1954


W G. Taggart

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Research in Agriculture

ANNUAL REPORT, 1952-53

Agricultural Experiment Station
Louisiana State University
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Letter of Transmittal

Baton Rouge, Louisiana
May 1, 1954

GOVERNOR ROBERT F. KENNON
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 1953, 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
The Cover—

Flowering Sugar Cane

Sugar cane flowers have been an oddity in Louisiana, relatively few people ever having seen arrowing in cane fields in the "Sugar Belt." This is because climatic conditions in the state are not favorable for cane flowering.

Now, however, ingenious scientists have controlled the weather experimentally, and as a result sugar cane not only has been induced to flower, but, what is more important, the flowers produce seeds from which new varieties are developed.

Dr. St. John P. Chilton, Head of the Department of Botany, Bacteriology and Plant Pathology, has been the most persevering and most determined of the scientists in working out ways for making sugar cane flower at the will of the breeder. Doubtless, Dr. Chilton's most outstanding research accomplishment will result in an entirely new and better method of sugar cane breeding, under controlled conditions for the first time, which in turn will be responsible for more and better varieties, and at an accelerated rate. The end result will be greater returns to the farmer, which is the paramount purpose of the Louisiana Agricultural Experiment Station.

I. L. Forbes
Assistant Director
Agricultural Chemistry and Biochemistry

SOME EFFECTS OF HIGH QUALITY PROTEIN DIETS AND SYSTEMATIC EXERCISE ON BLOOD VITAMIN A AND CAROTENE IN YOUNG MEN

As has been mentioned previously in the Annual Report, one objective of this department is to include in its metabolic studies problems directly applicable to human nutrition. The study of the factors affecting the human nutritional utilization of carotene in sweet potatoes has been continued. In the preceding Annual Report were described several findings which indicated that the absorption and metabolism of carotene, using albino rats as the experimental subjects, were affected by the nutritional quality of the protein in the diet. An unexpected finding consisted of puzzling irregular large fluctuations of the blood vitamin A levels. One condition that could not be controlled in the experiments with rats and might have accounted for these fluctuations was the amount of the animals' physical activity. Since studies of this effect are more easily made on human beings than laboratory animals, a preliminary test of the effect of strenuous physical activity on blood vitamin A and carotene was made with the cooperation of twelve members of the LSU track team. For the tests, samples of finger blood were collected from each man about three minutes before and six minutes after a 40- to 50-minute period of exercise which consisted of a 15-minute “warm-up” followed by running five or six 220-yard dashes at full speed at intervals of five minutes. For the group, the concentration of vitamin A in the blood increased during the work-out 43 per cent on the average, with individual changes varying from an increase of 106 per cent to a decrease of 22 per cent. The concentration of carotene decreased on the average 10 per cent; the changes for each man varied from an increase of 17 per cent to a decrease of 50 per cent. The man whose blood vitamin A level increased 106 per cent was in poor condition while the only runner showing a decrease in vitamin A in his blood was in excellent condition. These results suggested that exercise and physical fitness play a part in the body's handling of vitamin A and its precursor, carotene.
Further studies\textsuperscript{1} were then conducted under controlled conditions of diet and exercise to determine the effects of moderate physical activity, strenuous physical activity, sleep and the development of form, or condition, due to training, on the amount of vitamin A and carotene in human blood.

A representative group of 13 volunteers 18 to 22 years of age was selected from the LSU track team. During a 10-day period early in the training season (October) when their condition was relatively poor, the men received a basal diet essentially devoid of carotene and vitamin A, but otherwise adequate, for six days; during the next four days they received the basal diet supplemented with sweet potatoes which provided 7,000 micrograms carotene/man/day.

On the first four days and on the last four days of the 10-day period, the subjects performed light and heavy work-outs on alternate days. On these days, four samples of finger blood were collected daily from each subject for vitamin A and carotene analyses. The schedule of blood collections was (1) before breakfast, (2) and (3) in the afternoon before and after the work-out and (4) at bedtime.

Then for a period of 32 days extending through November, the subjects continued their physical training schedule and followed their ordinary dietary habits. When the athletic condition of the subjects had improved (December), the same controlled schedules of diet, physical activity and blood collections were again in effect for 10 days. A total of 764 samples of blood representing 260 human subject-days (13 men for two 10-day periods) were collected.

The average level of vitamin A in fasting blood (before breakfast) increased from 32.5 to 45.1 micrograms/100 ml. serum, or 39 per cent, during the first four days in October when the basal diet was almost devoid of vitamin A and carotene. The comparable change in December was from 37.5 to 51.7, or 38 per cent. The basal diet provided the athletes with ad lib quantities of skim milk and lean meat, the consumption of which averaged respectively about two quarts and 1.25 pounds daily for each man; this proportion of high-quality protein in the diet was much greater than that to which the subjects were usually accustomed. This circumstance of increasing the protein intake at the start of the experimental period provided a condition similar to that which obtained in two previous experiments. In 1949, and again in 1950, using non-athletic student volunteers and a basal diet devoid of carotene and vitamin A but otherwise adequate, with carbohydrates furnishing the bulk of the caloric requirements, it was observed that when one quart of skim milk/man/day replaced in the diet its calorič equiva-

\textsuperscript{1}These studies were aided by a contract between the Office of Naval Research, Department of the Navy, and Louisiana State University (NR 111-297).
lent in starch, the average level of vitamin A in the blood increased about 18 per cent. The results of the present experiment indicate that the combination of systematic exercise and a diet rich in high-quality protein rapidly increases the amount of vitamin A in the blood.

The average level of carotene in fasting blood decreased from about 100 to 75 micrograms/100 ml. serum during the first six days in October, and again in December, when the men received the basal diet practically free of vitamin A and carotene. During the next four days when the basal diet was supplemented with sweet potatoes, the average blood carotene level in October decreased further to about 70 micrograms/100 ml. serum; the corresponding decrease in December was even more pronounced. Pending further investigation, this continued decline in blood carotene values is tentatively attributed to effects of systematic exercise and the basal diet in speeding up the rate at which the body converts carotene to vitamin A.

The statistical evaluation of all the data has not been completed but the results so far seem to warrant the following generalizations.

The level of vitamin A in human blood is a sensitive dynamic vector quantity which may change rapidly in response to different influences such as physical activity after a period of rest, or vice versa. Changes in habits of physical activity may affect the amount of vitamin A in the blood. A substantial increase in the proportion of high-quality protein in the diet increased the level of vitamin A in fasting blood about 38 per cent within four days. After a five-week period of systematic exercise, the average amount of vitamin A in fasting blood had increased about 10 per cent; this increase is significant at the 1 per cent probability level. Twenty or thirty minutes of unaccustomed strenuous physical activity temporarily increased the blood vitamin A level 40 per cent, or more, while longer periods of light physical activity temporarily decreased the blood vitamin A level. The effect of rest or sleep is opposite to that of physical activity. When a period of at least six hours had elapsed between the ingestion of carotene (sweet potatoes) and the performance of the exercises, the physical activity caused an increase in the blood carotene value; usually the magnitude of this increase was much less than that observed for vitamin A.

The blood vitamin A level commonly fluctuates daily over a wide range. When the physical condition of a man is good, this range is smaller than it is when his condition is poor. As the human body becomes accustomed to performing a given set of exercises, as exemplified by the five-week period of conditioning, two opposing tendencies seem to influence the level of vitamin A in the blood: The accumulative effect of training tends to increase the amount of
vitamin A in fasting blood, while the magnitude of the temporary
elevation of blood vitamin A associated with a single performance
of the exercise gradually decreases.
Fluctuations in the blood carotene and vitamin A levels not
attributable to diet or exercise were occasionally observed during
the experiment.

—William H. James, Milton E. Bailey, Martha E.
Hollinger, A. C. Moreau and Ibrahim M. E. Gindi

COENZYME OF ASPARTIC ACID DEAMINASE

A large-scale hydrolysis of furfural was accomplished by the
batchwise autoclaving of furfural (2.5 per cent furfural in 2N
\( \text{H}_2\text{SO}_4 \) at 121° for 2 hours). In all, 384 liters of acid hydrolysate
were collected, neutralized, filtered; the filtrate was dried and
extracted with water and alcohol. The resultant material on acidi-
fication indicated that a mixture of formic and succinic acids were
the active components of the mixture. Attempts with known
samples of these two acids showed equivalent stimulation. At
present, work is being initiated to further elucidate the coenzyme
role by primary isolation of the enzyme.

—Virginia R. Williams and John F. Christman

MECHANISM OF ACTION OF B-VITAMINS

A routine examination of *Saccharomyces* species showed a
wide variance in their vitamin and mineral requirements. A
systematic disc method of analysis was devised to detect the abso-
lute vitamin requirements of 26 cultures of yeast.

—Neale S. Christman and John F. Christman

CHROMATOGRAPHY AND BIOLOGICAL STAINS

The chromatographic examination of Wright’s Stain (a pro-
duct of the alkaline reaction between methylene blue and eosin Y)
shows a component which is blue-purple in color which is a distinct
product of the reaction. This material, however, is light sensitive,
and does not fluoresce under ultra-violet light. The white light
decay products are not colored and do not fluoresce under ultra-
violet light.—John F. Christman and Milton E. Bailey

COMPARISON OF OBJECTIVE TESTS FOR QUALITY
OF FROZEN GULF SHRIMP

Last year this laboratory reported the results obtained from
a study of objective tests for quality of fresh Gulf shrimp which
were stored in ice for varying periods of time. During one of these

*Present address: Faculty of Agriculture, Cairo University, Giza, Egypt.*

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storage tests, shrimp which had been held for 24 hours, 6 and 12 days in ice were removed, washed in ice water and then placed in one-piece Marathon cartons, overwrapped with Tyton and heat sealed. They were then frozen in a plate freezer at -40°F. and after 24 hours were placed in 0°F. storage.

The results for all three samples showed no significant changes occurred in the values obtained for the tyrosine reactions, volatile acids or amino nitrogen determinations during 12 months of frozen storage. A small increase in the amount of trimethylamine nitrogen was observed for the 6-day- and 12-day-ice-storage samples after seven and four months of frozen storage, respectively. No change was obtained, however, for the 24-hour-ice-storage sample. It is concluded that none of the objective chemical tests studied are of value in indicating changes in quality of stored frozen shrimp. Bacterial plate counts are also of doubtful value. A very high count, however, would indicate that the shrimp were of poor quality at the time of packaging and freezing. The converse is not necessarily true, namely, that a low plate count indicates shrimp of high quality.

Of all the tests studied, the subjective organoleptic or taste panel test was the only one which revealed changes in quality during frozen storage. The 24-hour-ice-storage samples retained their sweet flavor during 7 months of frozen storage, while the 6-day-ice-storage samples had become tasteless after 3 months of frozen storage. The 12-day-ice-storage samples were tasteless the first 9 months of frozen storage and then developed a bitter taste on longer storage.

From these results it is evident that changes induced by bacteria or catalyzed by enzymes are proceeding too slowly at 0°F. (−18.8°C.) to be used to measure modification in quality. This also explains why foods retain their quality during relatively long periods of frozen storage.—E. A. Fieger and J. J. Friloux

**SEPARATION OF THE PROTEINS OF RICE**

Electrophoretic studies of the native protein fractions extracted from brown rice have indicated that the solubility fractions are not homogeneous. It has been impossible to separate the albumin fraction into more than one component. This protein is heterogeneous, however, since marked spreading is observed under the influence of an electrical field. The alkali-soluble protein oryzenin contains two discrete proteins. The globulin fraction also has been found to contain two proteins.—Russell T. McIntyre

**SINGLETARY PEA TOXICITY**

The crystalline toxic product previously reported has been shown to be a mixture of three closely related peptide-like materials.
These may be separated in a pure condition by use of a powdered cellulose column with butanol: water as developing agent. Correlation of degree of hydrolysis with toxicity has shown that complete hydrolysis is not necessary to destroy toxicity and that such loss coincides with removal of ammonia. Alkali is more effective than acid in this. Ammonia, glutamic acid and B-alanine have been identified as products of complete hydrolysis and there is evidence that a volatile acid is also produced. Both analytical data and dinitrophenyl tagging infer that these two amino acids are linked so as to leave their amino groups free.

—Harold P. Dupuy and Jordan G. Lee

**CHEMICAL PREVENTION OF BLACK SPOT (MELANOGENESIS) IN ICE-STORED SHRIMP**

The black bands and areas known as black spot which develop on shrimp a short time after they have been caught have been studied quite extensively in this laboratory. The biochemical basis for this blackening phenomenon is the auto-oxidation of certain substances which are formed from the breakdown of shrimp proteins. Under the conditions of ice storage, auto-oxidation cannot be completely prevented because of the presence of air, but a few chemicals are more readily oxidized by air and can be used to depress oxidation of the substances which lead to melanin formation by being preferentially oxidized themselves.

Three different experiments were undertaken to determine the ability of certain chemicals to prevent black spot formation in Gulf shrimp of the *Peneaus setiferus* species, and a fourth experiment was designed to determine the quantity of sulfite retained in shrimp that had been stored in 0.25 per cent sodium bisulfite ice for 5 days.

Shrimp dipped in 1 per cent sodium sulfite solutions and in 1 per cent “ascorbic-citric acid mixture 8-92” solutions are slightly protected from black spot formation for about 8 days. One-half per cent ascorbic acid solutions protect the shrimp from black spot formation for approximately 4 days. Shrimp treated with dilute “ascorbic-citric acid 8-92” and with ascorbic acid solutions maintain their natural colors and odors for approximately 9 days.

Shrimp packed in ice containing 0.25 per cent sodium bisulfite and those packed in ice containing 0.25 per cent sodium sulfite were protected almost perfectly from melanin formation for 14 days. These shrimp were completely odorless during the first 12 days of this storage period and maintained their natural colors. One-quarter per cent sodium chloride ice also protected the shrimp fairly well from black spot formation, but not as well as the sulfite ice.

Processing methods similar to those employed by commercial packing companies and by housewives failed to remove all of the
sulfite from shrimp which had been packed in 0.25 per cent sodium bisulfite ice for 5 days.—E. A. Fieger and Milton E. Bailey

A NEW TEST FOR HEATED MILK

The presence of raw milk in pasteurized milk is easily detected by the use of enzymatic tests (phosphatase, Schardinger, etc.). The presence of pasteurized or heated milk in raw milk is very difficult to ascertain. A method has been developed to ascertain the latter condition and is based upon the observed fact that even moderate heat treatment of milk results in a new equilibrium between monocalcium and dicalcium phosphate in the serum which can be measured from the stability of such serum to heat. The heat stability is measured in a constant temperature water bath at 70°C. by the time needed by the serum to give a precipitate, by the amount of such precipitate or by the turbidity of the supernatant liquid. A double test involving measurement of the above values before and after heating the sample permits more accurate results because it eliminates the effect of variations in heat stability of milks of different origin.—Socrates A. Kaloyereas

A SIMPLE TEST FOR RANCIDITY

Tests on a number of samples of oils indicate that a simple colorimetric test might be developed as a substitute for peroxide determination for rancidity in oil in cases where speedy operation is needed. The test is performed by mixing one ml. of oil with 3 ml. of a mixture of chloroform and acetic acid (2:3) and shaking it with a drop of saturated solution of KI. Two layers will be formed in the liquid of the tube. The color developed in both, top and bottom, layers although different from each other reflects closely the state of rancidity of the oil and can be used for its evaluation.

—Socrates A. Kaloyereas

EXPERIMENTS ON THE USE OF CARBON DIOXIDE FOR THE STORAGE OF ROUGH RICE

The use of carbon dioxide in concentrations high enough to control the growth of insects and microorganisms but not to totally suppress respiration proved very successful in the preservation of rough rice in closed containers at ordinary room temperatures despite the fact that its moisture content was around 22 per cent.

—Socrates A. Kaloyereas
Agricultural Economics

TRENDS IN THE LOUISIANA DAIRY INDUSTRY

Expanded fluid milk sales and increased competitive conditions have resulted in significant changes in the Louisiana dairy industry. Observed changes include: (1) increasing consumption of skimmed milk and skimmed milk products; (2) decreasing fluid cream sales; (3) trend toward larger dairy plants; and (4) expansion of marketing areas. External factors, such as increasing population, high level of employment and high consumer income, are conducive to a rise in the demand for milk and milk products.

The sale of bottled skim milk in the New Orleans Marketing Area was 38 times as great in 1952 as in 1949. Expanded use has also been made of non-fat milk solids in buttermilk, chocolate drinks and ice cream mix. Fluid cream sales in Class I were 12 per cent lower in 1952 than in 1949 whereas fluid milk sales increased 12 per cent during the same period. The decline in the sales of fluid cream and corresponding increase in sales of non-fat milk solids should be a guide post to dairy farmers in planning for future production. If the consumption of low-fat milk continues to increase and the expanding use of non-fat solids continues, it is probable that high-butterfat milk will command reduced premiums in the future.

A decline in the number of producer-distributors, coupled with an expanding production of milk, has resulted in an increase in the size of dairy plants in Louisiana. The increased size of dairy plant operations permits handlers to compete over wider areas for the sale of milk and milk products. The trend toward larger plants and wider distribution areas points to more competitive conditions which will require increased efficiency in production. Increasing population, high level of employment and consumer incomes provide for an optimistic outlook for expanding future markets for milk and dairy products.—William H. Alexander

FARM REAL ESTATE MARKET IN FRANKLIN PARISH

In connection with the farms purchased in 1952, 46 per cent of the buyers in Franklin Parish reported they acquired farm land to operate as a resident operator; 30 per cent to enlarge an adjoining owned farm; 18 per cent for investment and leasing to a tenant, and 6 per cent for non-resident operation.

The average price of farm real estate that changed ownership during 1953 in Franklin Parish was $83 per acre. The range in
prices paid varied from $40 to $163 per acre (Table 1). A decade earlier, the average sales price was $35, with a range from $31 to $107 per acre. The average price per acre of farm lands sold increased each year from 1943 through 1953. In many sections of Louisiana land prices did not increase during 1953, but in Franklin Parish the average sales price increased $8 per acre over 1952. A further increase in land prices is not anticipated during 1954, because of restrictions on cotton acreage and a tendency for the better quality farms and those in the vicinity of oil wells not to be for sale.

The highest point in activity in the real estate market in Franklin Parish during the past 15 years was in 1943, when there were 389 transfers as compared with only 130 conveyances in 1953 (Table 1). Although the price of farm real estate trended sharply upward during the last decade, the number of farms sold trended downward, which reflects the unwillingness of owners of family farms to sell. Ownership of productive land is a safeguard against devaluation of the monetary unit.

The percentage of farms sold and paid for without mortgage encumbrance varied from 18 to 44 per cent during the 15 years following 1938. In 1950, 44 per cent of the transfers were paid for in cash, the highest percentage of non-credit deals in any one of the

<table>
<thead>
<tr>
<th>Year</th>
<th>Average transfer price (Acre)</th>
<th>Units transferred</th>
<th>Method of finance at purchase</th>
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<tr>
<td></td>
<td>Low</td>
<td>High</td>
<td>Change from previous year</td>
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<td>1953</td>
<td>83</td>
<td>163</td>
<td>130</td>
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1Based on conveyance records. Sales showing family and unimproved land transfers were not included in calculating average price and range.
2Based on number units changing ownership.
3Mortgage credit greater than 100 per cent of the purchase price was found in a few cases largely to provide for land and building improvements.
last 15 years. In 1953, 38 per cent of the transfers were for cash. During the period 1939-1953, roughly one-half of the farms purchased were paid for partly from owned assets and partly from funds borrowed and secured by a real estate mortgage. The last column in Table 1 shows that 14 per cent of the farms transferred in 1953 were purchased with 100 per cent credit as compared with 27 per cent in 1942. The percentage of transfers acquired by means of credit for the full purchase price reflects a liberal credit policy in assisting farmers to acquire ownership control.

—Bueford M. Gile and Alvin C. Harper

COSTS AND RETURNS FOR FAMILY-TYPE CANE FARMS

The 1952 crop season was an average year for producers of sugar cane on family-type farms. For the 498 farms on which detailed information as to costs and returns was obtained, the labor income, or the amount of cash remaining to pay the farmer for his year's work and management after paying all farm expenses, averaged $487 per grower. In comparison, these producers made an average labor income of $921 per farm in the 1943-45 period, $599 in the 1946-48 period and $301 in the 1949-51 period.

The family-type sugar cane growers surveyed made an average cash return of 19 cents per hour worked in 1952. In addition, they had non-cash earnings in the form of farm perquisites which amounted to 35 cents per hour, making a total return of 54 cents per hour worked, when all cash and non-cash returns are included. The value of their own labor, measured in terms of what they could have earned had they worked for neighboring farmers or in nearby rural industries, was 57 cents per hour. Thus, they earned about as much by growing sugar cane as they could have earned had they worked elsewhere.

Major changes have occurred in the organization of and practices on family-type sugar cane farms in Louisiana in recent years as indicated by this long-time study, which has been conducted annually since 1938. The typical family-type unit in the prewar period was a four-mule farm; less than one-fourth of the producers had tractors, one-third had farm trucks and about two-thirds had a family automobile, which was used for both farm and personal use. By 1952, the typical farm, still producing about 40 acres of sugar cane, was a one-tractor, two-mule farm and one-fourth of these growers employed mechanical sugar cane harvesters, on a custom basis, to harvest the crop. During this period the man labor required to produce an acre of sugar cane declined from an average of 215 hours to about 150 hours. The shift from mule to tractor power has been the most important change during the 1948 to 1952 period, and the recent trend towards mechanical harvesting even on family-type farms indicates that an
almost complete change towards machine harvesting is to be expected in the near future.

In terms of total and net costs per ton produced, the mechanization of family-type sugar cane farms has not been accompanied by an absolute decrease in costs of production; total costs were less than $5 per ton during the prewar period and averaged about $8 per ton in the 1950-52 period. In general, the mechanization process served to replace a part of the man labor expenses with machinery expenses since sufficient man labor was not available to produce the crop by the old methods. In 1938, the hired labor wage rate was less than $1.50 per day; in 1952, the producers studied paid an average of $5.08 per day for all labor hired. In 1938, total tractor costs averaged $0.56 per hour of use; in 1952, this rate had increased to $0.92 per hour. In 1938, the producers surveyed operated farm automobiles at an average cost of 4 cents per mile; in 1952, this cost averaged about 10 cents per mile.—J. N. Jefferson

ECONOMIC GAINS FOR LOUISIANA FARMERS

Farmers had a gross income of $160,998,000 in 1939, as compared with $495,640,000 in 1952. This represents an increase of $334,642,000, or more than 200 per cent since the beginning of World War II (Table 1.) Cash receipts from farm marketings and government payments amounted to $130,749,000 in 1939 as compared with $446,678,000 in 1952, an increase of $315,929,000, or 242 per cent. If cash receipts from farm marketings are converted to the value of 1935-39 dollars from the standpoint of farmers' purchasing power, the income of 1939 was $133,417,000 as compared with $195,056,000 in 1952, an increase of 46 per cent in purchasing power.

Table 1. Income and Purchasing Power from Agricultural Production, Louisiana, 1939-52

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Income</th>
<th>Cash receipts from farm marketings &amp; government payments</th>
<th>Value of home consumption</th>
<th>Cash receipts adjusted to 1935-39 dollar</th>
<th>Index of prices paid by farmers (1935-39 = 100)</th>
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<tbody>
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<td>Thousand dollars</td>
<td>Per cent</td>
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<tr>
<td>1939</td>
<td>$160,998</td>
<td>$130,749</td>
<td>$21,184</td>
<td>$30,249</td>
<td>$133,417</td>
</tr>
<tr>
<td>1940</td>
<td>142,200</td>
<td>115,012</td>
<td>21,902</td>
<td>27,188</td>
<td>116,174</td>
</tr>
<tr>
<td>1941</td>
<td>164,553</td>
<td>134,186</td>
<td>16,799</td>
<td>30,367</td>
<td>127,796</td>
</tr>
<tr>
<td>1942</td>
<td>229,831</td>
<td>194,292</td>
<td>9,756</td>
<td>35,539</td>
<td>160,572</td>
</tr>
<tr>
<td>1943</td>
<td>304,434</td>
<td>258,873</td>
<td>17,400</td>
<td>45,561</td>
<td>190,348</td>
</tr>
<tr>
<td>1944</td>
<td>298,591</td>
<td>254,625</td>
<td>17,020</td>
<td>43,966</td>
<td>175,603</td>
</tr>
<tr>
<td>1945</td>
<td>320,862</td>
<td>271,022</td>
<td>12,796</td>
<td>49,840</td>
<td>179,485</td>
</tr>
<tr>
<td>1946</td>
<td>325,351</td>
<td>267,252</td>
<td>11,795</td>
<td>58,099</td>
<td>161,971</td>
</tr>
<tr>
<td>1947</td>
<td>411,406</td>
<td>344,476</td>
<td>9,079</td>
<td>66,930</td>
<td>179,415</td>
</tr>
<tr>
<td>1948</td>
<td>427,146</td>
<td>363,060</td>
<td>8,558</td>
<td>64,086</td>
<td>175,391</td>
</tr>
<tr>
<td>1949</td>
<td>400,479</td>
<td>344,895</td>
<td>9,093</td>
<td>55,584</td>
<td>172,448</td>
</tr>
<tr>
<td>1950</td>
<td>382,483</td>
<td>334,941</td>
<td>11,487</td>
<td>47,542</td>
<td>164,187</td>
</tr>
<tr>
<td>1951</td>
<td>446,501</td>
<td>393,944</td>
<td>11,584</td>
<td>52,557</td>
<td>175,086</td>
</tr>
<tr>
<td>1952</td>
<td>495,640</td>
<td>446,678</td>
<td>9,543</td>
<td>48,962</td>
<td>195,056</td>
</tr>
</tbody>
</table>
The greater income of 1952 was produced on about 26,000 fewer farms than in 1940. The reduction in farms is largely in cropper units. Another indication of progress in agriculture is the fact that Louisiana farmers utilized 4,295,550 acres of harvested cropland in producing crops for market in 1939 as compared with 3,327,850 acres in 1952. The reduced harvested cropland acreage has gone into pasture for the expanding livestock industry.

An important factor in the improvement in farmers' economic situation was the increases in prices for agricultural products from 1939 to 1952. The composite index of prices per unit of agricultural products received by Louisiana farmers was 95 (1935-39=100) in 1939 as compared with 291 in 1952. This represents an increase of 196 points, or 206 per cent, from 1939 to 1952 in the average prices farmers received per unit of their agricultural products. Farmers have been confronted with declining prices for their products for the last two years. The monthly indexes of prices received by Louisiana farmers (August 1935-July 1939=100) during 1953 were as follows:

<table>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>317</td>
<td>316</td>
<td>319</td>
<td>315</td>
<td>314</td>
<td>304</td>
<td>300</td>
<td>284</td>
<td>277</td>
<td>283</td>
<td>284</td>
<td>283</td>
</tr>
</tbody>
</table>

Prices declined 34 points, or slightly more than 10 per cent, from January 1953 to December 1953. (For further information, see Louisiana Experiment Station Bulletin No. 480.)

—J. P. Montgomery

### LIVESTOCK MARKETS

Since 1930 the cattle population in Louisiana has more than doubled, a rate of increase exceeded in only one other state, Florida. This rapid growth of the livestock industry has been accompanied by an increase in the number of markets available to producers. In addition to the long-established terminal market and packing facilities in New Orleans, there are packing plants and improved slaughter houses in most of the major towns of the state. Truck transportation has brought the terminal markets at Fort Worth, Memphis and other cities within reach of many Louisiana producers. By far the most important local outlets are the 42 auction markets located throughout the state. This diversity of selling points assures producers a year-round outlet and contributes materially to competitiveness in the market generally.

Although more than 600,000 cattle and half as many hogs were sold through Louisiana auctions in 1953, the volume of sales at some auctions is not large enough to attract outside buyers. In fact, one-third of the auctions handled two-thirds of the cattle and calves sold. However, the over-all situation is not as unfavorable as in most other states. For example, Louisiana has 43,000
cattle and calves on farms per auction, which exceeds any other southern state except Texas. In comparison South Carolina has only 13,000 on farms per auction and Georgia only 15,000.

—H. J. Casso and M. D. Woodin

**CLASSES AND GRADES OF CATTLE SOLD AT AUCTION**

The Louisiana Experiment Station is cooperating with six other southern states in studying the quality and price differentials of slaughter cattle and calves sold at auctions throughout the South. A total 3,494 cattle and calves were graded at representative Louisiana auctions during the fall of 1953, and a similar number will be studied in the spring of 1954. About 58 per cent of the animals graded were calves, 21 per cent cows, 14 per cent steers and 7 per cent heifers.

The average grade of all cattle and calves, based on U. S. standards, was Utility, a relatively low level of quality. Only 12 per cent graded Good or better, 60 per cent were Commercial and Utility and 28 per cent were below Utility. Only one of every 900 head graded Prime, and one of every 140 graded Choice; but one of every 9 graded Good.

Although calves averaged Commercial grade, actually only 36 per cent were of this quality. About 43 per cent fell in Utility grade. The fact that 15 per cent averaged Good or better and only 7 per cent were below Utility pulled the average up to Commercial. As a whole, the fall cattle run was below the quality expected to be found in Louisiana. No doubt the drought during the summer and fall of 1953 caused the quality of calves to be lowered.

The average weight of cattle and calves marketed, 452 pounds, also was relatively low. Calves averaged 315 pounds, steers and heifers 560 pounds and cows 728 pounds. Local and national packers bought about 60 per cent of all cattle and calves, while local butchers accounted for about 16 per cent and farmers only 4 per cent.


—H. J. Casso and M. D. Woodin

**THE MARKET EGG ENTERPRISE IN LOUISIANA**

A study of 55 market egg producers during the 1952-53 season showed that the production and sale of market eggs was more on an “individual” basis as compared with broiler and hatching egg flocks that have been developed along “group” or community lines.
All-pullet flocks were maintained by 40 per cent of the producers, with pullet replacement coming mostly from East Texas. The practice of starting two replacement flocks during the year, which is to insure a year-round egg supply, was gradually being adopted. Since family labor was most commonly employed, the average cash cost per pullet raised was only $2. Recommended production and marketing practices were widely used. While producers selling through “groups” received 7 cents less per dozen than those selling “individually,” the latter had a 4-cent marketing charge, leaving them only a 3-cent net advantage per dozen.

About 80 per cent of the eggs were sold direct to retail stores and consumers and 20 per cent to egg dealers and creameries. The average rate of lay per Leghorn pullet over a 10-month period was 176 eggs, or a 58 per cent rate of lay, with feed consumption averaging 8.4 pounds per month during the laying period. During a 7-month laying period from June to December, Leghorn pullets laid 112 eggs, New Hampshire egg-strain pullets 104 and Leghorn hens 93 eggs. Over the entire laying period, the New Hampshire pullets laid 159 eggs, or 17 eggs less than the Leghorn pullets. The average cost of producing a dozen eggs in Louisiana was 45 cents, excluding family labor charges. The gross receipts were 55 cents, or 10 cents net, per dozen, which gave a return of 73 cents per hour of labor.—Ewell P. Roy and James M. Baker

CROP IRRIGATION IN LOUISIANA

There are indications that the practice of irrigating crops and pastures is expanding rapidly in Louisiana. The United States Census of Agriculture lists a total of 1,763 farms and 13,603 acres in Louisiana that received some irrigation in 1950 not including rice farms where irrigation is an established practice. Preliminary and partial data from county agents in 1953 showed a total of 21,500 acres irrigated on 292 farms, mostly in the northern parishes. These incomplete data reflect an increase in irrigated acreage of almost 60 per cent in a three-year period. Of the 292 farms for which data were obtained 228, or approximately 78 per cent, had been irrigated for three years or less. Irrigated crops included cotton, corn, sugar cane, pastures, potatoes, orchards and truck crops.

Sufficient data are not available with which to evaluate the economics of irrigating the various farm crop enterprises in Louisiana. A research project has been approved to gather and analyze data with regard to the various economic problems associated with irrigation in Louisiana. The project will be concerned with costs, returns, weather and other problems which are of interest to farmers in making decisions about irrigation.

—Fred H. Wiegmann and Bill Bolton
FARM MANAGEMENT IN SOUTHERN TANGIPAHOA PARISH

Data for a farm management study were collected from 44 farms in the vicinity of Ponchatoula for the 1951-52 crop year. Most of the farms in the area are organized around the production of strawberries and the typical farm is relatively small. On the farms studied, there was an average of 24 acres of total land, 8 acres of cropland and 4 acres in cash crops. Net farm income averaged $2,220, labor income was $1,769 and labor earnings, which included the value of rent and food produced on the farm, was $2,519.

The farms were analyzed on the basis of the four major factors affecting profits or success in farming: size of business, production efficiency (yields), labor efficiency and diversity of business. There was a positive and direct relationship between each factor and farm returns, indicating that improvements could be made in these factors on a high proportion of the farms. Farms that were above average in all four factors had a labor income of $3,947; those that were below average in all four factors had an average labor income of $630.

Size of business appeared to be the most limiting factor to larger incomes. On a farm as small as some of those encountered in this study, it is difficult, if not impossible, to put in enough days of productive labor to yield a reasonable level of income; and it is hard to achieve the diversity needed to provide labor efficiency and protection against the risk of total loss that accompanies the use of a single enterprise. On many of the farms studied, effective size could have been obtained by adding another cash enterprise to land that was available.

In order to obtain an above average income in the area, the following minimum requirements are necessary with regard to the four major success factors: (1) a size of business that permits at least five acres of cash crops; (2) yields of at least 15 crates of strawberries per 1,000 plants, 200 bushels of peppers per acre and 150 bushels of cucumbers per acre; (3) at least 175-200 days of productive labor performed per man per year; and (4) less than 70 per cent of income from a single enterprise.

—Bill Bolton and Clay G. Barry

COST OF PRODUCING FEEDER PIGS IN NORTH LOUISIANA

Records on the cost of producing pigs suitable for use as feeders for hogging-off corn and soybeans were kept by 13 farmers in North Louisiana during the last half of 1951 and the first half of 1952. Average costs per farm and per feeder produced are presented in Table 1. There were approximately 10 brood sows kept per farm and 121 pigs per farm raised to feeding age during the course of the year.
TABLE 1. Average Cost of Producing Feeder Pigs on 13 Farms in the North Louisiana Cotton Areas

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost per farm</th>
<th>Cost per pig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest on investment in the breeding herd</td>
<td>$ 42.44</td>
<td>$.35</td>
</tr>
<tr>
<td>Home-grown feed</td>
<td>565.09</td>
<td>4.66</td>
</tr>
<tr>
<td>Purchased feed</td>
<td>450.68</td>
<td>3.72</td>
</tr>
<tr>
<td>Labor</td>
<td>353.08</td>
<td>2.91</td>
</tr>
<tr>
<td>Veterinary, medicine, etc.</td>
<td>114.79</td>
<td>.95</td>
</tr>
<tr>
<td>Purchases</td>
<td>104.23</td>
<td>.86</td>
</tr>
<tr>
<td>Interest and depreciation on buildings and equipment</td>
<td>104.63</td>
<td>.86</td>
</tr>
<tr>
<td>Pasture cost</td>
<td>67.31</td>
<td>.56</td>
</tr>
<tr>
<td>Fence cost</td>
<td>14.44</td>
<td>.12</td>
</tr>
<tr>
<td>Miscellaneous cost</td>
<td>32.08</td>
<td>.26</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$1,848.77</strong></td>
<td><strong>$ 15.25</strong></td>
</tr>
<tr>
<td>Income from sale of breeding stock and increase in herd value</td>
<td>236.69</td>
<td>1.95</td>
</tr>
<tr>
<td><strong>Net Expense</strong></td>
<td><strong>$1,612.08</strong></td>
<td><strong>$ 13.30</strong></td>
</tr>
</tbody>
</table>

The average price for feeder pigs for the two-year period 1951-52 was about $18.00 per hundred. Based on weights of 85 pounds per pig, the average feeder produced on the farms studied, which cost $13.30, could have been sold for about $15.30. While this two-dollar margin per pig would not appear to justify a feeder pig enterprise as a cash farm enterprise unless it was conducted on a much larger scale, it is likely that maintaining a few sows to provide one's own feeder pigs would be a profitable practice on farms where corn and soybeans are hogged off. Most of the farmers reported that there were important advantages to producing instead of buying pigs. These included the certainty of having pigs of the quality desired and a reduction of risk from disease and death loss.

