.

Watermelon Variety and New Strains Test—Twelve varieties were grown and yield data recorded. Dixie Queen 110, a new wilt-resistant variety, produced 33,934 pounds of marketable melons per acre, compared with 21,560 pounds for Black Diamond, a well known commercial variety.

Cantaloupe Variety and New Strains Test—Hale’s Best No. 36 was the best variety of the seven tested, producing 6,369 pounds of high quality melons per acre, with an average weight of 2.33 pounds.

Cowpea Variety Test—Yield data were collected from 15 varieties. Chinese Red produced 16.2 bushels per acre. Iron Clay failed to mature, and Certified California Buckeye was practically a failure, yielding only 1.2 bushels per acre.

Peach Fertilizer Test—Data on growth response of peach trees to 14 fertilizer treatments have been collected for two years. These data will be used to study the relationship of tree growth and fruiting to the different levels of nitrogen, phosphorus, and potassium fertilization.

—R. E. Wright.

Poultry

A modern type laying house adequate to accommodate 500 hens was divided into two equal pens, with one pen housing a laying flock of 250 hens (no males) and the other pen housing a hatching egg flock of the same size, age, and breed, but mated to produce fertile eggs for hatching. Costs of growing and feeding the males is being determined. The first year is not yet complete.


Marketing of Field Peas

Fresh field peas were shelled, packaged, and marketed in cellophane bags of sizes ranging from one-half to one and one-fourth pounds. Data collected, experience gained in the operations, and customer responses definitely indicated that there may be a relatively strong market for fresh shelled peas.

—J. M. Baker and D. M. Johns.
Pork Production

Feeder pigs were grazed on 3.75 acres of field corn, and a total body weight gain of 1,500 pounds was obtained. Salt and a protein supplement were supplied. The yield of corn was approximately 50 bushels per acre, and on this basis each bushel, plus the supplement feed, produced eight pounds of pork. —D. M. JOHNS.

Beef Cattle

A herd of 17 grade cows and heifers has been obtained. Six calves have been dropped. Attention is to be given to special grazing and management practices and selected bulls are to be used in an effort to develop nurse cows capable of more economically raising calves for the baby beef market.

—D. M. JOHNS AND JAMES KIDWELL.

Dairying

**Jersey Herd**—A demand on the part of the local dairy farmers has led to the development of a Jersey herd. Seven registered Jersey heifers were obtained from Louisiana State University and 15 registered Jersey cows were transferred to the Station in 1950 by the U.S.D.A. Experiment Station at Jeanerette, Louisiana.

The dairy ration is composed largely of home-grown feeds, such as corn, dehydrated sweet potatoes, oats, and sweet sorghum grain. Cottonseed meal is the only purchased ingredient. Sorghum silage is fed when pastures are low, and hay is before the cows at all times.

**Crossbreeding with the Brown Swiss and Red Sindhi**—The Red Sindhi-Brown Swiss crossbreeding work is being conducted as a part of the regional crossbreeding project in cooperation with the Bureau of Dairy Industry. The main purpose of this study is to determine the adaptability and productive capacities of the crossbred animals under southern conditions. The herd has been increased by the addition of 15 Brown Swiss heifers. At the present there are 19 Brown Swiss and Red Sindhi crossbred heifers and 5 crossbred bulls. Six of the crossbreds have been bred and will be in production this spring. The Brown Swiss cows that have dropped a crossbred heifer calf are being bred back to a Brown Swiss bull. The crossbred heifers also are bred to the Brown Swiss bull.

Physiological investigations under natural conditions will be made to determine the relative heat tolerance of the Brown Swiss and Red Sindhi crosses. The objectives are to establish normal body temperatures, respiration rates, and heart rates by various ages when the atmospheric temperature is 60° F. and below and at 85° F. and above. This information will give a measure as to the effect of sub-tropical climatic conditions on the Brown Swiss and cross-

142
breds. Observations have shown that the crossbreds graze more during the hot summer days as compared to the Brown Swiss. More accurate data are needed on grazing time over a 24-hour period in order to obtain more conclusive evidence.

—D. M. Johns, J. B. Frye, Jr., and George W. Scott, Jr.*

Northeast Louisiana Experiment Station, St. Joseph
C. B. Haddon, Superintendent
John C. Carpenter, Jr., Assistant Animal Husbandman
John A. Hendrix, Assistant Agronomist
Sherman A. Phillips, Assistant Agronomist
Russell Y. Ratcliff, Research Associate in Agronomy

Agronomy

Cotton Insect Control Test—In a large-scale, randomized, replicated field plot test at St. Joseph, La., the following insecticides were compared for control of the boll weevil and cotton aphid: Toxaphene spray formulated from an emulsifiable concentrate containing 4 pounds of toxaphene per gallon at the rate of 2 pounds of technical toxaphene per acre per application; toxaphene spray at the same rate but formulated from an emulsifiable concentrate containing 8 pounds of technical toxaphene per gallon; aldrin-DDT spray at the rate of 1/4 pound of technical aldrin and 1/2 pound of technical DDT per acre per application; and 3-5 dust (3 per cent gamma isomer BHC and 5 per cent DDT) at the rate of 10 pounds per acre per application. All applications were made by airplane.

All materials gave satisfactory control of the boll weevil and cotton aphid with the exception of the aldrin-DDT spray, which failed to control the cotton aphid. It was necessary to add parathion to one of the aldrin-DDT applications for control of this pest. There were no differences in yield.

—C. B. Haddon.

Soybean Variety Test—Since 1935 soybean variety tests have been conducted to determine the varieties and strains best adapted to soils and weather conditions in this section of Louisiana. Soybeans are planted on 40-inch rows in four-row plots and cultivated as needed, no fertilizer or inoculation being used. Varieties are grouped according to maturity (early, medium early, medium late, and late). Harvesting is done with a combine.

Varieties producing satisfactory yields over a period of years,

* Mr. Scott is a joint employee of the Louisiana Experiment Station and the Bureau of Dairy Industry, U.S.D.A., stationed at the Federal Livestock Experiment Station, Jeanerette.
according to maturity, are as follows: Early maturing group—S-100, 27.7 bushels per acre; medium early group—Ogden, 39.8; Dortchsoy No. 2, 31.0 bushels per acre; medium late group—Dortchsoy 31, 27.0; Ralsoy, 31.0; Volstate, 25.3 bushels per acre; late maturing group—Pelican, 17.2; Acadia, 17.9; Nela, 19.2; Mamotan 6680, 23.7 bushels per acre.

Results show that when soybeans are grown for oil production, the medium early and medium late varieties give best returns.

—JOHN A. HENDRIX.

Soybean Inoculation Test—This test has been conducted for four years to determine whether inoculation affects the yield of beans and foliage on the Delta soils. One early, one medium early, and one late maturing variety were planted and nine strains of inoculant were used in conducting this test.

Results showed that inoculation of soybeans, planted on rich, well-drained Delta soils, did not have any effect on yield of beans or foliage.

Soybeans in recent years have been used in this section for a cash crop, and on thin, old land where beans have not been grown it probably would be a very good practice to inoculate beans the first year.

—JOHN A. HENDRIX.

2,4-D for Control of Weeds in Corn—The practice of growing corn and soybeans interplanted has been a popular one in this area for some time. But as the mechanical corn picker gains popularity it creates the problem of growing corn free of foreign vegetation. The presence of morning-glory vines, hog weeds, cockleburs, and other weeds in corn hampers the mechanical harvesting of the crop. It reduces the efficiency of the picker and causes mechanical failures. To overcome this problem tests were conducted with 2,4-D sprayed in corn.

In these tests Funk’s G-737 corn was used with 100 pounds of nitrogen applied in split applications. All plots received the same cultivation. Spray was applied when corn was approximately five inches tall at one-half pound, three-fourths pound, one pound, and two pound rates per acre and again at lay-by time at the rate of three-fourths of a pound per acre to all except check plots. One plot received only the lay-by spray of three-fourths of a pound per acre. The yields on all plots were approximately the same, including the check plot which received the same cultivation as the other plots except for the spray. There was no difference in lodging between the sprayed plots and the check plots. At harvesttime the sprayed plots were free of weeds and vines, whereas the check plots were infested.

This test has been conducted for only one year and no definite recommendations can be made from it. But it clearly showed that
weeds and vines can be controlled in corn by spraying 2,4-D and that the yield will not be affected if the spray is applied before the corn is seven inches tall and at lay-by time. —Russell Y. Ratcliff.

**Outfield Soybean Fertilizer and Variety Experiment**—A soybean fertilizer experiment was conducted on Olivier silt loam at Delhi, La. Nitrogen was applied at the rate of 16 pounds, phosphate and potash at rates of 24 and 48 pounds per acre. Agricultural ground limestone was applied at the rate of 1,000 pounds to plots that received a 16-24-24 and 0-48-48 formulation. There were two check plots, one of which was inoculated.

There was no increase in yields from the addition of fertilizer, inoculation or lime at this location. Although the plants on the heavier fertilized plots made much faster and larger growth when compared with the plots not fertilized, there was no significant difference in yield between treatments. The soil where this test was conducted was planted the preceding year with soybeans which had been inoculated, and this may have accounted for lack of increase in yield over the plots not inoculated.

A soybean variety test was conducted at the same location with some of the leading commercial varieties. Yields of the varieties, listed according to maturity, were as follows: early maturing—Wabash and S-100 averaged 22.7 bushels per acre; medium early—Ogden and Dortchsoy 2 averaged 39.1 bushels; medium late—Dortchsoy 31, Volstate, and Roanoke averaged 36.7 bushels; late—Acadian, Pelican, Nela, and Mamotan 6680 averaged 30.2 bushels per acre.

—Sherman A. Phillips.

**Outfield Cotton Fertilizer Experiment**—This test was conducted on Olivier silt loam at Winnsboro, La. Nitrogen, phosphate, and potash were applied at the rates of 48 and 72 pounds per acre. The highest yield of seed cotton, 1,510 pounds per acre, was obtained from a 72-72-72 formulation. This was an increase of 1,003 pounds over the check plots, which yielded 507 pounds. The yield of cotton from a 48-48-48 formulation was 1,232 pounds per acre. Past experiments have shown that on this type of soil a combination of 36-48-48 or 48-48-48 per acre has given the highest yields.

—Sherman A. Phillips.

**Outfield Corn and Soybean Experiment**—A fertilizer experiment was conducted in Morehouse Parish with corn alone and corn interplanted with soybeans, one-half of each plot being interplanted with beans. Nitrogen was applied at the rates of 48 and 96 pounds, phosphate and potash at the rates of 24 and 48 pounds per acre. The highest yields obtained were 82.3 bushels for corn alone and 75.6 bushels for corn interplanted with soybeans, these being from the application of 600 pounds of 8-8-8 per acre plus 48 pounds of nitrogen as side-dressing. This was an increase of 71.3 and 65.0 bushels,
respectively, over the check plots. There was no increase from the addition of phosphate and potash until the nitrogen level had been raised above 48 pounds per acre.

In 1950, cotton which followed the above test in 1949 was fertilized with 400 pounds of 0-8-8 per acre. Cotton following corn alone yielded 1,440 pounds of seed cotton, while that following corn interplanted with soybeans yielded 1,810 pounds of seed cotton per acre. This was an increase of 370 pounds of seed cotton due to the soybeans.

—SHERMAN A. PHILLIPS.

**Oat Variety Test**—Commercial varieties, new strains, and hybrids have been included in oat tests in recent years. These tests are usually planted in early October, with the oats seeded at the rate of 2½ bushels per acre in plots 6 feet wide and 220 feet long. Plots this size are used so as to harvest with a combine.

Over a period of four years yields in bushels per acre for the leading varieties have been as follows: DeSoto, 66.9; Nortex No. 107, 66.5; Stanton, 65.1; Victorgrain, 62.7; Alber, 62.0; Delta Red, 61.9; Fulgrain, 60.6; Camellia, 57.4; and Traveler, 49.7. No fertilizer has been applied to these tests, as plantings are usually made following soybeans.

Since mechanized farming has reduced the number of work-stock on farms, planting oats for grain has correspondingly been reduced. The intensity of oat diseases has also caused a reduction in acreage planted. Oats are planted for winter grazing, principally; and also as a companion crop for lespedeza and some clovers, in the Delta where cotton has been intensively grown.

—JOHN A. HENDRIX.

**Animal Industry**

**Hogging Off Corn and Soybeans**—For the third consecutive year in hogging off work here at the Station there was not sufficient difference in gains of the lot fed tankage free choice and the lot fed no tankage to pay for additional cost of feeding tankage. In the lot with tankage it took 3.16 pounds of corn to produce one pound of pork; in the lot without tankage 3.39 pounds of corn were needed to produce one pound of pork. The lot with tankage produced 1,450 pounds of pork from 81.7 bushels of corn and the lot without tankage produced 1,280 pounds of pork from 77.5 bushels of corn. All of the hogs used in this test were sent to the University to have tests for soft pork run on fat samples. One pig out of 14 was killed as soft pork; the others were rated as hard pork.

—JOHN C. CARPENTER, JR.

**Production Costs of Feeder Pigs**—The results obtained in the second year in the production of feeder pigs to 100 pounds showed pigs could be produced slightly cheaper than the same quality pigs
could be bought on the local markets. All costs were included in production except the actual labor in feeding of pigs. No return was figured for sale of sows. The fall litter in 1949 was produced to 100 pounds for $.095 per pound. The 1950 spring litter was produced to 100 pounds for $.152 per pound. The probable reason for the big difference in per-pound cost of producing feeders is that the spring litter was pushed all the way and the fall litter was not. All feed costs were figured at local price of feed at time used. The same

Hogging off corn and soybeans at the Northeast Louisiana Experiment Station.

quality feeder pigs were selling on local markets at 18 to 24 cents per pound at the time the pigs reached 100 pounds.