It should be noted also that $13.30 is an average figure and that there were wide differences in costs on the farms studied. Three farms had costs of less than $10 while two had costs of more than $20 per pig. The most important factors affecting costs were the size of the enterprise and production efficiency. Between 10 and 20 brood sows appeared to constitute the most efficient operation from the standpoint of size. From the standpoint of production efficiency four farms weaning less than 6 pigs per litter had costs of $20.50 per pig, five farms weaning 6-8 pigs per litter had costs of $14.38 per pig and four farms weaning more than 8 pigs per litter had production costs of $9.82 per pig.—Bill Bolton

COTTON MARKETING

1. Cotton Classing and Market News

The Department of Agricultural Economics in the Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration of the United States Department
of Agriculture in providing free cotton classing and market news services for cotton producers in Louisiana. These services are provided under the Smith-Doxey Act passed by Congress in 1937. The service has increased the effectiveness of farmers in bargaining with cotton buyers and has encouraged the production of improved varieties.

To be eligible for services under the Smith-Doxey Act, farmers must belong to a cotton improvement organization. There were 39 cotton improvement groups in Louisiana during 1953 with a total membership of 28,513 farmers. These members planted 780,378 acres of cotton of which 711,072 acres were of the same variety. The total acreage of cotton harvested in Louisiana was 935,000.

The proportion of the total cotton crop submitted for classification under the Smith-Doxey program during 1953 represented a sharp increase over 1952. Through January 15, 1954, approximately 555,800 samples of cotton had been classed for Louisiana producers, representing approximately 68 per cent of the ginnings in the state for 1953, compared to 43 per cent of the ginnings submitted for classification from the 1952 crop. Since classification of cotton received under the Smith-Doxey Act is accepted by the Commodity Credit Corporation as evidence of the grade and staple length of cotton for loan purposes, the increase in 1953 may be attributed partly to the close proximity of the loan value to the market price of cotton during the season.

—James F. Hudson and George Joubert, Jr.

2. Cotton Quality Statistics

Cotton ginnings in Louisiana prior to December 1, 1953, averaged lower in grade and slightly longer in staple than a year ago. The proportion of ginnings reduced in grade because of rough preparation was less than in 1952 and amounted to only 1.5 per cent. The lower average grade in 1953 was due to an increase in the proportion of Strict Low Middling and Low Middling grades, 31.4 and 12.1 per cent, respectively, as compared with 20.8 and 2.3 per cent in 1952. There was a corresponding decrease in the proportion of Middling and Strict Middling grades, 38.3 and 15.4 per cent, respectively, as compared with 49.0 and 22.6 per cent in 1952.

The average staple length reported prior to December 1, 1953, was 33.8 thirty-seconds of an inch compared with 33.7 in 1952. The proportion of the crop one inch or less in staple increased from 3.8 in 1952 to 4.4 per cent in 1953; however, this was offset by an increase in the proportion 1-3/32 inches and longer. The proportion of the crop 1-3/32 inches and longer in staple increased from 7.2 per cent in 1952 to 10.5 per cent in 1953.

—James F. Hudson and George Joubert, Jr.
FARMERS' PRODUCE MARKETS

Of the seven farmers' produce markets that have operated in Louisiana in recent years, only the New Orleans French Market is still active. The discontinuance of farmers' markets has resulted largely from the trend away from direct selling to consumers and retailers by farmers and the decline in the number of market gardeners who produce a wide variety of products for sale in nearby consuming centers. Farmers have found it increasingly difficult to spend long hours selling their products in retail markets. Efforts to reactivate old markets or establish new ones should take into account these new developments. Studies in Louisiana and experience in other states suggest that farmers' markets must be combined with wholesalers' markets to form a produce center in order to be successful.

While the number of Louisiana farmers patronizing the French Market has declined, this market continues to provide an important outlet for locally-grown products. Until a modern market facility can be developed to serve both farmers and wholesalers, efforts should be continued to minimize the effects of traffic congestion and inadequate facilities.—M. D. Woodin

COMMERCIAL CANNING OF FRUITS AND VEGETABLES

Commercial canning plants provided a market for about two million bushels of sweet potatoes and large amounts of okra, green beans, and a variety of other products in the 1952-53 season. Sweet potatoes made up nearly three-fourths of the 2,391,000 cases of fruits and vegetables packed. Cannery output in 1952-53 exceeded the previous season by more than a third and established a new record.

Improvement in the quality of canned sweet potatoes and greater consumer acceptance have been favorable to an expansion of canning operations. While a third of the canned sweet potato output is packed in Louisiana, other states are increasing their production and local processors may face increased competition in the future.—M. D. Woodin

DEHYDRATING SWEET POTATOES FOR FEED

Since 1945 dehydration plants have provided an outlet for substantial quantities of sweet potatoes not wanted for shipping or canning. In the 1946-47 season nearly a million bushels were dehydrated by the 54 plants in operation. Since then both the number of plants and volume of output have declined. In 1952-53 there were 34 plants in the state, but only 10 operated and the output amounted to only 449 tons of feed from the 55,000 bushels of sweet potatoes processed.
The decline in dehydration has resulted from a number of causes. Many plants were established in areas where sweet potato production was not large enough to provide adequate volume of raw material for successful dehydrator operation. Research has shown clearly that a large volume of production is required for low-cost operation. For example, in 1952-53 plants producing more than 50 tons of feed operated at an average cost of $33 per ton, while those producing less than 50 tons averaged $115 per ton.

A few dehydrators located in areas of heavy sweet potato production probably will continue to operate successfully and perform a valuable service to the industry. They provide an outlet for cannery waste and unmarketable sweet potatoes, assist in weevil control and turn out a good quality livestock feed.

—M. D. Woodin

PRICING SURPLUS MILK IN THE NEW ORLEANS MARKETING AREA

Prior to 1949 dairy farmers in the New Orleans Marketing Area did not supply enough milk to meet Class I requirements during every month in the year. However, since 1949 they have delivered enough to supply fluid milk needs in all months, and the volume of surplus milk is increasing steadily. For illustration, only 5.2 million pounds, or 10 per cent of producer milk, were used in the surplus classes in 1946 as compared with 60.2 million pounds, or 23 per cent, in 1953.

The price paid to farmers in the New Orleans milkshed for milk in the surplus classes is based on the open market price for butter and non-fat milk solids. The inflexibility of support prices along with fixed “make” allowances for butterfat and solids-not-fat under the order, has resulted in rigid prices for butterfat and skim milk used in manufactured milk products. The high level of support prices on butter during 1953 coupled with a rigid “make” allowance under the order caused the value of butterfat in milk received from producers in the milkshed to be higher than butterfat purchased from sources other than regular producers. As a result of this situation, handlers did not accept full deliveries from all their regular producers. The chaotic conditions resulting from involuntary cutbacks of producer milk during the spring and summer of 1953 forced them to seek temporary facilities for separating milk in order that they might market the butterfat.

In studying the problems involved in pricing surplus milk on a competitive basis, two methods of analysis were used: (1) the cost of handling and processing milk and (2) the competitive prices paid by manufacturing milk plants in the area. Cost data were not available in the break-down necessary to determine a “make”
allowance that would be representative of costs and flexible enough to adjust prices paid producers so that they would be competitive with prices paid by manufacturing plants during all seasons of the year.

An analysis was made to determine the relationship of the surplus prices under the Order with the prices paid at six manufacturing milk plants in Central Mississippi. The analysis reflected that the prices paid by the six selected manufacturing plants in Central Mississippi were slightly below the Class II Order price, but slightly above the Class III price.

Milk purchased in Classes II and III in the New Orleans Marketing Area is utilized in the production of Creole cream cheese, ice cream, evaporated whole milk, plain condensed milk, sweetened condensed milk, roller-process powder and butter. The ungraded milk purchased by the six Mississippi plants is used in the manufacture of the same products, some of which are distributed in the New Orleans Marketing Area. Therefore, it seems essential to substitute a single surplus class, designated as Class II, which replaces the present Classes II and III. The price of this new Class II would be established at the simple average of the paying prices (F.O.B. plants) of the Mississippi plants for ungraded milk containing 4 per cent butterfat. (For further details, see Department of Agricultural Economics Mimeographed Circular No. 156.)—W. H. Alexander

CAPITAL AND CREDIT CONDITIONS ON LOUISIANA FARMS

1. Capital Requirements for Farming Increase

Capital requirements for farming have increased greatly. The dollar value of farm real estate in Louisiana as reported by the Census increased from $324,600,000 in 1925 to $870,600,000 in 1950. During the same period of time, the value of livestock on farms increased from 39.9 million to 147.8 million dollars and investment in farm machinery increased fivefold.

A large portion of the increased capital input required for an economical family farm unit has developed since World War II began. The substitution of machines for hand labor and of gas and oil power for animal power, a reduction in the purchasing power of the dollar, markedly higher land prices and a trend toward larger farms, have all contributed to the increased capital requirements in farming. While minimum capital requirements vary with the type of farming and family situations, an economic family farm unit in Louisiana requires a minimum investment of from $16,000 to $20,000 in real estate and $5,000 to $8,000 in operating capital at 1954 prices.
2. Financial Condition of Operating Farmers

The net worth of farmers as a whole is higher than at any previous time. The Census of 1950 found that 18.5 per cent of all farms in Louisiana were mortgaged as compared with 34.6 per cent in 1940. The debt on mortgaged farms in 1950 averaged 23.6 per cent of their reported value as compared with an encumbrance of 37.1 per cent in 1940. While the long-term and short-term operating capital outstanding debt has increased since 1950, most farmers in Louisiana enjoy a sound financial condition. At the end of the 1953 season, more than half of the farmers were completely out of debt.

The critical finance problem is found among an estimated 2 per cent of present farm owner operators who borrowed heavily to buy and equip farms and have outstanding mortgage and other debt in excess of 80 per cent of liquidation value of their assets. Prospective prices for farm products below war-time levels, combined with acreage controls, cast a shadow of financial trouble for the heavily indebted farmers.

—Bueford M. Gile and Alvin C. Harper
Agricultural Engineering

DRAINAGE AND CULTIVATION OF SUGAR CANE LAND

Research on drainage of sugar cane land is conducted jointly by the U.S. Dept. of Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering, and the Louisiana Agricultural Experiment Station.

Investigations have been under way for a number of years on the feasibility of grading sugar cane land to improve drainage. Test areas on which authentic information was available continued to show an increase in yields. The black land area, which is in its fourth year of cane (first stubble, second cycle cane), showed an increase of 5.26 field tons per acre, or 5.44 standard tons. The other areas were harvested at the close of grinding season and a considerable amount of cane was left in the field on both the graded and ungraded check areas.

Tests were run on the cost of maintaining graded land. The areas were out of cane this season. The work included loosening the earth to a depth of approximately 12 inches with a Caterpillar 6 tractor equipped with toolbar and sweeps, discing and dragging the area with a Caterpillar 4 tractor and 8-foot Rome offset disc harrow and smoothing the area with a tractor and 50-foot Eversman land leveler. The machine time is as follows: loosening, 0.37 hour per acre; discing and dragging, 0.54 hour per acre; and smoothing, 0.52 hour per acre—a total of 1.41 hours per acre. An angling arrangement was developed for the tool bar to gradually bring the implement from the ground without leaving a depression in the field.

Field trials were made on the grading of pastures and equipment utilization for doing the work. The fields were graded and flat sloped lateral ditches were installed 140 feet apart. The equipment time per acre for the grading work and the cutting of lateral ditches was 5.13 hours per acre. The ditches were cut with tractor and scraper at the rate of 364 feet per hour, and were approximately 1 foot deep with 15:1 side slopes.

The flat-planted sugar cane was first stubble 34-120 for the 1953 season. This land had been graded and the cuts crowned before the cane was planted. Because there was a good deal of trash in the field, a disc chopper was operated early in the season to chop up the trash and give a light off-barring to the row.

The first and second cultivations were carried out with a two-row chisel cultivator, using four chisels per row middle. In the
first cultivation the chisels were operated 12 to 14 inches deep, and in the second cultivation 5 to 7 inches deep. The third and fourth cultivations were with a three-row cultivator equipped with 10- and 16-inch sweeps operated 2 to 4 inches deep. The ridge cultivation was on graded land but received the same off-barring as the regular plantation practice. All plots received the same herbicidal sprays. The hoe labor on the flat plots was one hour per acre as compared to $11\frac{1}{2}$ hours per acre for the plantation. In the flat plots the quarter drains were plowed at the start of the season, with a small amount of shoveling, at a cost of about 50 cents per acre, with no further maintenance on the drains. The ridge cultivation required six plowings and shoveling at a cost of $2.16 per acre.

The flat-cultivated cane on black land yielded 4.71 standard tons per acre more than the ridge-cultivated on graded land. The flat cultivation on mixed land yielded 1.57 standard tons of cane per acre more than the ridge cultivation on graded land.

The overwintering of stubble on flat plots was just as good as on the ridge planted, harvesting with mechanical cutter was performed equally well on each type of planting, flat planted dried out quicker after rains, cultivation and drain costs were cheaper with flat cultivation and yields were higher for the flat-cultivated plots.—Harold T. Barr and Irwin L. Saveson

**COTTON MECHANIZATION**

The following changes were made in the tractor-mounted, small-plot spray machine developed in 1952 for applying herbicides in cotton:

1. Four 5-gallon cans were employed in place of the 10 smaller cans. This permitted loading enough materials in one can to spray all three replications.

2. A power take off mounted pump was used in place of the air compressor.

3. A 3-way valve installed in the boom line permitted scavenging of the boom, hose and pump, and discharged back into the can through the by-pass line.

A set of wheel fenders was developed for use with a Farmall "C" tractor in late season insecticide applications and defoliation tests. These fenders were supported by a parallel action linkage and could be raised and lowered by the hydraulic lift. Certain modifications would make them adaptable to other tractors also.

Spray shields were built for use in applying insecticides and defoliants to cotton having rank foliage. Finger-like rods welded to the rear of the shields permitted holding the cotton foliage away
from the spray nozzles to get full effect of their fan angle. These shields could be adapted and mounted on the rear of practically any farm tractor. More efficient and uniform coverage could be obtained with spray materials using this attachment.

Further studies with contact and residual types of post-emergence herbicides indicate that there is no significant difference in the control of weeds whether the nozzles are set to spray across the drill or backward to the direction of travel. Slightly greater injury to the cotton was experienced when spraying backward to the direction of motion. This is the reverse of the results obtained during the preceding season. Total costs of weed control are similar when using either method of spraying.

Recent studies indicated that cotton stalks and unopen bolls cannot be satisfactorily shredded by present machines so as to eliminate the harboring of insects. Machines with vertically rotated cylinders, rotating backward from the direction of motion on the ground, performed well on fairly small stalks. In tall, rank cotton, large stubbles up to 21 inches tall were left standing. Machines with horizontally rotated blades sheared the stalks off near the ground; however, long pieces of stalks were left lying on the ground. In all cases, a majority of the green bolls were left unharmed. There is a need for a stalk shredder that will cut the stalks...
off at or below the ground surface and shred all of the foliage small enough so that it will deteriorate early in the next growing season.

—Carl H. Thomas and Fenton L. Kenna

SELF FEEDING OF SILAGE

A portable self-feeding experimental silo was erected and tested this past season. The silo consists of vertical treated wooden slats held tightly together by wires. The vertical sections are each 4 feet high and the complete silo is 12 feet in diameter, 16 feet tall and will hold 40 tons of silage. The lower section has six self-feeding doors through which cows can feed on the silage. The silage has some tendency to bridge over the feeding doors for the first two or three days after cows start to feed from it and it requires from 15 to 20 minutes to loosen this material. However, after several days of feeding, this tendency lessens and requires very little tending, but it should be checked about once every other day. This self-feeding arrangement can handle up to 30 cows. The silage used in this test was sorghum.—Wiley D. Poole and H. D. Ellzey, Jr.*

CHEMICAL WEED CONTROL IN SWEET POTATOES

Tests were conducted for the third year on the use of chemicals for the control of grass and weeds in sweet potatoes. The chemicals were applied as a pre-planting spray in a band 16 inches wide on top of the row. The rows had been smoothed off by a roller prior to applying the spray. The plants were set by using both the hand stick method and a mechanical transplanter.

The chemicals used were Dinitro “Premerge,” 4 lbs. and 8 lbs./A; Chloro IPC, 6 lbs./A; CMU at ½ lb. and 1 lb./A; Du Pont “D” at ½ lb. and 1 lb./A; Du Pont “M” at ¾ lb. and 1½ lbs./A; and N-1 Naphthyl Phthalamic acid at 10 lbs./A. One chemical, Chloro IPC, was tested as a post-selective type at rates of 2 lbs. and 4 lbs./A, applied six days after planting. Results of the tests indicate that most contact sprays, when applied before planting, damage the plants when the hand stick method is used to set plants, but cause no damage when a transplanter is used. Plants set by a transplanter consistently outyielded those set by hand. Of the chemicals tested, only Dinitro at 4 lbs./A and N-1 Naphthyl Phthalamic acid at 10 lbs./A were satisfactory for use as a pre-planting spray where the plants were hand stuck. Chloro IPC, when applied as a post-planting spray at a rate of 2 lbs./A, gave good weed control with no damage to the plants.

—Wiley D. Poole and Teme P. Hernandez**

*Superintendent, Southeast Louisiana Dairy and Livestock Experiment Station.

**Department of Horticulture.
BUILDING MATERIALS FROM FARM RESIDUES

A recapitulation of work done and a correlation of results indicate that rice hulls and rice hull ash mixed with cement in the proper proportions produce a building material that meets all requirements for light building construction. However, this material is more costly than conventional cement lightweight aggregate building materials now available. Also, the mixing demands control that is not readily available to the farmer. It was decided in view of the above to investigate other possibilities of incorporating farm wastes into building materials.

Research is now being done on a modified adobe-type block that would prove satisfactory under Louisiana climatic conditions. Preliminary tests indicate that some of the Louisiana soils mixed with a filler such as rice hull ash and ground rice hulls will make a building material having sufficient strength for normal light building construction. Research is being directed to methods of stabilizing this building material so that its absorption of moisture will be controlled to a point where expansion and contraction will be within accepted limits and where its resistance to weathering is such as to make its use feasible.

To date, test results are not sufficient to warrant the publication of exact figures or of methods of preparation. However, indications are that a medium-strength, high-insulative value, economical and easy to prepare building material can be produced on the farm, using soil as the basic material and farm wastes as a filler.

—John H. Hough

ANHYDROUS AMMONIA EQUIPMENT

During the year a unit for testing anhydrous ammonia hoses was built and put into use in an effort to determine the safe life service to be obtained from different types of hoses. Tests of hoses that had been in use for two or more seasons in transferring anhydrous ammonia showed one-third to be good for further service and one-third to be doubtful; one-third failed below maximum working tank pressure. Of 23 new hoses tested, 20 met the state anhydrous ammonia requirements, and three failed below the minimum requirements.

Based on one year’s results, the application of anhydrous ammonia through sprinkler irrigation systems would seem to be a doubtful procedure, unless one is willing to sacrifice 20 per cent or more through evaporation. Additional tests are in progress on methods and equipment for handling anhydrous ammonia.

—Harold T. Barr
MECHANIZATION STUDIES OF SWEET POTATOES

Two new types of machines for removing sweet potato vines from the row prior to digging were built and tested. Both machines consisted of rotating bars with flails attached. Flexible chain flails and stiff steel flails were tested. One machine had the rotating axle with flails attached, operating parallel to the row, while the other machine had the rotating axle perpendicular to the row. The flail axle was rotated at a speed of 1200 RPM. Results of field trials indicate that the stiff flail did a better job of cleaning the vines from the row than the flexible chain flail. The machine with the rotating axle parallel to the row choked up with vines, while the one with the axle perpendicular to the row did not. The proper operating depth for this machine was found to be very critical; therefore, when it was suspended from the tractor hydraulic lift system it did not operate satisfactorily. It was necessary to provide some type of gauge wheels to hold the machine at the desired elevation with respect to the row.—Wiley D. Poole

DIELECTRIC TREATMENT OF ROUGH RICE

This project is a joint undertaking of the Louisiana Experiment Station and the USDA Agricultural Research Service. 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. Effects of the radio-frequency electric field upon insects and nematodes which may infest the rice are also being studied.

The major portion of the work to date has been devoted to the drying phase but both electrical characteristic and hygroscopic equilibrium studies are being conducted concurrently with the drying tests. The drying tests are designed to use laboratory data to choose optimum conditions for drying where radio-frequency energy is used as a source of heat. The electrical characteristic and hygroscopic equilibrium data are needed to make practical application of drying data for larger operations.

Results of the past season's work further emphasize that this source of heat can best be applied by using an intermittent system for drying. Too, it now appears that a five-minute heating interval with a 12- to 24-hour conditioning period between heating intervals will be near the optimum system for this intermittent drying operation. This system would require that the rice be in the drier for a total time of 15 to 30 minutes (not including conditioning periods) in the usual case. Limited tests of the effects of the radio-frequency field upon insects infesting rice indicate that the rice weevil can be killed with a treatment of only a few seconds duration.

—Finis T. Wratten

31
Animal Industry

PARASITISM IN BEEF CATTLE

Although this Department is not conducting experimental work in parasitology, it is fitting that a report be made on some observations of conditions in beef animals that have been encountered in the course of other experimental work. These conditions appear to be associated with parasitism. In view of many reports throughout the state, it is not unlikely that many cattlemen are faced with the same type of condition.

Starting in the winter of 1953, several head of cattle in the Experiment Station herd appeared to show symptoms of heavy parasite loads. These cattle exhibited rough hair coats, extreme emaciation and a severe, watery diarrhea. However, several examinations of feces failed to reveal large numbers of worm eggs. This failure to diagnose clinical parasitism, based upon the results of examination of feces for worm eggs, is apparently typical of the type of parasitism encountered. Post-mortem examinations of several head of cattle from the Experiment Station herd disclosed the presence of large numbers of small stomach worms, particularly Ostertagia ostertagi and Trichostrongylus axei, accompanied by a severe edema of the abomasum, small intestine and cecum. Workers in Georgia have reported the loss of many animals with the same case histories as the cattle in Louisiana.

Removing the affected animals from the pastures and putting them in a dry-lot on a high plane of nutrition was not effective in arresting the symptoms of this condition. Treatment with phenothiazine also was not effective. However, administration of a 2 per cent solution of copper sulphate following phenothiazine treatment has brought about extremely satisfying results. Several animals showing this chain of symptoms before treatment have recovered rapidly, with the diarrhea ceasing, hair coat becoming smooth, and weight being gained as rapidly as four pounds a day.

—R. A. Damon, Jr., and R. B. Lank

IMPROVEMENT OF BEEF CATTLE FOR THE SOUTHERN REGION

This investigation is being conducted in order to determine how much, if any, hybrid vigor can be expected to result from crossing different breeds of beef cattle. If hybrid vigor is manifested, methods will be tested to determine the most feasible sys-
tern for maintaining and utilizing this vigor in the production of beef cattle. A study will be made of the different types of cattle produced in this experiment in order to determine which type of breeding is most satisfactory under Gulf Coast conditions.

The first crop of calves from this project was produced in the spring of 1953. Six herds of 32 cows each, made up of 8 Angus, 8 Brahman, 8 Brahman-Angus and 8 Hereford cows, were bred to bulls of six different breeds. Bulls from the Angus, Brahman, Brahman-Angus, Charolaise, Hereford and Shorthorn breeds were used. This resulted in 24 different types of breeding in the calves. Very notable differences in fertility of bulls were encountered, with the number of live calves weaned in the six herds ranging from 10 to 25. Significant differences were found between the average weaning weights of the calves sired by the different breeds of bulls, the Charolaise and Hereford bulls producing the heaviest calves at weaning. However, no significant differences were found between the weaning weights of calves produced by the different breeds of cows. Analyses were made on the basis of weaning weights adjusted for age of dam and sex of calf. Tables 1 and 2 present the results of the first year of this experiment.

<table>
<thead>
<tr>
<th>TABLE 1. 6-Month Weights of Calves Sired by Bulls of Six Breeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed of Bull</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Angus</td>
</tr>
<tr>
<td>Brahman</td>
</tr>
<tr>
<td>Brahman-Angus</td>
</tr>
<tr>
<td>Charolaise</td>
</tr>
<tr>
<td>Hereford</td>
</tr>
<tr>
<td>Shorthorn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2. 6-Month Weights of Calves Produced by Cows of Four Breeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed of Cow</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Angus</td>
</tr>
<tr>
<td>Brahman</td>
</tr>
<tr>
<td>Brahman-Angus</td>
</tr>
<tr>
<td>Hereford</td>
</tr>
</tbody>
</table>

The heifer calves that have been produced in this experiment are being raised and will be retained for further breeding work. The steers that have been produced are being fattened on a combination of wheat and concentrate feeding. They will be slaughtered in the University's Meat Laboratory in the spring, at which time detailed carcass measurements will be taken.

PASTURE DEVELOPMENT AND MANAGEMENT
FOR BEEF CATTLE

The original plan of this project was to establish permanent pastures of Dallis grass and Bermuda grass in the spring of 1953 after surplus trees were removed and proper drainage established on 48 acres of alluvial land.

Removal of excess trees and completion of drainage were not completed until the fall of 1953. In September 1953, two 6-acre pastures were seeded to fescue at the rate of 10 pounds per acre, two 6-acre pastures were seeded to rye grass at the rate of 10 pounds per acre, two pastures were seeded to rescue grass at the rate of 10 pounds per acre, and two 6-acre pastures were seeded to wheat at the rate of two bushels per acre. On December 10, 1953, all lots were overseeded with 3 pounds of Louisiana white clover S-1 per acre. Application of ammonium nitrate was made in October.

Grazing on these plots was delayed by a drought until the first of January, when heifer calves were put on. Owing to the drainage system established, it has been possible to graze these pastures since calves were put on. Sufficient time has not elapsed to give any specific information with respect to the performance of the different grasses.

Pastures will be seeded to Dallis grass and Bermuda grass in March of 1954. Winter pastures will be seeded in the fall in an attempt to furnish as much grazing throughout the year as possible with a desirable balance of clover and grasses so as to keep bloat to a minimum.


COTTONSEED MEAL IN PRACTICAL RATIONS
FOR GROWING AND FATTENING SWINE

For several decades cottonseed meal has stimulated the interest for scientific research among hundreds of workers. Tests have been conducted either to determine the nutritive value of the meal or to study the toxic effects of free gossypol in the meal to monogastric animals. Theories have been expounded that gossypol is a highly reactive compound that either produces toxicity or creates a binding effect on essential amino acids and vitamins which renders them unavailable to the animal.

Modern processing techniques have improved the quality of cottonseed meals, and special treated meals can now be used at high levels without detrimental effects.

The purpose of this study was to evaluate the quality of protein in cottonseed meal, as affected by different methods of manu-
facture when fed singly and in combination with solvent extracted soybean oil meal.

The composition of the rations is shown in Table 1. Feed lot performances are shown in Table 2.

### TABLE 1. Composition of Rations (%)

<table>
<thead>
<tr>
<th>Lot</th>
<th>Ground Yellow Corn</th>
<th>Wheat Shorts</th>
<th>Meat and Bone Scraps</th>
<th>Dehyd. Alfalfa Meal</th>
<th>High Temp. Exp. CSM</th>
<th>Prepress Sol. CSM</th>
<th>Degossypolized CSM</th>
<th>Sol. Ext. SB Oil Meal</th>
<th>Aurofac</th>
<th>Carotene Mg/100 lbs.</th>
<th>Total Crude Protein</th>
<th>Calcium</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot I</td>
<td>62</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>14.5</td>
<td>14</td>
<td>12</td>
<td>0.5</td>
<td>0.5</td>
<td>404</td>
<td>16.13</td>
<td>0.430</td>
<td>0.638</td>
</tr>
<tr>
<td>Lot II</td>
<td>62.5</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>405</td>
<td>16.14</td>
<td>0.429</td>
<td>0.633</td>
</tr>
<tr>
<td>Lot III</td>
<td>64.5</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>409</td>
<td>16.19</td>
<td>0.428</td>
<td>0.604</td>
</tr>
<tr>
<td>Lot IV</td>
<td>64</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>408</td>
<td>16.37</td>
<td>0.439</td>
<td>0.549</td>
</tr>
<tr>
<td>Lot V</td>
<td>63.25</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>14</td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>407</td>
<td>16.19</td>
<td>0.434</td>
<td>0.591</td>
</tr>
<tr>
<td>Lot VI</td>
<td>63.25</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>407</td>
<td>16.24</td>
<td>0.434</td>
<td>0.591</td>
</tr>
<tr>
<td>Lot VII</td>
<td>64.25</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>409</td>
<td>16.29</td>
<td>0.591</td>
<td>0.576</td>
</tr>
</tbody>
</table>

### TABLE 2. Feed Lot Performance

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot I</td>
<td>8</td>
<td>169</td>
<td>67</td>
<td>1657</td>
<td>584</td>
<td>1073</td>
<td>207.1</td>
<td>73.0</td>
<td>134.1</td>
<td>533</td>
<td>2.01</td>
<td>3615</td>
<td>336.9</td>
<td>$13.13</td>
<td>6.8</td>
</tr>
<tr>
<td>Lot II</td>
<td>8</td>
<td>173</td>
<td>69</td>
<td>1685</td>
<td>577</td>
<td>1108</td>
<td>210.6</td>
<td>72.1</td>
<td>138.5</td>
<td>552</td>
<td>2.01</td>
<td>3872</td>
<td>349.5</td>
<td>$13.60</td>
<td>7.0</td>
</tr>
<tr>
<td>Lot III</td>
<td>8</td>
<td>175</td>
<td>70</td>
<td>1682</td>
<td>575</td>
<td>1107</td>
<td>210.3</td>
<td>71.9</td>
<td>138.4</td>
<td>557</td>
<td>1.99</td>
<td>3887.5</td>
<td>351.2</td>
<td>$13.60</td>
<td>7.0</td>
</tr>
<tr>
<td>Lot IV</td>
<td>8</td>
<td>174</td>
<td>66</td>
<td>1654</td>
<td>581</td>
<td>1073</td>
<td>204.5</td>
<td>72.6</td>
<td>134.2</td>
<td>527</td>
<td>2.04</td>
<td>3625.5</td>
<td>337.9</td>
<td>$13.14</td>
<td>6.9</td>
</tr>
<tr>
<td>Lot V</td>
<td>8</td>
<td>170</td>
<td>67</td>
<td>1636</td>
<td>581</td>
<td>1056</td>
<td>204.5</td>
<td>72.6</td>
<td>131.9</td>
<td>529</td>
<td>1.98</td>
<td>3627.5</td>
<td>343.8</td>
<td>$13.38</td>
<td>6.8</td>
</tr>
<tr>
<td>Lot VI</td>
<td>8</td>
<td>171</td>
<td>67</td>
<td>1633</td>
<td>574</td>
<td>1055</td>
<td>204.0</td>
<td>71.8</td>
<td>132.3</td>
<td>533</td>
<td>1.87</td>
<td>3704.5</td>
<td>349.8</td>
<td>$13.61</td>
<td>6.5</td>
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<tr>
<td>Lot VII</td>
<td>8</td>
<td>172</td>
<td>68</td>
<td>1645</td>
<td>575</td>
<td>1059</td>
<td>205.6</td>
<td>71.9</td>
<td>133.7</td>
<td>567</td>
<td>1.96</td>
<td>3743</td>
<td>349.8</td>
<td>$13.57</td>
<td>6.8</td>
</tr>
</tbody>
</table>

The average daily gains and efficiency of feed utilization were very satisfactory for all lots. There were no significant differences in average back fat thickness and yield of primal cuts among lots. According to the iodine numbers of the back fat, all carcasses possessed hard fat.

This study indicates that 100 per cent of our standard vegetable protein supplement can be replaced by low free-gossypol cottonseed meals with favorable results.—C. B. Singletary, A. B. Watts, R. M. Crown and R. A. Damon, Jr.

**DEVELOPMENT OF INBRED LINES OF SWINE**

The Duroc herd at the University of Louisiana has been developed over a period of several years into one of outstanding
quality. Several characteristics such as size of litter, rapidity of gain, body conformation and feed efficiency have been incorporated into the herd by careful selection and a limited amount of line breeding. However, the Duroc breed is classified as a lard type breed, and as such represents an undesirable type by our present standards. The present demands call for a bacon type or meat type hog as represented by the Yorkshire and Tamworth breeds. Nevertheless, within any breed there is a great deal of variation, and it has been observed that within the University Duroc herd there are many carcasses of a satisfactory meat type.

Instead of discarding our present lard type breeds which possess many desirable characteristics, these breeds must be converted to the production of meat or bacon type hogs. The study of the past history in swine production shows that the change in types of hogs has been effected quite rapidly. Mass selection appears to be an effective tool for dealing with this change in body conformation. In changing from a lard type to a bacon type hog it is important not to lose any of the valuable characteristics already incorporated in our breeds.

This investigation is planned to test the method of improving the carcass qualities of a herd of Duroc swine by the development of inbred lines—the better lines to be combined at a suitable time. The project has been started with the selection of several outstanding boars which have been bred to a limited number of sows and gilts. Several inbred lines have been started. In addition to the standard growth and feeding data, detailed carcass measurements will be collected from carcasses in each of the lines.

—R. A. Damon, Jr., C. B. Singletary and R. M. Crown

**COMPARISON OF FULL FEEDING VERSUS LIMITED FEEDING OF PIGS TO BE FINISHED BY HOGGING OFF CORN AND SOYBEANS**

From an economical standpoint, one of the most important decisions a swine producer must make concerns the method of feeding his pigs to market weight. Since concentrates have always been a limiting factor in fattening animals for market in Louisiana, feeding programs are now being centered around an abundance of forage production.

The objective of this investigation was to compare the effects of limited feeding with full feeding of weaned pigs while being maintained on clover pasture until placed on corn and soybeans for finishing to market weight.

The two trials involved 66 weanling pigs that were distributed equally on the basis of weight, sex and breed into two one-acre clover pastures. The limited-fed group received meat and bone
scraps at the rate of approximately one pound per head and a small amount of corn each day. The full-fed group received a balanced ration of corn and meat and bone scraps fed free choice. A mineral mixture was fed separately to both lots. A liberal amount of animal protein was fed to the restricted group for the purpose of promoting skeletal development.

The average data for the two trials are presented in Tables 1 and 2.

**TABLE 1. Summary of Results During 48-Day Holding Period on Clover Pasture**

<table>
<thead>
<tr>
<th></th>
<th>Lot 1 Limited Fed</th>
<th>Lot 2 Full Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Initial Wt. June 3 (lbs.)</td>
<td>60.5</td>
<td>59.8</td>
</tr>
<tr>
<td>Av. Wt. July 21 (lbs.)</td>
<td>87.3</td>
<td>123.7</td>
</tr>
<tr>
<td>Av. Daily Gain (lbs.)</td>
<td>0.56</td>
<td>1.35</td>
</tr>
<tr>
<td>Lbs. of Feed per Head per Day</td>
<td>1.45</td>
<td>4.10</td>
</tr>
<tr>
<td>Cost of Feed per Head</td>
<td>$3.10</td>
<td>$7.45</td>
</tr>
</tbody>
</table>

**TABLE 2. Summary of Results for Complete Trials**

<table>
<thead>
<tr>
<th></th>
<th>Lot 1 Limited Fed</th>
<th>Lot 2 Full Fed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av. Final Wt. (lbs.)</td>
<td>207.1</td>
<td>208.5</td>
</tr>
<tr>
<td>Av. Daily Gain (lbs.)</td>
<td>1.19</td>
<td>1.38</td>
</tr>
<tr>
<td>Av. No. of Days to Reach Market Wt.</td>
<td>124.7</td>
<td>111.4</td>
</tr>
<tr>
<td>Av. Dressing Percentage</td>
<td>79.3</td>
<td>79.4</td>
</tr>
<tr>
<td>Planimeter area of Lean in Rib Eye (sq. inches)</td>
<td>4.6589</td>
<td>4.1926</td>
</tr>
<tr>
<td>Av. Back Fat Thickness (inches)</td>
<td>1.8126</td>
<td>1.7959</td>
</tr>
<tr>
<td>Av. Carcass Grade</td>
<td>Choice No. 1</td>
<td>Choice No. 1</td>
</tr>
<tr>
<td>Selling Price per Pound</td>
<td>$0.239</td>
<td>$0.233</td>
</tr>
</tbody>
</table>

The cost of producing the pigs up to approximately 60 pounds before starting on the project was $10 per head. While being maintained on clover pasture the cost of feed for the limited-fed group was $4.35 less per head than for the full-fed group. When turned into the corn and soybeans the limited-fed pigs satisfactorily compensated for the lack of gain shown during the holding period on pasture.

The dressing percentage and back fat thickness between the lots were not statistically significant. The carcasses from both lots graded Choice No. 1.

Although it took the limited-fed pigs approximately two weeks longer to reach market weight, these trials indicated a substantial increase in profit by the method of limited feeding.


**A COMPARISON OF BLACKSTRAP MOLASSES AND AMMONIATED BLACKSTRAP MOLASSES (MOLATEIN) AS A FEED FOR BEEF CATTLE**

Ten and 20 per cent levels of blackstrap molasses and am-
moniated blackstrap molasses (molatein) were incorporated into growing-fattening beef cattle rations so that a comparison of their value as a cattle feed could be determined.

Forty head of Hereford steers, good grade, averaging 500 pounds in weight, were equally divided on the basis of weight and condition into four lots and fed the experimental rations, Table 1, for a period of 154 days.

The ammoniated blackstrap molasses had approximately the same chemical composition as the blackstrap molasses with the exception that it had been treated with anhydrous ammonia and contained a protein equivalent of 15 per cent.

The concentrates were hand-mixed at weekly intervals and fed twice daily. Grass hay, water and minerals were allowed free choice. Alyce clover hay was fed once a week to all lots at the rate of one pound per steer.

<table>
<thead>
<tr>
<th>TABLE 1. Composition of Rations</th>
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<tr>
<td>Lot</td>
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</tr>
<tr>
<td>Corn</td>
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<tr>
<td>Cottonseed meal</td>
</tr>
<tr>
<td>Blackstrap molasses</td>
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<tr>
<td>Ammoniated molasses</td>
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</table>

There were no significant differences in the average daily gains between the four lots for the duration of the experimental period. The average daily gains for the period were as follows: Lot 1—1.79 pounds, Lot 2—1.83 pounds, Lot 3—1.79 pounds, and Lot 4—1.79 pounds.

The cost of gains on the rations containing 20 per cent levels of blackstrap molasses and ammoniated blackstrap molasses was less than the cost of gains on the rations containing the 10 per cent levels.

The average slaughter grades of all lots were Low Choice. The average carcass grades of Lots 1 and 2 (the 10 per cent levels) were Choice and of Lots 3 and 4 (the 20 per cent levels), Low Choice.—P. B. Brown, R. A. Damon, Jr., and C. B. Singletary

REPLACEMENT VALUE OF MOLASSES AND UREA IN BEEF CATTLE RATIONS

The recent decline in beef cattle prices has caused the practical cattleman to seek new feeding methods which will enable him to winter his herd in a more economical manner.

The nutrient protein is the governing factor in the cost of livestock rations. The beef animal, being a ruminant, is capable
of utilizing non-protein-nitrogen substances and converting them into protein.

Blackstrap molasses alone is a good cattle feed, yet it is capable of absorbing and holding in solution urea, thereby increasing the protein equivalent in such a mixture to the extent that the desired protein equivalent of the beef cattle ration may be provided at a low cost.

A third feeding trial using blackstrap molasses and urea as a part of the experimental ration was conducted for 154 days. Four lots of eight steers each were used in the feeding trial.

The composition of the rations is shown in Table 1.

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<tr>
<td>Cottonseed meal</td>
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<td>Molasses</td>
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<td>Urea</td>
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<tr>
<td>Prairie hay*</td>
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<tr>
<td>Mineral Mixture</td>
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* Alyce clover hay fed once a week to all lots at the rate of one pound per steer.

The urea-molasses mixtures were blended by mixing 6 pounds of urea into 90 pounds of molasses in Lot 3 and 9 pounds of urea into 90 pounds of molasses in Lot 4.

The rations were formulated to contain approximately 15 per cent crude protein or protein equivalent. The urea supplied 34.6 and 48.7 per cent of the protein equivalent in Rations 3 and 4, respectively.

The urea-molasses mixtures and the dry concentrate mixtures were mixed at the time of feeding. The results indicated that Ration 2 containing 30 per cent molasses was equal pound for pound to Ration 1. The average daily gain of each lot was 1.77 pounds.

From the results obtained, it was found that the urea-molasses mixtures used in Lots 3 and 4 were equal in replacement value to 87 and 70 per cent, respectively, of the corn-cottonseed meal mixture used in Ration 1. The average daily gains of Lots 3 and 4 were 1.68 and 1.57 pounds. The urea replaced 50 and 75 per cent of cottonseed meal in the rations of Lots 3 and 4. The average cost of gains per cwt for the three lots fed molasses was $5.80 less than the gains obtained on the corn-cottonseed meal ration of Lot 1.

—P. B. Brown, R. A. Damon, Jr., C. B. Singletary and E. H. Vernon
FERTILIZERS FOR SUGAR CANE

In 1953 nine sugar cane fertilizer experiments were conducted. Five of these experiments were with plant cane and four were with stubble cane. Because of the heavy borer infestations, the wind damage from a tornado on November 21, and a May hailstorm, the yields at four locations were erratic and experimental errors were so high that statistical methods could not be applied.

Fertilizer Ratio Studies with Plant Cane

With plant cane on Baldwin silty clay loam at Shadyside Plantation, the application of an 80-0-0 treatment gave the highest yield of cane and a 40-40-60 treatment gave the highest yield of sugar. The 40-40-60 treatment yielded 4.40 tons more cane and 761 pounds more sugar than did the 40-0-0 treatment. A comparison of the yields of the different treatments indicates that the addition of phosphorus increased the yield while potassium did not.

On Jeanerette very fine sandy loam at Alice “B” Plantation, the 80-40-60 treatment in which the application of nitrogen was split gave the highest yield of plant cane. This yield was not significantly higher than the yields from the 80-0-0 split, 40-40-60 or 60-40-60 treatments. The 40-40-60 treatment gave a higher yield of cane than did 40 pounds of nitrogen alone. A soil additive, Soylaid, did not increase the yield of sugar cane.

Foliar Application of Nitrogen to Plant Cane

With plant cane at New Hope Plantation, an attempt was made to compare 40 and 80 pound levels of nitrogen applied in the off-bar furrow to 40 pounds of nitrogen applied in the off-bar furrow plus two NuGreen sprays of 20 pounds of nitrogen each. Forty pounds of nitrogen applied in the off-bar furrow proved to be more profitable than any other treatment.

The Effects of Additions of Magnesium to Stubble Cane

On Mhoon silty clay loam at Pecan Tree Plantation, an attempt was made to compare treatments containing dolomitic lime or Sul-Po-Mag versus the same treatments without magnesium. The application of magnesium to first year stubble did not increase the yield of sugar cane. There were no significant differences between treatments containing phosphorus, potassium and magnesium. The 150-0-0 treatment was more profitable than any other treatment; however, had lower levels of nitrogen been applied, perhaps more efficient responses to nitrogen might have been received.
At Katy Plantation on Baldwin silt loam, three sources of magnesium were applied to second stubble. In addition to dolomitic lime and Sul-Po-Mag, magnesium sulfate was used. The highest yield of cane was obtained from the 100-40-60 treatment where magnesium was applied as Sul-Po-Mag, and the highest yield of sugar was obtained from the 120-40-60 treatment without magnesium. These treatments were not significantly higher than 80 pounds of nitrogen alone.

**Fertilizer Recommendations**

On all plant cane, except where large crops of legumes have been turned under prior to planting cane, use at least 40 to 60 pounds of nitrogen. Where the green weight of legumes turned under ahead of planting cane is as much as 9 to 10 tons per acre, it is not necessary to fertilize the plant cane.

On stubble cane on the medium textured to heavy alluvial soils of the Mississippi or Red river bottoms, apply 80 to 100 pounds of nitrogen. Where known deficiencies of phosphorus and potassium exist, which is usually in the very fine sandy loam and silt loam types, 25 to 40 pounds of \( P_2O_5 \) and 40 to 60 pounds of \( K_2O \) should be applied in addition to nitrogen. In some cases the plant food may be supplied by the application of 500 pounds of 6-8-12 per acre supplemented with 50 to 70 pounds of nitrogen from either solid or liquid materials.

To stubble cane on the medium to light textured soils of the Pleistocene Mississippi terraces, apply 80 to 100 pounds of nitrogen, 25 to 40 pounds of \( P_2O_5 \) and 40 to 60 pounds of \( K_2O \).

Nitrogen may be supplied from any commonly available solid or liquid material. Where anhydrous ammonia is being used to supply nitrogen, minerals may be applied either before the ammonia or in the same operation from hoppers mounted on the sides of the tractor. The practice of splitting applications of nitrogen to stubble cane on medium textured soils where as much as 80 or more pounds of nitrogen is applied is proving profitable in some cases. Half of the nitrogen can be applied four inches deep in the middles at the last cultivation. Ammonia and other highly soluble carriers of nitrogen are especially adaptable to split applications.

Over a period of years the highest efficiency in extra production of sugar cane from fertilizer nitrogen has been one ton of cane for each increment of 6 pounds of nitrogen. Where phosphate and potash were needed for sugar cane, the addition of 40 pounds of \( P_2O_5 \) and 60 pounds of \( K_2O \) per acre increased the yield of cane 5 tons per acre above the use of 60 to 100 pounds of nitrogen alone.—D. S. Byrnside, Jr., and M. B. Sturgis
COTTON VARIETIES

Trials of commercial cotton varieties and new strains were conducted in 1953 on five Louisiana Experiment Station farms and one Southwestern Louisiana farm. These tests were located at Baton Rouge, St. Joseph, Bossier City, Homer, LeCompte and Arnaudville, Louisiana.

The leading varieties at Baton Rouge were Fox, Plains, Louisiana 33, Stoneville 5A-3202 and Coker 100WR; at St. Joseph the leading varieties were Louisiana 33 x 14, Delfos 9169, Stoneville 5A-3202, DES 7343, Bobshaw, Coker 100 WR 50-39 and Empire P-493; at Homer the varieties did not differ significantly.

Deltapine 15, for some unknown reason, made a poor showing in Louisiana Experiment Station tests in 1952 and 1953.

The new strains La. DS 524-9, La. DS 518-11, La. DS 518-12, La. DS 5243-1, La. DS 5241-3, La. DS 5248-14, La. DS 518-9, La. DS 5219-2, La. DS 517-39 and La. DS 5216-10 yielded an average of at least 100 pounds of lint per acre more than did the check variety Deltapine 15 at St. Joseph, Bossier City and LeCompte, Louisiana. The new strains La. DS 524-9, La. DS 518-9, La. DS 518-12, La. DS 5219-2 and La. DS 518-39 picked an average of 20 per cent more cotton on September 15, 1953, at St. Joseph and LeCompte than Deltapine 15. The La. DS new strains have been developed from a cross between Deltapine 14 and Stoneville 2B.

The cotton crop in Louisiana was planted a few weeks later in some regions, but climatic conditions were favorable during the remainder of the growing months and good yields were obtained in the state.—F. W. Self

GREENHOUSE STUDIES ON SYMBIOTIC NITROGEN FIXATION

Studies on symbiotic nitrogen fixation that were begun in 1952 were continued on four soils—Olivier silt loam, pH 5.2; Tabor sandy loam, pH 5.6; Bowie fine sandy loam, pH 5.9, and Sharkey clay, pH 6.4. Hairy vetch was grown on all the soils, and in addition, Melilotus indica was grown on the Sharkey clay. On the first three soils, the influence of artificial inoculation of the vetch seed, 600 pounds of 3-12-12 fertilizer per acre, and dolomitic limestone, on the yield, nitrogen content of the plants, nodulation and nitrogen fixation, was determined. The artificial inoculant was a fresh commercial culture of the legume bacteria. Where limestone was used the pH was raised to 6.2 or above. The only treatment used with the Sharkey soil was artificial inoculation of the vetch and M. indica seed. The plants were grown in six kilograms of each of the soils in earthenware jars. The quantity of nitrogen fixed was obtained by the difference in the nitrogen content of the soil at the

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beginning of the growing period and that of the soil and plant material at the end. The change in nitrogen is reported on the basis of dry soil.

The results show that, in general, much less nitrogen was fixed with vetch and *M. indica* than was fixed in previous studies using soybeans on some of these soils. On Olivier silt loam the maximum amount of nitrogen fixed by hairy vetch was 61 parts per million. This was obtained with the use of artificial inoculation of the seed and 3-12-12 fertilizer. The yield obtained with these two measures was about 65 per cent above that on the untreated soil. The rhizobia inoculating vetch were present in this Olivier soil, but they were only moderately effective in nodule formation and nitrogen fixation. Their efficiency was not appreciably influenced by soil fertilization and liming.

The only appreciable amounts of nitrogen fixation that occurred in the Tabor soil were obtained using artificial inoculation of the seed together with fertilizer or artificial inoculation with fertilizer and lime. Thirty-six parts per million and 39 p.p.m. of nitrogen were fixed in the two cases, respectively. These measures also gave the highest yields. Artificial inoculation alone caused a highly significant increase in the nitrogen content of the plants. The few native vetch rhizobia present in the Tabor soil were not stimulated by additions of fertilizer or lime.

On the Bowie fine sandy loam, significant increases in nitrogen fixation were obtained only with artificial inoculation of the vetch seed on fertilized soil and with the combination of artificial inoculation, fertilizer and lime. Fifty-four p.p.m. and 57 p.p.m. of nitrogen were fixed, respectively. Artificial inoculation caused a highly significant increase in the yield and nitrogen content of the plants.

Artificial inoculation of hairy vetch grown on Sharkey clay showed no effects. Only 15 p.p.m. of nitrogen were fixed although excellent nodulation was obtained.

Nodule formation was only very slight on *Melilotus indica* grown in Sharkey clay. Artificial inoculation of the seed showed no beneficial effects.

The relative degree of nodule formation was generally a good indication of the amounts of nitrogen fixed by the legume in all the soils except the Sharkey clay.—*Woody N. Miley and W. H. Willis*

**COMPOSTING FARM WASTES**

Experimental work has been started on the composting of gin trash and bagasse with the use of commercial cultures of compost microorganisms. Studies with approximately one-ton lots of these materials have shown that the nitrogen-carbon ratio of the gin trash changed from 1:36 to 1:22 during a six-week period
of composting. The original nitrogen content of the gin trash was 1.190 per cent and increased to 2.020 per cent during the six-week period. The nitrogen-carbon ratio of the original bagasse was 1:286 and narrowed to 1:146 in six weeks. The original nitrogen content of the bagasse was 0.156 per cent and after six weeks of decomposition, was 0.313 per cent. The gin trash decreased to approximately 65 per cent of its original volume. There was no measureable change in the volume of bagasse. Organic materials with a nitrogen-carbon ratio of about 1:25, when added to the soil, generally do not cause a temporary deficiency of available soil nitrogen.—W. H. Willis

EFFECTS OF DIFFERENT SOURCES OF PHOSPHORUS, MAGNESIUM AND LIMING MATERIALS ON THE GROWTH OF WHITE CLOVER ON BOWIE FINE SANDY LOAM

A greenhouse study was continued on the effects of different phosphates, magnesium and liming materials on the growth of white clover.

An acidic soil, Bowie fine sandy loam, low in available magnesium and other bases (25 p.p.m. Mg, 45 p.p.m. K, 150 p.p.m. Ca) and phosphorus, was used for this study. Oyster shell flour, dolomitic limestone and calcium silicate slag at the equivalent rate of 1,500 pounds per acre of calcium carbonate and a treatment receiving no lime were used with three sources of phosphorus with and without the addition of soluble magnesium in a factorial design. The sources of phosphorus were superphosphate, treble superphosphate and calcium metaphosphate. All treatments received the equivalent of 24 pounds of nitrogen as ammonium nitrate, 96 pounds of P₂O₅ and 96 pounds of K₂O per acre. Magnesium as Sul-Po-Mag, a commercial product analyzing approximately 22 per cent K₂O and 18 per cent MgO, at the rate of 32 pounds MgO per acre was used as the soluble source of magnesium. Approximately 20 pounds of air dry screened soil were added to three-gallon pots and the various treatments mixed with the soil. Four harvests were made of the clover.

The data indicate that, for the total period of growth, the yields from the treble superphosphate and calcium metaphosphate treatments with magnesium as Sul-Po-Mag were significantly better than those from the treble superphosphate and calcium metaphosphate without soluble magnesium. The yield from the superphosphate treatment with soluble magnesium was significantly better than the yield of the superphosphate treatments without soluble magnesium only when oyster shells were used as the source of lime.

The data also indicate that the addition of magnesium increased the absorption of phosphorus. The phosphorus absorbed
by the clover from the treble superphosphate and the calcium meta-phosphate treatments with soluble magnesium was higher than from these treatments without soluble magnesium. Apparently the sulphates in superphosphate increased the absorption of phosphorus indirectly by effecting an increase in the solubility of magnesium. There were no significant differences in the uptake of phosphorus between treatments with soluble magnesium and those without soluble magnesium when superphosphate was the source of phosphorus.—R. H. Brupbacher

**REACTIONS OF COTTON VARIETIES TO FUSARIUM WILT UNDER TWO DIFFERENT WILT-NEMATODE COMPLEXES**

Preliminary tests were conducted in 1953 to evaluate 49 strains and varieties of cotton for their reaction to Fusarium under two distinctly different wilt-nematode complexes. The two tests were located at Natchitoches and Baton Rouge. The soil at Natchitoches was heavily infested with Fusarium wilt and several species of parasitic nematodes of the genera *Meloidogyne, Pratylenchus, Trichodorous* and *Tylenchorhynchus*. The soil at Baton Rouge was heavily infested with Fusarium wilt and several species of parasitic nematodes of the genera *Rotylenchulus, Helicotylenchus, Pratylenchus* and *Hoplolaimus*.

Half & Half, which is highly susceptible to Fusarium wilt, had 79.5 per cent of the plants showing leaf symptoms of wilt at Baton Rouge and 87.7 per cent at Natchitoches. This indicates the extent of wilt in these soils. There were several distinct varietal reactions to wilt at the two locations. Certain varieties, such as Deltapine 15, Fox and Delfos 9169, were susceptible to wilt at both locations; however, they had a much higher percentage of wilt at Natchitoches than at Baton Rouge. A number of varieties, including Louisiana 33, were resistant to wilt at Baton Rouge but susceptible to wilt at Natchitoches. Several varieties, including Plains and Coker 100 W., were highly resistant to wilt at Baton Rouge but only moderately resistant at Natchitoches. There were three varieties, however, that showed good resistance at both locations. They were Auburn 56, Clewewilt No. 6, and Sikes 38-6. These three varieties also showed the highest degree of resistance to the root-knot nematodes. They would probably be of considerable value in a breeding program to combine resistance to wilt and root-knot nematodes along with other desirable agronomic characters.

Seven commercial varieties were included in this test. The average acre yields of lint obtained for these varieties at Natchi-toches were as follows: Auburn 56, 956; Plains, 951; Coker 100 W., 734; La. 33, 501; Fox, 251; Delfos 9169, 246; and Deltapine 15, 82. Although several years of testing are necessary to properly evaluate a variety for a particular location, these data suggest that wilt-
resistant varieties, such as Auburn 56, Plains and Coker 100 W., would be more profitable to grow on land that is heavily infested with wilt and root-knot nematodes than wilt-susceptible varieties such as Deltapine 15, Fox and Delfos 9169. The latter three varieties were essentially a failure on the wilt-nematode complex at Natchitoches.

—Jack E. Jones, L. D. Newsom, D. C. Neal and M. T. Henderson

OUTFIELD EXPERIMENTS ON COTTON AND CORN

Cotton

The experimental projects on cotton fertilization included experiments with fertilizer ratios, experiments on the sodium-potassium relationship in the growth of cotton, and studies of the effects of lime, sulphur and minor elements on the growth of cotton.

Results of a fertilizer ratio experiment on Miller very fine sandy loam at Cheneyville show there was a response of cotton from all levels of nitrogen applications. The highest yields were obtained from the 72-pound per acre level of nitrogen plus the application of 48 pounds of P₂O₅ and 72 pounds of K₂O. The highest yield obtained at this location was 3,198 pounds of seed cotton from the application of 600 pounds per acre of 12-8-12. This represents an increase of 1,153 pounds of seed cotton due to fertilizer.

Results of the sodium-potassium experiment on Olivier silt loam at Baton Rouge show the highest yields were obtained from the applications of complete mixtures containing nitrate of soda as the source of nitrogen. The highest yields were also obtained from higher rates of potash; however, sodium did partially substitute for potassium when potash was applied at the lower levels.

Studies on the value of nitrate of soda and the value of sodium in fertilization of cotton were conducted on upland soils that were acidic, low in available phosphorus, low in exchangeable potassium and sodium. Results of these studies show nitrate of soda gave higher yields than did ammonium nitrate when only nitrogen was applied. In treatments where nitrogen and potash but no phosphate were applied, nitrate of soda gave higher yields than did ammonium nitrate. Data obtained from these experiments show the highest yields resulted from the applications of complete fertilizers containing nitrate of soda and supplemented by 250 pounds per acre of dolomitic limestone. Results also give evidence that sodium influenced the use of soil phosphates.

The highest yield obtained from the experiment on the effects of fertilizers containing sodium and magnesium on the growth of cotton conducted on Ruston fine sand at Homer, was 1,658
pounds of seed cotton per acre. This yield resulted from the application of 600 pounds per acre of 8-8-8 with ammonium nitrate as the source of nitrogen plus 250 pounds of dolomitic lime per acre. The next highest yield was 1,645 of seed cotton from the application of 600 pounds of 8-8-8 with nitrate of soda as the source of nitrogen. There was a marked response to phosphate at this location.

Corn

Outfield experiments on corn were conducted with individual growers under ordinary farm conditions. The experiments were designed primarily to measure the influence of various amounts of nitrogen on the yield of corn when applied alone and in combination with phosphate and potash. The nitrogen was applied at the rates of 60, 90 and 120 pounds per acre. Phosphate and potash were applied at the rate of 30 pounds each per acre. The efficient utilization of nitrogen was reduced owing to very unfavorable seasonal conditions and poor stands in 1953. Results of the experiments show there was an increase in the yield of corn from each level of nitrogen applied. The highest yields were obtained at the high level of nitrogen when phosphate and potash were applied.

The highest yield obtained from the studies in 1953 was 80.6 bushels of corn from the application of 120 pounds of nitrogen plus 30 pounds of phosphate and 30 pounds of potash per acre on Portland silt clay loam at LeMoyen. The increase from fertilizer amounted to 61 bushels. Results of experiments conducted over a period of years show that when there is sufficient available phosphate and potash, approximately one bushel of corn is produced for each two-pound increment of fertilizer nitrogen applied.

—James Gregg Marshall

TESTS OF CORN HYBRIDS IN LOUISIANA

Tests of corn hybrids in the state in 1953 were conducted at seven locations. Information gained from these tests is utilized in determining the most desirable hybrids for the various sections of the state. The performance of hybrids at several locations for several years is observed through a continuous testing program in order to make valid recommendations. Corn hybrids may show a definitely restricted adaptability to varying soil and climatic conditions.

Recommended Hybrids

These recommendations are based on data obtained for the years 1951, 1952 and 1953. North Louisiana is considered to be that part of the state north of Alexandria while the area south of Alexandria is referred to as South Louisiana.
North Louisiana:
Dixie 11 (white)  Dixie 18 (yellow)
La. 468 (white)  *N.C. 27 (yellow)
Coker 811 (white) Dixie 22 (yellow)
Funk’s G-714 A (yellow)

South Louisiana:
La. 521 (white)
Dixie 18 (yellow)
Funk’s G737 (yellow)


**CORN HYBRID SEED STOCKS, 1953**

About 50 per cent of the 590,000 acres of corn grown in Louisiana in 1953 was planted to hybrid seed. The percentage of hybrid corn seed used in the state has shown a steady increase since 1943, when only 2 per cent of the total acreage was in hybrids. In general, the per acre yields have climbed along with the increased use of hybrid seed. The average yield has increased from 16 bushels per acre in 1943 to 22 bushels per acre in 1953.

The eight members of the Louisiana Hybrid Seed Corn Growers Association, Inc., produced in 1953 approximately 15,500 bushels of hybrid seed corn. This production consisted of Dixie 18, Dixie 11, La. 521 and La. 468 and was sufficient to take care of only one-third of the state's needs. Members of the Louisiana Hybrid Seed Corn Growers Association, Inc., are receiving assistance from the Louisiana Experiment Station in the work which involves the maintenance of inbred lines and production of seed of single crosses.

Increase of inbred lines was limited to 8.5 acres in 1953. Extremely adverse weather conditions resulted in very low yields. Only 425 pounds of inbred seed were produced.

In 1953 approximately 24 acres were planted to lines for the production of five single crosses to be used in the production of commercial hybrids. A total of 4,700 pounds of single-cross seed were produced.—Lee Mason

**CHEMICAL CHARACTERISTICS OF CERTAIN PROFILES OF ALLUVIAL SOILS IN THE LOWER MISSISSIPPI FLOOD PLAIN**

Profiles from the Iberia, Buxin and Baldwin soil series were studied. The comparative results indicate that the Iberia soils were highest in exchangeable calcium and base saturation. Exchangeable

*Harvest early because of poor husk protection.
magnesium and potassium were highest in the Buxin soils. The Baldwin soils were lowest in total cation exchange.

The Buxin series contained larger quantities of the oxides of iron, aluminum, magnesium, potassium and sodium as shown by analysis of the clay fraction than Iberia or Baldwin. The Iberia soils were highest in calcium oxide and Baldwin highest in silica. The content of silica increased with depth for all profiles.

The ratios of \( \text{SiO}_2/\text{R}_2\text{O}_3 \), \( \text{SiO}_2/\text{Al}_2\text{O}_3 \), \( \text{SiO}_2/\text{Fe}_2\text{O}_3 \), \( \text{SiO}_2/\text{total bases} \), and carbon to nitrogen varied with the soil series and the variations were apparently associated with source of materials.

X-ray patterns indicate that montmorillonite and illite were the most widely occurring clay minerals and varied with the particular series. The Iberia clay contained more montmorillonite than the Baldwin or Buxin, especially in the A and B horizons.

The peculiar characteristics of these series are of value in establishing fundamental facts that are being used in soil classification. It is evident that these series differ peculiarly in certain chemical and mineralogical properties; yet, certain similarities exist between certain profiles of different series.

The study of the chemical characteristics of the marshes of Terrebonne Parish has shown certain areas to be high in soluble salt content. Sulfates and chlorides of sodium were the predominating salts. Carbonates were not found in appreciable quantities even in samples of high soil reactions. The total salt content in the soils or soil materials of the marshes ranged from less than 1 to approximately 15 per cent. The surface water collected on these areas ranged from less than 1 to approximately 4 per cent total salt content.

As compared to the marshes of St. Mary Parish, the marsh profiles of Terrebonne generally contain larger quantities of salt, especially chlorides, and have higher soil pH's.

—B. N. Driskell and S. A. Lytle

SOIL SURVEYS AND SOIL STUDIES IN ST. MARY, TERREBONNE AND BOSSIER PARISHES

Detailed soil surveys in cooperation with the United States Department of Agriculture, Soil Survey Division, S. C. S., were completed on 234,900 acres of land in Terrebonne Parish and 29,000 acres in Bossier Parish during 1953.

The physical and chemical characteristics used in classifying the soil materials of the coastal marsh area of Terrebonne parish include: texture, structure, consistence, color, thickness and organic matter content of the various layers of soil materials, the degrees of decomposition or preservation of the organic soil materials, the salt content of the soil and the soil water, and the kinds of vegetation and growth conditions. Approximately one-third of the coastal
marsh area of Terrebonne Parish has been classified. Separations of the soil materials in the coastal marsh area include: fresh water, brackish water and saline peats, mucks and clays.

The classifications of the soils of the coastal marsh area may be useful in determining the sites best suited for wildlife, grazing and cultivated crops. Saline soils which are frequently inundated by tide waters and soils high in sulfur and sulfides are of doubtful agricultural value.

A bulletin, "Physical and Chemical Characteristics of the Peats, Mucks and Clays of the Coastal Marsh Area of St. Mary Parish," is now in the process of publication.

—S. A. Lytle, B. N. Driskell, C. W. McMichael, R. H. Jordan, E. L. Francis, John Millet

THE EFFECT OF SOURCE OF NITROGEN ON COTTON YIELDS ON OLIVIER SILT LOAM

Several sources of nitrogen were compared as to their effect on the yield of cotton at the Perkins Road Experimental Farm in 1951, 1952 and 1953. The different nitrogen sources were applied at the rate of 48 pounds per acre along with 48 pounds of P₂O₅ and 48 pounds of K₂O per acre. Two general forms of nitrogen carriers were tested, acid-forming and non-acid-forming or basic. The acid-forming sources of nitrogen were ammonium chloride, urea, ammonium sulfate and ammonium nitrate. The non-acid-forming sources were calcium cyanamid, sodium nitrate and sodium-potassium nitrate. Ammonium nitrate was also tested in combination with 600 pounds of dolomitic limestone per acre and 25 pounds of Esminel per acre. Esminel contains the elements copper, manganese, zinc, iron and boron.

All of the sources of nitrogen except ammonium sulfate and ammonium chloride produced significant yield increases over the check for the three-year period. The non-acid-forming or basic sources of nitrogen and the ammonium nitrate with lime produced an average of 2,015 pounds of seed cotton per acre as compared to 1,783 pounds of seed cotton per acre for the treatments receiving acid-forming sources of nitrogen. The increase in yield of the non-acid-forming carriers of nitrogen over the acid-forming carriers was due to the bases contained in these fertilizers since the soil on which this test was conducted was acidic and low in total bases.

—M. B. Sturgis and Wm. H. Patrick, Jr.

CONCENTRATION AND MOVEMENT OF OXYGEN AS RELATED TO ABSORPTION OF AMMONIUM AND NITRATE NITROGEN BY RICE

This study was designed to determine the value of nitrate nitrogen as compared with other forms of nitrogen as a nutrient
for rice at different oxidation levels of the root substrate. Three experiments—a greenhouse experiment, a field experiment and a nutrient solution experiment—were carried out. The treatments used to vary the oxidation level of the soil were oxygen bubbling through the soil and water and a hydrolyzed polyacrylonitrile soil conditioner in the greenhouse experiment, and rice straw and a hydrolyzed polyacrylonitrile soil conditioner in the field experiment. An increased growth of rice was obtained from the use of oxygen, although there were no differences in the oxygen concentrations of any of the treated soils which decreased to around 0.1 part per million. Ammonium nitrogen produced greater growth of rice in the greenhouse as compared to nitrate nitrogen. There did not appear to be any specific interaction between any of the oxidation treatments and nitrate or ammonium nitrogen. Oxygen and nitrogen were used to vary the oxygen concentration in the nutrient solution experiment. The added oxygen increased the absorption of ammonium nitrogen by the rice plants, but the uptake of ammonium nitrogen was more rapid in all cases than the uptake of nitrate nitrogen by rice from the nutrient solutions.

—Wm. H. Patrick, Jr., and M. B. Sturgis

SORGO FOR SIRUP AND FOR SILAGE

Sorgo is now recognized, in the South, as a profitable crop for sirup and feed production. There is an extensive market for a good quality sorgo sirup. Based on total feed produced per acre, sorgo ranks high especially when the crop is fed as silage. The extensive use of machinery for producing and harvesting sorgo reduces the acre cost and increases the profit obtained from the crop.

The U. S. Department of Agriculture conducts an extensive breeding program at Meridian, Mississippi, to develop new, high yielding varieties that reduce losses from diseases and lodging. The test reported here was conducted to secure information for evaluating some of these varieties under Louisiana conditions.

Sart, one of the two varieties recently released for commercial culture, matures in about 120 days. In this test it exceeded all other varieties by from 120 to 177 per cent in yields of sirup per acre. Tracy (released for commercial culture in 1953), White African and Mer. 51-2, which mature under normal conditions in about 106 days, were equal to Honey in acre yields of sirup. Atlas produced the lowest yield of sirup. Sart and Tracy produced the highest total sugar content of any of the varieties.

The importance of silage in profitable livestock production and its value as insurance against the possible effects of drought and floods on pastures is being recognized in Louisiana. Modern farm implements make it possible to handle high tonnage varieties with minimum labor. The new variety Sart was the most outstanding
sorgo in the test at Baton Rouge. It produced 25 tons of green silage per acre as compared with 19.3 tons for Honey and 16.1 tons for Atlas. Sart showed more resistance to leaf diseases than did the Honey and Atlas varieties. This experiment will be continued.