—JOHN C. CARPENTER, JR.

Pasture Gains for 1950—Six plots of eight acres each were used in this experiment. Approximately one steer per acre grazed from Feb. 20 to Nov. 6, 1950, in all plots except No. 6. Plot No. 6, which contains Kentucky 31 fescue and white Dutch clover, one-half, and Ladino clover, one-half, was grazed one head per acre from Feb. 7 to May 5, from June 19 to Sept. 23, and from Nov. 6 to Dec. 18, 1950. Plot No. 1 contained Persian clover and Dallis grass, No. 2 white Dutch clover and Bermuda grass, No. 3 red clover and Dallis grass, and No. 4 white Dutch and Alsike clovers and Dallis and Bermuda grasses. Red clover was seeded every third year in Plot No. 3. Plot No. 5 was not seeded and contained only native grasses and clover.
All pasture plots except 5 and 6 were seeded in 1941. Plot No. 6 was seeded in the fall of 1948. Gains were as follows: Plot 1, 310.6 pounds; Plot 2, 352.5 pounds; Plot 3, 421.9 pounds; Plot 4, 408.1 pounds; Plot 5, 301.3 pounds per acre. All steers were wormed and sprayed as needed. Salt was fed free choice on all plots.

—JOHN C. CARPENTER, JR.

**Winter Pasture Experiment**—Three groups of stocker calves were used in this experiment. Fourteen calves were turned on 10 acres of oats and Singletary peas and fed nothing else through the winter. Fifteen calves in Group No. 2 were on 10 acres of oats and Singletary peas and were fed one pound of cottonseed pellets per head per day. Each of these groups had access to wooded area. In Group No. 3, 15 calves were kept on a permanent pasture plot which contained dried Bermuda grass, and were fed four pounds of corn and cob meal and one pound of cottonseed pellets per head per day. The calves were placed on plots on Dec. 14, 1949, and taken off Feb. 20, 1950. Winter gains for plots were as follows: Plot No. 1, 185 pounds; Plot No. 2, 640 pounds; and Plot No. 3, 350 pounds. When taken off winter pasture, three calves from each group were placed in each of five permanent pastures and gains checked through spring and summer. Total gains for the first 84 days on spring pasture were: Group 1, 2,055 pounds; Group 2, 2,285 pounds; and Group 3, 2,255 pounds.

It is indicated from this test that it is not profitable to feed stocker steers through the winter, if sufficient pasturage is available to maintain them in thrifty condition. Even though some weight is lost during the winter months, if good spring pasturage is available, the losses are fully made up by June. —JOHN C. CARPENTER, JR.

**Plaquemines Parish Experiment Station, Diamond**

RALPH T. BROWN, Superintendent
FREDERICK B. SCHMITZ, Assistant Horticulturist

The development of this Station had its beginning in the early spring of 1949. Since that time four residences, a storage shed, garage and office-laboratory building have been constructed.

Several hundred attended the Official Opening and Field Day, which was held in May. The event was climaxed by a barbecue sponsored by the Plaquemines Parish Police Jury.

**Citrus**

A fertilizer experiment involving 12 fertilizer treatments was set up in randomized blocks at the Station on Owari Satsuma and Washington Navel trees which were planted in the spring of 1949.
A similar outfield experiment was begun with bearing Satsuma trees at Mr. Felix Elstons' at Buras, La.

Seedlings of rootstocks secured from Dr. Gardner of the U.S. Subtropical Fruit Field Station have been budded to Owari Satsuma, Washington Navel, Pineapple Sweet and Valencia, for planting in the winter of 1951, in hopes of finding a rootstock better adapted to this area than sour or trifoliata, the two which are most widely used.

Budwood of some 25 different varieties and species of citrus, collected by Dr. F. E. Gardner, have been budded and the trees planted for trial and observation at this Station, together with a selection made by Mr. Lynn Hawthorne of the Louisiana Agricultural Experiment Station.

Easter Lilies

The fertilizer and spacing test was planted again this year. From observations, it appears the best results might be obtained when the fertilizer is applied as a top-dressing rather than placed underneath at time of planting, because of dry weather usually encountered at time of planting.

In addition, a test was made to determine the best depth of planting for the three sizes of bulbs most commonly used. The studies were set up by Dr. W. D. Kimbrough, Mr. Howard Hanchey, and Mr. Joe Montelaro of the Louisiana State University.

Vegetable Crop Studies

Bush Beans—Forty-one varieties and breeding lines were planted in cooperation with the U.S. Vegetable Breeding Laboratory, as a part of the Southern Regional Snap Bean Trials.

Contender has exceeded all other varieties in production in the tests conducted here for the past two growing seasons. It has consistently produced twice as many beans as Stringless Black Valentine, the variety most widely used in commercial plantings in this area. The pods are similar to those of Black Valentine, but are slightly curved. It has matured a week to ten days earlier than Black Valentine, which makes it very promising for the early plantings in this area.

Topcrop (Fulcrop), another early, high-yielding variety, is too rough to sell in competition with Stringless Black Valentine and Contender. There were also several breeding lines which showed considerable promise.

Pole Beans—Canfreezer and Green Savage were grown in replicated plantings in the spring and summer in comparison with Reuter's Ideal Market, Kentucky Wonder, Black Creaseback, and Blue Lake. Reuter's Ideal Market was the only variety which exceeded Canfreezer and Green Savage in production. The average production
in bushels per acre for the two plantings was as follows: Reuter's Ideal Market, 333; Green Savage, 316; Canfreezer, 303; Kentucky Wonder, 241; Black Creaseback, 215; and Blue Lake, 145.

Reuter's Ideal Market is a string bean which has been grown in the past as the commercial variety in this area but is more susceptible to rust and does not compare with Canfreezer and Green Savage in quality. Canfreezer was preferred by most of the vegetable growers who saw the trials, because of its early, heavy production of high-quality beans. Green Savage was quite variable as to pod shape, but it produced over a more extended period than did Canfreezer.

Pole Lima Beans—Carolina Sieva produced 415 bushels per acre as compared to 368 for L 39-11F, which was second in production. Carolina Sieva is the preferred variety because of its early, heavy production. It comes into production a week ahead of L 39-11F.

Cabbage—Glory of Enkhuizen, All Head Early, Louisiana Allyear, and Bonanza were the four leading varieties of the 13 tested at this Station in the fall of 1950, producing 12,575, 11,867, 9,716, and 9,554 pounds of marketable cabbage per acre, respectively. Glory of Enkhuizen was slightly earlier than All Head Early and Louisiana Allyear and much earlier than Bonanza. All Head Early had the poorest internal quality and Bonanza the best. The ability of Bonanza to remain headed for an extended period is most desirable; however its late maturity makes it less desirable for fall planting than Glory of Enkhuizen or Louisiana Allyear.

Cauliflower—Ten commercial varieties of cauliflower were grown in fall trials at this Station under the supervision of Dr. Julian C. Miller and Dr. J. J. Mikell of Louisiana State University.

Snowball A and Snowdrift were the best varieties in the early maturing group, producing 4,954 and 4,491 marketable heads averaging 2.3 and 3.0 pounds per head, respectively.

In the medium-early group Snowball M, Stella Nova and Super Snowball were superior to Snowball X, producing 4,981, 4,219 and 3,811 heads averaging 2.6, 2.8, and 2.9 pounds per head, respectively.

Snowball Y was the best in the late maturing group, which included Helios. Snowball Y produced 4,437 marketable heads per acre which averaged 3.1 pounds per head.

Root Aphids Study—A test on the control of root aphids on cauliflower and cabbage was established in the fall of 1950 in cooperation with Mr. E. H. Floyd, Entomologist with the Louisiana State University Experiment Station. The insects were not of serious consideration but of the four materials tested Lindane applied at the rate of one pound of technical Lindane per acre showed considerable promise.
Eggplant—A variety test including New Orleans Market, Creole, Fort Myers Market, and Black Beauty was conducted as a preliminary to hybridization studies, which will begin in the spring. The New Orleans Market and Creole varieties were the market preference (at New Orleans) in color and shape.

There was no significant difference in yield, although there was a trend for Black Beauty to be slightly more productive, yielding 10,376 marketable fruit per acre as compared to 9,973 for Creole and 9,124 for the New Orleans Market.

Foliage diseases were controlled by frequent sprayings with "Copper A."

Staking or tying the plants to a wire strung above the row is an advantage later in the season when the plants are large and the fruit are borne higher on the plant.

In addition to the four varieties mentioned above, the Florida Highbush and New York Purple will be used in hybridization studies. All possible crosses have been made between these six varieties. The seed from these crosses will be planted in the spring of 1951 in a test with the commercial varieties of eggplant now on the market.

Irish Potatoes—Of the seven varieties and breeding lines planted at this Station, LaSoda was again unexcelled in appearance.

The average yield of Number 1 potatoes in bushels per acre for the four plantings this season was: Kennebec, 143; LaSoda, 137; and DeSoto, 131, as compared to 91 for Katahdin and 73 for Triumph.

Tomatoes—Twenty different commercial and home garden varieties have been grown in the spring trials during the last two seasons and the average yield of marketable tomatoes in pounds per acre for the leading varieties during this period was as follows: Rutgers, 24,603; Gulf States, 24,278; Jefferson, 22,961; Marglobe, 21,296; Lakeland, 19,696; and Grothen Globe, 14,972.

Although Rutgers and Gulf States have out-yielded Jefferson in total marketable tomatoes, they both show considerably more cracking than Jefferson, and Rutgers was slightly later.

Rutgers, Jefferson and Marglobe were about one week later maturing than the other three varieties.

Sweet Corn—Eighteen sweet and market corn varieties were tested in replicated trials and the varieties divided into four groups based on maturity, as follows: Early—those maturing earlier than Golden Cross Bantam; medium early—those maturing about the same time as Golden Cross Bantam; late—those maturing from two to five days later than Golden Cross Bantam; very late—those maturing from ten days to two weeks later than Golden Cross Bantam.

In the early maturing group Aristogold Bantam Evergreen was
considered the best, with an average yield of 4,154 marketable ears per acre. Golden Security exceeded all varieties in production in the medium maturing group, producing 7,498 marketable ears per acre as compared to 5,537 for Tristate and 5,172 for Golden Sweet. However, Tristate was slightly larger and had the best appearance.

In the late maturing group Oto exceeded all varieties in production of marketable ears, with an average of 7,247 ears per acre; whereas Gulfcoast produced 7,185 marketable ears per acre. Gulf-coast was preferred since it produced slightly larger ears.

Cucumbers—Eleven commercial varieties and breeding lines have been tested and the average marketable yield in bushels per acre has been as follows: Santee, 260; Marketer, 235; Cubit and Palmetto, 208; and A & C, 176. However, 37 per cent of the fruits of Palmetto had hollow spaces. The color tended to bleach out towards the end of the harvest season in the case of Santee and Cubit.

Cubit was the earliest maturing variety in the test and Palmetto the latest. Palmetto and Santee showed considerable resistance to downy mildew.

Cantaloupe Trials—Seven commercial varieties and breeding lines were tested in the spring, as part of the Southern Regional Cantaloupe Trials. Georgia 47 and Weslaco H exceeded all other varieties in production and quality. Georgia 47 showed the greatest resistance to downy mildew, followed by Weslaco H and Smith’s Perfect.

Red River Valley Experiment Station, Curtis
J. Y. Oakes, Superintendent
E. C. Bashaw, Assistant Agronomist
W. A. Nipper, Assistant Animal Husbandman

The Red River Valley Agricultural Experiment Station is located in Northwest Louisiana in the Red River Valley. The Station was started during the early part of 1949 and has been developed with all essential buildings completed and a complete experimental program put into effect.

The station was established primarily for the purpose of obtaining experimental information on alluvial soils of the Red River but much of the work undertaken may be applicable to the surrounding upland sandy soils of Northwest Louisiana.

Crops that are common to the Red River Valley are dealt with, with emphasis placed on new strains and improved varieties for increased production. The fertilizer requirement of each strain or
variety is receiving special consideration with varying ratios and amounts of each material.

Forage crops, grasses and clovers are being given much attention for future needs of the rapidly expanding livestock industry within the area. The development of pastures and pasture management in relation to livestock are receiving special consideration.

During 1950 numerous varieties and strains of corn, cotton, soybeans, alfalfa, grasses and legumes were under study. Each of these received adequate fertilizer to produce maximum yields. Study of beef cattle in relation to pasture development and management was started.

**Corn Work**

Corn does not rank first in importance in the Red River Valley but with the advent of hybrid varieties and better fertilizer practices, high yields are more prevalent than at any time in the past. As a result, it is becoming more important as a cash crop for seed and for use as feed in the production of beef cattle.

**Fertilization**—Experiments on the fertilization of corn were started in 1948 using a variety adapted to the area. Three years' results indicate that nitrogen fertilizer plays the most important part in producing high yields in the Red River Valley. Applications were made in varying amounts of nitrogen alone and in combination with phosphorus and potassium to determine the place of each in a mixed fertilizer. The results indicate that 90 to 100 pounds of nitrogen is required to produce maximum yields. There was little response from the use of phosphorus and potassium, but it is thought that these two elements have a place in a mixed fertilizer and additional study will be required to determine the proper ratio required.

The number of stalks per acre has been considered in securing maximum yields and it appears that single stalks spaced 16 to 18 inches apart give best results. Yields for three consecutive years have been 80 to 100 bushels per acre.

—J. Y. Oakes and E. C. Bashaw.

**Hybrid Corn**—Open-pollinated commercial varieties and popular hybrids developed by the Louisiana Agricultural Experiment Station and other experiment stations are placed under study to obtain information in relation to yields, erectness of plants, lodging characteristics, husk grade, height of plants, and height of ears on plants. These factors affect the desirability of corn varieties for different areas.