—John Gray and I. E. Stokes

SOYBEAN RESEARCH INDICATES EFFICIENT CULTURE ESSENTIAL

Soybean research at the Baton Rouge Station during the past 25 years indicates that if satisfactory yields of seed are to be obtained, this crop requires the attention that is usually given to any other crop being produced for profit. In fact modern implements make it possible to produce a good crop with relatively few man-hours. Soybeans do well on land suitable to the production of corn, and they follow corn in the rotation nicely. A good seedbed acceptable to the better cotton planters for cotton is quite satisfactory for the planting of soybeans.

The successful production of any crop, including soybeans, is dependent upon certain favorable environmental factors including an adequate supply of plant nutrients. The limited amounts of available nutrients in any particular soil of course would determine the amount required to be added for the profitable production of soybeans. This crop draws on the soil for mineral nutrients especially phosphorus, potassium and calcium.

Observations in Louisiana have indicated that soybeans respond well to increased fertility levels; however, preliminary tests at relatively low rates of fertilizer application did not show consistent response when applied directly at planting time. Good soil management with ample fertilization of the previous crop has often been reflected in higher yields of soybean seed. Soils well supplied with the necessary plant foods along with organic matter have usually given high yields. Experimental results at Baton Rouge have shown that the yield of seed of Ogden soybeans may be increased as much as 70 per cent with the use of phosphate, potash and lime.

Early and efficient cultivation is essential in soybean seed production. In fact, much of the grass and weed seedlings may be destroyed before the crop is planted if the land is prepared early and occasionally disked until planting time around May 15. The first cultivation should be made with a rotary hoe or harrow as soon as weed seedlings emerge after the soybeans are planted, and before the soybeans are up if necessary. The breaking of crusts formed following heavy rains will help the soybean plants to emerge and result in better stands. Two more early cultivations with the rotary hoe or harrow before the weeds become established should eliminate the weeds within the soybean rows. Later cultivations
with the usual farm cultivators should keep the fields clean. Weedy fields not only reduce yields but they can also make combining difficult in the fall.

In date-of-planting tests at the Baton Rouge Station, May and early June planting of early maturing varieties produced higher quality and more viable seed together with satisfactory yields than was obtained from earlier plantings. The late maturing, high forage yielding varieties, such as the Improved Pelican, produced similar yields of seed when planted from April to June, but the stalks grew progressively smaller and more erect with the later plantings. By planting in late May or as late in the spring as is possible to have sufficient moisture to insure stands, combining is made less difficult with the high forage yielding varieties.

Rate-of-planting tests at Baton Rouge have shown that satisfactory yields were obtained when 30 pounds of viable seed per acre were planted; however increases up to 60 pounds of seed per acre resulted in better stands with less weeds in the row. The planting of more than the minimum requirement of seed is good insurance and is therefore recommended.

Soybean varieties maturing during October have given good results at Baton Rouge over the years. October is an excellent month for combining since normally it is one of the months when relatively light rainfall occurs here. Commercial varieties giving satisfactory yields of seed in regional tests in Louisiana include the Ogden and selections from it, Volstate or Roanoke, and Dortchsoy 67. Newer varieties include the Jackson and Dorman. The Dorman has yielded better in the northern part of the state while the Jackson may be grown in the seed producing area of the state. All of the above soybean varieties are grown for crushing.

According to the 1950 Agricultural Census, more than half of the total soybean acreage in Louisiana was turned under for soil improvement. Much of this acreage was in the cane area where there has been a sustained demand for seed of high forage producing varieties to be turned under in the rotation. Seed of satisfactory forage type soybean varieties has not been available in ample supply for years. Inferior substitute varieties have been used.

The Louisiana Experiment Station has developed and released the Pelican, Improved Pelican, and the Acadian soybean varieties to meet this demand in the cane area and elsewhere where high yields of forage are required for soil improvement and for hay. Seed of these varieties are also satisfactory for oil. Analyses have shown an oil content of from 22 per cent to 24.5 per cent for the Improved Pelican. Other varieties acceptable for the cane area include Avoyelles, Otootan, Palmetto and the original Clemson. Some of the Clemson selections have been seed types that produced but little forage.
Considerable work has been done at the Baton Rouge Station during the past 10 years toward the development of earlier maturing soybean varieties suitable for crushing. Some very promising lines are being carried forward.—John Gray

ADAPTATION OF FORAGE SPECIES

Clover

Small-plot experiments with new varieties and strains of clover were continued. These experiments furnish information as to the adaptability of new varieties and strains as compared to commonly grown varieties. Mixture studies were also made in order to compare the ability of certain clover species, varieties and strains to grow in combination with an adapted grass. A balanced clover-grass mixture would probably lessen the problem of bloat.

The results from tests with crimson clover show that the reseeding strains are superior to common crimson in the second year after seeding. However, yield data indicate that there are no significant differences among the reseeding strains and common strains the first year after seeding. The reseeding strains included Dixie, Talladega, Autauga, Auburn and Mississippi crimson clover. Forage yield data also showed no significant differences among strains when grown in mixture with rescue grass. However, there was an increase in yield from the mixture over clover alone. The average hay yield from one clipping of crimson clover alone was 4,024 pounds per acre, as compared to 5,270 pounds from the clover-grass mixture. From hand separations, the average content of clover in all plots was 37 per cent, indicating that crimson clover will grow relatively well in combination with rescue grass.

Forage yield data showed that Louisiana S1 white clover produced higher yields than other strains of white clover during both first and second years after seeding. Certified ladino compared favorably with Louisiana S1 for total yield during first-year growth. However, the Louisiana strain has a greater yield during early spring and has better summer survival, thus giving earlier growth the following year. Mixture studies with white clover and rescue grass indicate that this mixture may be of value in the reduction of bloat. From two cuttings of this mixture test, the average per cent of clover ranged from 4 in the first cutting to 19 in the second cutting. Thirty-three pounds of nitrogen per acre was applied to the mixture in January. This nitrogen obviously brought about an excessive growth of grass, thus reducing the percentage of clover.

As in previous years, locally adapted red clover strains produced as well or better than strains from other areas. The yield of Regional Louisiana red was 7,766 pounds of hay per acre, as compared to 6,589 pounds from Kenland. Kenland produces more
forage, in the Baton Rouge area, than other introduced strains of red clover that have been tested. A mixture of red clover and rescue grass increased the average hay yield over 1,300 pounds per acre, as compared to clover alone. Red clover apparently recovers faster after clipping than prairie brome grass. Two cuttings were made from this mixture with clover making up an average of 15 per cent in the first cutting and 74 per cent in the second cutting.

The results of forage yield trials indicate that Nangeeela and Mt. Barker subterranean clover are two of the better varieties for growth in South Louisiana. Mixture studies show that “sub” clover will grow relatively well in combination with prairie brome grass. The average yield of this mixture was 5,880 pounds of hay per acre, while the yield of clover alone was 3,996 pounds. These yields include two cuttings, with the average per cent clover in the mixture ranging from 35 to 37.

**Grasses for Winter Grazing**

Second year forage yields were obtained on tests with tall fescue and orchard grass. Fescue survived the summer drought better than orchard grass and furnished earlier grazing the following spring. Goar fescue was significantly higher in total yield than other strains, with a yield of 5,323 pounds of hay per acre. Orchard grass forage yields were relatively low as compared to other adapted grasses. Very few orchard grass plants survived the second summer.

Tests were also conducted with brome grass. Results indicate that rescue grass (*Bromus cartharticus*) is better adapted to this area than other species of brome grass. There appear to be no outstanding differences among the available strains of rescue grass for forage yield. Smooth brome (*Bromus inermis*) does not appear adapted to local climatic conditions. Other species of brome grass tested were considerably lower in forage yield than commercial rescue grass.

Domestic rye grass produced a higher total forage yield than other strains included in the test. However, the differences in yield were not significant among domestic, S12 and common perennial rye grass. Their comparative yields were 7,569, 7,336 and 7,067 pounds of hay per acre, respectively. Domestic rye grass appeared to be more susceptible to disease than other strains, which included S22, S101, S24, S23 and New Zealand H1 rye grass.

**Summer Grazing Crops**

Rowan, a variety of Korean lespedeza, produced a significantly higher hay yield than other strains of lespedeza included in the test. All entries began to die out around bloom stage, as in previous years. Rowan appeared to have better survival than other strains.
at this stage of growth. Other strains or varieties included Iowa 6, Climax, Korean, Kobe and Common.

Forage yield tests were planted with varieties and strains of Bahia grass and Dallis grass. No yield data were obtained. However, Pensacola hybrid 14 x 108, a Bahia grass hybrid from Georgia, grew exceptionally well during the late summer drought.

Nineteen varieties and strains of millet and Sudan grass were planted in a forage yield trial. Results favored Tift Sudan for total forage yield. The better millet strains produced earlier growth than Sudan grass. Sudan persisted three to four weeks longer in the summer.

Forage yields of Tift Sudan and Starr millet were compared in a factorial experiment including four planting rates and four rates of nitrogen. The planting rates consisted of 15, 25, 35 and 45 pounds per acre. Nitrogen rates were none, 33, 66 and 132 pounds per acre. Four hundred pounds of 0-12-12 fertilizer per acre were applied before planting. Results of the first harvest on August 4 show that Starr millet was significantly higher in forage yield than Tift Sudan for all planting rates and nitrogen treatments. As an average of all nitrogen rates, millet and Sudan produced higher yields of forage with planting rates of 35 and 45 pounds per acre. There was no significant difference between these two planting rates, as an average of all nitrogen rates. Millet produced a higher average forage yield with the application of 66 pounds of nitrogen, while Sudan grass produced a higher yield from the 132-pound nitrogen treatment. A second cutting was made on September 10. The results were inconclusive except for varietal differences. In this cutting, Tift Sudan had significantly higher yields than millet for all planting rates and nitrogen applications.

—C. L. Mondart, Jr., and C. R. Owen

DALLIS GRASS BREEDING

The project with Dallis grass was initiated for the purpose of investigating the cause for the low quality of seed harvested in Louisiana and other parts of the South. The work was pursued further in an effort to find a more practical means of improving the quality of the seed of the grass. The results of much of the early phase of the work are reported in Louisiana Agricultural Experiment Station Bulletin 449, May 1951. Two new strains of grass were isolated by making plant selections from natural stands of Dallis grass and testing them over a period of five years. During the past three years considerable time and effort have been spent producing foundation seed. These seed have been distributed to farmers for increase. About 750 pounds of seed were produced from strains B230 and 430 during 1953.
Work has been continued with experiments comparing the performance of progenies with the parent plants transplanted in clone sections. The paired rows which were transplanted in the spring of 1952 with clone pieces in one row and the progeny plants transplanted in an adjacent row were used. Quantitative measurements were taken as in 1952 on characters such as the number and height of culms, number of leaves on a culm, dry weight of plant, seed weight and viable seed content.

From observations made during the growing season and from the results of the analysis of the seed from the 1952 crop, it was possible to classify the rows into groups showing no off-type plants in the progeny and those containing distinctly weak-type plants. Approximately one-third of the progeny included in the study gave rise to aberrant types, morphologically, and most of such types were found to be sterile.

Analysis of the data gathered from measuring the quantitative characters produced results which were somewhat inconsistent. For example, the clone-progeny relationship as indicated by the ratio of the variances calculated from the different quantitative characters showed differences to be significant for 44 out of 104 pairs. At least four of these were the result of the clone pieces being more variable than the progeny. The interpretation, of course, is based principally on the realization that perhaps 16 plants is an insufficient number for use in such experiments. Quantitative characters are definitely influenced by the environment, often more so than by genetic differences. Additional work is being undertaken with other materials, but with the techniques altered somewhat.—C. R. Owen

WHITE CLOVER BREEDING

The results of the past work with the development of Louisiana S1 white clover were published during 1953. The publication is available for distribution and is Louisiana Agricultural Experiment Station Bulletin 479, June 1953. The work with the maintenance of the breeding stock of Louisiana white clover and the production of breeder's seed is being continued. Most of the foundation seed were produced on the farms of the branch Experiment Stations. Nearly 2,000 acres have been seeded from foundation seed by seed producers in Louisiana and the supplies of seed of this crop should become available in quantity during this year or next.

Work was continued with the testing of new clones in polycross combination for the purpose of determining the general combining ability. These clones had previously proved to be tolerant to heat, drought and to the common diseases prevalent in this area. New combinations of clones are being tried for forming experimental synthetic varieties.
Experiments are being conducted to test the performance of Louisiana S1 white clover seed in advanced generations after the cross. Results were obtained from seed of the first through the third generations. There were no differences between these. They represented breeders, foundation and certified seed.

Tests of seeding rates were conducted to determine the effect of varying rates of seeding on the forage and seed crops produced the following spring. Seeding was done on a well-prepared seedbed at rates of 3, 5, 10, 15 and 30 pounds per acre in October 1952. While the heavier rates gave cover over the land earlier and would probably have competed better with weeds, there were no differences in the plots by April. The forage density, blossom rate and seed production did not vary significantly.—C. R. Owen

RED CLOVER

The block on which the red clover was planted was flooded in April and most of the crop was lost. Foundation seed of Louisiana Station I red clover was planted on about 100 acres during the fall of 1952. The seed crop from this was light in 1953; however, it is expected to increase this year. Louisiana Station I red clover is a strain formed by massing the superior progeny from acclimated Louisiana stocks. It is about two weeks later than other local strains of red clover.—C. R. Owen

LESPEDEZA

Work with common lespedeza is being continued. Progeny plots survived the summer and fall during the past season and produced a crop of seed. This is encouraging in view of bad weather conditions prevalent during the past three seasons. In previous years, most of the lespedeza has died at the blooming stage. The cause has probably been a combination of insects and foliage diseases. Work with this crop is being continued.—C. R. Owen
ORAL SUPPLEMENT VERSUS INTRAMUSCULAR INJECTION OF AUREOMYCIN TO YOUNG CALVES

Twenty-four male Jersey calves were divided into three groups. Group I served as a control, Group II received weekly intramuscular injections of approximately 400 mg. aureomycin (aureomycin in sesame oil as A1C1 complex), and Group III received 50 mg. aureomycin daily in the milk and a 1 per cent level of Aurofac A in the calf starter. After receiving colostrum for three days, all calves were fed milk up to 30 days of age. An all-plant protein calf starter and good quality Alyce clover hay were fed to all calves at 8 days of age. Aureomycin feeding and injections were started at 4 days of age. The experiment was continued for 16 weeks.

The aureomycin-injected calves showed excellent condition and smooth hair coat beginning at 9 - 10 weeks of age. The oral-fed aureomycin calves showed this bloom condition at 12 - 16 weeks. Both aureomycin groups of calves significantly outgained the control group. At 16 weeks of age, the average daily gains were 0.79, 1.07 and 0.94 lbs. for Groups I, II and III, respectively (Table 1).

<table>
<thead>
<tr>
<th>Group</th>
<th>Average daily gains(\ast)</th>
<th>Lb. of starter per lb. gain</th>
<th>Increase height at withers(\ast)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Control</td>
<td>0.78</td>
<td>3.13</td>
<td>5.99</td>
</tr>
<tr>
<td>II Injected aureomycin</td>
<td>1.07</td>
<td>2.67</td>
<td>7.59</td>
</tr>
<tr>
<td>III Oral aureomycin</td>
<td>0.94</td>
<td>2.79</td>
<td>6.44</td>
</tr>
</tbody>
</table>

\(\ast\)P < .05

Carcass studies of calves receiving aureomycin supplement. Injected aureomycin animal on left, oral aureomycin in center and control animal on right. All animals same age.

TABLE 1. Average daily gains, increase in height of withers, and feed efficiency at 16 weeks of age of dairy calves
Carcass studies reflected the larger size and weight of the aureomycin groups. Meat yields showed larger muscles and skeletal size (Table 2).

![Calf on left received injections of aureomycin. Note its smooth hair coat as contrasted with that of the control animal on the right. Both animals same age.](image)

<table>
<thead>
<tr>
<th>Group</th>
<th>Carcass weight</th>
<th>Length of body</th>
<th>Meat 12th rib</th>
<th>Cooking data (9-10-11 ribs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb.</td>
<td>cm.</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Control</td>
<td>74.8</td>
<td>727</td>
<td>68.95</td>
<td>2.82</td>
</tr>
<tr>
<td>Injected</td>
<td>110.5</td>
<td>832</td>
<td>65.87</td>
<td>7.28</td>
</tr>
<tr>
<td>Oral</td>
<td>95.8</td>
<td>795</td>
<td>67.82</td>
<td>3.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td>g.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td>Before cooking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>424.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>619.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>505.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.25</td>
</tr>
</tbody>
</table>


**AMMONIATED MOLASSES—A PROTEIN SUBSTITUTE**

For ruminating animals, non-protein nitrogen compounds—like urea, ammonium bicarbonate, etc.—may be utilized as a substitute for part of the high protein feeds in a ration.

In recent years, many industrial carbohydrate by-products with a low nitrogen content have been found to combine with anhydrous ammonia, thereby increasing their nitrogen percentage and thus their protein equivalent value (N x 6.25). Cane molasses, like other sugar-containing by-products, has been ammoniated, in-

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*Animal Industry Department.
creasing its natural protein value of approximately 2.5 per cent to a protein equivalent value of 15 - 38 per cent. The ammonia reacts chemically with the invert sugar in the molasses forming a stable protein substitute. The value of these compounds for dairy animals is being determined.

16 Per Cent Protein Equivalent Ammoniated Molasses—Two groups of Holstein steers, 5-6 months of age, were allowed ammoniated molasses, free-choice, along with a 19 per cent digestible protein grain ration and grass hay. Group I received the 16 per cent ammoniated molasses and Group II received a 10 per cent protein ammoniated molasses obtained by diluting the 16 per cent ammoniated molasses with regular molasses.

The molasses was fed in an open pail. For the first two weeks all animals were fed 6 pounds of grain daily and during the last three weeks of the trial the grain ration was reduced to 3 pounds daily. The results are as follows:

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Animals</th>
<th>Average Daily Gain</th>
<th>Amt. of ammoniated molasses consumed</th>
<th>Starter per lb. of gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (16%)</td>
<td>3</td>
<td>1.37</td>
<td>364.7</td>
<td>3.17</td>
</tr>
<tr>
<td>2 (10%)</td>
<td>3</td>
<td>1.79</td>
<td>458.5</td>
<td>2.53</td>
</tr>
</tbody>
</table>

All calves showed some degree of loose feces probably due to the molasses consumed. No differences were noted between the two groups of animals in the amount of hay or water consumed. This work is being continued.

Toxicity studies of the product with mature rats showed that there was a tendency toward diarrhea and excitability. Palatability studies at a 10 per cent ammoniated molasses solids level with rats showed that the molasses ration was palatable and, if anything, slightly superior for growth to the control ration.

38 Per Cent Protein Equivalent Ammoniated Inverted Cane Molasses—This highly ammoniated product was fed at a 10 per cent level in an 18 per cent protein grain ration replacing cottonseed meal. Dairy steers made satisfactory growth over a 12-week period when fed grass hay and 3 pounds of the grain ration daily. The results are presented in Table 2.

<table>
<thead>
<tr>
<th>Average Weights</th>
<th>Ammoniated molasses</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average initial weight (lb.)</td>
<td>267.5</td>
<td>266.0</td>
</tr>
<tr>
<td>Average final weight (lb.)</td>
<td>385.5</td>
<td>373.5</td>
</tr>
<tr>
<td>Average daily gain (lb.)</td>
<td>1.30</td>
<td>1.18</td>
</tr>
<tr>
<td>Average Feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total grain (lb.)</td>
<td>273.0</td>
<td>273.0</td>
</tr>
<tr>
<td>Total molasses (lb.)</td>
<td>27.30</td>
<td>0</td>
</tr>
<tr>
<td>Lb. feed per lb. body gain</td>
<td>2.31</td>
<td>2.54</td>
</tr>
</tbody>
</table>
When fed “ad libitum” along with hay and grain ration, the ammoniated molasses was not palatable. The high alkaline content (pH 8.5) possibly was responsible for its lack of palatability.

Toxicity studies of the product were made with mature albino rats. Administration directly into the stomach resulted in some distress for one to seven days, after which the rats resumed increased feed intake and showed normal weight gains. Neutralization of the ammoniated molasses (pH 8.5) with lactic acid to pH 6.7 resulted in normal intake and gains.

—L. L. Rusoff, J. B. Frye, Jr. and Jordan G. Lee*

FACTORS AFFECTING BREEDING EFFICIENCY OF LOUISIANA DAIRY HERDS USING ARTIFICIAL BREEDING

Delayed breeding and sterility in dairy cattle cause considerable loss of time and money among Louisiana's dairy farmers. Recognizing this situation, a study was initiated to determine the relative importance of problems related to the breeding efficiency of dairy cattle. During the period of November 1, 1953, through January 21, 1954, a total of 54 randomly selected dairy farms were visited. A detailed questionnaire concerning feeding and management practices, breeding practices, past and current breeding results, and herd health was completed on each farm. Also, the reproductive organs of 23 “problem” cows were examined.

It was found that 21 of the 54 farmers (40.4 per cent) were breeding cows back in less than 60 days after calving.

As shown in Table 1, lower fertility results were obtained on these farms than on farms where the practice was to wait at least 60 days after calving to breed cows. These results are in agreement with those reported by several experiment stations.

<table>
<thead>
<tr>
<th>Interval after calving (days)</th>
<th>Number of farms</th>
<th>Per cent of farms</th>
<th>Percentages of 60- to 90-day non-returns to first services</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 - 44</td>
<td>10</td>
<td>19.2</td>
<td>62.8</td>
</tr>
<tr>
<td>45 - 59</td>
<td>11</td>
<td>21.2</td>
<td>63.9</td>
</tr>
<tr>
<td>60 - 74</td>
<td>28</td>
<td>53.8</td>
<td>64.5</td>
</tr>
<tr>
<td>75 - 90</td>
<td>3</td>
<td>5.8</td>
<td>68.7</td>
</tr>
</tbody>
</table>

Research has shown that on the average a period of 42 days is required for the reproductive organs of the cow to reach their normal tone and health after freshening. Better breeding results are obtained when cows are bred back 60 to 90 days after calving. Other management practices which appeared to be playing a role in poor breeding efficiency were as follows:

*Agricultural Biochemistry Department.
1. Using several different bulls in natural service (in addition to artificial insemination) in a herd in an attempt to settle "repeat-breeder" cows. This practice spreads any disease or infection.
2. Inseminating cows too early or too late in the heat period.
3. Missing heat periods by failing to check cows for heat twice daily.
4. Breeding heifers too young or too small.
5. Failure to keep and make use of adequate records.
6. Purchasing cows without any health records or examination.

A total of 30 farmers out of 54 had 94 cows which they classed as "problem" or "hard" breeders. The nature of the problems was as follows:

Brucellosis or Bang's disease, 8 cows; leptospirosis, 3; anaplasmosis, 2; granular vaginitis, 1; cystic ovaries, 8; infantile ovaries, 2; persistent yellow body, 2; uterine metritis, 1; and repeat breeders, 8. It is of interest to note that 12 of the cows which were termed "problem breeders" by the farmers were actually pregnant. The nature of the problems in the remainder of the cows has not been determined as yet.

Insofar as herd health and management practices related to it were concerned, brucellosis or Bang's disease appears to be the most important disease affecting reproductive efficiency. Only 14 of the 54 herds had been blood-tested in the past 12 months. Thirty-six herds had been tested at some time in the past. Sixty-one per cent of these herds contained one or more reactors. Many of the farmers were keeping the reacting animals. However, it should be mentioned that 49 of the 54 farmers are following a calfhood vaccination program.

Results to date indicate that poor management, Bang's disease, leptospirosis and cystic ovaries are the most important causes of delayed breeding and sterility in the dairy cattle in the herds which have been visited. Although no attempts were made to diagnose or test for vibriosis or trichomoniasis, further investigations may reveal that these diseases are as important in Louisiana as they have been found to be in other states.


A STUDY OF HEALTH PRECAUTIONS AND PRACTICES USED BY ARTIFICIAL BREEDING ORGANIZATIONS IN THE UNITED STATES

Reduction in the spread of genital diseases is considered by many as one of the primary advantages of artificial insemination. Few authorities would disagree with this point providing all bulls used were free from contagious diseases and strict sanitary prac-
tices were followed throughout the process. In an effort to determine the health program being followed by semen producing businesses, questionnaires were sent to all major organizations in the United States. Forty-one of the 52 questionnaires sent out were completed and returned. The 41 cooperating organizations reported that bulls being considered for purchase were tested for brucellosis and tuberculosis.

Eighteen of the organizations reporting indicated that bulls were tested for Vibrio fetus and trichomoniasis prior to purchase. Many other bull studs reported that the breeding history of herds in which bulls had been used were studied for symptoms of these and other diseases. Nineteen associations reported that new bulls were isolated for periods varying from ten days to two months. Fifteen of the 19 studs practicing isolation have separate barns for this purpose. In response to questions concerning bulls in service, all of the associations reporting indicated that brucellosis tests were made on all bulls at 3 to 12 month intervals. Tuberculosis tests were made on bulls in 35 of the 41 studs at regular intervals varying from 60 days to 2 years. Twelve associations reported that bulls were tested for Vibrio fetus by the blood agglutination test developed by Dr. W. N. Plastridge at 3 to 12 month intervals. Twenty, or about half of the organizations included in this study, indicated that bulls were tested for trichomoniasis at 1 to 12 month intervals. The swab or douche method was used to obtain smears for microscopic examination. Several studs reported that bulls were not tested for Vibrio fetus and/or trichomoniasis because methods of testing were not reliable or facilities for testing were not available. Three organizations reported that streptomycin was used in semen diluter as a precautionary measure against Vibrio fetus. (This is a common practice in almost all of the studs.) Numerous other comments and suggestions were listed.


**THYROIDAL ACTIVITY, SEXUAL BEHAVIOR, SEMEN PRODUCTION AND FERTILITY OF BULLS USED IN ARTIFICIAL BREEDING**

Previous studies at this and other stations have shown that the high environmental temperatures during the summer and early fall months cause a decline in semen quality and fertility of bulls. Also, it has been observed that there is a marked decrease in libido or sexual drive of the bulls during these hot months. In addition to these problems, some bulls refuse to work artificially at times; others become sluggish and have poor libido throughout the year. Investigations of thyroidectomized bulls have shown that such bulls completely lose libido and their value for artificial breeding.
Also, the high temperatures of the Gulf Coast region apparently may cause a mild form of hypothyroidism. It appears, therefore, that there may be some important inter-relationships among thyroid activity, sexual behavior, semen production and fertility of bulls. However, there is a lack of objective data on these inter-relationships. If these interrelationships were known and if an objective means of rating sexual behavior of bulls were available, it should be possible to predict more accurately the potential value of a bull for use in artificial breeding than can be done at present. Recognizing this situation, investigations were initiated to obtain data on these problems. These studies are in progress and none of the data have been analyzed to date.

—W. S. Griffith, Cecil Branton, G. F. D’Arensbourg, J. E. Johnston and T. E. Patrick

EFFECTS OF HOT WEATHER AND HIGH HUMIDITY ON SEMEN PRODUCTION AND FERTILITY OF THE DAIRY BULL

Dairymen in Louisiana and other Southern States have often observed low fertility and periods of temporary sterility in their dairy bulls during the late summer and early fall. The widespread use of artificial insemination has increased the importance of this problem, since the bull is used throughout the year to breed several thousand cows, rather than 30 to 60 as is customary in natural breeding.

A study of records at the L.S.U. Dairy Improvement Center shows that bulls are most fertile in the spring, with a rapid decline occurring after the peak is reached in June. The poorest results are obtained in August, with some improvement occurring in September and October, after which the breeding efficiency levels off during the winter months. Much variation is observed between bulls during the summer. Some are completely sterile, whereas others maintain a relatively high fertility.

In order to determine the effects of temperature and humidity upon semen production and fertility of dairy bulls, studies have been initiated at the L.S.U. Dairy Laboratories. Four pairs of bulls (2 Jersey and 2 Holstein) were selected on the basis of breed, age, semen production and fertility. Four bulls, one of each pair, were placed in a building from June to September where the temperature and humidity were maintained at a constant level. Temperature was maintained at approximately 80° F. throughout the period. The remaining four bulls were maintained in the bull barn at the Dairy Improvement Center under usual farm conditions with the temperature ranging up to 95° F. Eighty-seven per cent of the semen samples collected from the bulls in the controlled temperature barn were suitable for use in artificial insemination as compared to
63 per cent for the group of bulls maintained under normal summer conditions. The average breeding efficiency for the bulls maintained in the cooler temperature was 74.1 per cent, whereas the bulls kept under usual conditions had a conception rate of 70.1 per cent. Information obtained from this study indicates that the semen production and fertility of dairy bulls can be maintained at a relatively high level during the summer months if they are housed in a barn where the temperature is kept at approximately 80° F. —T. E. Patrick, J. E. Johnston, H. C. Kellgren, J. B. Frye, Jr., Gerald D’Arensbour and Cecil Branton

SEmen Production and Physiological Response of Jersey, Holstein-Friesian, Red Sindhi-Jersey (F1) and Red Sindhi-Holstein (F1) Bulls Exposed to Controlled Elevated Temperatures and Humidities

Two bulls each of Holstein-Friesian, Red Sindhi-Holstein and Red Sindhi-Jersey breeding and one of Jersey breeding were exposed in the climatic control chamber to cycled temperatures and humidities for a period of four weeks. The chamber conditions were set to resemble those naturally experienced in Louisiana during hot summer weather with a daily maximum of 95° F. and a minimum of 75° F. One bull of each breed and crossbreed was also maintained under optimal conditions as a control. Two ejaculates were collected from each bull each week and physiological observations were made three times each day on all bulls.

The Red Sindhi crossbred bulls were able to maintain lower body temperature and respiration rates than the comparable purebreds under hot conditions. However, characteristics such as scrotal length, flank skin temperature, and scrotal skin temperature did not reflect as definite breed differences.

Deleterious changes in semen quality occurred in all bulls exposed to elevated temperatures and humidities commencing about three weeks after initial exposure. These changes were characterized by a decline in initial motility and an increase in methylene blue reduction time and morphologically abnormal spermatozoa. The changes were more marked in purebred bulls than in the Red Sindhi crossbreds. Control bulls under optimal conditions maintained their semen quality during the same period.

—H. C. Kellgren, J. E. Johnston, J. B. Frye, Jr. and B. Green
PHYSIOLOGICAL AND HEREDITARY RESPONSES OF LACTATING JERSEY AND HOLSTEIN-FRIESIAN COWS TO NATURAL ENVIRONMENTAL TEMPERATURES AND HUMIDITY

Studies of the body temperatures, pulse rates, respiration rates and milk production data on 14 lactating Holstein-Friesian and 15 lactating Jersey cows during the period of April 1 through September 30, 1952, were made to determine their physiological and hereditary responses to varying climatic conditions. It was found that environmental temperatures above 85° F., particularly 90° F. or above, along with rather high humidities caused high body temperatures and respiration rates as well as lowered milk production. On the average, for each 1.0° F. increase in body temperature of a cow there was a 2.14-pound decrease in the daily yield of fat-corrected milk. However, there were wide differences in the responses of the cows. These responses were found to be partially hereditary, indicating that body temperature can be used as an index for heat tolerance and for selection purposes. For the most reliable and repeatable results it was found that body temperatures of the cows should be taken when the environmental temperature is 90° F. or above. Under these conditions the heritability of body temperatures was 34.0 per cent, indicating that selecting and breeding cows for lower body temperatures (heat tolerance) would be as successful as for higher milk production itself. Further studies are needed to determine the genetic and phenotypic correlations between heat tolerance and milk production in our European breeds of dairy cattle. Also, it must be determined whether or not heat tolerance and high milk production are compatible.

—Cecil Branton, J. E. Johnston and G. D. Miller

STUDIES OF LACTATING HOLSTEIN-FRIESIAN, JERSEY AND RED SINDHI-HOLSTEIN (F,) COWS UNDER HOT NATURAL CONDITIONS

Recent studies have shown that high temperatures and humidities have adverse effects upon dairy cattle. In order to further evaluate the effects of hot climate on the behavior, production, and physiological response of lactating cows, 69 animals were observed during 12 hot days of June 1953. The study included 38 Holstein-Friesian, 23 Jersey, and 8 Red Sindhi-Holstein cows. Afternoon body temperatures and respiration rates and production of 4 per cent-fat-corrected milk were recorded on all 12 days, while time spent grazing during daylight hours and during the night was recorded on 8 and 5 days, respectively. The average air temperature between the hours of 9:00 A.M. and 3:00 P.M. on the days of the study was 90.5° F.
The results of this study are summarized in Table 1.

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. of Animals</th>
<th>Body Temp (°F)</th>
<th>Respiration Rate (count/min.)</th>
<th>Daylight Grazing (min/day)</th>
<th>Night Grazing (min/day)</th>
<th>Total Grazing (min/day)</th>
<th>Milk Production (lbs 4% FCM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holstein-Friesian</td>
<td>38</td>
<td>103.7</td>
<td>84</td>
<td>128</td>
<td>255</td>
<td>383</td>
<td>22.0</td>
</tr>
<tr>
<td>Red Sindhi-Holstein</td>
<td>8</td>
<td>101.9</td>
<td>60</td>
<td>264</td>
<td>199</td>
<td>463</td>
<td>19.5</td>
</tr>
<tr>
<td>Jersey</td>
<td>23</td>
<td>103.0</td>
<td>82</td>
<td>159</td>
<td>268</td>
<td>427</td>
<td>19.4</td>
</tr>
</tbody>
</table>

Half Holstein-half Red Sindhi cows used in heat tolerance studies.

The body temperatures and respiration rates of the crossbreds were significantly lower than those of the Jersey and Holstein cows, although they produced as much milk, on the average, as the Jerseys and nearly as much as the Holsteins. The crossbreds also grazed nearly twice as much during hot daylight hours as the other breeds, and although they grazed less during the night, their total daily grazing time was greater than that of either of the other breeds. The fact that the Holstein-Friesian and Jersey cows spent nearly twice as much time grazing during the night as during the day illustrates the need for provision of the best possible night pasture and adequate daytime shade for these breeds during hot weather.—J. E. Johnston, Cecil Branton, J. B. Frye, Jr., G. D. Miller and J. J. Vizinat

BLOOD COMPOSITION OF RED SINDHI-JERSEY CROSSES AS AFFECTED BY A FIXED HOT ATMOSPHERE

Twenty-five Sindhi-Jersey crosses—9 (Sindhi x Jersey) (F₁), 3 (Sindhi x Jersey) (F₂), 6 (¼ Sindhi, ¾ Jersey), 7 (¾ Sindhi, ¼ Jersey)—and 15 purebred Jersey heifers were subjected to a fixed high temperature of 105° F. and 34 mm Hg in a climatic...
chamber for a period of 6 hours. The animals were subjected to the fixed hot atmosphere at 2-month intervals beginning at 6 months up to 24 months of age. Three separate blood samples were obtained from each animal: a) Period I, 18 hours prior to their being subjected to the high temperature; b) Period II, immediately after the 6-hour exposure; and c) Period III, approximately 18 hours after exposure. The blood samples were taken from each animal from 1 to 3 times during the year. The blood was analyzed for hemoglobin, packed red blood cells (hematocrit), plasma Ca and plasma inorganic P values. In general, the Sindhi crosses showed higher blood values than the purebred Jerseys. Statistical analyses are being made of the data, especially a comparison of the blood values between Periods I and II, and I and III.