Among the commercial varieties grown, several in both yellow and white have consistently produced high yields and have proved very satisfactory for the Red River Valley. Of the white varieties, Dixie 11, La. 468, Dixie 17, Funk's 780W, and Funk's 790W have
proved very desirable. Of the yellow varieties, Dixie 18, Funk's G714, Dixie 22, Funk's G737 and N.C. 27 have proved very satisfactory.

Commercial varieties and hybrids are fertilized at a uniform rate of 90 to 100 pounds of nitrogen per acre. Yields under favorable conditions have ranged from 90 to 100 bushels per acre.


Fertilization of Corn and Soybeans—Corn and soybeans were interplanted, with the corn spaced 18 inches apart in 42-inch rows. Forty pounds of nitrogen with phosphorus and potassium was applied before planting, with the remainder applied when the corn plants were 18 inches high. Plots that were not fertilized were used as checks. Three rates of fertilization were used: a 40-40-40, 80-40-40, and 120-40-40. The no-fertilizer plots produced the highest bean yield; and with each increase in nitrogen, the bean yield dropped slightly, with a yield of 24.3 bushels for no fertilizer and 18.2 bushels from 120 pounds of nitrogen. Corn yields were consistently higher on plots having no beans, with the highest yields from the 120-pound application of nitrogen.

The object of the experiment is to determine the effect of soybeans on corn yields over a long period of time and to utilize phosphorus and potassium in bean yields since little response has been obtained from these elements in increasing corn yields.

—J. Y. Oakes and E. C. Bashaw.

Oat Varieties

Sixteen oat varieties from various southern states were included in a test to check the performance from the standpoint of adaptability, disease resistance, forage produced and grain. Observations were made through the growing season to determine the forage value of each variety. The Coker Fulbright, Fulgrain, Louisiana 42-48, and Victorgrain would have provided the earliest grazing. The Florida 167, Anderson, Camellia, DeSoto, and Ferguson varieties are also good forage types and would have provided excellent grazing.

The yields were severely reduced by rust. The leading varieties in the 1949-50 test were Camellia, Louisiana 42-48, Victorgrain, and DeSoto. In the 1948-49 test the best yields were obtained from Alber, Victorgrain, Fulgrain, and Florida 167. The yields for the entire test during 1948-49 were higher than during 1949-50.

—J. Y. Oakes and E. C. Bashaw.

Soybeans

The Station has been co-operating with the U.S. Regional Soybean Laboratory in conducting uniform soybean tests on new vari-
eties and strains. The chief objective of the project is the development of adapted varieties for oil production.

Numerous varieties and strains were included in the test. They ranged in maturity from early September to early November. Most of the strains have not been named and have not been released for commercial production. Outstanding strains will be released to farmers as soon as their performance merits it.

Commercial varieties are placed in a test to determine those varieties best adapted to the area for seed and forage production. Commercially grown varieties producing satisfactory yields include the S-100, Ogden, and Ogden selections in the early group; Volstate and Roanoke in the medium late group; and Acadian and improved Pelican (La. 41-1219) in the late maturing group.


Cotton Studies

**Fertilization**—The fertilization of cotton in the Red River Valley has received much attention in recent years. Farmers have begun to approach maximum yields on a minimum acreage as a result of better fertility measures, better seed and more rigid insect control.

A fertilizer experiment was made using 600 pounds of mixed fertilizer per acre. The ratios varied from zero to 12 per cent for the elements nitrogen, phosphorus, and potassium. In addition, nitrate of soda, ammonium nitrate, ammonium sulphate, and anhydrous ammonia were used at optimum rates to determine source or sources of materials best suited to the production of cotton.

In general, under comparatively dry conditions best results have been obtained from an 8-8-8, 12-8-8, 8-8-4, 10-8-8, and 8-0-8, but under conditions where normal rainfall was well distributed over the growing season, the nitrogen applications alone have given excellent results.

Side-dressing applications of nitrogen fertilizers alone showed some increase over applications made at the same rate before planting but were not significant.

Forty to fifty pounds of nitrogen fertilizer alone appears to give about maximum yields under favorable conditions. The application of phosphorus and potassium is not discouraged, as in a dry year potash deficiencies, nematodes, and wilt are very prevalent. These elements assist in better maturity and more normal growth of the plants.

—J. Y. Oakes and E. C. Bashaw.

**Varieties**—An analysis of 24 commercial varieties showed that Bobshaw 1, Delfos 651-6304, Fox, Deltapine 15, White Gold Wilt, Coker 100 Staple, Miller 610, Coker 100 WR, Plains, and White Gold Strain 5 were the leading varieties. Of these varieties the lint per cent varied from 35.9 per cent on Coker 100 WR to 39.8 per cent on
Deltapine 15. The Deltapine 15 has consistently produced the highest percentage of lint over a period of three years. The staple length has varied from 1 1/16 inch on Bobshaw 1, to 1 5/32 inch on Coker 100 Staple and Coker WR. The other varieties in this group vary between these extremes.

The number of bolls required to produce a pound of cotton ranges from 65 on Miller 610 and White Gold Wilt to 75 on Deltapine 15. The other varieties in this group vary between 65 and 75 bolls per pound.

Yields on these varieties range from 933 pounds of lint cotton on Bobshaw 1 down to 801 pounds on White Gold Strain 5, with the other varieties falling between these extremes.

Tests on the advanced strains, new strains, and progenies of Deltapine 14 have given high yields, a high per cent lint, and a good staple length.


Mechanization—In the mechanized picking test on Deltapine 15-51, Fox, Deltapine 15, Plains, Empire, C.R. 1, Coker 100 WR, Stoneville 2B, Louisiana 33, and Mebane 6801; the Deltapine 15-51, Fox, and Deltapine 15 were the three best yielding varieties. Deltapine 15-51, Fox, Deltapine 15, Plains, and Empire were better adapted to picking by machinery.

The lint samples Nos. 1 and 2 shown on page 157 were harvested with a mechanical picker. Sample No. 1 graded good ordinary, while sample No. 2 graded strict low middling. The difference of two grades between these samples was due to varietal characteristics.
Lint samples from cotton harvested with a mechanical picker. (See "Mechanization" in accompanying text for descriptions.)
Samples were cleaned and ginned on an experimental gin. Samples Nos. 3 and 4 were harvested with a spindle-type picker and ginned on a commercial gin with modern cleaning equipment. Lint sample No. 3 graded strict middling, while sample No. 4 graded middling. The difference of one grade between the lint samples was due primarily to the fact that the latter sample was harvested after a rain.

Test on the efficiency of a mechanical picker showed that where cotton was well defoliated with a majority of it open, as much as 92.4 per cent of all cotton could be picked the first time over and a large percentage of what remained could be obtained by scraping. The efficiency of the machine, however, will depend on the number of remaining leaves, excess vegetation, grass, vines, etc., condition of picker mechanically, and speed of operation of machine.


Cotton Insects—The control of cotton insects in Louisiana in the production of cotton is a must on the list of a few essential things to be done in order to produce maximum yields.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Boll Weevil Infestation (Per cent punct. sqs.)</th>
<th>Bollworm Injury (Per cent inj. bolls)</th>
<th>Yield of Seed Cotton (Pounds per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Treatment</td>
<td>58.42</td>
<td>13.50</td>
<td>636</td>
</tr>
<tr>
<td>20% Toxaphene - 40% Sulphur Dust</td>
<td>38.71</td>
<td>3.62</td>
<td>1446</td>
</tr>
<tr>
<td>Toxaphene Spray</td>
<td>4'71</td>
<td>5.00</td>
<td>48</td>
</tr>
<tr>
<td>Toxaphene - DDT (2-1) Spray</td>
<td>31.08</td>
<td>.62</td>
<td>1938</td>
</tr>
</tbody>
</table>

All treatments resulted in less damage from the boll weevil and bollworm and produced higher yields than the check. The toxaphene-DDT spray was significantly better than the toxaphene spray. There was no significant difference in boll weevil and bollworm injury between the toxaphene dust and toxaphene-DDT spray, but if the yields are used as a basis for comparison, toxaphene-DDT spray was more effective.


Insecticide Test on Cotton—A comparison was made of insecticides applied as dust, wettable powder, concentrate spray, and emulsion concentrate spray. Plots consisted of 12 rows of sufficient length to make .42 acre in size. Applications of dust or spray were made at five-day intervals. Insect infestation counts were made at regular intervals. Results of the test showed that where calcium arsenate spray was used, cotton produced 1,823 pounds seed cotton per acre; wettable BHC-DDT spray, 2,547 pounds seed cotton; miscible BHC-DDT spray, 2,400 pounds seed cotton; and 3-5-40 dust, 2,434 pounds seed cotton. The results show that all materials pro-
duced significantly better yields than where calcium arsenate alone was used.
—L. D. NEWSOM AND E. C. BASHAW.

Forage Crop Studies

Alfalfa Varieties—Results for the first and second year of the alfalfa variety test are presented in the following table.

<table>
<thead>
<tr>
<th>Variety</th>
<th>1949 Tons Hay Per Acre</th>
<th>1950 Tons Hay Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo</td>
<td>7.74</td>
<td>8.08</td>
</tr>
<tr>
<td>Arizona Chilean</td>
<td>9.70</td>
<td>8.01</td>
</tr>
<tr>
<td>Hairy Peruvian</td>
<td>10.35</td>
<td>8.01</td>
</tr>
<tr>
<td>Southwestern Common</td>
<td>10.41</td>
<td>7.99</td>
</tr>
<tr>
<td>Peerless</td>
<td>9.99</td>
<td>7.78</td>
</tr>
<tr>
<td>Atlantic</td>
<td>9.36</td>
<td>7.64</td>
</tr>
<tr>
<td>Oklahoma Common</td>
<td>9.90</td>
<td>7.31</td>
</tr>
<tr>
<td>Kansas Common</td>
<td>9.21</td>
<td>7.28</td>
</tr>
<tr>
<td>Ranger</td>
<td>9.10</td>
<td>6.96</td>
</tr>
<tr>
<td>French Du Puiti</td>
<td>8.46</td>
<td>6.37</td>
</tr>
<tr>
<td>African</td>
<td>7.30</td>
<td>5.37</td>
</tr>
</tbody>
</table>

Yields for 1950 were somewhat lower than for the previous year, but the relative rank of the varieties remained about the same. Five cuttings were made at approximately four- to six-week intervals, depending on weather conditions.—E.C. BASHAW AND J. Y. OAKES.

Sudan Grass—Three varieties of Sudan grass were tested in 1950 as in 1949. Yields for each variety are presented in the following table in tons of air dry hay per acre.

<table>
<thead>
<tr>
<th>Variety</th>
<th>1949 Tons Hay Per Acre</th>
<th>1950 Tons Hay Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tift</td>
<td>16.3</td>
<td>10.06</td>
</tr>
<tr>
<td>Sweet</td>
<td>15.9</td>
<td>9.92</td>
</tr>
<tr>
<td>Common</td>
<td>12.5</td>
<td>7.85</td>
</tr>
</tbody>
</table>

For the second consecutive year the Tift produced the highest yield, with Sweet running a close second. The crop provides excellent hay if cut at the proper time and provides an excellent temporary pasture for late summer months if properly managed. Sudan grass provides an excellent hay crop but it is very difficult to cure and usually requires about one week to air dry in field before baling or stacking. Even with its slow drying qualities the palatability of the hay is apparently not reduced when rained on before baling or stacking.
—E. C. BASHAW AND J. Y. OAKES.

Lespedeza—Four of the more prominent varieties of Lespedeza
—Kobe, Korean, sericia, and common—and nine selections obtained from the Department of Agriculture were tested during the summer of 1950. None of the varieties tested performed satisfactorily. They produced limited growth and were lacking in vigor. Preliminary data indicated that lespedeza may be unsuited to the Red River Valley except in isolated cases.

Alyce Clover and Hairy Indigo—Plots of Alyce clover and hairy indigo were under observation during the summer of 1950. One harvest of hay was made and each of these crops produced a good yield of hay. Hairy indigo produced 2.4 tons of hay per acre and Alyce clover produced 2.0 tons. Alyce clover produced forage of a very high quality and showed considerable promise where a late, rapidly growing crop is desired for hay. The hairy indigo forage was of very poor quality.

Red Clover—All of the red clover varieties tested looked good; two and possibly three cuttings of high quality hay per year can be obtained from this crop. Kenland, Cumberland, and the Louisiana polycross varieties have shown up particularly well.

Miscellaneous Legumes—Of the miscellaneous legumes, Alsike, black medic, hop clover, and bur clover looked good. Persian, Lappa, Subterranean, Rose, and Ball clovers produce an excellent growth for a short period of time in the spring, but considering their short life and the fact that they leave the ground practically bare when they go out, their value except in special cases is doubtful.

Preliminary results indicate that birdsfoot, trefoil, and other lotus strains are not adapted to the area.


General Observations from the Forage Crops Nursery—Of the 26 grasses in the forage nursery, the fescues (particularly Ky. 31), ryegrass, Bermuda grass (particularly coastal), Dallis grass, and Sudan grass have proved to be well adapted to the area. Some of these grasses have already been placed in pasture experiments and the others are soon to follow. The prairie and Harlan strains of bromegrass have shown up well in the plots but more information is needed before large-scale pasture tests will be attempted with them.

Preliminary tests indicate that Rhodes grass and Teff grass have considerable promise for summer grazing.

Reeds canary grass shows a little promise but its practical value is doubtful where so many other grasses are well adapted.

Orchard grass and tall oatgrass, although they have survived, make very little growth in this area and are considered to have little or no value as pasture grasses in this area.

Bulbous bluegrass, Smilo, and Veldt grass were not suited. They failed to survive the first year.
Several attempts have been made to obtain a stand of Harding grass but so far have failed.

Future results from the grass tests seeded in 1950 should aid considerably in the evaluation of some of the above grasses as well as lovegrass, the bluestems, carpet grass, and many others.

—E. C. Bashaw.

Animal Industry

Pasture Studies—Pasture studies were started in 1949 to evaluate several grazing crops. The crop or crop combinations are oats alone, followed by Johnson grass; oats and Singletary peas, followed by Johnson grass; fescue-white Dutch clover, and fescue-Ladino clover.

The pastures were established in the fall and winter of 1949, but grazing was delayed until July 1950 because of insufficient animals to utilize them. Cattle were grazed from July 10 until Oct. 31, on Johnson grass that followed the oats and oats and Singletary peas and the fescue-white Dutch clover and fescue-Ladino clover pastures. The pastures were stocked at the rate of four animals on five acres owing to the possible critical grazing period occurring during July and August as a result of usual low rainfall during these months.

The cattle on the fescue-white Dutch clover pastures gained 1,393 pounds for the 112-day period, or an average gain of 1.55 pounds per animal. Fescue-Ladino clover produced 1,235 pounds of beef with an average daily gain of 1.35 pounds per animal, while
Johnson grass produced 1,188 pounds of beef with an average daily gain of 1.32 pounds per animal.


Grade Herefords on oats and Singletary peas at the Red River Valley Experiment Station in 1950. The Station did not have enough cattle to utilize all of the grazing.

**Hogging Off Corn and Soybeans**—Hogging off corn and soybeans is a profitable practice when properly managed.

Three acres of corn and soybeans were interplanted, with one acre planted to S-100 soybeans and an early hybrid, Funk's G50, and the remaining two acres planted to Ogden soybeans and a late maturing hybrid, Dixie 11 corn. Hogs were purchased locally, and as the early hybrid matured, it was fenced off and hogs turned on to utilize the crop. When the first acre was finished an additional acre was cross fenced and hogged off. When this was completely utilized the last acre was used in finishing the hogs off for market.

Three hundred sixty pounds of corn, together with the green beans, produced 100 pounds of pork per acre. The selling price for the finished hogs was $19.07 per hundredweight.

A net profit of $202.08 per acre was realized after deducting cost of tankage, minerals, salt, worm treatment, vaccines, and dry lot feeding of the hogs for 30 days, representing a cost of $107.80.

—W. A. Nipper and J. Y. Oakes.
Experimental work was conducted on both the old and the new Rice Experiment Stations during 1950. This work consisted of the following lines of investigation: rice fertilization, rice drying and storage, pasture-rice rotation, forage crop investigations, rice breeding, and variety testing. Approximately 1,400 barrels of foundation seed of six varieties were produced and will be distributed to seed rice growers.

Some of the improvements on the new station during 1950 consisted of fallow working all idle land, leveling all fallow land, expansion of irrigation facilities, construction of one 40x100-foot steel machinery storage shed and two houses for staff members, and the near completion of an office building at the new Rice Experiment Station.

Rice Drying and Storage

Temporary Storage of Undried Rice—Extensive testing of temporary storage of rice with a high moisture content was carried out during 1949 and 1950. These studies were stimulated by the critical harvest period of early rice that has occurred during the last few years. About 40 per cent of the total rice crop in Louisiana has been harvested in approximately two weeks time and the present drier and bulk storage facilities are not adequate to handle this volume in this short period. This overcrowding of available facilities has resulted in depressing the price of rice, and lowering the milling quality of the grain. Studies on temporary storage of undried rice were made in a glass lined bin that can be hermetically sealed and in two 500-bushel Butler bins in which an aeration system had been installed.

Glass Lined Bin—Two hundred and sixty barrels of Rexoro rice with a moisture content of 18.1 per cent direct from the combine were stored in the bin Nov. 10, 1949, and temperature readings were recorded until June 12, 1950. The bin was opened on that date and many tests and analyses made on the rice. Three hundred and sixty barrels of Zenith rice with 19.3 per cent moisture were sealed in
the bin Oct. 4, 1950, and temperature recordings and carbon dioxide concentration readings were made during storage. The bin was opened Nov. 9, 1950. The rice did not heat to a critical point during the storage of either lot. An objectionable odor was noticed each time the bin was opened but this odor was more pronounced after the long period of storage than after the shorter storage period. Germination of the rice was very low after storage of both lots. The milling quality was not altered appreciably during storage and there are indications that the odor disappears in the milling process.

Aeration—Two 500-bushel Butler bins with an aeration system were installed and two lots of undried Zenith rice direct from the combine were placed in the bins. The aeration system pulled air down through the rice and was very successful in keeping the rice from heating. The data collected on this experiment indicate that rice may be kept for long periods by aeration.

Rice Drying “On the Farm”—Studies were made during 1950 to determine if rice could be dried in storage bins of 500- and 1,000-bushel capacities by aeration without supplementary heat and by using portable driers that furnish aeration with supplementary heat.

Drying Rice in Bins by Aeration with Atmospheric Air—Two different lots of undried Zenith rice with initial moisture contents of 19.2 per cent and 22.5 per cent were successfully dried by drawing air down through the rice in the 500-bushel bins. Climatic conditions were very favorable for both periods of operation and definite conclusions concerning drying of rice by this method should not be made until further study under adverse climatic conditions can be conducted.

Drying Rice in Bins by Aeration with Supplementary Heat—Three different lots of undried rice were dried in two 1,000-bushel bins by forcing heated air up through the rice. A portable gasoline engine-driven fan with the heat from the engine used as supplementary heat was used to dry two lots of rice, while another portable drier (FoodKeeper) with an electrically driven fan and a thermostatically controlled fuel oil heat exchanger was used to dry the third lot of rice. Detailed data on temperature, relative humidity, volume of air, moisture at different levels, milling quality, and costs of operation were recorded. The first year’s data from these studies indicate definite possibilities of developing “on the farm” drying and storage, and more intensive work should be carried out on this project.

Long-Time “On the Farm” Storage of Dried Rice—The need for orderly marketing of the rice crop by the farmer has long been recognized. Since the loan program was initiated by the Production and Marketing Administration, safe bulk storage and insect control
has become imperative to both the rice farmer and the government. Experimental studies have been conducted on rice from the 1948, 1949, and 1950 crops to determine:

1. The best types and materials of construction of storage bins.
2. The safe moisture levels at which rice can be stored.

A vast amount of data has been accumulated from studies of rice from the 1948 and 1949 crops. Rice from the 1950 crop will be kept in storage until deterioration occurs, and detailed data are being gathered from this series of experiments.

The data accumulated to date show that rice containing more than 14½ per cent moisture cannot be safely stored and that insects can be effectively controlled in bulk storage by periodic fumigation. To date all types of storage appear to be satisfactory but the long-range study under way may give more definite information concerning this phase of the project.

—L. G. COONROD, H. T. BARR, AND R. K. WALKER.

Fertility Studies: Rice

The Effect on the Yield of Rice from the Application of Different Amounts and Combinations of Nitrogen, Phosphorus, and Potassium. Drilled Rice—A fertilizer test consisting of 27 different rates and ratio combinations was conducted during 1950 on drilled Bluebonnet rice. The field design was a randomized factorial test which included three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P₂O₅ per acre), and three rates of potassium (0, 20, and 40 pounds of K₂O per acre). The fertilizers were applied at the time of seeding.

Both the application of nitrogen and phosphorus gave an increase in the rice yield. The application of potash did not show a significant increase in the yield. There was no significant difference in yield between the 20-pound application and the 40-pound application of either nitrogen or phosphorus. Where both nitrogen and phosphorus were applied at 20- or 40-pound rates the average yield was 20.45 barrels per acre. In the treatments where both were missing the average yield was 14.90 barrels per acre. Nitrogen applications without phosphorus gave an average yield of 16.25 barrels per acre, and phosphorus applications without nitrogen gave an average yield of 17.83 barrels per acre.

Water Planted Rice—A fertilizer test consisting of 27 different rates and ratio combinations was conducted during 1950 on water planted Magnolia rice. The field design was a split-plot randomized factorial test which included three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P₂O₅ per acre), and three rates of potassium (0, 20, and 40 pounds
of K₂O per acre). The plots were split with a method of handling the water after seeding—one-half of each plot was drained five days after seeding, and the other half was flooded until harvest. All fertilizers were applied as top-dressing.

The application of both nitrogen and phosphorus gave an increase in rice yields. The application of potash did not affect the yield of rice. There was a significant increase in rice yield from the application of 40 pounds of nitrogen in comparison with the yield received from the application of 20 pounds. Where neither nitrogen nor phosphorus was applied the average yield was 13.3 barrels per acre. Where both were applied the average yield was 19.2 barrels per acre. The average yields from the application of nitrogen and phosphorus were: no nitrogen, 14.50 barrels per acre; 20 pounds nitrogen per acre, 17.15 barrels per acre; 40 pounds nitrogen per acre, 19.53 barrels per acre; no phosphorus, 15.52 barrels per acre; 20 pounds phosphorus per acre, 17.56 barrels per acre; and 40 pounds phosphorus per acre, 18.11 barrels per acre. There was no significant difference of yield between the 20-pound application and the 40-pound application of phosphorus.

The average yield for the area where the water was removed five days after seeding was 15.4 barrels per acre. Where the water remained on the area until harvest the average yield was 18.7. This difference in yield was highly significant.

*Top-Dressing*—An experiment was conducted during 1950 to determine the effect on the yield of Rexoro rice, which had been fertilized at seeding with 250 pounds of 6-8-8, from the top-dressing application of different amounts and combinations of nitrogen, phosphorus, and potassium. The field design was a randomized factorial test which included two rates of nitrogen (0 and 25 pounds of N per acre), two rates of phosphorus (0 and 20 pounds of P₂O₅ per acre), and two rates of potassium (0 and 20 pounds of K₂O per acre).

Nitrogen was the only element which gave a significant increase in rice yields. Phosphorus and potassium top-dressing applications did not affect the yield. The plots which received no nitrogen made an average yield of 12.70 barrels per acre. The plots which received 25 pounds of nitrogen as top-dressing produced an average yield of 15.66 barrels per acre.


**Fertility Studies: Forage Crops**

The Effect on the Yield of Forage Crops from the Application of Different Amounts and Combinations of Nitrogen, Phosphorus and Potassium—Improved pastures are becoming increasingly important to the rice farmers of Southwest Louisiana. Fertilizer experi-
ments on several different crops were begun during 1950 to determine the fertility requirements of the rice belt soils for maximum forage yields.

*Kobe Lespedeza*—Fertilizers were applied as top-dressing to Kobe lespedeza which had been seeded in rice stubble without seedbed preparation or fertilization. The field design was a randomized factorial which consisted of two rates of nitrogen (0 and 20 pounds of N per acre), three rates of phosphorus (40, 80, and 120 pounds of P₂O₅ per acre), and three rates of potash (0, 40, and 80 pounds of K₂O per acre).

Both nitrogen and phosphorus applications gave a significant increase in yield. Potash applications gave no significant difference in yields. The average yield increases from the application of nitrogen and phosphorus were: no nitrogen, 3,382 pounds per acre; 20 pounds of nitrogen per acre, 3,728 pounds per acre; no phosphorus, 2,814 pounds per acre; 40 pounds of phosphorus per acre, 3,679 pounds per acre; 80 pounds of phosphorus per acre, 2,753 pounds per acre; 120 pounds of phosphorus per acre, 4,235 pounds per acre.

**Other Forage Crops**—Several other fertilizer experiments were initiated during 1950 on which forage yields will be measured. The forage crops in these experiments are: oats, rye grass, fescue and crimson clover mixture, fescue and alsike clover mixture, rye grass and alsike clover mixture, oats and crimson clover mixture, and oats and alsike clover mixture.


**Pasture-Rice Rotation**—The pasture-rice rotation experiments were continued in 1950 and continue to show the high value of improved pastures for increasing beef yields and increasing rice yields following improved pastures. There were four locations of these experiments in various stages of completion on the different soil types of the rice area. One experiment was completed at the Joe Zaunbrecher farm, Gueydan, La., and the second consecutive rice crop following three years of improved pasture produced 14.91 barrels per acre while the check pasture produced 10.26 barrels. The first year rice crop following three years of improved pasture at Karl Goebbel's farm, Elton, produced 25.0 barrels per acre while the check pasture produced 20.6 barrels per acre.

Beef yields on second year improved pastures at E. O. Daughenbach's farm, Lake Charles, were 265 pounds per acre as compared to 73 pounds produced on the check pasture. First year improved pastures on the new Rice Experiment Station produced 126 pounds of beef per acre as compared to 49 pounds for the check pasture.

**Winter Grasses and Legumes**—Sixteen winter grasses and 51 winter legumes were planted Oct. 23, 1948, for observation to determine their general adaptability to the rice area. After two years of
observation the data indicate that the following summary may be made: Ten strains of red clover and seven strains of crimson clover made excellent growth on a well-drained and well-fertilized seedbed. Seed production was good on all strains, and a volunteer stand was obtained the following year on all strains except common crimson clover. None of the 10 strains of alfalfa produced enough forage nor showed enough perennial or reseeding qualities to warrant further study. They are not considered to be generally adapted to the rice area. All Louisiana polycross white clover strains were outstanding in earliness, forage production, seed production, perennial tendency, and reseeding qualities. They appeared to be superior to Ladino clover. Lappa clover, Ball clover, and Persian clover made good growth and seed production and were excellent in reseeding. They were very poor in heat resistance, and forage had disappeared almost completely by May 15. Broom grass (Harlan) and rescue grass made a good growth during the first year, but heat resistance, perennial tendency, and reseeding qualities were very poor. Six strains of fescue grass made a poor growth both years. Of the six strains, Kentucky fescue 31 appeared to be the best. Camellia oats made the best growth and apparently would be more suitable for grazing than any of the other 15 strains and varieties of winter grasses tested.