—L. L. Rusoff, M. W. Schein* and J. J. Vizinat*

**BLOOD STUDIES OF RED SINDHI CROSSBRED CATTLE**

These studies are being conducted to determine whether or not certain blood constituents may be used as a measure of heat tolerance. Blood samples are obtained on 3 consecutive days each month. Analyses are made for hemoglobin, hematocrit, plasma Ca and plasma P.

**Sindhi x Holstein (Baton Rouge—L.S.U.)**

Thirty-eight animals (19 Holsteins, 16 ½ Sindhi x ½ Holstein, 3 ¼ Sindhi x Holstein) are on experiment. In general, the Sindhi crosses show higher average values for hemoglobin, hematocrit and plasma Ca. One-year averages (tentative) are as follows:

<table>
<thead>
<tr>
<th>Breed</th>
<th>Hemoglobin</th>
<th>Hematocrit</th>
<th>Calcium</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>mg %</td>
<td>mg %</td>
</tr>
<tr>
<td>Holstein</td>
<td>8.9</td>
<td>31.49</td>
<td>9.91</td>
<td>6.94</td>
</tr>
<tr>
<td>½ Sindhi</td>
<td>10.0</td>
<td>34.50</td>
<td>10.29</td>
<td>7.14</td>
</tr>
<tr>
<td>¼ Sindhi</td>
<td>9.62</td>
<td>37.00</td>
<td>10.27</td>
<td>6.46</td>
</tr>
</tbody>
</table>

**Sindhi x Brown Swiss (Hill Farm Experiment Station, Homer)**

Twenty-seven animals (8 Brown Swiss, 9 ½ Sindhi x ½ Brown Swiss, 8 ¼ Sindhi x ¾ Brown Swiss, 2 ¾ Sindhi x ¼ Brown Swiss) are on experiment. In general, the Sindhi crosses show higher average values for hemoglobin and hematocrit. One-year averages (tentative) are as follows:

<table>
<thead>
<tr>
<th>Breed</th>
<th>Hemoglobin</th>
<th>Hematocrit</th>
<th>Calcium</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>mg %</td>
<td>mg %</td>
</tr>
<tr>
<td>Brown Swiss</td>
<td>9.20</td>
<td>32.34</td>
<td>9.27</td>
<td>8.05</td>
</tr>
<tr>
<td>½ Sindhi</td>
<td>11.00</td>
<td>37.51</td>
<td>9.64</td>
<td>8.01</td>
</tr>
<tr>
<td>¼ Sindhi</td>
<td>9.30</td>
<td>33.68</td>
<td>9.60</td>
<td>8.25</td>
</tr>
<tr>
<td>¾ Sindhi</td>
<td>9.86</td>
<td>32.88</td>
<td>10.08</td>
<td>9.93</td>
</tr>
</tbody>
</table>

—L. L. Rusoff, J. E. Johnston, E. J. Stone,**

J. B. Frye, Jr. and D. Johns**

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*New Iberia Livestock Experiment Station, Jeanerette, La.

**Hill Farm Experiment Station, Homer.
A NEW ANTIOXIDANT FOR THE PREVENTION OF OXIDIZED FLAVORS IN STORED FROZEN CREAM

Studies in the use of some new antioxidants for the prevention of fat oxidation in stored frozen cream have recently been concluded. It had been previously reported that 0.04 per cent ethyl hydrocaffeate (a compound obtained from green coffee), prevented the development of an oxidized flavor in stored frozen cream for a period of 6 months in either glass or metal containers with .5 PPM copper added. It has since been found, however, that the 0.04 per cent concentration will prevent the oxidized flavor development for a 12-month storage period.

Trials using ascorbic acid with ethyl hydrocaffeate were also conducted. The cream used in the trials contained 40 per cent fat, pasteurized at 150° F. for 30 minutes, rapidly cooled to 40° F. and divided into four lots. Each lot was treated as follows:

1. Ethyl hydrocaffeate plus ascorbic acid.
2. Ethyl hydrocaffeate plus ascorbic acid plus 0.5 PPM copper.
3. Ascorbic acid only.
4. Ascorbic acid plus copper.

All samples were stored in metal containers (½ pint friction-top tinned cans). These were used to simulate commercial conditions as nearly as possible. The cream samples were placed in storage at -10° F. immediately after treatment and were examined for flavor every 30 days for a period of 6 months and then again at the end of 12 months.

The results of these trials indicate that ascorbic acid added to cream containing ethyl hydrocaffeate definitely prevented or delayed the development of oxidized flavors in all concentrations used. Ascorbic acid, when used alone, however, was not effective in preventing fat oxidation either with or without added copper. Ethyl hydrocaffeate at the .004 per cent level was effective in preventing the development of oxidized flavor in copper-contaminated cream to which had been added 25 mg. ascorbic acid per liter for a storage period of 12 months.

—A. J. Gelpi, Jr., L. L. Rusoff and Ernest Bryant

ACETYLATED MONOGLYCERIDES MIGHT POSSIBLY BE USED AS CHEESE COATING

The possibility of using certain acetylated monoglycerides as cheese coating are being investigated with the cooperation of the Southern Regional Research Laboratory at New Orleans and the Distillation Products Industries at Rochester, New York. In preliminary trials several monoglycerides with different degrees of acetylation were used. These products are commonly referred to
as acetostearins when fully saturated and acetooleins when unsaturated, and are both derived from lard or cotton seed oil. The preliminary work consisted mainly in attempting to work out a satisfactory, practical method of applying the coatings to the cheese surface. The first trials were made on small pieces of brick and Cheddar cheese, and the dipping time and temperature were varied until a satisfactory combination was reached.

The acetostearins used in the preliminary trials included products known as MVG-4-31; acetostearin no. 91; and Myvacet type 500. The samples were dipped at 200° F. for 10 seconds (the time and temperature found most satisfactory) and stored for curing at 45° F. and 55° F. (conventional curing temperatures). Samples of the same lots of cheese were dipped in cheese paraffin as controls. The cheese was observed for rind formation, surface mold and moisture loss. These trials were not satisfactory as a whole, which fact might be attributed to the crude method which had to be resorted to in applying the coating and also to the fact that neither the paraffin nor the acetostearins adhered well to the freshly cut cheese surfaces. The Myvacet type 500 proved to be the most promising from every angle.

In further trials with Myvacet type 500, a steam-heated dipping tank was installed and whole daisy-type (22 pounds) Cheddar cheese was treated under regular commercial conditions. Control cheese was dipped in regular cheese paraffin for comparison. Moisture analyses will be run periodically and mold growth on rind will be observed. Comparisons will be made with the paraffined controls stored under same conditions. Curing temperatures of 45° F. and 55° F. are also being used in these trials.

A. J. Gelpi, Jr.
Entomology

MALATHION SPRAY CONTROLS HOUSE FLIES IN POULTRY ESTABLISHMENTS

Recently there has been a trend in poultry egg production to use the single hen battery cage type of housing. There are many advantages in using this type of housing and the practice is becoming more popular throughout the South. One of the chief disadvantages or limitations to this system in Louisiana is the problem of fly control. The droppings accumulate beneath the cages and serve as an ideal breeding medium for the house fly, resulting in extremely large numbers of flies in and around the houses.

Tests for fly control were conducted on the L. S. U. poultry farm and in local commercial houses in 1953. Malathion spray at the rate of one pound of the technical chemical from emulsifiable concentrate and 20 pounds sugar per 100 gallons gave excellent control of both adult flies and maggots. The spray was applied with a three-gallon compressed air sprayer to the droppings area, cages and supports. An average of one quart of spray per 100 square feet of floor space was used in houses. Within 30 minutes after application practically 100 per cent kill of all adult flies was obtained. The application continued killing adults for approximately one week. The spray also killed all maggots within two hours after applying. It was found that a weekly spraying schedule maintained the fly population (both adults and maggots) at a minimum.

Spray application to the droppings in winter failed to effect larval control owing to the habits of the maggots of burying themselves deeply in the mass. The foul odor emanating from the droppings practically disappeared with larval control. The use of TEPP and lindane mixtures as baits for fly control gave a high mortality to adult flies for one to two days; however, no larval control was obtained with this method, and at the best only temporary reduction in fly population was possible.

Malathion is considered relatively safe to handle and use around poultry. No adverse effects on the birds or eggs were noticed where the spray was continually used for three months with the spray mist falling on the birds themselves. The over-all cost for preparing three gallons of spray at the 1953 price levels was approximately $0.80.

—E. H. Floyd, B. A. Tower and C. E. Smith
SOIL FUMIGATION FOR CONTROL OF THE NEMATODE-WILT COMPLEX OF COTTON

Tests conducted in Louisiana during 1951, 1952 and 1953 proved that on severely affected areas the nematode-wilt complex of cotton may be profitably controlled by soil fumigation. In seven tests conducted in such areas the average increase resulting from fumigation has been 829 pounds of seed cotton per acre. Cost of treatment in these tests has averaged less than $15 per acre. In similar tests in areas less severely affected, yields have not been increased by application of soil fumigants.

Results of these tests justify recommendations for control of nematodes affecting cotton in some areas of the state. Soil fumigation is recommended only in those areas where the nematode-wilt complex is so severe that stands of a susceptible variety such as Deltapine 15 cannot be maintained. Without fumigation, tolerant varieties such as Coker 100 Wilt yield much better than Deltapine 15 in severely affected areas and should be planted under such conditions. Where the disease complex is severe, yields of tolerant varieties have also been greatly increased by fumigation.

Ethylene dibromide (Dowfume W-85, Soilfume 85, etc.) applied at the rate of 2 gallons per acre or a mixture of dichloropropane-dichloropropane (D-D mixture) at the rate of 7 gallons per acre have given commercially practicable control of nematodes which attack cotton in Louisiana.

Recommendations for control of the nematode-wilt complex have been prepared in mimeographed form for distribution by the Extension Service.—L. D. Newsom and W. J. Martin*

EFFECT OF A NEMATODE-WILT COMPLEX ON GROWTH AND YIELD OF HALF AND HALF AND DELFOS 425 COTTON

The effect of a complex composed of plant parasitic nematodes and Fusarium wilt on the growth and yield of two cotton varieties was studied at Baton Rouge during 1953. Rotylenchulus reniformis was the most abundant nematode in the test area but members of the genera Helicotylenchus, Pratylenchus and Hoplolaimus were also present. Half and Half had been found to be highly susceptible to wilt when grown at this location in previous years while Delfos 425 was highly resistant. In a randomized, replicated, small-plot test half of each plot was fumigated April 13 with D-D mixture at the rate of 9 gallons per acre. Nematode populations were estimated from pint soil samples after separation from the soil by means of the modified Baermann technique. Height of plant was determined July 2, 15 and August 11. Wilt infection was determined July 2,

*Plant Pathology Department.
14, 29, August 10 and September 10. Yield and characters of seed and lint were determined by standard procedures.

The populations of parasitic nematodes per pint of soil the first week of June were as follows:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Rotylenchulus</th>
<th>Helicotylenchus</th>
<th>Pratylenchus</th>
<th>Hoplolaimus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half and Half—treated</td>
<td>94</td>
<td>54</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Half and Half—untreated</td>
<td>1030</td>
<td>508</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Delfos 425—treated</td>
<td>91</td>
<td>28</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Delfos 425—untreated</td>
<td>1590</td>
<td>528</td>
<td>3</td>
<td>15</td>
</tr>
</tbody>
</table>

Population of Rotylenchulus increased in both treated and untreated plots throughout the season but that of other species showed little change. Fumigation with D-D produced the following results: Height was increased an average of 20 per cent for Half and Half and 7 per cent for Delfos 425. Wilt incidence during the period July 2 to September 10 was decreased 35 per cent in Half and Half; delay in occurrence of infection appeared to be more important than reduction in percentage of plants infested. Incidence of wilt in Delfos 425 was reduced but the percentage of infected plants in untreated plots did not exceed 2.5 at any time so the effect of wilt on performance of this variety was considered to be negligible. Yield of lint was increased 190 pounds per acre, or 20 per cent, for Delfos 425 and 175 pounds, or 42 per cent, for Half and Half. Weight of bolls was increased significantly for both varieties. Seed index and lint per cent were not affected by treatment.—L. D. Newsom and J. E. Jones

![Mature females of Rotylenchulus reniformis surrounded by egg masses attached to a cotton root. (Photograph by H. B. Boudreaux.)](image)
SUGAR CANE INSECTS

Sugar Cane Borer

There was a further increase and spread of the sugar cane borer over the entire cane growing area in 1953. Two successive mild winters favoring successful overwintering of large populations of borers and more extensive planting of susceptible varieties of cane were responsible for the increase in seriousness of the problem.

Cultural Practices for Destroying Overwintering Borers—Studies to determine the best cultural practices for destroying overwintering borers were continued. Under relatively mild weather conditions, the population of borers in cane pieces, suckers, stunted stalks and tops was reduced by various treatments as follows: chopping and pulling the soil back on the row, 76 per cent; chopping and wrapping in the middles, 88 per cent; wrapping alone, 84 per cent; shaving the tops of the row and wrapping, 92 per cent; and with nothing done, 20 per cent. Shaving and wrapping is the most effective practice, since this operation clears the top of rows of tall stubbles and pieces of cane which may harbor large enough populations of borers to produce heavy infestations in the spring. For wrapping to be most effective, thorough burning is necessary to reduce the amount of leaves and tops since this material prevents a tight wrap. These studies have shown the need of some device to clean the top of the rows of cane pieces where shaving is not desired. A majority of the cane growers are now using the wrapping operation in their borer control program.

One of the objectives of the above work was to create interest in the development of a cane top shredder by the builders of sugar cane harvesting machines. A shredder built by the Thompson Machinery Company was under observation and test during the harvesting season. Preliminary data revealed that more than 90 per cent of the borers in joints attached to the tops were killed by the device. Shredding the material is advantageous in adding humus to the soil and has been found to make wrapping more effective.

Chemical Control—Insecticidal control studies were designed to secure data on the savings from first generation control in cane sufficiently advanced to be forming joints during attack by this generation; to compare the relative effectiveness of 1, 2, 3 and 4 applications of cryolite and Ryania against the first and against second generations; the savings from 4 applications each on second and third generation; and the comparative effectiveness of Ryania, regular cryolite and a cryolite material of a lower sodium fluoaluminate content.

The results reveal that in a majority of fields at least four
applications of insecticides are necessary and that for most effective control as many as four against each second and third gener-

Cultural practices for destruction of overwintering cane borers. Top picture, plot showing material wrapped in middles without shaving; bottom, plot in which rows were shaved and material wrapped in the middles.
ation borers are desirable. It was also evident that under the early growing conditions prevailing in the spring of 1953, which promoted joint formation during first generation attack, the injury to the lower joints by the first generation is important and should...
be prevented. The cryolite material of a lower sodium fluoaluminate content compared favorably with 40 per cent Ryania in plane tests on second and third generation control; however, in a small-plot test with hand-gun application it was much inferior. About 65,000 acres of cane and corn were dusted for borer control in 1953.

**Biological Control**—A laboratory for the mass production of the Trichogramma parasite of borer eggs was designed, built and operated in 1953. A total of 69,335,000 parasites were produced, of which 59,430,000 were released by growers to aid in the control of the sugar cane borer. The growers expressed the desire for 269,893,000 Trichogramma, but because of the inability to produce that many each farm was limited to a quota of 250,000.

**Varietal Resistance**—In the fall of 1952, 49 canes showing resistance to the borer were selected from plantings of seedling selections, agronomists’ plots, and outfield variety plots of both the Louisiana and Federal Stations. These canes were planted in a plot on the Houma Station and were observed for resistance under a heavy borer infestation. Some of the canes showed a definite resistance. Thirty-four more selections were added to the plot in 1953. This plot will be resel ected each year and continued indefinitely as a possible source of new resistant varieties or resistant breeding material.

**Soil Insects**

Several additional soil insect tests were harvested to add to the data already collected on the subject. Chlordane has given the most consistent results for control of small soil insects and soil animals as well as wireworms. In a total of 25 tests conducted by both stations, chlordane at the rate of 2 to 4 pounds of technical material per acre has resulted in an average gain of 2.8 tons of cane and 463 pounds of sugar per acre in black heavy soils. No gains have been obtained in the light sandy soils. There appear to be possibilities in the use of a combination treatment of soil insecticides and fungicides.

—*A. L. Dugas, E. J. Concienne, James Brazzel* and *C. E. Smith*

**ORNAMENTAL PEST CONTROL WITH INSECTICIDES**

Results of tests during 1952 and 1953 showed that the phosphate insecticides malathion and demeton are very effective for control of aphids on roses. The systemic insecticide demeton exhibited longer residual effectiveness, but its toxicity hazard to the applicator presents a problem which makes small package distribution questionable. Both insecticides were satisfactory for control of spider mites on roses and azalea.
Uovotran and aramite were effective for control of the spider mite, *Paratetranychus ilicis* (McG.), which is a serious pest of azalea during the winter and early spring. These two chemicals have acaricidal properties only.

The attack of chrysanthemums by thrips and aphids during blossom development period makes control of these pests more difficult because of susceptibility to injury and objectionable insecticide residues. Insecticides prepared from emulsifiable concentrates do not leave unsightly residues. Results of a study made during 1953 to determine whether emulsifiable concentrates can be used on chrysanthemums after blooms show color showed that malathion (.5 pound per 100 gallons), and mixtures of DDT-demeton (.5 pound DDT and .25 pound demeton), or dieldrin-demeton (.15 pound dieldrin and .25 pound demeton per 100 gallons) were effective for both thrips and aphid control and resulted in no injury to the flowers.—*J. S. Roussel and C. E. Smith

**PROPER DDT DUSTING SCHEDULE CONTROLS EARWORMS IN SWEET CORN**

The experiments begun several years ago in an effort to develop a satisfactory control for the earworm damaging sweet corn in Louisiana were continued in 1953. Tests in previous years have shown the danger of using sprays containing oil on corn. It was found that under certain weather conditions the oil sprays severely damaged the plant and reduced yield. As a result of these experiences subsequent tests have been limited to the development of an adequate program of control using DDT dust. (See Annual Report, 1951-52.) Tests in 1953 consisted of two experiments on Golden Cross Bantam corn using 10 per cent DDT dust at different numbers and intervals of application. Both the conventional and bellows type of hand-operated dusters were used. The rotary dusters required from 25 to 35 pounds of dust per acre per application compared to 15 to 25 pounds for the bellows-type duster. Applications were made at 2- and 3-day intervals beginning at first silking and continuing for 3, 4 and 5 applications. All treatment schedules proved highly superior over the check in producing worm-free ears. The best control was secured when 5 applications were made at 2-day intervals using a bellows-type duster. The schedule gave an average of 93 per cent undamaged ears compared to 29 per cent in the check. There was a tendency for better control in all the schedules where the bellows-type duster was used. In all cases the 2-day schedule was superior to the 3-day schedule regardless of the total number of applications involved.

—*E. H. Floyd and C. E. Smith*
TREATMENT OF SEED CORN CONTROLS SOIL INSECTS INJURIOUS TO CORN

Experiments begun several years ago using soil poisons and seed treatments to control soil insects which damage corn before and after emergence were continued in 1953. Previous tests have shown that treatment of the seedbed with several organic insecticides gave excellent control of all the pests involved. However, owing to the habits of the insects concerned under Louisiana conditions, practically complete protection to the crop was found possible through merely treating the corn seed before planting, using a slurry prepared from chlordane or lindane and thiram. Work in 1953 on sweet corn involved the use of chlordane and lindane both with and without thiram as seed treatments. Golden Cross and Aristoeold varieties of corn were used. All of the seed treatments proved effective in controlling the southern corn rootworm and resulted in increased yields. Untreated plots produced an average of 945 dozen ears per acre compared to an average of 1,350 dozen from the treated plots. The increases in yields in treated plots were due to increased stands and vigor. No injury occurred from any of the treatments used on the seed in the 1953 experiment. However, tests in previous years have shown that the insecticides used alone may cause a certain degree of damage. This injury is not noticeable when chlordane is used in combination with thiram and is greatly lessened in the case of the lindane-thiram combination. Injury to corn seedlings by the lindane mixture appears to be more pronounced during periods of dry weather. Affected plants are flattened near the crown and stunted.

Experiments were conducted in North and South Louisiana with treated field corn seed. Insect species of importance in these tests were the southern corn rootworm and the sand wireworm.

The chlordane-thiram treatments proved effective in protecting corn from injury by the sand wireworm in North Louisiana. Plots planted with treated seed had better stands and healthier plants. Treated plots averaged 24 bushels per acre compared to 15½ where untreated seed was used. Tests in South Louisiana were conducted using chlordane, aldrin and heptachlor, each with thiram, as seed treatment formulations, and with ¾ pounds chlordane per acre derived from granulated material applied as a drill treatment, and lindane at the rate of ½ ounce per acre applied in planting water. All treatments proved approximately equally effective in controlling the southern corn rootworm and protecting the young plants. In one test (located on the L. S. U. Sugar farm*) treated plots averaged 9,400 plants per acre compared to 3,800

*Conducted in cooperation with E. C. Simon, Agronomist, Louisiana Sugar Experiment Station.
SOIL CHEMICALS OFFER PROMISE FOR CONTROL OF SWEET POTATO WEEVIL AND OTHER INSECTS DAMAGING SWEET POTATO TUBERS

Previous studies with chlordane used as a soil treatment before setting the slips have shown this material is somewhat effective in reducing injury by the sweet potato weevil and also gives considerable control of several miscellaneous species of soil insects which damage the surface of developing tubers. These studies were enlarged in 1953 and included chlordane, aldrin, and heptachlor used as soil poisons, and calcium arsenate as a dust on the growing plant. The new granular formulation of the chemicals was used and applied both as a bed treatment and broadcast over the entire area. Aldrin applied at the rate of 3 pounds of the technical chemical per acre gave the highest degree of control of the miscellaneous soil insects and as good control of the sweet potato weevil as was obtained by dusting with calcium arsenate. All of the chemicals used gave fair control of these insects. Heptachlor was superior to chlordane. In one test treated with aldrin only one-half of one per cent of the potatoes were damaged on the surface by soil insects, whereas potatoes from untreated plots averaged 14 per cent. Sweet potato weevil damage was reduced by approximately 60 per cent by both aldrin and calcium arsenate treatments. Miscellaneous soil insect species responsible for damaging the surface of potatoes in Louisiana are white grubs, wireworms, mole crickets, flea-beetle larvae and perhaps others.—E. H. Floyd and C. E. Smith

SOIL RESIDUES FROM FOLIAR APPLICATION OF TOXAPHENE AND BHC-DDT MIXTURES

Insecticide residue study plots were established on Olivier and Sharkey soil types in 1951. Toxaphene and BHC-DDT mixture were the insecticides chosen for study since they were the most widely used on cotton at the time. The insecticides were applied to the foliage at 5-day intervals for a total of 10 applications beginning when the cotton started fruiting freely. Two rates of application were made with each insecticide for each soil type. Toxaphene was applied at the rate of 20 and 40 pounds of technical toxaphene per acre per year; the BHC-DDT mixture was applied at the rate of 3 and 6 pounds gamma BHC and 5 and 10 pounds of technical

81
DDT per acre per year. The same schedule of applications has been repeated in succeeding years on cotton growing in these plots.

Insecticide residues have been assayed by both chemical and biological techniques. Effect on germination has been determined each year for the following crops: oats, var. Camellia; turnip, var., Purple top; pea, var. Creole; and hairy vetch. No effect on germination of any of these crops has occurred during the three years. Soil extracts of samples taken from the plots have been bioassayed with Drosophila melanogaster Meig. as the test insect. Results have not indicated the presence of any toxic residues. Chemical analyses of soil extracts have indicated the accumulation of small residues of the insecticides in both soil types. The fact that these residues are not toxic to Drosophila is of interest. These studies will be continued.


EXTENDING THE INTERVAL BETWEEN INSECTICIDE APPLICATION FOR COTTON INSECT CONTROL

During the last three seasons attention has been directed toward extending the interval between insecticide applications for control of cotton insects. Concentrated spray mixtures containing dieldrin at the rate of 0.25 and DDT at the rate of 0.5 to 1.0 pound per acre applied at 7-day intervals gave adequate control of moderate boll weevil infestations and excellent control of heavy bollworm infestations. Where boll weevil infestations have been heavy it has been necessary to decrease the interval between applications to 5 days in order to obtain satisfactory control. Concentrated spray mixtures containing dieldrin at 0.15 and DDT at 0.5 pound per acre, or endrin at 0.2 pound per acre, applied at 7-day intervals failed to give adequate control of boll weevil but gave excellent bollworm control in tests during 1953.

—L. D. Newsom, J. S. Roussel and C. E. Smith

PROTECTION OF STORED CORN FROM INSECT DAMAGE

The studies using lindane to protect corn from damage by stored grain insects were continued during the 1952-53 storage season. Previous work in 1952 showed the value of lindane impregnated on small pieces of corn cobs in the control of grain insects. Tests in 1952-53 were conducted using cob pieces impregnated with lindane on snapped, shucked and shelled corn in both 55-gallon drums and in farm cribs. The lindane was used in dosages varying from 1/10 gram to 5 grams per barrel of corn. The purpose of the tests in steel drums was to determine the relative values of different dosages and the placement of the impregnated cobs in the
corn mass. After 11 months' storage under conditions favoring insect development, 1½ grams of lindane per barrel of shucked corn when retained in the center of the mass contained an average of 18 per cent of the kernels damaged by insects. When the same amount of lindane was retained on the bottom of the containers the infestation averaged 72 per cent of the kernels damaged. Untreated corn in the test had 100 per cent of the kernels damaged at the end of nine months.

Snapped corn in similar small-scale tests was not protected as well as shucked corn. Lindane at the rate of 5 grams per barrel contained 34 per cent damaged kernels after 11 months compared to 50 per cent in the untreated lots. However, under practical storage conditions in farm cribs containing corn of the same variety and of equal initial infestation, snapped corn treated with 1 gram of lindane per barrel of corn distributed in small screen cages uniformly throughout the corn mass gave very good protection for 11 months. Twenty-seven per cent of the kernels were damaged at the end of this period compared to 78 per cent in the untreated crib. Tests with shelled corn using one-half gram of lindane per bushel of grain showed that when the chemical was distributed throughout the corn mass the infestation was 17 per cent after 11 months. When the chemical was placed in a single mass in the center of the corn, the infestation was 84 per cent at the end of 9 months' storage and the corn was so mouldly that the test had to be discontinued.

These studies show the value of this chemical in the protection of stored corn. They also show that the important point in its use is not the dosage used but its distribution. The use of lindane on grain has not as yet been accepted by the Pure Food and Drug Administration.—E. H. Floyd and C. E. Smith

ONION YIELDS INCREASED WHEN THRIPS ARE CONTROLLED

Work begun in 1950 using DDT in various forms to control onion thrips was continued in 1953 in conjunction with fungicidal sprays to control mildew.

The purpose of these studies is to develop a schedule of spraying which will be more effective than DDT dust now in use to control thrips, and to develop a combination spray which will protect the plants from both thrips and mildew. DDT as a wettable powder at 3 pounds 50 per cent per 100 gallons plus 3 pounds dithane Z-78 and 1 pint of a special wetting agent compared favorably with ½ per cent DDT emulsion plus dithane for control of thrips in 1953. The thrips population in 1953 was far below average. Experiments in previous years under severe thrips infestation have shown
that 4 applications of the emulsifiable form of DDT were as effective as 6 applications of the wettable powder form. All treatments in 1953 reduced the thrips population to a seasonal average of 4 per plant as compared to an average of 24 per plant in the checks. The average increase in yield of onions as a result of thrips control was 1,586 pounds per acre. Since there was no development of mildew on onions in 1953 this increase in yield is attributed to the control of thrips.—E. H. Floyd, C. E. Smith and E. C. Tims
Feed and Fertilizer Laboratory

ACTIVITIES OF THE LABORATORY

The principal function of this laboratory is to analyze official samples of feeds, fertilizers and pesticides for the Louisiana Department of Agriculture and Immigration. These analyses are for purposes of law enforcement. During the past year most products examined were found to comply with claims made for them.

Several hundred miscellaneous samples were analyzed for people of the state and for other departments of the Experiment Station. Examinations of saliva and urine samples for presence of "dope" were made daily during the racing season for the Louisiana Racing Commission.

Various of the laboratory personnel carried on research and collaborative work on improvement of existing analytical methods and development of new methods—E. A. Epps
Forestry

NATURAL REPRODUCTION FOLLOWING HARVEST CUTTING OF LOBLOLLY PINE ON MISSISSIPPI TERRACE SOILS

The use of fire alone proved ineffective as a means of bringing about natural regeneration of loblolly pine (Pinus taeda L.) on river terrace soils. A cutover area near Kleinpeter, Louisiana, afforded opportunity to seek means of perpetuating pine on a site normally in hardwood cover exclusively. An accidental stand of pine, originating on an abandoned field from nearby yard seed trees, reached maturity and was cut in 1942. Adequate seed source was left and regeneration was obtained, but an untimely fire destroyed it. Hardwood brush, briars and weeds at once took over the site and by 1947 only about 10 per cent of the area was in pine reproduction, most of it severely suppressed by brush. Since the seed trees were still standing, attempts were made to obtain a new crop of pine seedlings.

In the fall of 1948 the area was severely burned. The fire removed the low vegetation, killed back hardwood saplings to the ground and did not injure the pine seed trees. The latter produced an estimated sound seed crop of about 50,000 seeds per acre, which fell sporadically and in a spotty distribution pattern over the entire winter of 1948-1949.

Despite the seedbed preparation and a fairly adequate amount of seed, the seedling crop of 1949 was disappointing. Some seed had undoubtedly been destroyed by rodents and birds over the winter. There was no known inhibiting factor to germination. A dense annual weed crop probably smothered numerous seedlings over the summer. A seedling count in the fall of 1949 showed that less than 35 per cent of the area was stocked to pine.

In 1950 the burning treatment was repeated. This time the burn was too light and spotty to be effective. An estimated seed crop of 200,000 seeds per acre was put down that season, but once again few seedlings could be found the following spring. In compliance with the wishes of the owner of the tract, further attempts to reproduce the area to pine were abandoned and the remaining seed trees were sold and cut in the summer of 1951.

Two alternative ways of overcoming these difficulties should be noted. One, the area could not only be burned but worked over thoroughly with brush-cutting and scarifying machinery to get a good seedbed. However, seed losses to rodents and birds would
still occur and annual weeds would continue to be a serious problem. The other solution would be to burn and then plant one-year-old nursery-grown seedlings. The latter was actually tried on a small scale and appeared to be successful. After 4 years in the ground an experimental planting showed 78 per cent survival and the surviving trees averaged 7.4 feet in height.

Both treatments would be expensive, costing up to $20 per acre. It is probable that few owners would care to invest so heavily in establishment of a pine crop on heavy soils where pine does not normally grow. Efforts to raise pine should be confined to the lighter soils where, given an even start, it can compete more successfully with the climax hardwood cover.—A. B. Crow

EXPERIMENTAL AND DEMONSTRATIONAL TREE PLANTING IN WASHINGTON PARISH

This pine plantation, now in its fifth growing season, is making rapid height growth and is becoming increasingly obvious as a contrast to the open range that surrounds it. Inasmuch as this part of the Southeast Louisiana Livestock Experiment Station Farm is still not under fence and is subject to open range cattle grazing, no additions to the original plantations have been made and none are contemplated as long as this situation exists.

Examinations and measurements were made on June 11, 1953. The following table summarizes the results:

<table>
<thead>
<tr>
<th>Species</th>
<th>Year Planted</th>
<th>Age, Years</th>
<th>Survival %</th>
<th>Ave. Ave. Height Feet</th>
<th>Ht. Growth Past Year</th>
<th>Fusiform Rust Infect. %</th>
<th>Brown Spot Infect. %</th>
<th>Out of &quot;Grass&quot; %</th>
<th>No. of Seedlings Checked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slash pine</td>
<td>Feb./49</td>
<td>4½</td>
<td>64</td>
<td>9.0</td>
<td>3.3’</td>
<td>28</td>
<td></td>
<td></td>
<td>1651</td>
</tr>
<tr>
<td>Loblolly pine</td>
<td>Feb./49</td>
<td>4½</td>
<td>83</td>
<td>6.1</td>
<td>1.6’</td>
<td>13</td>
<td></td>
<td></td>
<td>1657</td>
</tr>
<tr>
<td>Longleaf pine</td>
<td>Feb./50</td>
<td>1½</td>
<td>49</td>
<td></td>
<td></td>
<td>32</td>
<td>19</td>
<td>2226</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feb./51</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feb./52</td>
<td>3½</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slash pine</td>
<td>Feb./50</td>
<td>2½</td>
<td>85</td>
<td>6.3</td>
<td>2.6’</td>
<td>16</td>
<td></td>
<td></td>
<td>825</td>
</tr>
<tr>
<td></td>
<td>Feb./51</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Developments of this plantation through 1953 warrant the following statements:

1. Slash pine seedlings have made the greatest total height growth, the greatest height growth during the previous year and in general exhibit the best vigor and all-around appearance. On the other hand they have the lowest survival, the greatest amount of fusiform rust infection and have shown a disturbing amount of
annual mortality during the past few years. In the last four years survival has dropped from 74 per cent to 64 per cent; most of this decrease is believed due to rust infection. At present, 28 per cent of the living trees are "cankered." If all of these trees should die during the next 10 years, an understocked stand will result.

2. Loblolly pine seedlings have survived better than any other species in the test but have made rather poor height growth when compared to the slash pine. This condition can be charged to a heavy infestation of pine tip moths. This hazard should become less serious during the next few years as the trees outgrow the attack. This species has about one-half the rust infection of comparable slash pine seedlings. Mortality from this cause has also been very low.

3. Longleaf survival has been very poor when it is considered the area has been planted two or three times. About one-fifth of all living seedlings have come out of the "grass stage" and initiated height growth, but at best the stand will always be badly understocked.

4. The temporary fence built four years ago to protect the young seedlings from cattle grazing is no longer serviceable. Practically all posts have failed and cattle have grazed the area during the past year. During the summer months, however, they did not reduce the grass rough as much as was hoped and during the winter months some browsing on the smaller seedlings was evident. Most slash and loblolly pines were tall enough to escape serious damage but the longleaf seedlings just coming out of the grass suffered some needle loss. If this condition develops again next winter, it is planned to spray the seedlings with a chemical repellent.

—Martin B. Applequist

FENCE POST SERVICE TESTS

Two new post series, Texas cedar and pole or sap cypress, were installed on the Fence Post Farm during 1953. This brings the total number of posts in this test to 970. It is hoped that one or two more series can be set during 1954, thus including a total of 41 different species or series on which service test data will eventually be obtained. This cross-section will include practically all types of native post materials commonly used in Louisiana.

The annual inspection and service testing of all posts was made during December 1953. It resulted in 135 post failures, slightly less than the 144 for the previous year. A total of 313 posts have failed thus far, or about one-third of all posts in the test.
Table 1 summarizes the results of all post failures that have occurred thus far.