White Clover—Six strains of white clover were planted Oct. 28, 1949, to determine which were more suitable to the rice area. They were rated or scored for rate of growth, rate of bloom, and heat resistance. Forage yields were taken by clipping. The Louisiana synthetics No. 1 and No. 2 were very outstanding in forage production and had the best heat resistance and rate of growth. Ladino clover and white clover (Wisconsin grown) were very poor in rate of bloom and forage production.

Lespedeza—Seven new strains of lespedeza were planted along with Kobe and Korean to determine their adaptability to the rice area. Yields were taken by clipping. Strain FC 31843 made the highest yield and out-produced Kobe by 30.6 per cent. This is considered very significant because Kobe is the standard variety used in this area.

Seed Production—Sixteen hundred and fifty pounds of strain B-230 Dallis grass seed were harvested and made available to farmers in this area for further increase. Fifteen acres of Louisiana Synthetic No. 1 white clover were planted to increase seed supplies.


Rice Breeding and Varieties

The objective of the rice improvement work of the Rice Experiment Station is to develop and make available to growers better
medium and long-grain varieties of early, midseason, medium-late and late maturity. Growers especially desire early-maturing varieties, and long-grain types bring a higher price. Disease resistance, adaptation to the combine-drier method of harvesting, yielding ability, milling quality, and cooking quality are other important factors considered in the breeding of improved varieties.

The experiments in 1950 were much the same as in previous years, including crossing, selection of pure lines, genetic research, nursery row plot and drill-strip field plot testing of promising selections in comparison with standard varieties, and increasing pure seed. Except for some miscellaneous strain tests and disease experiments, the field work was moved to the new Rice Experiment Station farm northeast of Crowley. No outfield plot work was conducted in 1950.

Twenty-six varieties and strains were tested throughout the five-year period, 1946-50. Outstanding yields were indicated for Lacrosse, Blue Rose x (Rexoro-Blue Rose) selections 3-I-9-2-4 and 6-I-25-12, and Rexoro x Purple Leaf selection 3-72-3. Satisfactory yielding ability was indicated for all other varieties except Blue Rose and Delrex. The five-year average yield for all 26 varieties was 12.7, or 1.7 barrels higher than the average for the entire Louisiana rice crop for the same period, indicating that the tests were conducted under typical rice growing conditions.

Three unnamed promising varieties were grown by farmers in field trials to provide material for tests for milling quality on a commercial scale, and to determine the reaction of farmers and rice buyers to these new varieties. These varieties were:

1. Blue Rose x (Rexoro-Blue Rose), selection 6-I-25-12. This selection is a few days later than Blue Rose. It has the disease resistance, stiff straw, smooth hull, and uniform maturity necessary for successful combining and drying. The grain is of Blue Rose type but somewhat smaller. This selection is gaining favorable response from both growers and millers, but has not been released because of insufficient information about milling quality and the market trend away from medium-grain rice.

2. Rexoro x Purple Leaf, selection 3-72-3. This selection is shorter strawed and about 10 days earlier than Rexoro. It is susceptible to stem rot and Cercospora but has given excellent results especially on the darker soils. Since the grain is more plump than that of Rexoro or Bluebonnet, it does not fall into any class familiar to the trade, and a market outlet has not been established. Enough lots have been milled commercially, however, to draw attention to its high milling quality. The head-rice out-turn has ranged from 85 to 94 pounds. In cooking quality it is equal to the finest flaky long grain.

3. Rexoro x Delitus, selection B321B40-3, is a flavored (aro-
matic or scented) variety of much higher yielding capacity than Delrex. The grain is somewhat chalky and does not mill so well as Delrex. It matures about 10 days earlier than Rexoro.

Other selections of special interest include:

(1) Rexoro x Zenith. Several long grain types of Zenith maturity and with vigorous growth have been selected.

(2) Selection 4II-1-8 from Rexoro-Blue Rose. A selection that matures with or is slightly earlier than Bluebonnet. It appears to be superior to Bluebonnet in producing better stands and in Cercospora resistance and uniformity of maturity, and in having a slightly more slender grain. It is slightly taller than Bluebonnet, and the straw is more slender. Under ordinary conditions, however, it appears to remain standing until mature. Apparently it has some resistance to stem rot. The smaller straw diameter may be of some advantage in reducing borer damage.

(3) Backcross Rexoro selections. (a) Rexoro^2 x (Rexoro-Blue Rose), selection 7/8-Rex. 3-12, a second backcross that is very similar to Rexoro. Being resistant to Cercospora leaf spot, its leaves do not turn brown but remain green until after the grain is fully mature. It is slightly shorter strawed than Rexoro. (b) Rexoro^3 x (Rexoro-Blue Rose), 15/16-Rex.-3-22 selections. These are third backcross selections with resistance to Cercospora leaf spot, but otherwise indistinguishable from Rexoro.

Four of the nine named varieties reported in production in Louisiana in 1950 were released from the Rice Experiment Station. Nearly 33 per cent of the rice acreage was seeded to these four varieties, Rexoro representing 24.2 per cent, Magnolia 4.3 per cent, Fortuna 3.4 per cent, and Nira .96 per cent of the total state acreage. Rexoro (including a small acreage of Texas Patna) was in second place, and the acreage seeded was the largest ever devoted to this variety. In Texas, Rexoro and Texas Patna combined ran a close second to Bluebonnet, the leading rice variety in that state.

—NELSON E. JODON.

**Southeast Louisiana Dairy and Livestock Experiment Station, Franklinton**

H. D. ELLZEY, JR., Superintendent
B. D. NELSON, Assistant Dairyman

**Pasture Studies with Dairy Cattle**

**Summer Pastures**—The following summer grazing crops were under study: 1. Sweet Sudan in 36-inch rows. 2. Sweet Sudan broadcast. 3. Sweet Sudan and soybeans broadcast. 4. Sweet Sudan and Alyce clover. 5. Cat-tail millet broadcast.
All pastures were fertilized with 300 pounds of 6-8-8 at planting time and top-dressed with 32 pounds of nitrogen per acre. Each of these pastures caused the animals to produce more milk per day than the animals on a Dallis grass-lespedeza permanent pasture.

Sudan grass, broadcast, produced slightly more milk than Sudan in rows, and since it is more expensive to plant Sudan in rows, this procedure is of doubtful merit. Sudan and soybeans, broadcast together, produced slightly less milk than Sudan in rows. These crops when broadcast do not appear to be good companion crops.

Cat-tail millet was the most outstanding summer grazing crop under trial, producing 400 pounds more milk than any other crop in the test.

Winter Pastures—Experiments involved the following: 1. Oats alone, animals removed March 1, 1950, and pastures overseeded with Kobe lespedeza. 2. Oats alone, continuously grazed as long as growth
permitted. 3. Oats-hairy vetch. 4. Rye grass-crimson clover. 5. Oats-
crimson clover (poor stands obtained and therefore discontinued). 6. Rye grass on Dallis grass sod. 7. Kentucky 31 fescue on Dallis grass sod. 8. Crimson clover. 9. Dry lot (control); animals fed legume hay free choice and allowed to forage a native carpet grass pasture; silage was fed at rate of 30 pounds per day per animal.

All pastures were fertilized with 500 pounds of 6-8-8 at planting time. Thirty-three pounds of nitrogen were applied every 45 days for a total of three applications. The crimson clover was not fertilized inasmuch as it followed Alyce clover which had been fertilized with 500 pounds of 3-12-12.

Grazing periods for the various crops were as follows: Oats-

There was little difference in the return per acre above feed and pasture costs for the following treatments.

1. Oats grazed until March 1, animals then transferred to crimson clover—$95.77.
2. Rye grass-crimson clover—$95.69.
3. Oats-hairy vetch—$94.85.

Rye grass on sod was a close fourth, having a net value of $90.25 per acre. As was true in previous years, the rye grass caused the animals to produce more milk per animal while carrying slightly fewer animals per acre. Oats-hairy vetch, as in previous years, was a more consistent performer inasmuch as the level of production was fairly constant throughout the 154-day period.

In all cases where a legume was seeded with a grass, it appeared that the legume was contributing little to the total amount of forage available. At the same time, however, the legume-grass combinations produced more milk than the grass alone.

Oats alone, grazed as long as growth permitted, was the fifth most profitable winter pasture, having a net worth of $66.05 per acre.

Kentucky 31 fescue was the least profitable winter pasture, having a total net worth of $30.75 per acre. Since fescue usually does better the second than the first year and is a perennial, thereby eliminating recurring seed and seedbed preparation costs, it should not be judged too severely at this point.

Data from the control group forcibly demonstrate the value of winter pasture. The per-cow return above all costs for the control group was $18.87 for a 154-day period as compared to a per-cow return of $143.01 above all costs for rye grass-crimson clover for a 140 day period. —H. D. Ellzey, Jr., and B. D. Nelson.
**Yield Testing**—A total of 24 open-pollinated and hybrid corns having a yield range of 15-30 bushels per acre was included in this test. The top yielding entries were generally the same as in previous years, i.e., Dixie 22, Dixie 17, Funk’s G-714A, Funk’s G-790W, and Funk’s G-780W. The two Dixie hybrids continued to produce a low quality corn and are therefore of extremely questionable merit.

—H. D. Ellzey, Jr., and Hugo Stoneburg.

**Nitrogen X Spacing**—Spacings varied from 12 inches to 30 inches in 6-inch increments. Total nitrogen application varied from 30 pounds to 158 pounds in 32-pound increments. In no instance did the application of 158 pounds of nitrogen produce a greater yield than the 126-pound application. This was true regardless of spacing. Also, in no instance for any given spacing, did the addition of 32 pounds of nitrogen significantly raise the yield over the next lowest nitrogen level. Only when there was a difference of 64 pounds in the level of nitrogen fertilization was there a significant difference in yield evidenced for a given spacing.

A 24-inch spacing, with 30 pounds of nitrogen applied at planting and 64 pounds applied as a side-dressing, appears to be the most desirable procedure for applying the nitrogen portion of the fertilizer mixture.

—H. D. Ellzey, Jr.

**Fertilization**—This test was conducted as in the past, i.e., nitrogen, phosphorus, and potash were varied in 4 per cent increments from 0 to 12 per cent. All fertilizers were applied at the rate of 600 pounds per acre and each treatment was duplicated in order that a 48- and 72-pound nitrogen side-dressing could be made. The need for phosphorus was forcibly demonstrated in this experiment in that absolutely no corn was produced where phosphorus was omitted. This was true even when nitrogen and potash were applied in fairly liberal amounts. As would be expected in soils having a low phosphorus content, the quality of corn was very poor for those treatments providing a low phosphorus level. Little response was obtained from the application of potash; the difference in yield between an 8-8-0 and 8-8-12 was only slightly greater than that necessary to effect a highly significant difference.

Six hundred pounds of an 8-12-8 per acre side-dressed with 72

---

1 All corn experiments occupied a tract of land that was cleared of shrubs, trees, stumps, etc., during the fall of 1949. These experiments, therefore, represented the first crop of any kind ever planted on this tract. So-called “new ground” in this area, in contrast to “new ground” in other areas, is exceptionally infertile and the plant food therein is largely unavailable. Physical structure is also very poor. It might be said that the soil is largely sterile from a crop production point of view. For these reasons, yields were abnormally low and responses, in many cases, were abnormal or unlike those that might be obtained on similar soil that has been in cultivation three or more years.
pounds of nitrogen gave the highest yield. This same treatment also produced the greatest yield in last year's experiment.

—H. D. Ellzey, Jr.

**Tung Meal as a Fertilizer Material**—This test, inaugurated last year, was continued with some modification. The total amount of nitrogen applied to all treatments was 70 pounds, plus 24 pounds each of phosphate and potash. Of the 70 pounds of nitrogen, 0, 17, 35, 52, and 70 pounds came from tung meal. In all instances the yields produced by those treatments obtaining part or all of their nitrogen from tung meal were significantly greater than the yield from the treatment where all of the nitrogen was supplied from commercial sources. There was no significant difference between those treatments obtaining part or all of their nitrogen from tung meal. This would indicate that tung meal, as is true for most organic fertilizer, is slightly superior, pound for pound of nitrogen, to some of the commercial carriers.

Tung meal should not be used alone, as it does not contain sufficient phosphate for profitable yields. This is evidenced by the fact that 2,000 pounds of tung meal (contains approximately 70 pounds of nitrogen) per acre plus 24 pounds of potash, but no phosphate, produced only one-third as much corn as the treatment wherein 24 pounds of phosphate were added to this mixture. The addition of potash only to the tung meal did not affect the yield of corn.


**Calf Feeding**

The purpose of this experiment was to determine whether the amount of milk fed calves according to the "Cornell system" could be reduced without adversely affecting the calves. Accordingly, two groups of seven calves each were fed milk as follows:

<table>
<thead>
<tr>
<th>Weeks of age</th>
<th>Lbs. of milk daily</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
<tr>
<td>Group I</td>
<td>5 6 7 7 6 6 5 4 3 3</td>
</tr>
<tr>
<td>Group II</td>
<td>5 6 7 6 5 4 3 2 0 0</td>
</tr>
</tbody>
</table>

Calves fed according to the modified Cornell system consumed 98 pounds less milk. Except for the amount of milk fed, all calves were handled alike.

Calves in group I made a total gain of 71 pounds in 12 weeks, or an average daily gain of .85 pound. Calves in group II made a total gain of 65 pounds in 12 weeks, or an average daily gain of .77 pound.

Each calf in group I consumed an average of 131 pounds of grain as compared to 135 pounds for the calves in group II. There was no apparent difference in the amount of hay consumed.

The calves in group II gained an average of 26.5 pounds from 8 to 12 weeks of age, the period when no milk was being fed, whereas
the calves in group I gained an average of 29 pounds and received milk for two of these four weeks. None of the calves in group II appeared to be stunted at any time during the experiment. All calves are now one year old and it is impossible to determine which calves composed the two groups.

Follow-up experiments are now in progress to determine whether the amount of milk can be further reduced and to what extent skim milk powder can be used to substitute for whole milk.


Alyce Clover

Fertilization—In this experiment phosphate and potash were varied from 0 to 24 per cent in 6 per cent increments. These elements were applied separately, with each other, and with 3 per cent nitrogen. All treatments were at the rate of 600 pounds per acre. Per-acre green weight yields varied from 704 pounds where no fertilizer was applied to 12,016 pounds where 600 pounds of 0-24-12 were applied per acre. No response was obtained from the application of nitrogen inasmuch as 600 pounds per acre of a 3-12-12 produced 12,001 pounds of forage. Little or no response was obtained from the application of potash, as evidenced by the fact that 600 pounds of a 3-12-0 produced 9,690 pounds of forage as compared with 9,571 pounds from the same amount of 3-12-12 and 9,697 from an 0-12-12.

—H. D. Ellzey, Jr.

West Louisiana Experiment Station, DeRidder

C. B. Roark, Superintendent
Harold E. Harris, Research Associate in Agronomy

The West Louisiana Experiment Station is a pasture and livestock station located on Highway 171, eight miles north of DeRidder and two miles north of Rosepine, in Vernon Parish. This is in the cutover pine lands of west Louisiana.

This report deals with the third year’s operation on this station. Since the first year was devoted to clearing, fencing, and building, this is a report of the second year of experimental work.

Land Use

The soils of this area are light. The main soils on the Station are Bowie, Beauregard, and related soils. The topography is rolling. These light soils with rolling topography erode rapidly if left exposed to the weather without cover.

One of the best means of using the land of this area is for the
production of pine forest products. This is the long-time point of view. For the immediate future, improved pastures grazed by good quality livestock of the ruminant class, is a sound type of farming. The primary feed for cattle is pasture and roughage; therefore this area is adapted to the production of cattle.

Pastures for Beef Cattle

An experiment using different combinations of pasture plants was established on five pastures fenced separately. In 1948, the first year these pastures were seeded, they were limed and treated with a mixture containing 40 pounds of nitrogen, 80 pounds of $P_2O_5$, and 40 pounds of $K_2O$ per acre. Basic slag was the source of one-half of the $P_2O_5$ used.

In 1949 the treatment was a mixture containing 15 pounds of nitrogen, 60 pounds of $P_2O_5$ and 60 pounds of $K_2O$ per acre. Yields of beef per acre in 1950 were as follows for the five respective pastures:

The pasture containing a combination of Dallis grass and Louisiana white clover with rye grass seed broadcast in the fall of 1949, gave a yield of 442 pounds of beef per acre during the period from Jan. 14 to Nov. 1.

The pasture containing Kentucky 31 fescue and Louisiana white clover gave a yield of 370 pounds of beef per acre when grazed between Jan. 14 and July 1 and during the month of November.
Louisiana white clover and Dallis grass pasture made a yield of 337 pounds of beef per acre from Jan. 14 to March 1 and from June 1 through October.

Summer pasture containing Dallis grass and common lespedeza gave a yield of 212 pounds of beef per acre during the period from May through October.

The pasture containing oats and Singletary peas produced a yield of 172 pounds of beef per acre during the period January through February and during the last half of April.

The above yields were made during the year 1950, following an unusually mild winter, and the rainfall was favorable until mid-July. However, grazing was cut short in the fall because of dry weather and an early, cold winter.

**Weather Data**

The annual rainfall was about normal, 53.10 inches, but 42.15 inches fell, during the first half of the year and only 10.95 inches the last six months. According to weather records over a period of years, the rainfall for the first six months normally exceeds that of the last six months by less than 3 inches. During 1950 the rainfall for the first six months was almost four times as heavy as it was during the last six months of the year.

**Methods of Planting Dallis Grass**

An experiment to determine the comparative results of different methods of planting Dallis grass was established in 1949 and additional data obtained in 1950. The accumulative results of this experiment to date show the best method of planting Dallis grass to be one in which the seeds are rolled into a firm, well-prepared seedbed with a cultipacker seeder. The second best of the five methods tried was where seeds were broadcast during March in oats and white clover pasture that had been established on a thoroughly prepared seedbed the previous fall, and on which cattle were grazing at the time the Dallis grass was sown.

**Soil Erosion Control**

When native grass lands are plowed and converted to improved pastures on rolling light soils, there is often severe loss of top soil from heavy rains before a new sod is formed, even though the land is adequately terraced. To prevent this soil loss and to avoid the construction of terraces on land to be sodded to thick growing grasses and legumes, a method of establishing pasture in alternate strips similar to strip cropping is being used. The strips are established in 30-foot widths running generally across the slope, but not necessarily on exact contour.
The 30-foot strip of native range grass left undisturbed holds the soil from severe washing until a new sod is formed on the adjoining plowed strip. The small amount of soil that does start washing is immediately caught and held in place by the old native grass when it reaches the native sod strip.

After the new strips of pasture are established with a good cover of sod, the remaining strips of range grass are plowed and seeded the following year.

Varieties and Strains of Forage Crops

A nursery containing 83 varieties or strains of summer and winter forage crops serves as a basis for larger seed increase plots.

**White Clover**—A forage yield trial of six strains of white clover was conducted. All strains were replicated four times. The Synthetic 1 and certified Ladino extended over the longest growing period.

**Red Clover**—Three strains of red clover were used in a forage yield test. The highest yield was obtained from Synthetic 1, followed by Synthetic 2 and common.

**Warm Season Plants**—Summer growing plant tests include four
varieties of lespedeza and three varieties of Sudan grass, also several varieties and strains of grasses new to this area.

Poultry

Egg production is one of the livestock enterprises of this area. This enterprise is generally conducted on more of a factory basis than a farm basis.

Chickens are primarily grain consuming livestock, and since grain production in this area is on a limited scale, baby chicks and feed, the raw materials, are purchased and eggs are the finished product. Small farm units and a healthful climate are two major factors that influence the poultry enterprise in this area.

This project consists of a laying flock, starting with approximately 1,000 pullets. It is planned to run this same flock through the second year, comparing production of pullets this first year with production of the same flock in their second year.
Results of Research Against Insects Attacking Cole Crops in 1950

Small-plot field experiments and laboratory experiments with various synthetic organic insecticides for the control of caterpillars attacking cabbage were conducted in the spring of 1950. Allethrin proved less effective than pyrethrum at comparable strengths in both laboratory and field experiments. Aldrin at 1 pound and dieldrin at 0.2 pound in 100 gallons of water were not effective in the field. 1,1-bis(p-chlorophenyl)propane and 1,1-bis(p-chlorophenyl)butane at the rate of 1 part to 800 parts of water killed all the caterpillars in the field and these insecticides at 1 part to 1,600 parts of water reduced the caterpillar population 90 per cent.

In an experiment on the control of the turnip aphid on fall-grown mustard, dust mixtures containing 0.5 per cent of rotenone plus 2 per cent of piperonyl butoxide, piperonyl cyclonene, or methylated naphthalene or 1 per cent of n-propyl isome were about equal in effectiveness to a 1 per cent rotenone dust. These dusts were more effective than dusts containing 0.25 per cent of rotenone plus 1 per cent of piperonyl butoxide or methylated naphthalene or 0.5 per cent of n-propyl isome.

One application of 0.5 pound of an insecticide containing 27 per cent of O-ethyl O-p-nitrophenyl benzenethiophosphonate in 100 gallons of water per acre and a 25-per cent 1,1-bis(p-chlorophenyl)butane emulsifiable solution at 1 part to 800 parts of water gave 37 and 58 per cent control, respectively, of the turnip aphid on heavily infested mustard plants.—K. L. Cockerham and P. K. Harrison.

Results of Sweet Potato Weevil Investigations During 1950

A 20 per cent toxaphene dust at the rate of 20 pounds per acre and an emulsion spray at the rate of 3 pounds of DDT in 16 gallons of water per acre, applied five times at three-week intervals, were the most effective insecticides tested against the sweet potato weevil in field plots. The toxaphene reduced the weevil infestation 76 per cent and was significantly better than the untreated check. The DDT reduced the weevil infestation 40 per cent, but this reduction was barely significant as compared with the check. Dusts containing 10

1 In cooperation with the Louisiana Agricultural Experiment Station.
per cent of chlordane or 20 per cent of DDT, applied at the rate of 20 pounds per acre, were not effective.

Neither a dust nor an emulsion containing DDT applied to sweet potato plants at the rate of 3 to 5 pounds of technical DDT per acre gave a satisfactory kill of adult weevils confined on the plants in cages immediately after the treatment, nor did these treatments protect the vines from subsequent weevil infestation.

The mixing in the soil of DDT at the rate of 100 pounds, chlordane at 20 pounds, or aldrin, dieldrin, or 1,1-bis(p-chlorophenyl)-butane at 5 pounds per acre did not prevent weevil emergence from seed sweet potatoes bedded in the treated soil or prevent infestation of the plants produced by these seed potatoes.

Dusts containing 10 per cent of DDT or 10 or 50 per cent of methoxychlor applied to the interior surfaces of wooden cages in July, 1949, continued to be effective against sweet potato weevil adults placed therein at monthly intervals throughout 1950. The 10 per cent DDT and 50 per cent methoxychlor were somewhat better than 10 per cent methoxychlor, the knockdown being quicker and the total weevil mortality slightly greater.

The herbicide 2,4-D continued to be effective in eliminating volunteer plants in fields and the surplus plants in old seed beds and mother rows. The amine and sodium salts of 2,4-D were equally effective and standard (0.1 per cent) dilutions were equal to those twice as strong. One application destroyed all treated plants. In a replicated small-plot field test more than 99 per cent of the plants and 93 per cent of the seed sweet potatoes were destroyed. One application of the amine salt of 2,4-D on volunteer plants growing in a corn field, when the corn was from 2 to 3 feet high, caused rather serious injury to the corn. Many of the corn stalks fell over and the roots were seriously affected. However, the yield of the corn crop was not reduced by this injury. As a result of the work conducted during 1950 and preceding years, 2,4-D is being recommended for use as a herbicide in all weevil-infested areas.

In tests with new seedlings and varieties for resistance to sweet potato weevils, the seedlings L-187 and L-244 and the variety White Star had the fewest infested sweet potatoes and Oklahoma 24 had the most. In two other plantings where observations were made the seedling L-187 had fewer infested sweet potatoes than the variety Porto Rico. Both seedlings L-187 and L-244 have shown consistently promising results in this respect in previous years.

—K. L. COCKERHAM AND P. K. HARRISON.

Relative Humidity and Temperature Within the Bee Hive

The relative humidity and temperature in two colonies of honeybees at Baton Rouge were determined by the use of a recording hygrothermograph from May 5 to Oct. 20. Both factors were fairly
uniform within the brood nest, but much less uniform in the honey supers. Temperatures in the brood chamber ranged from 88° to 102° F., and in the second honey super from 73° to 106° F. Relative humidities in the brood chamber ranged from 40 to 62 per cent and in the second honey super from 32 to 78 per cent. Results indicate that the greater the distance from the brood nest, the greater was the range of temperature and relative humidity.

Summer honey frequently ferments in the comb within the hive at Baton Rouge. Such honey is high in moisture (18 to 22 per cent) and contains many yeasts. The combination of high summer temperature and high relative humidity probably prevents the bees from properly ripening summer honey. At 90° F. and 90 per cent relative humidity there are 13.3 grains of water vapor per cubic foot of air, while at 70° F. and 90 per cent relative humidity there are only 7.2 grains of water vapor per cubic foot of air. Honey containing 20 per cent moisture absorbs more moisture from the air when the air temperature is 68° F. and the relative humidity is above 60 per cent.

—E. Oertel.

Cotton Disease Investigations

Research on cotton diseases and methods of control in Louisiana are conducted cooperatively by the Division of Cotton and Other Fiber Crops and Diseases, United States Department of Agriculture, and the Louisiana Agricultural Experiment Station.

The disease projects which are in progress include breeding for bacterial blight resistance, breeding and testing for fusarium wilt resistance, and seed treatment for control of seedling diseases and stand improvement.

Bacterial Blight—Bacterial blight, or angular leaf spot, is most prevalent in the northwestern cotton section of the state. Studies toward developing blight-resistant strains of cotton adapted to Louisiana were begun in 1949. Emphasis has been centered in studying in the field following pure-culture inoculation the reaction of certain hybrids and backcrosses, particularly, Deltapine 14 x Stoneville 20 F2 from Louisiana, and Stoneville 2-B massed hybrids F2 and F3, F2 backcrosses of Stoneville 20 x Empire, and Stoneville 20 x Deltapine from Texas. Stoneville 20 (Tenn.) and Stoneville 2-B (Ark.) are the resistant parental lines. In six selections of the Stoneville 20 x Empire backcross, 1 was highly resistant, 1 completely resistant, and 4 were susceptible in 1950. In 8 selections of the Stoneville 2-B F2 massed hybrids, 3 were highly resistant, 2 completely resistant, and 3 susceptible, while in 7 selections of the same F3 massed progeny, 3 were highly resistant, 2 completely resistant, and 2 susceptible. Four selections of the Stoneville 20 x Deltapine backcrosses from Texas were completely resistant.
The susceptible population of the F₂ Deltapine 14 x Stoneville 20 was rogued in July following inoculation in June and the resistant plants selfed together with the other resistant lines. Selections were made at harvest for further study of fiber properties. Some of the resistant selections possess good boll size and lint percentage. Determinations for staple length, strength, uniformity, and lint index will be made.