### TABLE 1. Summary of Fence Post Failures

<table>
<thead>
<tr>
<th>Species</th>
<th>Total No. Posts Tested</th>
<th>Total No. Failures</th>
<th>Years Since Set</th>
<th>Average Service Life</th>
<th>Primary Cause of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweetgum “peeled”</td>
<td>25</td>
<td>25</td>
<td>2½</td>
<td>1.4</td>
<td>24</td>
</tr>
<tr>
<td>Ironwood (bluebeech)</td>
<td>25</td>
<td>25</td>
<td>2½</td>
<td>1.9</td>
<td>19</td>
</tr>
<tr>
<td>Cottonwood</td>
<td>25</td>
<td>25</td>
<td>3½</td>
<td>2.4</td>
<td>18</td>
</tr>
<tr>
<td>Sweetgum (unpeeled)</td>
<td>25</td>
<td>24</td>
<td>3½</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Black willow</td>
<td>25</td>
<td>23</td>
<td>3½</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Loblolly pine</td>
<td>25</td>
<td>22</td>
<td>2½</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Cherrybark oak</td>
<td>25</td>
<td>21</td>
<td>3½</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Sweet pecan</td>
<td>24</td>
<td>21</td>
<td>3½</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Honeylocust</td>
<td>25</td>
<td>20</td>
<td>3½</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Longleaf pine</td>
<td>25</td>
<td>20</td>
<td>2½</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Loblolly pine “peeled”</td>
<td>25</td>
<td>18</td>
<td>2½</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Blackgum</td>
<td>25</td>
<td>17</td>
<td>2½</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Water oak</td>
<td>25</td>
<td>15</td>
<td>3½</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Black cherry</td>
<td>25</td>
<td>13</td>
<td>3½</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Hickory</td>
<td>22</td>
<td>10</td>
<td>2½</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Red mulberry</td>
<td>25</td>
<td>7</td>
<td>2½</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Sassafras</td>
<td>25</td>
<td>4</td>
<td>3½</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Redcedar</td>
<td>25</td>
<td>1</td>
<td>3½</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Used crosstie-split</td>
<td>25</td>
<td>1</td>
<td>2½</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>White oak (Wash. Parish)</td>
<td>25</td>
<td>1</td>
<td>1½</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>496</strong></td>
<td><strong>313</strong></td>
<td></td>
<td><strong>253</strong></td>
<td><strong>56</strong></td>
</tr>
</tbody>
</table>

*Dry rot failures 6”-24” above groundline.

In three series, “peeled” sweetgum, ironwood and cотовood, all 25 posts have failed and an average service life has been calculated based on the results obtained. This service life figure is strictly a mathematical average; all cотовood posts cannot be expected to give 2.4 years of service. In addition to the above three series, it is very likely that another eight or ten series will show complete failure next year. Included in this group are honeylocust and cherrybark oak, two species that are commonly considered fair to moderate in natural durability. Similarly, over one-half of the posts have already failed in black cherry, a species of moderate durability. Perhaps the most unexpected failures have occurred in the mulberry series. Over one-third have failed in the species, generally classed in the durable to very durable group.

About four-fifths of all failures have been caused by the usual rot and decay fungi. In many of these posts, large grub-like borers were present but in insufficient numbers to be important. In about 18 per cent of all failures, however, these borers were so numerous as to be considered the primary cause of failure. Many posts were
literally riddled by the borer channels; in one post ten live grubs were counted.

For the first time since inspections began termites were noted. They were not abundant however and have been secondary causes of failure.—Martin B. Applequist

PERMANENT MANAGEMENT PLOTS

Ten one-half acre plots were established during the winter of 1937-38 in selectively cut pine stands of St. Helena Parish. The location of all trees 1.1 inch and up and all stumps was mapped. Diameter, height and age of all trees were recorded. Three continuous mil-acre strips were laid out and permanent markers placed for future checks. On each mil-acre (6.6 x 6.6 feet) all pine reproduction was listed by size classes. Also the portion of each plot overshadowed by hardwood was expressed in per cent. The plots have been selectively cut one or more times since 1937. One plot, Number 3, has been burned regularly so that it is clear of both pine reproduction and hardwood brush.

Complete checks have been made at the end of each five-year period. Growth and basal area for each one-half acre are given in the table below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.87</td>
<td>31.73</td>
<td>8.89</td>
<td>10.75</td>
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<td>2</td>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>20.45</td>
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<td>11.74</td>
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<tr>
<td>10</td>
<td>6.14</td>
<td>4.68</td>
<td>5.45</td>
<td>3.99</td>
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</tr>
</tbody>
</table>

Growth on small crowned trees that had passed the stage of rapid height growth when cut was made 1935-36, has been slow even though released from competition.

Hardwood basal areas 1952-53 were: 1—None, 2—1.74, 3—None, 4—6.62, 5—1.84, 6—0.12, 7—7.50, 8—0.82, 9—4.33 and 10—2.68 square feet per one-half acre plot.

90
Natural restocking and growth of reproduction on the 75 mil-acres per one-half acre plot are given below. Also listed is the average portion of the mil-acre plots over-shadowed by hardwood.

<table>
<thead>
<tr>
<th>Mil-Acre Plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
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<td>3</td>
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<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Hardwood brush covered an average of 24.3 per cent of the mil-acre plots in 1942-43. This had more than doubled 10 years later, reaching an average of 56.4 per cent. Many small pines that have reached a height of 5 feet or more are still overtopped.

—Bryant A. Bateman
Home Economics

HUMAN NUTRITION

Nutritional Utilization of Carotene from Sweet Potatoes by Preadolescents

The experimental plan, methods and procedures of this carotene utilization experiment on 6 girls aged 8 to 11 years were presented in last year’s report. The serum levels of vitamin A and carotene were given.

The statistical analyses of the data have been made during this year. The average serum vitamin A and serum carotene values dropped when the subjects were on the basal diet devoid of carotene and vitamin A and rose when sweet potato was added. These differences in serum vitamin A and serum carotene proved to be significant at the 1 per cent level. The addition or omission of fat-free milk to the diet had no significant effect on serum levels of vitamin A. The protein and fat levels were kept constant throughout the experiment. An analysis of variance showed no significant differences between the performances of the six girls on either the basal or the experimental diets. This experiment offers evidence that the intake of carotene from sweet potatoes, in the quantities suggested by the National Research Council, maintains normal vitamin A serum levels in the absence of any preformed vitamin A.

—Dorothy S. Moschette, Kathryn Beamer, Laureame McBryde and Ruth Patrick

ENERGY ABSORPTION OF SIX PREADOLESCENT GIRLS ON A CONTROLLED DIETARY REGIME

A study was conducted to determine the energy absorption of six preadolescent girls on a controlled dietary regime. This experiment covered a period of 56 days. Aliquots of food eaten and feces excreted were collected daily. These samples were dried and analyzed for caloric content in an Emerson fuel calorimeter. From these analyses the caloric intake and caloric loss for each of eight periods were determined. The energy absorption of the girls was then determined obtaining the difference between the calories ingested and the calories lost through the feces.

The average daily caloric intake for all the subjects for the entire experiment was 2,097 calories. The average caloric fecal
loss was 60 calories per day. The coefficient of correlation between the mean daily caloric intake and the caloric loss was not close.

The average daily caloric intake per kilogram for the group was 77.7 calories and the average caloric loss was 2.3 calories per kilogram. This gave an average caloric absorption of 75.4 calories per kilogram. The correlation coefficient between the caloric loss per kilogram was significant, having a value of +0.735. There was a direct relationship between the caloric intake and the caloric absorption per kilogram, as indicated by the correlation coefficient of +0.998.

The mean caloric loss for the group was 2.9 per cent and the mean caloric absorption was 97.1 per cent of the mean daily caloric intake. The values for percentages of calories absorbed by the subjects were fairly constant, 96.6—97.8, regardless of the total intake.—Dorothy S. Moschette, Ruth Patrick and Paula Sue Richardson

**NITROGEN UTILIZATION OF PREADOLESCENT GIRLS**

There is no specific reference to data on nitrogen balance in children aged 6 to 11 in the literature covered by Chemical Abstracts during the period 1937 to present. In an attempt to add to the knowledge needed in this field nitrogen balances were determined on six girls 8 to 11 years of age. These subjects were on a regulated dietary regime computed to contain approximately 55 to 60 grams of protein and 2,000 calories daily for the five subjects 8 to 9 years of age. The 11-year-old subject was given approximately 75 grams of protein and 2,250 calories.

Micro-Kjeldahl analyses for total nitrogen were made on weekly composites of daily aliquots of food, urine and feces. The average daily nitrogen intake was found to be 10.0 grams (62.5 grams protein) for the five 8- and 9-year-old subjects and 12.0 grams (75.0 grams protein) for the 11-year-old. All the subjects stored nitrogen throughout the nine weeks of the experiments. The percentage retention was higher (16 to 22 per cent) for the 8- and 9-year-old subjects than for the 11-year-old (13 per cent).

—Kathryn Beamer and Ruth Patrick

**A LABORATORY AND WEAR STUDY OF CHAMBRAY DRESSES WITH CERTAIN HOME-APPLIED AND FACTORY-APPLIED FINISHES**

A laboratory and wear study of factory-applied and home-applied finishes on cotton dress chambray was conducted at Louisiana State University between October 1950 and December 1953.*

*Copies of the complete report may be obtained by writing Dr. Clara Tucker, Head, Department of Home Economics, Louisiana State University, Baton Rouge, La.
The results of the laboratory phase were published in the Journal of Home Economics for October 1952. The same fabrics, procedures and methods of analysis were used throughout the study. The final report covers controls, final laboratory results and results of the wear study. Home finish described in the first report as "K Starch" was Permastarch, "P A Starch" was Korex, and "Wax Starch" was Brisk.

Major results are summarized as follows:

1. Only four of 31 dresses were worn out when called in at the end of the study. Dress style rather than fabric failure seems to have been the factor which caused trouble. Splitting at the top of the sleeves occurred in three dresses, and underarm, too, in one. The one untreated dress was completely worn out. Considerable strength remained in all except the latter fabric.

2. Treated fabrics in both the home- and factory-finished groups were stronger at the end of the study than the untreated fabrics. Several fabrics were stronger at the end than at the beginning of the study. Loss of strength in factory-finished fabrics was temporary, lasting only until fabrics were laundered. No finish affected strength adversely.

3. Size, habits and activity of the wearers had little bearing on results, in the final analysis.

4. Color was more adversely affected by factors involved in the wear study than by those involved in laboratory study, but was not directly related to hours of wear or to laundry methods used. There was a tendency for more severe fading with increased wear and washing, however.

5. Crease recovery was more affected by the wear than by the laboratory study. Only the crease resistant treated fabric had "good" recovery at the end of the wear study.

6. Laboratory procedures had a more adverse effect on strength than actual wear and care, while the latter had a greater adverse effect on crease recovery. Weight per square yard tended to decrease with laboratory treatment, but not in actual wear. The greater uniformity of procedure in the laboratory and severity of the wash tests probably account for the difference. In many instances the laboratory treatment was carried further than in actual wear.

7. There was no tendency for fabric weight to change consistently in one direction or the other with either laboratory or wear treatment.

8. No one method of laundry had more adverse effect than any other, either in manner of washing or detergent used.

Both classes of finishes were generally liked by wearers. It was concluded that both the factory and the home-applied finishes used were considered desirable by consumers.—Evelyn E. Stout
The major purposes of the nutrition education research project have been (1) to develop tests and testing procedures through which a school or a community can appraise the effectiveness of its nutrition education program; and (2) to explore means of improving nutrition education programs.

A study designed to explore the conditions hindering homemakers from serving their families more nutritious meals was reported in the November 1953 issue of the Journal of Home Economics. The study conducted by Dr. Clara Tucker and Dr. Ray Loree was entitled "Hurdles to Good Food Practices." For the population included in this study, it was found that the food attitudes of the homemaker were more predictive of the quality of the meals served in the home than was the income of the family.

Louisiana Bulletin No. 481, "Evaluative Processes in Home Economics. I. Foods and Nutrition," by M. Ray Loree and Kathryn R. Mackensen, was published in June 1953. This bulletin was written to help home economics teachers throughout the state evaluate outcomes of courses in foods and nutrition. The manual was an outgrowth of research and experimental tryouts of tests administered to Louisiana school children. A second bulletin, "Evaluative Process in Home Economics. II. Child Development," is in preparation.

The scope of the research project has been broadened to include all phases of child development and hence the project has been renamed "Child Development."—M. R. Loree
Horticultural Research

CABBAGE BREEDING AND VARIETY TRIALS

Stock seed from a selected line of the Allyear variety was grown in Denmark. Other selections have been made from segregating lines of Allyear in an attempt to obtain strains suitable for both spring and fall plantings. Selections from crosses made between Allyear and Bonanza are now in the $F_2$ and $F_3$ generations. This material is segregating and many lines are being carried.

Results of the spring variety test conducted at Breaux Bridge show that the highest total yield, 15,028 pounds per acre, was obtained from Copenhagen Market. Detroit Resistant ranked second with a yield of 14,810 pounds and Medium Copenhagen ranked third with 14,026 pounds. Although Allyear yielded less than the three mentioned above, its quality was the best of all varieties tested. Medium Copenhagen is resistant to cabbage yellows and should be planted where this disease is prevalent.

Dry weather conditions made it impossible to obtain an adequate stand in the fall trials.

—John J. Mikell, Julian C. Miller and James F. Fontenot

BREEDING OKRA FOR FRESH MARKET, PROCESSING AND OIL PRODUCTION

The research was continued toward the development of better varieties of okra for fresh market, canning, freezing and the production of oil. Several lines have been selected for their superior features and are being purified and increased. The hybridization program is still being carried on, and new selections are being made in view of new requirements of varieties to fulfill specific needs.

Okra for Fresh Market

Several of our lines look promising with respect to pod color and shape and to plant type and productivity. An ideal market variety should have a dwarf plant type with narrow leaves. It must also produce high yields over a relatively long period of the season. These characteristics are present only in a variety with shortened internodes which show profuse lateral branching. Pods for fresh market must be of dark green color and have the ability to withstand fairly long periods of display.

Okra for Processing

The most important varieties being grown in Louisiana for canning or soup stock are Louisiana Green Velvet and Emerald.
The canners require that a variety have the same features as those of a fresh market variety, except for pod shape. An ideal pod for canning is long, thin, straight and dark green.

Increasing interest in the freezing prospects of okra has prompted the conduction of freezing tests on Louisiana Green Velvet, Louisiana Market, Emerald, and Gold Coast varieties and several of our most promising seedlings. Pods of Emerald have been found to collapse badly after freezing and are inconvenient to pack for freezing. Louisiana Market has a desirable pod shape and texture for freezing, but its color is not as dark green after blanching as that of some of the other varieties and seedlings. Several of our seedlings have exhibited desirable pod features for freezing and canning along with preferred plant type characteristics.

Okra for Oil

In view of the demand for vegetable oils to be used as edible oils, the importance of breeding a variety high in oil production per acre is still being emphasized in the breeding program. An average seedling (L-34) selected for this purpose produced 1,493 pounds of dry okra seed last year, which contained 15.4 per cent oil, thus yielding approximately 230 pounds of oil. Another seedling (L-5-1) produced seeds having 18.63 per cent oil content. This compares favorably with the oil content of Louisiana Green Velvet, our leading variety, which contained about 15 per cent oil last year.—Lloyd G. Jones, Julian C. Miller, W. F. Wilson and W. A. Sistrunk

ONION BREEDING

The primary objectives of the onion breeding program remain the improvement of the Creole variety through selection for deeper red color, high solids, higher yields, non bolting, non splitting, disease resistance and elimination of white and off-color bulbs. Inbred lines, hybrids and standard varieties are being grown and observed with the above objectives in mind. Yield tests are being grown at Chase, Baton Rouge and Diamond in which a total of 42 hybrids and varieties are included.

Yield Trials

In the test at Diamond, Granex and Texas Early Grano 502 were the two outstanding varieties. Total yields of all varieties, except the Creole, were reduced because of purple blotch. This disease also tends to reduce keeping qualities since it prevents the bulbs from maturing normally.

At Baton Rouge the trials suffered from both purple blotch and unusually adverse weather at harvest time, conditions which
caused much rotting in the field. Outstanding varieties were Granex, Texas Grano 502, Calred, San Joaquin and two experimental hybrids, H 514 and H 515.

The tests at Chase were relatively free from diseases. There again, however, the three outstanding varieties were Texas Early Grano 502, Granex and San Joaquin.

Disease Studies

As mentioned above purple blotch was very serious in the 1953 season in South Louisiana. The yield plots at Baton Rouge and Diamond were badly infected in spite of repeated sprays with Dithane. The plots in North Louisiana had an early infection which did not develop because of subsequent lower relative humidity. It was noted that most Creole lines were more resistant to purple blotch than most of the short-day type onions, and that resistance seemed to be lost as the onions neared maturity. Some types, such as Granex, made sufficient early growth before the purple blotch attacks so that yields were not seriously lowered. However, affected plants matured with the killed tops standing erect and necks full of moisture. This condition resulted in much rotting of the bulbs in storage. The variety Calred was highly resistant to purple blotch at Baton Rouge.

Experimental Results

A date of planting test again indicated that the optimum date of planting onions in the seedbed at Baton Rouge was October 1. Earlier plantings resulted in a high incidence of bolting and later plantings gave lowered total yield. This test has been carried on for several years with the same results and will be concluded with the 1953 experiment.

In direct seeding experiments there was no advantage in using pelleted seed over unpelletized seed, nor in the use of Krilium to prevent a crust over direct seeded beds. Best results in weed control (used as post emergence) were obtained with potassium cyanate used at the rate of a half pound per gallon of water.—August E. Kehr and E. C. Tims

PEA BREEDING

Louisiana Purchase, a new southern pea, was developed by the Louisiana Agricultural Experiment Station from a cross between Calhoun Crowder and Blackeye. This variety, originally known as selection L-3, is a heavy producer of white to cream colored, speckle-eyed peas. The peas are wrinkled when dry. The green pods contain an average of 14 to 17 peas. The green color of the peas is retained longer in the maturing pods than the greenish color in
the Blackeye variety. This strain produces a semi-vining type plant. The Louisiana Purchase is a good variety for use as fresh, frozen, canned or dry edible peas.—P. L. Hawthorne and J. C. Taylor

PEACH BREEDING

The first of the progeny seedlings from the peach breeding program fruited in 1953. Eleven from this first year group were selected for further testing. The maturity dates for those selected were from mid-May until late June. More emphasis is being placed on good-quality early varieties because the Louisiana peach is among the first to appear on the market; therefore, time of maturity, good quality and highly colored fruits are important factors.

—P. L. Hawthorne and J. C. Taylor

CHEMICALLY CONTROLLED PEACH MATURITY

This preliminary report is based on 1953 results of foliar applications of maleic hydrazide and 2,4,5, trichlorophenoxyacetic acid applied independently and in combination with each other to the Dixigem variety. The time of application was varied from one to six weeks before normal, expected maturity. The 2,4,5 T applied five weeks before maturity hastened maturity by about ten days. These fruits were very uneven in color and maturity. A high percentage of the 2,4,5 T treated fruits were split.

Maleic hydrazide applied five weeks before maturity retarded normal ripening by about four days. This anti-auxin material increased the total and soluble solids content of the fruits, increased the storage life and produced a higher degree of uniform firmness of fruits. Four hundred p.p.m. of maleic hydrazide, combined with 30 p.p.m. of 2,4,5 T applied five weeks ahead of normal maturity, produced a desired synergistic effect on growth response. Fruit maturity was about four days earlier than the check. A definite increase was noted in degree of uniform maturity, firmness, color, size, and total soluble solids from this treatment over the check.

—P. L. Hawthorne, L. G. Jones, J. C. Taylor and W. A. Sistrunk

CONTAINERS FOR MARKETING LOUISIANA “TRE-RIPE”* PEACHES

The Louisiana wirebound peach box included in commercial shipments of peaches to distant markets in 1953 continued to prove itself in its ability to deliver a high-quality, bruise-free, riper peach to market. A two-fruit layer box made of heavy water-repellent corrugated cardboard used for the first time in 1953 looked promis-

*A patented name owned by the Louisiana Peach Growers Association.
ing from preliminary trials. The Laird fillers were used as partitions between fruits, replacing the cells in this container.

The Laird partitions were more efficient than paper cups in preventing load or pressure bruising to fruits packed in the bottom layer of the tomato lug type pack. The wood lug type container used with the Laird partitions may become important in the packing of Louisiana "Tre-Ripe" peaches.

Although the use of the Louisiana cell peach box makes it imperative that a grower buy and store a large inventory of three sizes of boxes and cells, it continues to be a good container for packing riper peaches. This major factor, plus a limited number of minor ones, may cause growers to change to one or more of the first-mentioned containers.

Eight different types and sizes of consumer unit trays have been used in this study during the past three years. Of this number the four-fruit "Bailey Pack" and the six- and eight-peach "Alford Trays" possess more of desirable grower packing and handling qualities than others studied. Mimeograph Circular 23 presents this phase of the work in detail.—P. L. Hawthorne and J. M. Baker

IRISH POTATO INVESTIGATIONS

Over 15,000 seedlings were grown in greenhouses during the fall of 1952, and selections were made for planting in South Dakota. Approximately 3,500 single tubers from individual plants of 16 parental combinations were planted at Clark, South Dakota, early in May for observation and selection.

Eighty-two seedlings, plus certain selected lines and varieties, were planted in the spring of 1953 in observational, preliminary and advanced trials at Baton Rouge, Diamond, Donaldsonville and New Roads. These trials, together with the selections planted in observational, preliminary and advanced trials at Clark, constituted the 1953 Irish potato plantings of older selections designed principally for a study of yield and tuber/foliage characteristics. All lines were planted at Baton Rouge; and, where seed tubers were available, these seedlings were also planted at Diamond, Donaldsonville and New Roads.

Almost ideal weather conditions prevailed during the growing and harvesting season at Diamond, Donaldsonville, New Roads and Baton Rouge.

As in previous years, LaSoda outyielded all standard varieties and promising seedlings. It is now being used as the standard in the red seedling yield trials.

Preliminary seedling yield trials in 1952 at two locations in Louisiana and one location in South Dakota, together with 1953 advanced yield trials at four locations in Louisiana, indicate promis-
ing red-tubered selections which had yields within 25 per cent of the yield of LaSoda grown in the same trials. Particular interest at present centers on selections 82-94, 82-269 and 92-23, which, with other promising selections such as 92-167, 02-14A, 02-63 and 02-76, are being retained for further study because of their color, production and vigor, range of adaptability, or blight or scab resistance.

Selections such as 91-143, 91-258, 81-113 and 81-115 produced satisfactory yields of high-quality tubers and are being continued as promising white-tubered lines.

Combined Results of 5 Yield Trials of 5 Potato Varieties at 8 Locations in Louisiana during the Past Five Years

<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
<td>LaSoda</td>
<td>194.8</td>
<td>140.1</td>
<td>226.3</td>
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<td>140.1</td>
<td>149.5</td>
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<td>152.5</td>
<td>199.8</td>
<td>146.6</td>
<td>248.9</td>
<td>85.5</td>
<td>129.0</td>
<td></td>
<td>156.7</td>
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<tr>
<td>Katahdin</td>
<td>146.2</td>
<td>188.3</td>
<td>141.3</td>
<td>152.0</td>
<td>259.2</td>
<td></td>
<td>80.7</td>
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<td>156.8</td>
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<tr>
<td>Triumph</td>
<td>165.0</td>
<td>94.4</td>
<td>160.2</td>
<td>140.1</td>
<td>165.9</td>
<td>48.1</td>
<td>107.7</td>
<td>154.3</td>
<td>129.5</td>
</tr>
<tr>
<td>Kennebec</td>
<td>177.3</td>
<td>170.9</td>
<td>205.9</td>
<td>103.9</td>
<td>246.2</td>
<td>94.3</td>
<td>103.5</td>
<td>326.1</td>
<td>178.5</td>
</tr>
</tbody>
</table>

Yields expressed in bushels per acre of No. 1's.

1 year average. 2 year average. 3 year average. 4 year average.

Red LaSoda, a mutation from LaSoda, apparently will produce as well as LaSoda, or slightly better. Both of these varieties produce 90 to 99 per cent No. 1 tubers of premium grade, while Red LaSoda also promises to give the growers a skin color that is most desirable for the red potato market.

Triumph yielded about as expected from previous experience; however, it is gradually giving way to the superior tuber quality and higher yield of LaSoda. Kennebec again exhibited, but to a lesser extent, the excessive tuber rot which growers encountered in 1950. Cherokee was early in all test potatoes and yielded well, but the tubers tended to be too flat and irregular in shape. Its resistance to scab, however, is still a character in its favor.

Processing studies are being conducted on all of the promising seedlings and varieties from all of the plots. Their suitability for canning, freezing and chipping has been determined. An acceptable final product can be prepared from any of the varieties and promising seedlings if they are handled properly.

—Julian C. Miller, J. R. King, Raymon E. Webb and W. A. Sistrunk

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SWEET POTATO INVESTIGATIONS

The work on sweet potatoes for the past year includes that conducted at Baton Rouge, the Sweet Potato Research Center at Chase, Louisiana, three state Experiment Stations and with farmers at seven locations in the state.

An irrigation system was installed at the Sweet Potato Research Center at Chase. Without this facility it would have been impossible to have distributed seed to certified seed growers and farmers of the state.

Foundation Stock Seed

A total of approximately 1,200 bushels of Unit I Porto Rico, Goldrush, Earlyport and Heartogold has been distributed to sweet potato growers, shippers and canners throughout Louisiana. This seed comes from hill selections and is true to type and variety. A new dark copper skin Goldrush was also increased for release. The foundation stock seed of this selection comes from a single root mutation that was selected in 1951. Comparative yield data for 1953 showed that it produced 201.9 bushels per acre, and the original Goldrush produced 179.5 bushels per acre.

Breeding

Approximately 30,000 of the 45,000 seed harvested were hand pollinated crosses. This is the largest number of hand pollinated seed that has been harvested in any one year in Louisiana.

There were 10,502 first-year seedlings grown at Chase, Louisiana, in 1953, and from these 151 were saved for further testing. Most of these seedlings have a good copper skin color, deep orange flesh and show promising yielding ability.

There were 9 second-year (1952) and 33 third-year (1951) seedlings saved for further testing. Most of this material yielded well and had good skin and flesh color. The majority of these seedlings stored well in 1952 and 1953.

Yield Trials

In early trials Earlyport (L-240) and Porto Rico 2-1 were outstanding at Diamond. Unit I Porto Rico showed up extremely well as to yield at Hammond. In the Arnaudville area, where Earlyport is grown for the early fresh market, results show that it outyielded all Porto Rico skin type varieties and seedlings. Farmers reported that in all cases where Earlyport was grown it outproduced Unit I Porto Rico by at least two to one. Allgold continued to show its high yielding ability in this area, but its skin color makes it unacceptable for commercial planting in Louisiana. This also applies to Heartogold.

Results obtained in regular tests showed that Earlyport produced the highest average yield at all locations in Louisiana. Unit I
Porto Rico, Porto Rico 2-1 and Goldrush produced approximately the same yield when an average was taken of all locations.

The dark copper skin mutation of Goldrush was planted along with the other varieties and seedlings at Hessmer. There was no significant difference in its yield and that of Unit I or Goldrush; however, at Chase it outyielded both of these varieties. Seed of the Goldrush mutation is in demand because of its attractive skin color.

Irrigation Studies

Two irrigation tests were conducted with sweet potatoes at Chase, Louisiana. In Test I the plots were transplanted on April 24 and harvested on August 24. Test II was transplanted on June 18 and harvested on October 8, 1953.

Results from Test I: Transplanted April 24 and Harvested August 24, 1953

<table>
<thead>
<tr>
<th>Variety</th>
<th>Bushels Marketable Sweet Potatoes Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Irrigated</td>
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<tr>
<td>Earlyport</td>
<td>10.0</td>
</tr>
</tbody>
</table>

*Irrigated with sprinkler system; 2 inches of water applied at each date of irrigation.

Results from Test II: Transplanted June 18 and Harvested October 8, 1953

<table>
<thead>
<tr>
<th>Variety</th>
<th>Bushels Marketable Sweet Potatoes Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Irrigated on July 3; July 10; July 17; August 7; August 17</td>
</tr>
<tr>
<td></td>
<td>Inches per Irrigation 2&quot; 1&quot; ½&quot;</td>
</tr>
<tr>
<td>Goldrush</td>
<td>146.3 141.4 100.8</td>
</tr>
<tr>
<td>Earlyport</td>
<td>158.1 128.4 99.8</td>
</tr>
<tr>
<td>Mean yield for irrigation</td>
<td>131.5 117.3 93.8</td>
</tr>
</tbody>
</table>

The yield differences between irrigated and non-irrigated plots were not as large in Test II as in Test I. This is due to better distribution of natural rainfall that resulted in July and August. Preliminary studies with three varieties, Unit I Porto Rico, Goldrush and Earlyport, regarding time of set of sweet potato roots were conducted under good soil moisture conditions. The above three varieties were transplanted in replicated test on April 23, 1953, and the counts of the set of roots were made 40 days, 61 days and 75 days after transplanting.
Results from the study of roots set on sweet potato plants indicate that a drouth period occurring between 40 days and 75 days after transplanting may affect the set of the sweet potato roots and also the growth and thus reduce the yield. At 75 days after transplanting there were 2 roots or more over 2.5 inches in diameter. In the irrigation study in Test I the drouth period occurred between 37 and 84 days after transplanting. The non-irrigated plots had some plants with 1 or 2 roots set; however, many plants did not set any roots at all.

Disease Studies

a) Wilt—All seedlings saved in 1953 were tested for their reaction to Fusarium wilt. Many previous years’ seedlings have proved to be resistant to wilt; however, most of them are not suitable to become commercial varieties because of one or more reasons. This material is being used as parents in the breeding nursery and has proved to be of much value, as the percentage of wilt resistant seedlings increases each year.

b) Soil Rot—All seedlings that are saved for further evaluation are planted on a field plot known to be thoroughly infested with the soil rot organism. To determine the degree of resistance in each seedling notes are taken during the growing season on vine growth and rootlet rot. After harvest all roots are examined and notes are taken on number and depth of lesions on each root.

Three varieties and 38 seedlings were planted at random and replicated four times. Unit I Porto Rico is very susceptible; Goldrush is susceptible; and Heartogold is moderately susceptible. From this test we might conclude that 0-25, 0-57, 0-58, 0-99, 1-13, 1-64, 1-72, 1-126 and 1-223 have some degree of resistance. Seedling 1-13, which has a copper skin, was particularly outstanding in this test because of no mortality of plants, very good vine growth, low amount of rootlet rot and high production of marketable roots with few and shallow lesions.

Nematodes

Work was conducted in 1953 on infested soil at the North Louisiana Hill Farm Experiment Station at Homer, where root knot nematodes are known to be abundant. The data on root knot and root rot indices indicate that there are varietal differences in
their behavior to nematodes. Soil fumigation with Dowfume W85 at the rate of 4 gallons per acre decreased to some degree the incidence of nematodes in most cases. In general, yields were higher when the soil was fumigated; however, the treatment-variety interaction was not significant.

**Storage: Temperature and Varieties**

a) **Shrinkage**—The effects of different storage temperatures and different varieties on the keeping qualities of sweet potatoes have been studied for the last four years. The varieties used in this work were Unit I Porto Rico, Goldrush and Earlyport. Experimental temperatures were 50° F., 60° F. and that of common storage. The potatoes were harvested in the fall of each year, cured and placed in the storage rooms, from which samples were taken periodically for analyses throughout the winter and spring.

It is apparent that the varieties responded similarly to different storage temperatures with respect to shrinkage rates. The degree of shrinkage was negligible at 50° F. and 60° F. throughout the storage period from a practical standpoint, while the losses under common storage conditions appear to be of commercial importance. This indicates that a significant loss might occur under common storage conditions normally used by growers and shippers today.

b) **Quality Changes During Storage**—The results were obtained last year in the sweet potato storage experiments dealing with quality changes of potatoes during the storage period. The per cent dry matter content remained fairly constant throughout the storage period in all of the three varieties at 60° F. and common storage temperatures. There was a gradual decrease in per cent dry matter in all varieties at 50° F. This correlated with the slow deterioration and loss of quality of the sweet potatoes at this temperature. There was an increase in the sugar content in all of the varieties during storage at each temperature, especially during the first two months of storage. The Goldrush variety accumulated more sugar at each of the storage temperatures than either of the other varieties. Carotene content varied during the storage period, showing an increase in the beginning of the storage and a gradual decline thereafter throughout the storage period.

It is apparent that of the storage temperatures tested 60° F. was most satisfactory for all the varieties used. These potatoes still had an attractive appearance, had shrunk less, showed less sprouting, and were of much higher quality at the end of the storage period (July 1) than potatoes stored at 50° F. or in common storage.
Culinary and Processing Studies

a) **Baking Test**—Baking tests were conducted on 2 varieties and 41 promising seedlings. The factors considered were flesh color, flavor, texture and fiber. Seedlings 1-13, 1-80, 1-86 and 1-152 were superior to the checks, which were Unit I Porto Rico and Goldrush.

b) **Carbohydrate Changes During Cooking**—The total sugar contents at the time of harvest of the three varieties, Unit I Porto Rico, Goldrush and Earlyport, were not appreciably different. After curing, Unit I Porto Rico was higher than the other varieties in reducing sugars content in the fresh samples and remained that way throughout the storage period. Earlyport contained a higher percentage of reducing sugars in the cooked product than Goldrush in all instances. However, there was a greater increase of reducing sugars in Unit I Porto Rico during the cooking process than in either of the other varieties.

c) **Sweet Potato Chips**—Further studies are being made on the best method of preparing sweet potato chips. Presently the results indicate that pre-heating the potatoes for 30 minutes in a water bath at 160° F. prior to peeling, slicing and frying gives the better quality chips. Cottonseed oil or any vegetable oil is suitable for the frying fat. A starting temperature of 300° F. and a finishing temperature of 270° F. has resulted in the highest quality product. The Goldrush variety makes the most attractive chips but any of the standard orange fleshted varieties are satisfactory.

d) **Frozen Sweet Potatoes**—Preliminary results indicate that the Goldrush variety is the most desirable one used in this test for freezing in this area. Heartogold rated second as it contains practically as much orange color as Goldrush. Unit I Porto Rico and Earlyport are somewhat lighter in color and more variable in the finished frozen product.

—Julian C. Miller, Teme P. Hernandez, John J. Mikell, James F. Fontenot, Travis P. Hernandez, Lloyd G. Jones, William A. Sistrunk, Dale Newsom*

**shallot breeding**

The main objectives of the shallot breeding project are (1) resistance to pink root, yellow dwarf virus and mildew, (2) to produce male sterile lines to facilitate the breeding program, (3) early and late season types to take advantage of higher prices at these two periods, and (4) more vigorous, upright growth.

Pink root resistance comes from the Nebuka onion and certain varieties of garden onion. Pink root testing equipment has been set

*Department of Entomology.
up to screen seedlings for resistance. Seedlings which survive these
tests are used in further breeding work.