Breeding and Testing for Fusarium Wilt Resistance—The breeding program for fusarium wilt resistance was continued along the lines previously reported. Ten selfed strains, 7 hybrids, 1 backcross, and 43 F₂ progenies of Louisiana 33 x Deltapine 14 were planted in progeny rows on wilt-infested soil. Among the 10 strains studied, outstanding for resistance were Coqette W.R., Coker 97, Deltapine 6, Delfos 425-920, and Stoneville 2-B-R. A selection of Delfos 9169 also showed fair resistance. Stoneville 2-B-R, Delfos 9169, and Louisiana 33 also were productive in tests conducted in the Red River Valley section of the state. Among the hybrids, the more promising from the standpoint of resistance, productiveness, and fiber properties are Deltapine 6 x Delfos 6102, Coker 97 x Deltapine 6, and the backcross Deltapine 6 x Delfos 6102 x Deltapine 6.

—D. C. Neal.

Seed Treatment for Stand Improvement—During the past season comparisons were made at Baton Rouge of dust and slurry treatments of Dow 9-B and Ceresan M. Reginned and acid-delinted Deltapine 15 seed were used. Plantings were made in 50-foot row sections with 6 replications of each treatment together with untreated seed of each seed type. Analyses were made for pre-emergence kill, emergence and seedling survival, and yield. The differences in pre-emergence kill between dust and slurry treatments for both chemicals were not significant; however, the reduction in pre-emergence kill for all treatments was highly significant over the untreated seed. As to emergence and seedling survival, Ceresan M dust-treated seed was highest, the differences over Dow 9-B dust and untreated being highly significant. The Dow 9-B dust failed to give stands significantly better than untreated, but each slurry treatment gave stands that were highly significant over the untreated. There was very little difference between Dow 9-B slurry and Ceresan M slurry.

The highest yield was obtained from Ceresan M dust, the differences over Dow 9-B dust and untreated seed being highly significant. Both slurry treatments did not significantly improve the yield. The results for seed type and treatment showed that only the reginned seed treated with Ceresan M dust gave a significantly higher yield than untreated seed.

—D. C. Neal.

Regional Tests—Regional seed treatment tests also were conducted at the Red River Valley Station at Curtis and the Northeast
Substation at St. Joseph, the objectives being to determine optimum rates and methods of planting of chemically-treated, reginned and acid delinted cotton seed and their effects on stand improvement and yield. Rates of plantings were 3, 6, and 9 seeds per foot, hill-dropped and drilled. The chemical treatment at each locality was Ceresan M, and the variety at Curtis was Deltapine 15 and the one at St. Joseph, Coker 100 Wilt. Data were collected for plant survival and yield at Curtis and for plant survival at St. Joseph. Plant survival data were not analyzed statistically. At Curtis, the means for reginned and delinted hill-dropped seed were practically the same, whereas the mean difference for each seed type drilled was 5.9 per cent higher for the reginned. On the whole, higher survival was attained with the lower rates of planting regardless of the method of planting used. At St. Joseph, the reginned seed gave a better survival than delinted, and with one exception, the lower planting rates gave better stands. Methods of planting had little effect.

The only factor which influenced the yield at Curtis was rate of planting. The 6-seeds-per-foot rate gave the highest yield. The mean yields in pounds per acre for the three planting rates were as follows:

<table>
<thead>
<tr>
<th>Rate</th>
<th>Pounds per acre</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seed Cotton</td>
<td>Lint</td>
</tr>
<tr>
<td>3 seeds per foot</td>
<td>2357.1</td>
<td>935.7</td>
</tr>
<tr>
<td>6 seeds per foot</td>
<td>2553.5</td>
<td>1013.7</td>
</tr>
<tr>
<td>9 seeds per foot</td>
<td>2178.5</td>
<td>864.8</td>
</tr>
<tr>
<td>Difference barely significant</td>
<td>219.6</td>
<td>87.2</td>
</tr>
<tr>
<td>Difference highly significant</td>
<td>294.6</td>
<td>116.9</td>
</tr>
</tbody>
</table>

—D. C. Neal, C. B. Haddon, and J. Y. Oakes.
Financial Statement
Agricultural Experiment Stations
Research Funds
July 1, 1949 - June 30, 1950

FEDERAL RESEARCH FUNDS

<table>
<thead>
<tr>
<th>Hatch</th>
<th>Adams</th>
<th>Purnell</th>
<th>Bankhead-Jones</th>
<th>Hope-Flannagan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>RRF</td>
<td>RM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$65,919.96</td>
<td>$17,700.00</td>
</tr>
<tr>
<td>Appropriation</td>
<td>$15,000.00</td>
<td>$15,000.00</td>
<td>$60,000.00</td>
<td>$85,178.44</td>
</tr>
</tbody>
</table>

EXPENDITURES—FEDERAL FUNDS

<table>
<thead>
<tr>
<th>Salaries and Wages</th>
<th>Hatch</th>
<th>Adams</th>
<th>Purnell</th>
<th>Bankhead-Jones</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$13,603.19</td>
<td>11,621.34</td>
<td>48,863.70</td>
<td>49,558.97</td>
<td>9,720.06</td>
<td>51,697.57</td>
</tr>
<tr>
<td>Supplies and Expense</td>
<td>1,254.65</td>
<td>1,744.68</td>
<td>6,822.72</td>
<td>6,533.08</td>
<td>1,705.56</td>
</tr>
<tr>
<td>Travel</td>
<td>82.16</td>
<td>325.03</td>
<td>2,621.96</td>
<td>1,696.63</td>
<td>747.73</td>
</tr>
<tr>
<td>Capital Outlay</td>
<td>60.00</td>
<td>1,308.95</td>
<td>1,691.62</td>
<td>8,131.28</td>
<td>1,783.43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$15,000.00</td>
<td>$15,000.00</td>
<td>$60,000.00</td>
<td>$65,919.96</td>
<td>$13,956.78</td>
</tr>
</tbody>
</table>

EXPENDITURES—STATE FUNDS

<table>
<thead>
<tr>
<th>Bankhead-Jones State</th>
<th>State Non-Offset</th>
<th>Other State Funds*</th>
<th>Research Fellowships†</th>
<th>Total All Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>$67,488.34</td>
<td>$213,985.53</td>
<td>$361,358.69</td>
<td>$33,693.30</td>
<td>$675,525.86</td>
</tr>
<tr>
<td>Supplies and Expense</td>
<td>20,284.43</td>
<td>51,594.25</td>
<td>192,823.34</td>
<td>32,567.52</td>
</tr>
<tr>
<td>Travel</td>
<td>3,652.78</td>
<td>8,569.22</td>
<td>18,001.45</td>
<td>4,783.36</td>
</tr>
<tr>
<td>Capital Outlay</td>
<td>9,732.56</td>
<td>22,069.39</td>
<td>226,356.00</td>
<td>260,793.69</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$101,158.11</td>
<td>$296,208.39</td>
<td>$798,542.48</td>
<td>$73,689.92</td>
</tr>
</tbody>
</table>

*Includes appropriations for substations and special Legislative appropriations.
†Does not include funds appropriated for plant expansion.
Agricultural Experiment Station Staff

ADMINISTRATION

W. G. Taggart, M.S., Director
I. L. Forbes, Ph.D., Assistant Director
J. Gordon Gibert, B.S., Administrative Assistant
Lawrence V. George, B.S., Editor
Nathalie Poirier, Executive Secretary
Frances W. Macy, Secretary to the Director
Frances S. Stoker, Librarian

STATE STATION, BATON ROUGE

Agricultural Chemistry and Biochemistry

1 E. A. Fieger, Ph.D., Nutritionist; Head of Agricultural and Biochemistry Department
Emilie Ann Andrews, B.S., Research Assistant
1 John Francis Christman, Ph.D., Assistant Biochemist
Martha E. Hollinger, Ph.D., Associate Nutritionist
William Holden James, Ph.D., Associate Agricultural Biochemist
Socrates Kaloyereas, Ph.D., Associate Food Preservationist
1 Jordan Grey Lee, III, Ph.D., Associate Biochemist
Harvye Lewis, Ph.D., Assistant Nutritionist
1 Allen D. Tillman, M.S., Assistant Nutritionist
1 Virginia Rice Williams, Ph.D., Assistant Nutritionist

Agricultural Economics

1 B. M. Gile, Ph.D., Agricultural Economist; Head of Agricultural Economics Department
1 William H. Alexander, M.S., Assistant Agricultural Economist
1 James Milton Baker, M.S., Associate Agricultural Economist
1 Warner L. Bruner, M.S., Research Associate
Henry J. Casso, M.S., Research Associate
1 J. Norman Efferson, Ph.D., Agricultural Economist
Alex M. Hodgkins, B.S., Research Associate (resigned Aug. 14, 1950)
1 James F. Hudson, M.S., Assistant Agricultural Economist
Dallas M. Lea, B.S., Research Associate
Morris M. Lindsey, B.S., Research Associate (resigned July 14, 1950)
1 Joseph P. Montgomery, M.S., Associate Agricultural Economist
Olin B. Quinn, M.S., Research Associate
Ewell P. Roy, M.S., Research Associate (appointed July 1, 1950)
Richmond O. Slay, B.S., Research Associate (appointed Aug. 14, 1950)
1 Felix E. Stanley, M.S., Associate Agricultural Economist
Randall Stelly, M.S., Research Associate
1 Martin D. Woodin, Ph.D., Agricultural Economist

186
Agricultural Engineering

Harold T. Barr, M.S., Agricultural Engineer; Head of Agricultural Engineering Research Department
Lawrence E. Creasy, B.S., Assistant Agricultural Engineer
Joseph C. Newell, M.S., Assistant Agricultural Engineer
John S. Norton, B.S., Research Assistant (resigned Nov. 30, 1950)
Wiley D. Poole, M.S., Associate Agricultural Engineer

Animal Industry
1 J. B. Francioni, Jr., M.S., Animal Husbandman; Head of Animal Industry Department
Charles I. Bray, Ph.D., Animal Husbandman (deceased March 23, 1950)
1 R. M. Crown, M.S., Associate Animal Husbandman
James F. Kidwell, Ph.D., Animal Husbandman (appointed Aug. 1, 1950)
1 Swayze E. McCraine, M.S., Associate Animal Husbandman
Clifton B. Singletary, M.S., Assistant Animal Husbandman

Crops and Soils
1 M. B. Sturgis, Ph.D., Agronomist; Head of Agronomy Department
Richard L. Arceneaux, B.S., Assistant in Agronomy
H. B. Brown, Ph.D., Agronomist (retired)
Robert H. Brupbacher, Jr., M.S., Assistant Agronomist
Jack D. DeMent, M.S., Assistant Agronomist
C. T. Dowell, Ph.D., Agronomist (retired)
Bertran N. Driskell, Ph.D., Associate Agronomist
Benjamin F. Grafton, M.S., Assistant Agronomist
John P. Gray, Ph.D., Agronomist
1 Merlin T. Henderson, Ph.D., Agronomist
Hugh W. Ivy, Jr., B.S., Assistant Agronomist
Jack E. Jones, M.S., Assistant Agronomist (appointed July 1, 1950)
Sherman A. Lytle, B.S., Associate Soil Scientist
Charles W. McMichael, M.S., Assistant Agronomist
James G. Marshall, M.S., Research Associate
Clifford L. Mondart, Jr., B.S., Research Associate
Henry O. Muery, B.S., Research Associate
Corbin R. Owen, M.S., Associate Agronomist
1 Walter J. Peevy, Ph.D., Agronomist
1 Clarence E. Scarsbrook, Ph.D., Associate Agronomist
Ferd W. Self, M.S., Associate Agronomist
1 William H. Willis, Ph.D., Agronomist

Dairy
1 Jennings B. Frye, Ph.D., Dairy Husbandman; Head of Department of Dairy
1 Cecil Branton, Ph.D., Assistant Dairy Husbandman
1 Alcee J. Gelpi, Jr., M.S., Associate Dairy Technologist
1 James Edward Johnston, Ph.D., Assistant Dairy Husbandman (appointed July 1, 1950)
George D. Miller, M.S., Assistant in Dairy Research
1 Thomas Everette Patrick, M.S., Assistant Dairy Husbandman
1 Louis L. Rusoff, Ph.D., Associate Dairy Nutritionist
1 Eric E. West, M.S., Research Associate
Entomology

C. Egan Smith, M.S., Entomologist; Head of Entomology Research Department
Emile J. Concienne, B.S., Research Associate
Alvan L. Dugas, M.S., Entomologist
Ernest H. Floyd, M.S., Associate Entomologist
Lee Dale Newsom, Ph.D., Assistant Entomologist
John S. Roussel, M.S., Assistant Entomologist
James C. Weber, B.S., Research Associate (appointed Feb. 1, 1951)

Fertilizer and Feedstuffs Laboratory

Ernest A. Epps, Jr., M.S., Chief Chemist and Head of Department
Hugh C. Austin, Jr., B.S., Research Associate
Frances L. Bonner, M.S., Assistant Chemist
Ethel Loyd Claiborne, B.S., Research Associate (resigned Sept. 30, 1950)
William P. Denson, B.S., Assistant Chemist
Jesse L. Farr, M.S., Assistant Chemist (retired)
Joseph G. Kawalczuk, B.S., Research Associate
John B. McDevitt, B.S., Research Associate
Clayton C. Moreland, B.S., Assistant Chemist
John W. Torbert, B.S., Research Associate (appointed Nov. 10, 1950)

Forestry

1 Ralph W. Hayes, M.F., Forester; Head of School of Forestry
1 Martin B. Applequist, M.F., Assistant Forester
1 Bryant A. Bateman, Ph.D., Forester
1 A. Bigler Crow, M.F., Assistant Forester
1 Leslie L. Glasgow, M.S., Assistant Forester
1 Charles O. Minor, M.F., Assistant Forester
1 William M. Palmer, M.F., Associate Forester
1 Richard F. West, M.F., Assistant Forester

Home Economics

1 Clara Tucker, Ph.D., Head of Department of Home Economics
Echo P. Cheely, M.S., Research Associate
Margaret H. Dallyn, B.S., Research Assistant
1 Ray Loree, Ph.D., Associate Home Economist
1 Laureame McBryde, B.S., Research Associate
1 Dorothy S. Moschette, M.A., Associate Home Economist

Horticulture

1 Julian C. Miller, Ph.D., Horticulturist; Head of Horticultural Research Department
Rita Belle Attaya, M.S., Research Assistant
Stewart Lamonte Dallyn, Ph.D., Associate Horticulturist (appointed Sept. 1, 1950)
James F. Fontenot, M.S., Assistant Horticulturist
1 Richard H. Hanchey, M.S., Assistant Horticulturist
P. Lynwood Hawthorne, M.S., Associate Horticulturist
Teme P. Hernandez, Ph.D., Assistant Horticulturist (located at Chase, La.)
August E. Kehr, Ph.D., Associate Horticulturist
1 William Duke Kimbrough, Ph.D., Horticulturist
John J. Mikell, Ph.D., Assistant Horticulturist
John C. Noonan, M.S., Research Associate (appointed Aug. 1, 1950)
2 Raymon E. Webb, M.S., Assistant Horticulturist

Plant Pathology
1 St. John Poindexter Chilton, Ph.D., Plant Pathologist; Chairman of Department
John G. Atkins, Jr., Ph.D., Assistant Plant Pathologist
Preston H. Dunckelman, M.S., Assistant Plant Pathologist
Claude W. Edgerton, Ph.D., Plant Pathologist (retired)
Irvin L. Forbes, Ph.D., Plant Pathologist; Assistant Director of Experiment Station
Weston J. Martin, Ph.D., Associate Plant Pathologist
Percy J. Mills, M.S., Research Associate
1 Antonio G. Plakidas, Ph.D., Plant Pathologist
Ernest R. Stamper, M.S., Assistant Plant Pathologist
Eugene C. Tims, Ph.D., Associate Plant Pathologist
Edwin H. Todd, M.S.A., Research Associate (part-time)

Poultry
1 Charles W. Upp, Ph.D., Poultry Husbandman; Head of Department
1 William Dewey Blackwell, B.S., Research Associate
1 Harry E. Hathaway, M.S., Research Associate
1 Benjamin A. Tower, M.S., Assistant Poultry Husbandman
1 Alva Burl Watts, Ph.D., Assistant Poultry Husbandman
Ernest Williams, B.S., Assistant in Poultry Husbandry (appointed Aug. 1, 1950)

Rural Sociology
1 Homer L. Hitt, Ph.D., Rural Sociologist; Head of Department
1 Alvin L. Bertrand, Ph.D., Assistant Rural Sociologist
John N. Burrus, M.S., Research Associate (resigned June 30, 1950)
1 Paul H. Price, Ph.D., Assistant Rural Sociologist
Irving L. Webber, M.A., Research Associate (appointed Sept. 8, 1950, resigned Jan. 1, 1951)

Sugar Station
Claude B. Gouaux, B.S., Agronomist (located at Lafayette, La.)
E. C. Simon, M. S., Associate Agronomist

Veterinary Science
1 William T. Oglesby, D.V.M., Veterinarian; Head of Department
2 Charles H. Bridges, D.V.M., Research Associate
Carol Tucker Ernest, M.S., Research Assistant (resigned Feb. 28, 1951)
1 Robert B. Lank, D.V.M., Associate Veterinarian
Helen Elizabeth Levy, B.S., Assistant in Veterinary Science
Roy L. Mayhew, Ph.D., Parasitologist
1 James G. Miller, D.V.M., Assistant Veterinarian (appointed Aug. 1, 1950)
SUBSTATIONS

FRUIT AND TRUCK EXPERIMENT STATION, HAMMOND
Walter F. Wilson, Jr., M.S., Associate Horticulturist; Superintendent
Mike J. Giamalva, M.S., Assistant Horticulturist (appointed Aug. 15, 1950)

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN
Ralph S. Woodward, M.S., Associate Horticulturist; Superintendent
James L. Heath, Jr., B.S., Research Associate in Animal Industry
John C. Taylor, M.S., Research Associate in Horticulture

NORTH LOUISIANA HILL FARM EXPERIMENT STATION, HOMER
Dawson M. Johns, M.S., Associate Agronomist; Superintendent
LeVernon Beaubouef, M.S., Assistant Agronomist (appointed Feb. 1, 1951)
Verlin P. Bennett, M.S., Research Associate in Agronomy (resigned June 30, 1950)
Thomas Hansbrough, B.S., Research Associate in Forestry (resigned Sept. 6, 1950)
E. E. Hodgkins, B.S., Research Associate in Dairying (appointed Feb. 1, 1951)
Howard C. Kellgren, B.S., Research Associate in Dairying (appointed Aug. 15, 1950, resigned Jan. 19, 1951)
Robert E. Wright, M.S., Assistant Horticulturist

NORTHEAST LOUISIANA EXPERIMENT STATION, ST. JOSEPH
Christopher B. Haddon, B.S., Agronomist; Superintendent
John C. Carpenter, Jr., M.S., Assistant Animal Husbandman
John A. Hendrix, M.S., Assistant Agronomist
Sherman A. Phillips, B.S., Assistant Agronomist
Russell Y. Ratcliff, B.S., Research Associate in Agronomy

PLAQUEMINES PARISH EXPERIMENT STATION, DIAMOND
Ralph T. Brown, M.S., Assistant Horticulturist; Superintendent
Frederick B. Schmitz, M.S., Assistant Horticulturist (appointed Sept. 1, 1950)

RED RIVER VALLEY EXPERIMENT STATION, CURTIS
Jared Y. Oakes, M.S., Agronomist; Superintendent
Elixis C. Bashaw, B.S., Assistant Agronomist (resigned Jan. 1, 1951)
Lowell L. McCormick, B.S., Assistant Agronomist (appointed Feb. 1, 1951)
Cedric R. Jordan, M.S., Assistant Entomologist (appointed June 1, 1950, resigned Sept. 15, 1950)
Weldon A. Nipper, M.S., Assistant Animal Husbandman

RICE EXPERIMENT STATION, CROWLEY
Rufus K. Walker, M.A., Associate Agronomist; Superintendent
David E. Black, B.S., Research Associate in Agronomy
Charles Nelson Bollich, B.S., Research Associate in Plant Breeding (appointed July 1, 1950)
L. George Coonrod, B.S., Assistant Agricultural Engineer
J. Mitchell Jenkins, B.S., Superintendent (retired)
N. E. Jodon, M.S., Associate Agronomist (U.S.D.A.)
Roy Jean Miears, B.S., Assistant Agronomist

SOUTHEAST LOUISIANA DAIRY AND LIVESTOCK EXPERIMENT STATION, FRANKLINTON
H. DeWitt Ellzey, Jr., M.S., Assistant Agronomist; Superintendent
Billy D. Nelson, B.S., Assistant Dairyman (resigned Jan. 31, 1951)
Denis Edward Simon, Jr., B.S., Research Associate in Dairy Husbandry
(appointed March 1, 1951)

W. E. Jodon, M.S., Associate Agronomist
Roy Jean Miears, B.S., Assistant Agronomist
Southeast Louisiana Dairy and Livestock Experiment Station, Franklinton
H, DeWitt Ellzey, Jr., M.S., Assistant Agronomist; Superintendent
Billy D. Nelson, B.S., Assistant Dairyman (resigned Jan. 31, 1951)
Denis Edward Simon, Jr., B.S., Research Associate in Dairy Husbandry
(appointed March 1, 1951)

WEST LOUISIANA EXPERIMENT STATION, DERIDDER
Cecil B. Roark, M.S., Associate Agronomist; Superintendent
Harold E. Harris, B.S., Research Associate in Agronomy

UNITED STATES DEPARTMENT OF AGRICULTURE
(Located at State Station, Baton Rouge, La.)
K. L. Cockerham, M.S., Entomologist
Theodore P. Dykstra, Ph.D., Senior Pathologist
P. Kips Harrison, M.S., Entomologist
Otto Mackensen, Ph.D., Apiculturist
Troy H. Mullins, M.S., Agricultural Economist
David C. Neal, Ph.D., Senior Pathologist
Everett Oertel, Ph.D., Apiculturist
Irwin L. Saveson, B.S., Drainage Engineer
Warren Whitcomb, Jr., Ph.D., Apiculturist, in charge
Finis T. Wratten, M. S., Agent (in Agricultural Engineering)

1 Part-time teaching.
2 On leave of absence.

Index

Alfalfa varieties, 159
Anhydrous ammonia: equipment, 28; for sugar cane, 41
Beans: breeding, 74; varieties, 74, 75, 122, 141, 149
Beef cattle: crossbreeding, 36, 134; feeds for (including pastures), 156, 176
Calf feeding, 56, 57, 174
Citrus, 95, 148
Clover varieties and strains, 50, 51, 126, 140, 160, 161, 168, 176, 178
Cooperatives, 19
Corn: fertilizers, 45, 139, 145, 153, 154, 173; hoggng-off, 18, 135, 146, 162; insecticides, 64, 65, 123; rotations, 124; spacing, 124, 173; varieties, 125, 139, 153, 173; weed control, 144
Cotton: disease studies, 182; fertilizers, 44, 47, 138, 139, 145, 155; insect studies, 62, 63, 136, 143, 158; marketing and ginning, 22; mechanization, 15, 28, 156; production practices, 17; varieties, 43, 125, 136, 155; weed control, 89
Cucumber: disease control, 122; fertilizers, 122; varieties, 121, 152
Dairy studies, 55-59, 142, 170, 174
Dallis grass: new strains, 53; planting methods, 177; seed drying, 32; seed increase, 168
Easter lilies, 99, 149
Farm production, Louisiana, 16
Fescue, 127, 140, 160, 161, 167, 171, 176
Financial statement, 185
Food preservation studies, 8-11
Forage studies, 38, 50, 51, 53, 91, 139, 159, 166, 167, 171, 175-78
Forestry, 68-69
Hay, harvesting and curing, 31
Horticultural crops, 74, 90, 95, 96, 120-23, 128-30, 140, 148-52, 180
Insecticides, for: cole crops, 180; corn, 64, 65, 123; cotton, 62, 63, 64, 136, 143, 158; peaches, 130; poultry, 107; sugar cane, 61; sweet potatoes, 61
Irish potato, 81, 90, 129, 151
Johnson grass control, 86
L. casei, growth measurement of, 7
Lespedeza: fertilization, 47, 167; varieties, 159, 168
Marketing: cotton, 22; fruits and vegetables, 21, 24, 25, 141; meat, 26
Mechanization: cotton, 15, 28, 156; social effects of, 110; sweet potato, 29
Milk: production affected by feeds, 55, by sprinkling, 56; supply and utilization, 12
Minor elements studies, 47
Nutrition studies, school children, 70, 72
Oats: diseases, 94; fertilization, 45; grazing, 161, 172; varieties, 140, 146, 154
Onion: breeding, 76, 96; insect studies, 66; seed production, 129
Ornamentals, 83, 98-100, 149
Pastures, 37, 38, 125, 147, 148, 161, 167, 170, 176
Peaches: fertilizers, 141; insect studies, 130; marketing, 24; rate of maturity, 78; varieties, 129
Peas, field, 24, 141
Poultry: abnormalities, 105; APF supplements in ration, 6; breeding, 101, 102; diseases, 118; egg production, 141, 179; frozen storage, 108; growth studies, 101, 103; hens vs. pullets, 133; lice control, 107; meat yields, 105; turkeys, 131
Residues, farm, utilization of, 34
Rice: drying, 32, 163; fertility studies, 165; rotations, 167; seed treatment, 89; storage, 11, 163; varieties, 168
Seed treatment: cotton, 183; rice, 89; sugar cane, 86
Social effect of mechanization, 110
Shrimp studies, 8
Singletary pea, lathyrinic factor of, 7
Soil: survey, 48; testing, 45
Soybeans: fertilizers, 47, 145, 154; hogging-off, 18, 135, 146, 162; inoculation, 144; varieties, 143, 145, 154
Strawberries: fertilizers, 120, 121; quality studies, 82; varieties, 120; weed control in, 120
Sudan grass, 38, 132, 159, 160, 170
Sugar cane: breeding, 86; diseases, 86; drainage, 33; economic studies, 13; fertilization, 41; insect studies, 61; seed treatment, 86; varieties, 86, 114; weed control, 86
Sweet potato: breeding, 78; diseases, 88, 90; fertilizers, 128, 140; human nutritional utilization of carotene from, 5; insect studies, 61, 180; marketing, 25; mechanization, 29; seed piece studies, 29, 140; varieties, 79-85, 129, 140
Swine: breeding, 35, 39; Brucellosis in, 116; production by hogging-off crops, 18, 135, 142, 146, 162; production of feeder pigs, 146; wallows for, 35
Tomato: diseases, 90, 91; fertilizers, 128; varieties, 83, 128, 151
Tung nut production, 12
Turkeys, 131
Vegetable industry, economic studies, 19
Watermelon varieties, 128, 141
Weed control, chemical: corn, 144; cotton, 89; strawberries, 120
Winter grazing, 50, 140, 147, 167, 171, 176

192