Resistance to yellow dwarf comes entirely from the Nebuka
onion. This involves the use of colchicine to double the chromosomes
of the first generation hybrid which is sterile. The doubled F₁
hybrid is fertile. Backcrosses to the fertile plants still show virus
resistance and appear shallot-like. It is not known how continued
backcrosses will hold up in their resistance to virus. This material
is very vigorous and gives us the much desired early season and
late season growth. Preliminary trials of this material look promising.

Mildew resistance is a long-term project. Progress is very
slow.

There are several lines of the backcross progenies which have
commercial possibilities. For this reason Seedling Number 8,
which has been outstanding, is not being released until this more
disease resistant material can be tested.

The Homer Red shallot has been found to be completely
sterile, and the nature of this sterility is being investigated.
—August E. Kehr and E. C. Tims*

STRAWBERRY BREEDING

A spore suspension spray of the organisms that cause leaf
scorch and leaf spot was applied to all seedlings grown in 1953.
A uniform infection made it possible to discard all but 1,092 from
10,263 seedlings. These were transferred to the nursery to produce
plants to fruit in the spring of 1954.

Nine varieties and selections were included in a replicated
yield trial. The data in the following table show that definite in-
crease in yield and value can be expected from three of the selec-

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total yields*</th>
<th>Marketable yields*</th>
<th>Dollar value**</th>
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<tr>
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<td>135.08</td>
<td>756.72</td>
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<td>Klonmore</td>
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<td>0-242</td>
<td>377.63</td>
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*Expressed in crates per acre.
**Calculated by adding the dollar value of four two-week periods.

*Department of Plant Pathology.
tions over the named varieties presently being used by growers. Test shipments of fruits of varieties and selections to Robert Hockman, Laboratories Division, Kroger Food Foundation, Cincinnati, Ohio, show that selections 0-188, 0-242 and 0-299 were equal or superior to the named varieties in shipping qualities. Strawberry buyers who saw fruits of 0-188 and 0-299 expressed a preference for these selections.

The freezing of varieties and promising seedlings and subsequent organoleptic evaluation gave further proof of the superiority of 0-188, 0-242 and 7-42 over the standard varieties. They also showed their superiority when processed into preserves.

—P. L. Hawthorne, J. C. Miller, William A. Sistrunk, W. F. Wilson, Jr. and N. L. Horn*

ORNAMENTAL HORTICULTURE

Chrysanthemum Investigations

Exhibition type chrysanthemums are grown commercially in Louisiana mainly for sale for All Saints Day. Rooted cuttings should be set out from the middle of May to the first of June to produce flowers for that time. The tops of plants should be removed soon after growth is well started. Two to three stems should be allowed to grow. All buds should be kept removed except the terminal.

Plants were set in a lath house and in a plastic screen house. Excellent flowers were produced in both locations. Several varieties were tested and the following were found to be satisfactory: Silver Sheen, Ambassador, Betsy Ross, Mrs. Kidder, Blazing Gold, Detroit News, Indianapolis Pink and Queen of the Pinks. Several varieties of the spider type were grown. All produced excellent blooms but, with the exception of Mary Garden, all were very late. This type of flower did not seem to be popular in this area.

Hardy chrysanthemums are quite generally grown in yards in Louisiana. An extensive variety test of these was planted in field plots about the middle of May. Loss of plants was severe with some varieties, owing to adverse weather conditions after setting. Plants of many varieties, however, grew well and produced an abundance of excellent flowers. The following varieties were found to be exceptionally good: Bonfire, Bronze Dot, Caravan, Firecracker, Dream Girl, Golden Herald, Jessie, Joybringer, Pink Dot, Pristine, Sea Gull, Serenade, Silver Plate, Spellbound, Treasure, Yellow Dot and Yellow Doty.

*Department of Plant Pathology.
Magnolia Grandiflora Seed Germination Tests

Tests showed that half sand and half vermiculite by volume was the best germinating medium used. Large plump seeds that floated in water were not viable. Seed with the pulp removed germinated a higher percentage than non-cleaned seed.

Forty-four per cent germination was obtained from seed that were harvested, cleaned and planted immediately from which floaters had been removed. Eighty-eight per cent germination was obtained from seed stored two months in vermiculite at 60° F. and then planted.

Sulphuric acid proved injurious to magnolia seed where the pulp had been removed. Hot water treatments were not beneficial.

Mimosa Seed Germination Tests

Mimosa seed soaked in concentrated sulphuric acid for 20, 25 and 30 minutes and then planted germinated slightly over 98 per cent. Non-treated seed germinated 43 per cent. Soaked seed had germinated over 98 per cent two weeks after planting; only 10 per cent of the non-treated seed had germinated at that time.

Mimosa seed stored 3¼ years and then soaked for 30 minutes in sulphuric acid and planted germinated 84.6 per cent.

Production of Poinsettia Cuttings

Dormant poinsettia stock plants of eight varieties were received gratis from the Ecks Poinsettia Farms, Encinatis, California. The plants of each variety were divided into three groups. One group was planted in the open, one in a plastic screen house and one in the greenhouse. Cuttings were made June 16, July 18, August 18 and September 30. Plants in the open did not make satisfactory growth. Those in the plastic screen house grew better and produced more cuttings than did those in the greenhouse. Cuttings taken September 30 made satisfactory plants for the holiday season. Varieties were rated as to suitability as follows: St. Louis Red, Indianapolis Red, Improved Albert Ecke, Oak Leaf, Mrs. Paul Ecke, Henrietta Ecke (double), Ecke White and Barbara Ecke Supreme.—W. D. Kimbrough and R. H. Hanchey
Plant Pathology

SUGAR CANE SEEDLINGS FROM LOUISIANA

The production of true seed of sugar cane in Louisiana has been proved feasible under greenhouse conditions at Grand Isle. In the winter of 1950-51, a start was made with the production of only 75 seedlings. In 1951-52, 68,000 seedlings were produced, and in 1952-53, an estimated 73,590 seedlings were produced from seed from Grand Isle.

In the fall of 1953, 243 selections were made at Baton Rouge from the 14,982 seedlings from Grand Isle crosses which were space planted in the field in 1952, and 67 selections were made at Houma, Louisiana, from 6,421 seedlings produced at Grand Isle in 1952.

In the spring of 1953, 29,463 seedlings from Grand Isle crosses were planted in the field at Baton Rouge, and 13,310 were planted at the United States Department of Agriculture Sugar Field Station at Houma, Louisiana. Thus a total of 42,773 seedlings produced from crosses made at Grand Isle in 1952-53, will be available for selection in the fall of 1954.

—Elias Paliatseas, P. H. Dunckelman, R. J. Steib, and S. J. P. Chilton

FLOWERING OF SUGAR CANE

In 1953 a technique was found which made it possible to induce sugar cane to flower at Baton Rouge, La. By gradually shortening the day length as normally happens in the fall, six varieties of sugar cane flowered at Baton Rouge, La., in the summer of 1953. The same six varieties were made to flower in the fall in a repetition of the experiment, and in addition one other variety also flowered. Seed produced were viable, giving good germination.

This technique should make it possible to do crossing of sugar cane at Baton Rouge, La., and also permit better breeding by making it possible to control crossing.

—S. J. P. Chilton, C. F. Moreland, P. H. Dunckelman and R. J. Steib

SUGAR CANE BREEDING

From 1948 through 1953, a total of 113,000 sugar cane seedlings from crosses made at Canal Point, Florida, have been planted at the Louisiana Agricultural Experiment Station at Baton Rouge, Louisiana. In addition to approximately 1,250 selections made
since 1948, 297 selections were made in the fall of 1953 from crosses made at Canal Point in 1951. Of the selections made in 1953, 56 were considered worthy as types suitable for the western area of the Louisiana sugar cane belt and were planted on Katy Plantation in cooperation with Mr. John Caffery and the United States Department of Agriculture.

In the fall of 1953, 52 C. P. numbers were assigned. Of these, 49 were for sugar production and 3 were for syrup. Previously, 2 C. P. numbers were assigned in 1951 and 35 were given C. P. numbers in 1952. Thus, a total of 89 C. P. numbers has been assigned to selections made at L. S. U. from Canal Point, Florida, crosses since 1948.

—P. H. Dunckelman, R. J. Steib, P. J. Mills and S. J. P. Chilton

RATOUN STUNTING DISEASE OF SUGAR CANE IN LOUISIANA

Ratoon stunting disease of sugar cane, a new virus disease, was reported from Queensland, Australia, several years ago. The disease was found in many of their native and introduced varieties. Reports that the disease had been found in imported Canal Point varieties led scientists of the Division of Sugar Plant Investigations, Bureau of Plant Industry, USDA, to suspect that the disease was present in the Canal Point, Florida, breeding collection and possibly in Louisiana. A survey by Dr. E. V. Abbott and co-workers revealed that the disease was present at Canal Point and in commercial varieties being grown in Louisiana.

This new disease is somewhat different from other sugar cane virus diseases in that it produces no readily recognizable leaf or external stalk symptoms. However, infected stools, particularly in stubble crops, show a general retarding of growth, often severe stunting when moisture is deficient, a smaller root system, more slender stalks and a tendency to abnormal straightness and stiffness of the leaves. If stalks from an infected stool are split longitudinally, many of the vascular bundles in the nodal region will show an orange-red discoloration. There is still some doubt as to the reliability of internal stalk symptoms in identifying the disease.

The method of transmission of any disease is of importance in working out control measures against the disease. Transmission of virus diseases by mechanical means and by insect vectors are the two most common methods of spread.

Ratoon stunting disease can be readily transmitted by mechanical means. Australian workers have shown that cane stalks may be infected with the disease by dipping the cut ends into juice from canes having the disease, by forcing infective juice into the stalk with a hypodermic needle, or simply by cutting the stalk with a
knife which has recently been used to cut a diseased stalk. In Louisiana, the lower cutting blade and topping knife of mechanical harvester probably serve as the chief method of spreading the disease. On plantations where a cane knife is still used to cut cane for the mill and planting purposes, it probably serves as the chief method of spreading the disease.

Preliminary studies conducted within the past year at the Louisiana Agricultural Experiment Station have shown that plant cane grown from seed pieces of C. P. 44-101 inoculated with juice from stunting stools of C. P. 44-101 did not grow as tall, produced more slender stalks and failed to produce as much cane per acre as plant acre grown from healthy seed cane.

Studies are now being made to determine how widespread ratoon stunting disease is in our commercial varieties, to what extent the disease is affecting yield of different varieties and the best heat treatment to use in controlling the disease in Louisiana.

—R. J. Steib, P. J. Mills and S. J. P. Chilton

HOT-WATER AND HOT-AIR TREATMENTS OF SUGAR CANE

Chlorotic streak disease of sugar cane caused by a virus has been successfully controlled by treating seed pieces in water kept at 52° C. for 20 minutes. A new disease of sugar cane also caused by a virus has been reported from Queensland, Australia. This disease causes greatest damage to stubble crops and has been appropriately named the ratoon stunting disease. Since its discovery in Australia, a survey by workers of the Division of Sugar Plant Investigations, Bureau of Plant Industry, USDA, Houma, La., was made to determine whether or not the disease was present in Louisiana. After preliminary investigation and testing, an announcement was made that the disease was found in C. P. 44-101, the leading commercial variety in Louisiana.

Reports from Australia indicate that the disease can be successfully controlled by use of a heat treatment, either hot-water or hot-air. However, it was pointed out that temperatures required to kill the virus came very close to killing the cane. Instead of 52° C. for 20 minutes, which is used to control chlorotic streak, it was found necessary to treat the cane in hot-water at 52° C. for as long as one hour. Other hot water treatments using varying temperatures and varying times of exposure also controlled the disease. Treatment in a hot-air oven at 50° C. for 24 hours or at 54° C. for 8 hours was also found to cure the disease.

Before either the hot-water or hot-air treatment could be recommended in Louisiana, it was necessary to determine how such severe treatments would affect germination of our present commercial and promising new varieties. Heat treatment studies were
started in July and continued through August of 1953. Fifteen varieties were treated with hot-water and hot-air using different temperatures and varying times of exposure. Of all heat treatments tried, use of hot-air, 54°C for eight hours, gave the best results. When a comparison was made between the total number of eyes germinating after hot-air treatment and the total number of eyes germinating which received no treatment, it was found that the average germination of 1,305 treated eyes was 94 per cent of a like number of untreated eyes. Results obtained with hot-water were not as encouraging. All hot-water treatments which would kill the virus in the cane caused a much greater reduction in germination than the hot-air treatment. A comparison, using the best hot-water treatment, 51°C for 1½ hours, was made between the total number of eyes germinating after treatment and the total number of eyes germinating which received no treatment. It was found that the average germination of 944 treated eyes was only 67 per cent of a like number of untreated eyes.

Results of heat treatment studies indicate that hot-air, 54°C for eight hours, is probably the safest heat treatment to use in controlling ratoon stunting disease of sugar cane in Louisiana.

—R. J. Steib

THE ACTION OF 2,4-D UPON THE AZOTOBACTER OF SOME SUGAR CANE SOILS

The role that microorganisms play in continuing fertility of the soil is of such great importance that any deleterious effect upon them by the indiscriminate use of herbicides might be of serious consequence to the economy of the soil. Since but little is known of the effect of these agents upon these microorganisms, studies have been initiated to determine the action of the herbicides both on the large groups of the soil microflora as well as upon specific members within the groups.

The Azotobacter, one of the organisms directly concerned with the soil nitrogen, have been studied for their response to the triethanolamine of 2,4-D. Tests were made on three soils of the experimental sugar cane plots, the Sharkey clay, and the Mhoon and Commerce loams. Both the pure culture mode of study and the soil plaque technique were used. In the latter mode of study, all the components of the soil were free to act in the presence of the herbicide.

The results showed that at rates comparable to field applications (1 to 2 ppm) 2,4-D does not harm this group of free-living, nitrogen-fixing bacteria. It was found in the soil plaque study that when 200 ppm to 100 ppm were used, the per cent of decrease of these organisms ranged from 66.3 to 99.9. The pure culture
work was in agreement with these findings. One can conclude, then, that for the *Azotobacter* of these three sugar cane soils, the possibility of damage by 2,4-D at the common field rates is quite remote.—A. R. Colmer

HOST PLANT STUDIES OF A NEMATODE, *TYLENCORHYNCHUS* SP., FROM SUGAR CANE SOILS

In a previous report it was indicated that an undescribed species of *Tylenchorhynchus* caused a stubby and depleted condition of sugar cane roots. This nematode thrived and reproduced on sugar cane roots in steam-sterilized soil.

Studies were made to determine whether this nematode lived and reproduced on the roots of plants other than sugar cane. Nine different species were tested to determine whether the nematodes lived and reproduced substantially when placed in sterilized soil planted to the test plants. The following plants were used: Johnson grass, Zenith rice, white Tuxpan field corn, Unit I Porto Rico sweet potatoes, Pelican and Acadian variety soybeans, wild sweet clover, Deltapine 15 cotton, white Trumpet Easter lily and common Ligustrum.

The nematodes reproduced in the presence of the following: Johnson grass, Zenith rice, Unit I Porto Rico sweet potatoes, both varieties of soybeans and the wild sweet clover. They failed to reproduce in the presence of the white Tuxpan field corn, Deltapine 15 cotton and common Ligustrum. Reproduction on white Trumpet Easter lily was doubtful.—Wray Birchfield

WEED CONTROL IN SUGAR CANE

Continued studies on the use of chemicals in sugar cane for the control of Johnson grass and other weeds indicate a combination of 2,4-D and TCA to give good control as in the past. CMU, which gave as good control of Johnson grass seedlings in 1952 as the 2,4-D, TCA combination, did not give as good control in 1953. New chemicals tested in sugar cane were Dalapon, Urab, Karmex D and C.I.P.C. Some of these showed promise as herbicides.

—E. R. Stamper, W. S. Hardcastle and S. J. P. Chilton

CONTROL OF WHITE TIP OF RICE BY SEED TREATMENT

Tests conducted during the past two seasons (1952-1953) have shown that seed-borne white tip of rice may be controlled by treating the nematode-infested seed with N-244 (3-p-chlorophenyl-5-methyl rhodanine). Recommendations were released this year for the use of this chemical on seed of susceptible rice varieties at the
rate of 1 1/4 ounces per bushel. This material may be applied either as a slurry or paste and can be applied at the same time the seed is being treated with fungicides.

Among the most susceptible rice varieties commonly grown in Louisiana are: Zenith, Rexoro-Patna, Magnolia and the various Rose varieties. Seed from these varieties should be treated with N-244, particularly if the plantings from which the seed was saved showed white tip infection. Studies have shown that some of the effectiveness of this seed treatment may be lost if water from infested plantings is allowed to run into or across areas where treated seed has been planted. The disease-causing nematode is a very active swimmer and it can infect the growing plants.

Included in the resistant varieties are: Bluebonnet, Fortuna and Sunbonnet. Studies have indicated that no advantage is derived by treating these resistant varieties with N-244.

—W. H. Stroube

KERNEL SMUT OF RICE

Kernel smut of rice, usually considered a minor disease, was present in serious proportions in some plantings during 1953. Little information was available on the life cycle of the fungus (Neovossia horrida), so studies were conducted in an effort to increase our knowledge of this fungus and the disease it causes.

Spore germination studies showed that less than 0.1 per cent of the smut spores germinated in water. It was found that germination could be increased to about 12 per cent by heating the spores in a dry-air oven at 70° C. for 30 minutes. Germination was accomplished in an incubator at 29° C. in sterile tap water under diffused light. The germination could be increased to about 23 per cent by adding 2 ppm of thiourea to the water used for germination. Each germinating spore usually produces 30 to 60 primary sporidia, thereby providing a relatively concentrated suspension of sporidia.

No smutted kernels were produced from seed or seedlings that were treated with chlamydospores, spordial suspensions or cultures (consisting of mycelium and secondary sporidia) of the fungus.

In order to make floral inoculation studies, a number of rice plants were covered with glacie bags before the panicles were visible. The bags were removed from six of the plants at about blooming time. Approximately 40 florets per plant were opened by hand and a drop of sporidial suspension applied to each. All the uninoculated florets were removed from each panicle and the panicles rebagged.

Of the 240 florets inoculated, 20 set seed, and of these, two were smutted. No smutted kernels were found in the covered or uncovered controls.
The results of these studies indicate that the chlamydospores of the rice smut fungus can be induced to germinate under certain conditions and that this is a floral infection non-systemic type of smut.—W. H. Stroube

WEED CONTROL STUDIES IN RICE

An intensive study of chemicals for possible use in rice fields for the control of weeds was made in 1953. Promising ones were selected for trial in 1954. Comparisons between 2,4-D and 2,4,5-T indicated 2,4,5-T to be more effective on curly indigo than 2,4-D. A substitute for 2,4-D has been sought, and present indications are that there is possibility of obtaining a chemical less hazardous to neighboring broad-leaved crops than 2,4-D.—John B. Baker

CHEMICALS FOR REDUCING MOISTURE IN RICE

A number of desiccants were tested in rice fields to determine their ability to reduce the moisture content of rice before harvesting. Rather small reductions in moisture occurred in the tests as compared to untreated areas.—J. B. Baker and Claude Dance

BREEDING FOR RESISTANCE TO ONION MILDEW

The breeding for resistance to downy mildew is being continued with the Calred-Creole hybrids. In spite of all efforts to produce an epidemic of mildew on the onion breeding material there has been none of the disease in the plots during the past two seasons. In 1953 part of the onion hybrids were planted in the Breaux Bridge area and the others at Baton Rouge. There was no mildew at either place. For this reason some of the hybrid bulbs and seed of several F₃ lots and two second backcross lots were sent to California in the fall of 1953. This material was planted in an area where mildew is said to develop every year.—E. C. Tims

SOIL TREATMENT TESTS FOR CONTROL OF PINK ROOT IN SHALLOT AND ONION

Pink root is often a serious problem for the shallot growers on small farms where they don’t have enough land to rotate properly. The disease usually develops in the early fall and late spring crops when the weather is warm. It was thought that some kind of chemical treatment might be developed for use on small pink root infected areas where the disease is serious. Preliminary greenhouse tests were made with a number of fungicides. But the results were not conclusive. Field tests in Lafourche parish and at Baton Rouge have also been unsatisfactory. However, in one
test Arasan and Arthocide showed some promise. This work is being continued.—E. C. Tims and T. E. Freeman

VARIETAL REACTION TO CERATOSTOMELLA FIMBRIATA IN SWEET POTATO

Recent reports of high resistance to Ceratostomella fimbriata in the sweet potato prompted extensive tests of the varieties reported resistant under conditions of inoculum and temperature prevailing in Louisiana. These studies showed that certain of the varieties reported resistant were completely susceptible under conditions in Louisiana. Comparative studies of Louisiana isolates of the fungus with a Maryland isolate showed that the Louisiana isolates were more pathogenic on certain varieties than the Maryland isolate. Further studies revealed that the reaction of varieties to the black rot fungus also depends upon the temperature under which the disease develops. At 21° C. no difference in size of lesions was demonstrated among the following varieties: Unit 1 Porto Rico, Allgold, Sunnyside, Kandee, B-6097 and B-5941. At room temperature (23-28° C.), however, significantly smaller lesions were demonstrated in Kandee, B-6097 and possibly Allgold. Of the above varieties and seedlings, B-6097 may be of some value as a black rot-tolerant parent in the sweet potato breeding program in Louisiana.—W. J. Martin

REDUCTION OF SOFT ROT IN SWEET POTATO BY DISINFECTION OF WASHING MACHINES

Studies were continued on the disinfection of sweet potato washing machines by spraying with a 2 per cent solution of Vancide 51, as a means of reducing losses caused by Rhizopus nigricans. The results obtained last year were similar to those reported previously; soft rot developed to a much lower extent in potatoes
washed immediately after spraying the brushes and chain rollers with Vancide 51. Tests last year were designed to give data on the build-up of soft rot as the time of operation increased after disinfection. A summary of the data from the nine principal tests made last year is given below:

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<th>Sample of Roots Taken</th>
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<tr>
<td>Before disinfection</td>
<td>1,418</td>
<td>2.33</td>
</tr>
<tr>
<td>Immediately after disinfection</td>
<td>2,418</td>
<td>0.50</td>
</tr>
<tr>
<td>Two hours after disinfection</td>
<td>2,591</td>
<td>1.27</td>
</tr>
<tr>
<td>Six hours after disinfection</td>
<td>1,364</td>
<td>2.05</td>
</tr>
</tbody>
</table>

The soft rot data were obtained approximately one month after washing and packaging. The gradual increase of soft rot in the potatoes as the time after disinfection increases suggests that the machinery might be disinfected advantageously after each two or four hours of operation.—W. J. Martin

**STUDIES ON TRANSMISSION OF THE INTERNAL CORK VIRUS OF SWEET POTATO**

Field experiments were made at Grand Coteau, Louisiana, to study the transmission of internal cork to cork-free plants of the Unit 1 Porto Rico variety planted in plots in the middle of a 10-acre planting of cork-affected plants. Examination of the roots from the original cork-free plants revealed a high incidence of cork in these, indicating abundant and effective transmission of the disease by some agent during the growing season. Incidence of the disease was similar in roots from unsprayed plots and from plots sprayed with Systox at the time of planting and at 10-day intervals during the growing season. After storage the percentage affected roots was 34 in the original cork-free stock, compared to 48 in the cork-affected stock. Observations of insect populations in this field during the growing season revealed the presence of very few aphids. However, leaf hoppers of various types were abundant from the time of good vine coverage until harvest.

Controlled experiments in which *Myzus persicae*, which were reared on plants infected with the internal cork virus, were transferred to cork-free plants of the Unit 1 Porto Rico variety growing under cages made with 32 x 32 mesh lumite screen, resulted in no detectable transmission of the virus by these aphids.—W. J. Martin

**EFFECT OF FUNGICIDAL SPRAYS ON YIELD OF IRISH POTATOES**

The following three sprays were compared on Bliss Triumph potatoes growing at Baton Rouge, Louisiana, in the spring of 1953: Dithane D-14 (2 quarts Dithane and one pound of zinc sul-
fate per 100 gallons of water), Manzate (2 pounds per 100 gallons of water) and Tribasic Copper Sulfate (4 pounds per 100 gallons of water). The potatoes were planted on January 30 in 3-row plots 40 feet long. Four applications of spray were made as follows: March 19, March 26, April 1 and April 8. At harvest on April 21, relatively little disease had developed in these plots. A trace of early blight and some tip-burn (cause undetermined) were evident in all plots equally. The combined yield of US 1 and US 2 grade tubers is given below:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean* Yield in Lbs./A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dithane D-14</td>
<td>10,048</td>
</tr>
<tr>
<td>Manzate</td>
<td>9,892</td>
</tr>
<tr>
<td>Tribasic Copper Sulfate</td>
<td>8,713</td>
</tr>
<tr>
<td>L. S. D. 5%</td>
<td>686</td>
</tr>
<tr>
<td>1%</td>
<td>970</td>
</tr>
</tbody>
</table>

*Mean of 4 replicates.

The above data shows a definite advantage for Dithane D-14 and Manzate over Tribasic Copper Sulfate as a fungicidal spray for Bliss Triumph potatoes.—W. J. Martin

COTTON DEFOLIATION

Seventeen chemicals suggested by their manufacturers as possible cotton defoliants or desiccants were evaluated during the 1953 season at four locations in Louisiana. All chemicals were applied at a single rate and by means of tractor-mounted spraying or dusting equipment. To prevent damage to the cotton plants by the equipment, special wheel and sprayer shields were employed.

In terms of leaf drop, no one chemical was superior at all locations. However, the various chlorate formulations consistently gave the best defoliation. The per cent of defoliation ranged from 20 in the case of pentachlorophenol to 93 in the case of a liquid chlorate formulation. The magnesium salt of chlorate appeared to give a somewhat milder leaf burn than the sodium salt and at the same time caused about the same per cent of leaf drop. None of the materials tested should be considered as ideal defoliants.

—W. K. Porter, Jr., C. R. Thomas and L. W. Sloane

RESPONSE OF COTTON VARIETIES TO PRE-EMERGENCE HERBICIDES

During the 1952 cotton season, observations and experimental data indicated that certain cotton varieties were more susceptible than others to pre-emergence application of dinitro phenolic herbicides. In 1953, tests were conducted to investigate these reported differences.
Thirteen varieties were included in field and greenhouse tests. They were: DPL-15, DPL-Fox, Bobshaw, Delfos 9169, Miller, DPL-9183, DPL-8389, Louisiana 33, Empire, Coker C-100 Wilt Resistant, Coker Staple, Stoneville 5-A and Stoneville 2-B.

Chloro IPC, Dinitro, CMU and Karmex DL were applied at several rates as pre-emergence herbicides.

No differences were observed in the reactions of the varieties in these tests when the chemical used was Chloro IPC, CMU or Karmex DL.

Results from tests in which dinitro chemicals were applied were variable and no definite conclusions could be drawn. Further tests involving this chemical are in progress.


PRE- AND POST-EMERGENCE HERBICIDES FOR WEED CONTROL IN COTTON

Several new chemicals were evaluated during the 1953 season as possible pre-emergence herbicides for cotton. These chemicals were compared with the recommended rates of dinitro, 3 Chloro IPC and CMU. One chemical, Weed Killer “D” (Karmex DL), compared favorably with the recommended chemicals. This chemical is one of a group of urea compounds which have been tested as pre-emergence herbicides. It was tested by the manufacturer during the 1953 season in several field trials and will be marketed in 1954 under the trade name Karmex DL. An Experiment Station recommendation is not being made on Karmex DL for the 1954 season. The material CMU previously recommended by the Experiment Station will not be sold as a pre-emergence herbicide in cotton.

Certain petroleum oils are recommended to control weeds in cotton from the time the cotton plant is three inches high until the plant is large enough to flame. These oils may be used as a follow-up to pre-emergence herbicides or as the sole chemical in the weed control program. Regardless of which system is used, the oils must be applied to the young grasses and broad-leaved plants to obtain satisfactory results. The oils are not recommended for use after the cotton plant begins to “bark.” Further studies are being made on the application of so-called pre-emergence herbicides as post-emergence sprays.

—W. K. Porter, Jr., C. R. Thomas, C. B. Haddon and L. W. Sloane

CAMELLIA ROOT ROT

Root rot of camellias is caused by a soil-inhabiting fungus, Phytophthora cinnamomi. Previous studies have shown that (1) the disease is more prevalent in poorly-drained soils, and (2) camellia varieties differ in their susceptibility to the disease. Con-
trol of root rot, therefore, must be based on cultural practices (im-
proving soil drainage) and on the utilization of tolerant or resist-
ant rootstocks. Since most of the camellias sold by nurseries today
are grafted, information on the relative resistance to root rot of
different varieties used as rootstocks will be of value. Other factors,
such as facility of rooting of cuttings and compatibility between
stocks and scions, must be considered.

Rooted cuttings of several varieties of Camellia sasanqua and
C. japonica were planted in soil artificially infested with Phyto-
phthora cinnamomi. After a period of several months, the plants
were dug and their roots examined for root rot. In general, vari-
eties of C. sasanqua show a high degree of resistance. Most of
the C. japonica varieties tested were found susceptible but a few
were found to be moderately resistant. The varieties tested and
their reactions are listed below:

I. C. japonica varieties:
   2. Susceptible: Mrs. Chas. Cobb, Pink Perfection, Herme,
      Sarah Frost, Prof. Sargent, Debutante, Alba Plena.

II. C. sasanqua varieties:
   1. Resistant: Super Rosea, Cleopatra, Rosea, Mine-No-
      Yuki, Tobenko, Oliefera, Shell Pink, Texas Star, Apple
      Blossom.
   2. Moderately susceptible: Hiodoshi, McGee Seedling, and
      an unknown variety (supposed to be a variety of C.
      oliefera).

In addition to the rooted cuttings, several hundred seedlings
from open-pollinated seed of C. japonica and C. sasanqua were test-
ed in a similar manner. A high percentage of sasanqua seedlings
exhibited a high degree of resistance. Most of the C. japonica seed-
lings were found to be susceptible, but a limited number showed
a high degree of resistance to root rot and made vigorous growth.
This indicates that it would be possible to select C. japonica seed-
lings that will make desirable rootstock.

The root rot fungus was killed by exposure to 42.5° C. for 1
hour or to 45° C. for 15 minutes. Rooted camellias, on the other
hand, were not injured by exposures to 47.5° C. for 20 minutes.
This suggests that it may be possible to “cure” a root rot infected
plant by exposing it to a temperature high enough to kill the
fungus within its roots without harming it.—L. W. Baxter

CONTROL OF CORKY EXCRESCEENCE IN CAMELLIAS

Corky excrescence (“cork”) is a physiogenic disease caused
by fluctuations in soil moisture. Experiments have been carried
on since 1949 in which plants have been sprayed with materials
designed to reduce the transpiration rate. A wax emulsion (Dowax 222) was tried first. This gave complete prevention of cork, and in 1949 and 1950 tests caused no appreciable injury to the plants. However, in the 1951 and 1952 tests it caused severe burning of the foliage. Temperature and humidity were apparently contributing factors. In both years in which injury occurred, it was hot and dry when the wax spray was applied. It is evident that the wax emulsion, although a very effective preventive, is not safe enough to recommend for general use.

A second material, a latex (Goodrite Latex “VL600”) diluted 1:10 and 1:14 with water, has been tested during the past three seasons in two localities, Baton Rouge and Hammond. This material has given excellent control of cork without any noticeable injury (leaf burning). One plant in the Hammond test shed some of its leaves and showed a multiple flower bud formation. However, as none of the 58 sprayed plants in the Baton Rouge test showed any detrimental effects from the spray, it is considered possible that the partial defoliation and multiple bud formation exhibited by the Hammond plant were caused by some factor other than the latex spray. Although latex has given satisfactory prevention of corky excrescence and appears to be a safe material, further tests are necessary before it can be recommended for general use, because of the possibility that its continuous application to the same plant may bring about chronic symptoms.—A. G. Plakidas

ADDITIONAL INFORMATION ON LEAF AND FLOWER VARIEGATION IN CAMELLIAS

In the 1951-52 Annual Report, evidence was presented indicating that both the leaf and flower variegation in camellias were transmissible by grafting and therefore presumably due to virus infection rather than to genetic instability or mutation (“bud sports”) as popularly believed.

From the 1952 and 1953 transmission experiments, the following additional corroborative evidence was obtained:

1. Color breaking of the flowers was transmitted to several additional solid-colored varieties. This brings to 12 the number of varieties to which flower variegation has been transmitted thus far. In three separate grafts, flower variegation was effected in the varieties Mathotiana and Rev. John Bennett when these were grafted opposite scions of the variegated sasanquas Shishi Gashira, Hinodgumo, and Haryu Assugai, showing that the same virus is present in both C. japonica and C. sasanqua.

2. In the 1953 grafts, leaf variegation was transmitted to two solid-green, solid-pink flowered seedling camellias in three separate
grafts. These have not bloomed as yet and no evidence is available on color breaking of their flowers.

3. In the same experiments (1953 grafts) leaf variegation was transmitted from the variety Lallarook, which has variegated flowers but solid-green foliage, from the varieties Blood of China, Pope Pius and Te Deum, which have brightly variegated foliage but solid-red, or only slightly variegated, flowers, and from a white-flowered variety (Alba Fimbriata) which exhibits prominent leaf variegation but no change in the color of its flowers. These results indicate a differential response by camellia varieties to the virus, some exhibiting flower variegation only, others prominent leaf variegation and none to a trace of flower variegation, and others prominent variegation in both foliage and flowers.—A. G. Plakidas

NEW RECORDS OF PLANT-PARASITIC NEMATODES IN LOUISIANA

The following new records were made in 1953:

1. Ditylenchus dipsaci, the stem and bulb nematode, was found on Phlox from New Orleans, Louisiana.
2. Belonolaimus gracilis, the sting nematode, was found in the vicinity of sugar cane roots at Grand Isle, Louisiana.
3. Nothotylenchus affinis was found abundantly in some sweet potato soils near Sunset, Louisiana.
4. Tylencholaimellus sp. was found in abundance in a sweet potato field at Homer, Louisiana.
5. Aphelenchoides fragariae, the bud and leaf nematode, was found in strawberry plant beds at Hammond, Louisiana.
6. Paratylenchus sp., a pin nematode, was found in soils from two home gardens at Baton Rouge, Louisiana.

—W. J. Martin and Wray Birchfield

STRAWBERRY DISEASE CONTROL

Thirty-nine materials were tested in the laboratory screening program for the control of Botrytis cinerea, the organism which is the most common cause of strawberry fruit rots in Louisiana. From these tests five materials were considered promising, namely, Calogreen, Craig Experimental 224, Septigard 25, Stauffer N-251 and Velsicol 48-CS-36. The results of the effects of these fungicides on the organism in laboratory tests are given in Table 1.

Previous reports indicated that DHA-S was effective in the control of B. cinerea applied during the harvesting period when other fungicides could not be applied. Concentrations of 4 pounds per 100 gallons of spray were used. Because of the high cost of
the materials it was desirable to determine whether this rate could be reduced. The results of laboratory tests indicated that when the concentration was reduced to \(\frac{1}{4}\) pound per 100 gallons of spray, the fungicidal effect was reduced 10 per cent.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. Berries</th>
<th>Recorded Dates of Rots</th>
<th>Total Rots</th>
<th>% Rot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check 1(^1)</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Check 2(^2)</td>
<td>25</td>
<td>6</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Calo-Clor(^4)</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Calogreen</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Craig 224</td>
<td>25</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Septigard</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Stauffer N-251</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^1\)Fruit dipped in a combined suspension of conidia and fungicide.
\(^2\)Inoculations made 4/21.
\(^4\)Untreated berries.
\(^4\)Berries treated with fungus only.

Captan and Carbide and Carbon Experimental Fungicide 5400, which were the most promising materials used in the screening tests of the previous year, were tested at four locations in 1953. Because of the dry weather conditions during the picking season, it was not possible to determine the effectiveness of these fungicides for the control of fruit rot.

Two seedlings, 0-161 and 742, were fairly resistant to \(B.\) cinerea as compared to a number of other seedlings and commercial varieties tested in the laboratory. Klonmore and 0-187 were the most susceptible by the method used. L-27 and 0-188 appeared to have some resistance. Klonmore, the most widely used commercial variety in Louisiana, was found to be one of the most susceptible among the varieties and seedlings inoculated.—Norman L. Horn

PEACH DISEASE STUDIES

During the harvesting seasons of 1952 and 1953 an undescribed fruit rot of peaches was observed in Louisiana orchards. A study was made of the organism, including symptoms, physiological characters, pathogenicity, and chemical control. Although all varieties of peaches tested in the laboratory were susceptible to the organism, some were more susceptible than others. The following varieties are listed in decreasing susceptibility: Southland, Burbank Early Elberta, Dixigem, Halehaven, Triogem, South Haven and Sunhigh. The best treatments in laboratory tests for the control of the organism were Captan, Ferbam and Carbide and Carbon Experimental Fungicide 5400.
Field and greenhouse tests were made with a number of materials for the control of bacterial leaf spot, but no positive results were obtained. Field treatments included Preventol GD, Carbide and Carbon Experimental Fungicide 5400, Stauffer N-251, Phenamin OD 100-W. E. and Septigard 25. Excised stems were treated in the greenhouse with aureomycin, streptomycin and terramycin. In one series these materials were added to the solution in which the stems were to be grown and in another series they were sprayed on the leaf surface.—Norman L. Horn

**CUCUMBER ANTHRACNOSE**

Cumulative data during the past two years supported the evidence that in the Hammond area of Louisiana the cucumber anthracnose organism (*Colletotrichum lagenarium*) is seed borne and not soil borne. The field pattern of infection centers supported this theory; that is, in soil that was virgin to cucumbers and in soil that had harbored infected cucumbers the previous year the organism originated from one to several isolated spots per field. Furthermore, plants that developed from seeds planted in soil which had been heavily artificially infested 10 months previously did not become infected. This latter test was made in soil in five-gallon crocks placed outside during the course of the experiment. Cucumbers, peas and vetch, and finally soybeans were grown in this soil until the test cucumbers were again planted there. Finally, seed germination tests in the greenhouse showed that it was possible for one to several seeds per pound package of commercial seed to be infected with anthracnose. With these considerations in mind it is hoped that a seed treatment will be available soon for the control of the organism.—Norman L. Horn

**SOIL FUMIGATION WITH METHYL BROMIDE IN BELL PEPPER HOTBEDS**

Experiments in 1952 and 1953 gave striking control of damping-off caused by *Rhizoctonia solani* and of weeds in bell pepper beds treated for 24 hours under a gas-proof cover with 2 pounds of methyl bromide per 100 square feet of bed two or more days before seeding. The following data were obtained in 1953-54:

<table>
<thead>
<tr>
<th></th>
<th>Treated</th>
<th>Untreated</th>
<th>L.S.D. 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean no. plants per sq. ft.</td>
<td>52.18</td>
<td>38.50</td>
<td>4.63</td>
</tr>
<tr>
<td>Mean no. plants damped-off per sq. ft.</td>
<td>0.19</td>
<td>7.38</td>
<td>4.55</td>
</tr>
<tr>
<td>Mean no. nut-grass plants per sq. ft.</td>
<td>0.0</td>
<td>7.25</td>
<td>2.75</td>
</tr>
</tbody>
</table>

Broad-leaved plants were also controlled.—W. J. Martin
Poultry

TWO SYSTEMS OF FEEDING CHICKS, GROWING PULLETS AND LAYING HENS

A study was conducted to investigate the effect of two ration treatments on the performance of chicks, growing birds and laying hens. A meat strain and an egg strain of New Hampshires were used in this study. The birds' life was divided into three phases: the starting phase, the day-old to 10 weeks of age; the growing phase, 10 weeks to 20 weeks of age; and the laying phase, 20 weeks through a 9-month laying year. During the starting phase one-half of the birds were fed a high energy, high efficiency ration and the other half were fed a high fiber, low efficiency ration. During the growing phase and laying phase a high efficiency type mash containing 21 per cent protein was used. All birds were ranged on native Bermuda grass during the growing phase. One group of birds of each strain was fed in such a manner that they consumed the mash and a scratch grain mixture in a ratio of 70 mash to 30 grain. This ration contained approximately 18 per cent protein. The other ration treatment involved the feeding of the mash and scratch grain mixture in a ratio of 40 mash to 60 grain. This ration contained approximately 15 per cent protein.

The two ration treatments did not affect age at first egg nor initial egg weight of the meat strain New Hampshires, but age at first egg was delayed about 17 days when the egg strain birds received 40 mash-60 grain during the growing phase. There was little or no difference in initial egg weight of the egg strain birds. There was no significant difference in egg production for the meat strain birds regardless of the way the birds were fed during any phase. The way the egg strain birds were fed during the starting and laying phases significantly affected egg production in favor of the high efficiency ration in the starting phase and the 70 mash-30 grain fed groups in the laying phase. There was no significant difference in egg production due to the way the birds were handled during the growing phase.

W. M. Davis, A. B. Watts, B. A. Tower, C. W. Upp

THE PROTEIN EVALUATION OF COTTONSEED MEALS

The study of the effect of method of manufacture on the protein quality of cottonseed meal is being continued. The Southern Regional Research Laboratory in New Orleans prepared small samples of meals for test in the laboratory under different condi-
tions and these were tested in short-term growth experiments. During the past year over 200 different samples of meal were evaluated. Many of these far exceeded the nutritional value of any meals to date. It would appear at the present time that the acid or alkaline conditions under which a meal is prepared greatly influence the nutritional value of the meal. This work is being continued and investigated thoroughly. The results to date are preliminary but show great promise. It would appear that some modifications in the commercial production of cottonseed meal could be made which would result in greatly increased nutritional value of the meals. Also during the year two surveys of meals produced by mills using the screw press method and the prepress solvent method were made. These surveys involved samples from at least 20 different meals by each process, and the results were compared with meals previously evaluated by the hydraulic and expeller methods. Meals prepared by the prepress solvent method were greatly superior to those prepared by the other methods of manufacture. There were meals that proved to be of high nutritional value by every method of manufacture. No process has consistently produced superior meals. In every method of manufacture there have been superior meals as well as inferior ones. This work is being continued and certain processing conditions are being intensely investigated as they appear to produce meals superior to any produced so far.

—A. B. Watts and C. W. Pope

THE IMPROVEMENT OF QUALITY AND PRODUCTIVENESS OF WHITE PLYMOUTH ROCKS THROUGH LINE BREEDING, CROSSBREEDING AND HYBRIDIZATION

(CROSSING INBRED LINES)

The first five-year phase of this project has ended. During this period emphasis was placed on developing inbred lines of White Plymouth Rocks. Each year the inbred progeny was compared with outbred White Plymouth Rock progeny in measures of vigor, such as hatchability, growth rate, livability, egg production, etc. As anticipated, the outbreds were superior to the inbreds in all measures of comparison. During this period “pilot” tests of various types of crosses were made (for both meat and eggs) and results indicate that several different crosses show promise. Of the original 37 full-sib matings that were made in 1949 only four lines show enough promise to warrant continuing them as inbred lines. Seven other mediocre lines were mated inter-se in 1953 and an attempt will be made to extract other inbred lines from them.

The second five-year phase of this project is now starting. It is hoped that inbred lines of New Hampshires and possibly other
breeds will be developed for use in hybridization. Various types of crosses will also be made during this period in order to evaluate the combining ability of the various inbred lines. Breed and strain crosses will also be made and evaluated if and when facilities are available.—B. A. Tower and C. W. Upp

A STUDY OF PROCESSING LOSSES AND MEAT YIELDS OF BROILERS OF DIFFERENT BREEDING

This study was designed to determine the differences in processing losses and meat yields among various breeds and crosses of broilers.

With weight kept constant within ranges of 1/4 pound, samples of 10 males and 10 females were selected from four breeds and crosses. These birds were slaughtered and deboned. Pertinent weights were taken as follows: Live, New York dressed, eviscerated, head, shank and feet, viscera, giblets, breast meat, other meat, and bone. White Cornish yielded the highest dressing percentage and percentage of edible meat. This breed yielded 1.26 per cent more breast meat and .45 per cent more “other meat,” or 1.71 per cent more edible meat than the next high yielding group. There was considerable fluctuation in the other measurements, but as an over-all picture the Cornish showed a superiority.

A similar set of data was collected for other breeds and crosses. Body weight varied more in this part of the study, and pressure cooking was used to remove meat from the bones. White Cornish lost more weight due to cooking than the other groups of birds, but still yielded a higher percentage of cooked edible meat. Weight losses due to cooking ranged from 21.99 per cent to 24.09 per cent. While the actual figures for the data on the different cooked measurements varied somewhat from those on the raw deboned birds, trends were the same. White Cornish showed about the same superiority in yield of edible meat.

The “cooking method” of removing meat from bones as done in this study appears to be as slow and tedious as the deboning of raw carcasses. Cooking also led to losses that cannot be accounted for with these data.

A. B. Watts and H. E. Hathaway

VARIATIONS IN THE QUALITY OF EGGS LAID DURING DIFFERENT SEASONS

During the past year the effect of season of the year on certain blood constituents and egg quality measurements was studied using a group of hens housed in single-deck laying cages. These
hens were an egg strain New Hampshire and were placed in bat-
teries at 24 weeks of age during the month of September. One
week each month the eggs were identified as to the hen that laid
them and the time of lay. During the middle of the week a blood
sample was secured by heart puncture and certain constituents
determined chemically. The constituents studied were: blood
specific gravity, plasma specific gravity, total calcium, inorganic
phosphorus and total phosphorus. The measurements made on the
eggs were specific gravity, per cent shell and albumin height. The
experiment was terminated June 1, 1953. Correlations between the
egg quality measurements and the blood constituents were made.
Also the seasonal effects on the egg quality measurements and blood
constituents were studied. The specific gravity of the eggs remained
fairly constant until the onset of hot weather during April and
May, at which time a decline in this measurement was noted. Since
the egg shell is the most important contributor to the specific
gavity of the egg, it would appear that shell quality significantly
decreased during hot weather. The per cent shell showed exactly
the same decline as the specific gravity. There appeared to be a
slow but constant decline in interior quality of the egg as measured
by albumin height during the laying year. This decline was
constant and did not appear to be influenced by the season. The
calcium level of the blood did not change significantly during
the experimental period. The inorganic phosphorus content
of the blood tended to drop slowly as the experimental period pro-
gressed and increased considerably when egg shell quality de-
creased. The specific gravity of whole blood and plasma seemed to
follow the same pattern as did the interior quality measurements
of the eggs. This experiment is being continued with a new group
of birds and several treatments will be studied in an attempt to
prevent the decline in egg shell quality as the environmental tem-
perature increases.—E. Williams, A. B. Watts and C. W. Upp

DEVELOPMENT AND USE OF CORNISH STOCK

Continued improvement has been made in the Cornish fowl.
Egg production has been increased, the age of sexual maturity de-
creased and the broiler qualities have been improved. Major em-
phasis in selection has been toward a white broiler which has fast
growth and fast feathering. Crosses with egg breeds have been
made, and tests just completed show that the Cornish and Cornish
crosses have a higher dressing percentage than other popular
broiler strains and tend to have a broader, plumper breast. Growth
rate has tended to be slightly less than popular broiler strains
with approximately equal feed conversion. Two experimental
crosses are being made this year to determine if some desirable
traits may be transferred to the Cornish stock. A single pen of Cornish females was mated to a Buff Orpington male. It is anticipated that a more massive frame may be transferred to the Cornish. The other cross involves the White Leghorn breed, and dominant white plumage will be transferred as well as any desirable egg production characters which may be picked up from such a cross. These crossbred birds will be mated back to the Cornish and selected for all desirable characteristics. Continued selection will be necessary to improve growth rate and reproductive qualities if the Cornish are to be used on a commercial scale.

—W. A. Johnson, B. A. Tower and C. W. Upp

MALATHION SPRAY CONTROLS HOUSE FLIES IN POULTRY ESTABLISHMENTS

For report of this work, see page 72, under Entomology Report, by E. H. Floyd, B. A. Tower and C. E. Smith.
Rural Sociology

LOUISIANA'S RURAL POPULATION AT MIDCENTURY

Research on Louisiana's rural population has been continued with emphasis this year on selected aspects of its make-up or composition. One of the factors singled out for special consideration has been the educational status of the state's rural people. Their standing in 1950, as has been the case in previous census years, was considerably below that of urban Louisianians. Although non-whites were characterized by less schooling than whites in all residential categories, the rural-urban differential characterized both races. Among adult whites, the median number of school years completed was 10.2 in urban areas, 7.8 in rural-nonfarm territory and 7.0 on farms. The corresponding figures for non-whites were 5.6, 3.6 and 3.6, respectively. It will thus be noted that among white rural dwellers, those living in rural-nonfarm areas fared somewhat better than those on farms. Among nonwhites, on the other hand, the educational attainment of farm residents equalled that of rural-nonfarm people.

Rural Louisianians not only compare unfavorably in formal education with urban residents of the state, but they also are at a disadvantage with reference to the rural people of the nation as

**MEDIAN YEARS OF SCHOOLING COMPLETED**

Louisiana & United States

<table>
<thead>
<tr>
<th></th>
<th>Median Years of Schooling Completed</th>
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<tr>
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Figure 1.—Median years of schooling completed by adults 25 years of age and over, by residence, Louisiana and the United States, 1950. (Source: Census of Population: 1950.)
It will be noted in Figure 1 that the educational level of both the rural-farm and the rural-nonfarm residents of the state is distinctly inferior to that of the corresponding categories of the national population. This is the case for both races. As a matter of fact, urban Louisianians also rank below urban residents in the nation as a whole, but the differential almost vanishes among whites. Indeed, considerable pride may be taken by the state in the relatively high educational attainment of its white urban residents. The educational challenge for the future lies primarily in raising the level of rural whites and of both urban and rural non-whites.

The decade between 1940 and 1950 witnessed a marked improvement in the state's educational level. (See Figure 2.) This progress was evident among both white and nonwhite farm adults.

![Figure 2 — Median years of schooling completed by adults 25 years of age and over, by residence, Louisiana, 1940 and 1950. (Source: Sixteenth Census of the United States: 1940; Census of Population: 1950.]

The former had reported 6.2 median years of schooling in 1940 as compared with 7.0 median years in 1950. The corresponding figures for nonwhite farm adults were 2.4 and 3.6. Rural-nonfarm dwellers failed to realize a similar improvement in educational status. Non-whites residing in rural-nonfarm territory registered the slight gain from 3.5 to 3.6 median years in the 10 years, but the position of rural-nonfarm whites actually worsened, changing from 8.1 median years in 1940 to only 7.8 in 1950. It seems likely that the
shift from farm to nonfarm status of considerable numbers of adults, either through migration or classification, contributed to this pattern of educational change in rural-nonfarm areas.
Also subjected to special study has been the age composition of the state’s farm people at midcentury. Figure 3 effectively portrays the general features of their age structure and brings into relief the broad differences in age between them and urban Louisianians. The concentration of children and youth (under 20 years of age) is marked, whereas young adults (20-35 years of age) are relatively scarce in farm areas. Note the sharp break in the rural-farm age-sex pyramid at age 20 and the strikingly small proportion of persons between 25 and 30, and 30 and 35 years of age. In contrast, the urban age structure is characterized by a conspicuous bulging in the productive and vigorous years of young adulthood. These fundamental residential age differentials result primarily from the high birth rate of farm people coupled with their large-scale migration to urban areas in late adolescence or early maturity.

Changes in the age structure of the farm population between 1940 and 1950 are also evident in Figure 3. The impact of the aging process during the decade was significant. Not only did the age brackets of 65 years and over contain relatively more persons in 1950 than in 1940, but similar increases occurred in all age groups above 35 years. Offsetting the aging to some extent, though contributing further to the burden of dependency in farm areas, was the growing relative importance of children under 10 years of age as a result of higher birth rates in the 1940’s. This pattern of age changes which resulted in the simultaneous increase of the relative number of oldsters and youngsters is of fundamental importance to the farm population of Louisiana.—Homer L. Hitt

A STUDY OF THE LOCATION, CHARACTERISTICS AND IMPORTANCE OF SOCIO-CULTURAL AREAS IN RURAL LOUISIANA

In the last two decades much time and effort have been devoted to rural social planning and rural social research. In this connection, a great many programs have failed completely or made progress only after time-consuming trial and error procedures. This has been true to a large extent because various localities have differing socio-cultural characteristics. Thus, procedures which might work well in one place sometimes fail in another. Anyone familiar with the situation in states such as Louisiana can appreciate why a particular approach or program might work well in one part of the state but be completely ineffectual and possibly rejected in another part.

The present study, begun in July 1953, is an attempt to delineate homogeneous areas within the state with respect to socio-cultural characteristics in order to lessen the problems of the agricultural planner. The research procedure followed involves two
steps. First, quantitative data are to be used to give preliminary indications of the location of homogeneous areas. Second, field investigations will be made to verify at first hand the homogeneity determined in the first step and to isolate cultural islands.

Considerable data for a comprehensive group of sound sociological variables have been assembled. These data have been taken from the various census publications and other current sources. In addition, indexes of such characteristics as education, age, mortality, dependency and health have been computed. These criteria will be statistically manipulated to determine an index of homogeneity in the near future. Field investigations will be made during the summer of 1954, and a report of the findings will be prepared during the ensuing year.—Alvin L. Bertrand

A COMPARATIVE STUDY OF THE KNOWLEDGE AND ATTITUDES OF RURAL DWELLERS TOWARD HEART DISEASE

The major cause of death in Louisiana is heart disease. Consequently, health education endeavors need to be directed toward increasing the knowledge of the people of the state about this type of illness. Such programs can best proceed after studies have been made to determine the existing knowledge and prevailing opinions of the various segments of the population. The present study, undertaken as a cooperative endeavor with the Louisiana Heart Association, is designed to fulfill this purpose. From a total of over 1,000 interviews taken in sample areas of North and South Louisiana, the following conclusions have been reached.

Generally speaking, rural-farm people know less about heart disease than persons in other residential areas. South Louisiana is more aware of heart disease than North Louisianians, and Negroes are less aware of heart disease facts than are whites. It can be readily perceived that these differentials in knowledge are closely related to the educational attainments of these groups. This fact points up one of the more subtle benefits of education.

The more specific findings of the study indicate an alarming degree of ignorance in rural-farm areas with respect to heart disease. For example, almost two-thirds of the rural-farm informants did not know that there is more than one kind of heart disease, and approximately nine-tenths of these informants had never heard of an electrocardiogram.

In conclusion, the preliminary findings of this study strongly suggest that the well being of the rural people of the state would be improved considerably by both general and specific health education programs.—Alvin L. Bertrand and Clarence A. Storla
THE SOCIAL ADJUSTMENT OF AGED FARMERS IN LOUISIANA

The study of the role and status of aged persons in Louisiana's agriculture has been continued during the past year. Additional analysis has been focused on the significance of persons 65 years of age and over in the various tenure classes and among operators of the different types of farms. The economic classes of farms which are operated by aged persons and the size of such farms have also been the object of study. The investigation has been made for State Economic Areas as well as for the state as a whole.

The study shows that 13.3 per cent of all farm operators in 1950 were 65 years of age or over. However, this proportion varies greatly when the different tenure classifications are considered. (See Figure 4.) Aged farm operators are relatively more numerous among full owners than among the other tenure categories. Of this group, 13.8 per cent were classified as aged in 1950. In a contrast, persons 65 years of age and over constituted a much smaller proportion (4.2 per cent) of the farmers who were classed as part owners. Among the tenant classifications, aged farm operators were more prevalent among those persons listed as share-cash

AGED FARM OPERATORS* BY TENURE CLASSES,
LOUISIANA, 1950

Figure 4.—Aged farm operators, by tenure classes, Louisiana, 1950. (Source: United States Census of Agriculture: 1950, "Louisiana," Volume 1, Part 24.)
tenants. They accounted for 6.7 per cent of the persons in this category. The data show that, in general, the aged farm operators were much less significant among tenants than among owners. In fact, they made up only 4.1 per cent of the persons who were classed as tenants.

Information relative to types of farms shows that aged farmers comprised a substantial portion of those persons operating poultry farms. In fact, in 1950, 22.7 per cent of these farms were operated by persons 65 years of age and over. They are also significant among the operators of farms classified as "general-primarily livestock," "miscellaneous and unclassified," and "livestock other than dairy and poultry." The proportions of the aged among the operators of these types of farms in 1950 were 20.1, 20.9 and 19.0, respectively. The aged were of least importance among the operators of farms classified as "general-primarily crop," "other field crop," "vegetable," "dairy," "general-crop and livestock," "cotton," "fruit-and-nut," and "cash-grain." Among operators of these types of farms, the aged did not account for more than 8.0 per cent of the total number of operators in any one of them.

Aged farm operators are proportionately less numerous among the operators of farms of 10-29 acres and 30-49 acres than among operators of farms of other sizes. They made up only 10.9 and 10.6 per cent of these operators, respectively. The relative number of old persons is greatest among operators of farms of 140-179 acres, of 220-259 acres and 500-999 acres, in the rank order named. They constituted 20.3, 19.2 and 19.2 per cent, respectively, of persons operating farms in these categories. It is of interest to note that the aged also represented a significant proportion of those persons who were operating farms of under 10 acres. They comprised 16.8 per cent of the operators of farms of this size. In general, however, the aged are more important among those persons who are operating farms of 70 acres and over than they are among operators of smaller agricultural enterprises.

From the standpoint of economic classes, the data indicate that aged persons are most significant among farmers operating commercial farms of Economic Class VI (farm products sold are valued from $250 to $1,199.) They are least important among Class IV commercial farms (farm products sold are valued from $2,500 to $4,999.) The aged constituted 10.1 per cent of the former as compared to only 5.5 per cent of the latter. Old people were relatively numerous among the operators of residential farms. Almost one-fourth (23.6 per cent) of these operators were 65 years of age and over. The aged were also proportionately very important among persons operating part-time farms. The data show that 15.6 per cent of these farmers were classified as aged.

—Paul H. Price
Sugar Cane

VARIETIES

During the fall of 1953 nine new sugar cane varieties were sent to each of the Experiment Station Test Fields. These were: C. P. Nos. 50-25, 50-37, 50-39, 50-40, 50-41, 51-13, 51-21, 51-24 and 51-27.

Seed cane of these varieties was also made available to the American Sugar Cane League for planting on their Smithfield Primary Seed Increase Station.

No releases for commercial cultivation were made this year.

Three promising unreleased new sugar cane varieties are under extensive seed cane increase on the Primary and Secondary Seed Increase stations supervised by the American Sugar Cane League. These are: N.Co. 310, a foreign importation, and C. P. Nos. 47-193 and 48-103 from the Canal Point breeding program.—E. C. Simon
A great deal of emphasis has been placed in recent years on so-called hard breeding cows in herds where infectious diseases of the reproductive tract could be eliminated as the cause or were of a low incidence. In an attempt to find how some problems other than infectious diseases and poor management enter into the breeding picture, resulting in so-called hard breeders, a project was designed to study this problem and to see what corrective measures might be effective. Three herds having no discernible trouble with infectious diseases and which received better than average care (for the area they represent) were selected for pilot study. All three herds employ artificial insemination, using semen from the Dairy Improvement Center at Louisiana State University. This type of study is complex and some criteria must be set up as standards. An animal was considered a hard breeder when any of the following conditions were present: (a.) Bred three times and in heat a fourth time, (b.) Irregular heat periods, (c.) Not in heat 60 days after calving.

In order to make a complete study, every animal was examined rectally at 45-60 days after the last breeding for positive diagnosis of pregnancy. Included in the study were only adult animals which had brought one or more calves. A total of 313 animals have been observed in the study on which 586 rectal examinations have been made. Two hundred and seventy pregnancies diagnosed were found to correspond to the breeding date of the inseminator. Within this group there were 14 instances of false heat, that is, cows showing definite signs of heat proved by rectal examination to be with calf.

One hundred and twenty-two, or 33 per cent of the total possible pregnancies, did not occur on schedule for the reasons listed:

1. Anestrus—78. (a.) No heat since calving, 30; (b.) In heat since calving, but not after 60-day rest period before rebreeding, 25; (c.) Bred, not coming in heat, not pregnant, 23.
2. Abortion (those definitely diagnosed pregnant and later found not to be pregnant)—18.

A major type of breeding disorder noted to date in this study, is under the classification of anestrus. Sixty-three pregnancies, or a little over 50 per cent of the 122 possible pregnancies not occurring
on schedule, resulted from the prompt application of corrective measures. Recognizing that a study of this kind may run at least a minimum of four months on any one animal, it seems reasonable to assume that many more of the hard breeders will respond favorably to treatment.

The application of corrective measures can return many so-called hard breeders to productive life. This can only be accomplished by the alert, observing herdsman keeping complete and accurate records and employing competent veterinary medical aid to determine the type of trouble and instituting proper corrective measures.—R. B. Lank

GASTRO-INTESTINAL PARASITES OF CATTLE

The work on this project has been a continuation of the studies on the low level feeding of phenothiazine to calves with pure infections of the large stomach worm (Haemonchus contortus). An experiment in which 1½ grams of the drug was fed daily during the first two weeks following inoculation, indicates that infection will not be prevented since there was no appreciable difference between the number of eggs recovered from the treated and control animals. This agrees with the results obtained in similar experiments with the hook worm and nodular worm and indicates that the drug offers no protection against infection by the larval stages already on the premises.

A preliminary experiment indicates that ½ gram of phenothiazine daily is approximately the minimum amount necessary to eliminate or reduce the eggs and infective larvae. This is also the minimum amount that has been found necessary to produce the same results in the hook worm and nodular worm infections. The recommended procedure is to add the phenothiazine to the grain at the rate of 1½ grams daily (3 times the minimum) per animal. This practice allows for variations in the amount of the grain mixture consumed by different individuals of the herd and for variations in management practices. In this manner the number of infective larvae will be decreased, thus reducing the ability of the treated calf to spread the infection.

An experiment offering a salt-phenothiazine mixture 10 to 1, has been carried on for four years. The results indicate that none of the animals ate enough of the mixture regularly enough and over long enough periods of time to promise effective control of parasites in cattle. It must be remembered that the effectiveness of this method of medication is dependent upon the animal's consuming daily at least the minimum amount proven effective by experimental administration. Variations in desire for salt account for differences in intake. It points to the fact that the only sure way to get the material into the animal is to mix it with the feed.
If, however, other methods of feeding the drug are impractical, then the salt mixture might be of some help in reducing the parasitic infection.—R. L. Mayhew and Betty J. Torbert

ANAPLASMOSIS

During the year there was additional experience reported on the use of antibiotics (aureomycin and terramycin) in treating clinical cases of anaplasmosis. All information continues to point to the extreme importance of an early, accurate diagnosis. Owners in anaplasmosis areas must call for assistance when cattle are first seen sick—time is most important. Recovery rates are high with early diagnosis and treatment; low, regardless of treatment when presented in advanced stages of the disease.

Aralen-dihydrochloride recently used quite extensively was subjected to critical screening tests and showed no activity against the *Anaplasma marginale*. The same measuring stick was used as applied to the studies of the antibiotics, namely, its effect upon the multiplication of the anaplasma bodies.

This Station worked with Maryland and Oklahoma on the complement fixation test as a method of detecting the carrier animal. Close agreement was obtained. It is felt that the complement fixation test may be developed into a workable tool, provided all details are carried out meticulously. It is not a simple, easy test.

Studies were run in conjunction with the Kansas Station to see if the anaplasma infection could be eradicated from a carrier by the continuous administration of antibiotics. All animals became negative as demonstrated by the complement fixation test 35 days or more after treatment. Subsequently, some of these animals (splenectomized as calves) were susceptible to reinfection. This finding does not seem to have a practical application, but it may be a very useful research tool.

During the past year great difficulty has been experienced because of the presence of eperythrozoonosis in a virulent form in our carrier animals. This condition was first reported from this Station by Jensen in 1943 when it interfered materially with his work on anaplasmosis. It does not appear to be of any significance in normal animals, but in splenectomized calves, our experimental animal of choice for the basic work on anaplasmosis, it often throws a cloud into the picture. Much time has been spent trying to locate a source of pure anaplasma infection.

Finally, early diagnosis, treatment with an effective antibiotic and supportive treatment as recommended by the veterinarian, followed by careful nursing, are the most effective means of combating clinical anaplasmosis.

—J. G. Miller, Lon E. Foote, Helen E. Levy and Betty J. Torbert

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Substations

Fruit and Truck Experiment Station, Hammond

W. F. Wilson, Jr., Superintendent
M. J. Giamalva, Assistant Horticulturist

STRAWBERRY STUDIES

Spray, Rotation, and Sanitation for Fruit Rots

Two varieties, Klondike and Klonmore, were grown for comparison on an area which had been in strawberries for several years and on an area which had not been in strawberries. Half of each area was sprayed with fermate, two pounds to 50 gallons of water, and the other half was not sprayed. Half of the plants of each variety were from an area which had not been in strawberries previously and the remaining half of the plants of each variety were from an area which had strawberries or plants for the past several years. The resulting yields and rot percentages gave a comparison of varieties, plant sources, growing areas, and spray vs. no spray.

There were no differences between varieties. In the new growing area there was a 6 per cent reduction in rot over the old growing area and a 28-crate average increase in yield. Plants that came from an area in which strawberry plants had not been grown previously produced much greater yields, 284.9 crates per acre compared to 159.25 crates per acre from the plants which came from the old plant producing area. There were no differences between the sprayed and unsprayed plants.

Varieties

The variety test consisted of the varieties Klonmore, Marion Bell, L-27, L-161, L-162, L-0-188 and Nick Beauty. Highest yields were obtained from Nick Beauty, a seedling grown by a local grower. This variety is susceptible to leaf spot and produces many misshappen fruits. This is a very promising seedling but further testing is necessary before it can be recommended. The second highest yielding variety was Seedling L-0-188. This seedling is very susceptible to leaf spot and not as firm as our standard varieties.

Yields of 427, 464 and 462 crates per acre were recorded from Klonmore, Marion Bell and L-27, respectively.

Phosphorus Ratio Test

During the past several seasons a fertilizer test for strawberry production using a 1-1-1, 1-2-1, 1-3-1 and 1-4-1 ratio has been con-
ducted on an area which has been in strawberries continuously and on an area which has not been in strawberries for a number of years. Nitrogen and potash were kept constant at 60 pounds per acre, phosphorus was varied at 60, 120, 180 and 240 pounds per acre for both locations.

Yields of 331.8, 329.0, 310.8 and 307.3 crates per acre were recorded from 1-3-1, 1-4-1, 1-1-1 and 1-2-1 ratios, respectively, on the high phosphorus or continuously planted area. On the new area yields of 286.6, 271.4, 270.4 and 248.5 crates per acre were recorded from the 1-3-1, 1-2-1, 1-4-1 and 1-1-1 ratios, respectively.

**Chemical Weed Control**

The area devoted to this test was very heavily infested with most of the common weeds and grasses which are troublesome to the strawberry growers. Previous work has recommended the use of 2,4-D at the rate of two pounds per acre acid equivalent as a pre-setting spray. This season 3-Chloro-I.P.C. at rates of 6, 9 and 12 pounds per acre, and C.M.U. at rates of 1, 2 and 4 pounds per acre were compared with the recommended treatment.

Both of these materials at all rates gave better control of the weeds and grasses than did 2,4-D. The labor saved in the operation of scraping was slightly greater from the use of I.P.C. and C.M.U. and slightly more labor was saved by the higher rates of application.

Yields were decreased, when compared with control, or no treatment, by the heaviest rates of application of C.M.U. and I.P.C. owing to injury to the plants.

Six pounds of I.P.C. per acre and 2 pounds of C.M.U. per acre gave increases of 50 crates per acre in comparison to the control and were equal to the recommended pre-setting spray of 2,4-D.

These materials show much promise for further study as means of weed and grass control in strawberries.

**POLE BEAN STUDIES**

In the spring of 1953 a comparison was made between the two most common systems of handling pole beans. The four-pole tepee system was compared to the Georgia system of strings attached to wires strung above the beans between poles.

Forty man-hours were required to cut, haul, put up and take down poles from 6 rows, or 1/12 acre, using the tepee system. When using the Georgia system, 33.75 man-hours were needed to put up wires and strings and take them down from 1/12 acre.

Yields of 91.9 bushels of U. S. No. 1 and 20.7 bushels of No. 2 beans were recorded from the area where the tepee system was used. Where the Georgia system was used yields of 67.7 bushels No.
1 and 26.5 No. 2 were recorded. These are very low yields, which were due to a very unfavorable season for the crop.

**CUCUMBER STUDIES**

The program involved the testing of new varieties for disease resistance as well as for yield. Yields of 330, 316, 308 and 302 bushels of marketable cucumbers were harvested from Marketer, S.C. 10-3, S.C. 15 B-3 and S.C. 18-5, respectively. Marketer, the recommended and most widely grown cucumber variety in this area, is susceptible to mildew.

All of these varieties except Marketer showed some resistance to downy mildew. Three of these produced larger total yields; but the percentage of culls was higher, resulting in lower marketable yields. These varieties show some promise but require further testing before being acceptable for the area.

Even though dusting is required for control of diseases of Marketer, it continues to be the recommended variety for this area.

**SWEET CORN STUDIES**

The Southern Regional Trials for sweet corn varieties are conducted each season by this Station. The tests this season included 47 relatively new varieties for observation, several of which look promising and will be included in next season's replicated trials. The replicated test this season was composed of nine varieties. Yields of the best of these varieties are shown below, in comparison with the yield of Aristogold Bantam Evergreen, which is the recommended variety for this area.

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**IRISH POTATO STUDIES**

In tests by this Station for the past several years in cooperation with a state-wide testing program for Irish potato varieties conducted by Dr. Raymon Webb, a new variety, LaSoda, has produced higher yields than Triumph and is much smoother, with a brighter colored skin which makes it more desirable for commercial production. This past season LaSoda yielded 74.34 bushels per acre in comparison with 57.74 bushels per acre for Triumph. Red LaSoda, a mutant of darker color, averaged 78.86 bushels per acre.
OKRA STUDIES

Varieties

Six of the standard varieties of okra were grown in a production test. Yields were recorded in number of pods and tons produced per acre. The planting was harvested three times each week from June 17 to October 5.

Highest yields were produced by Dwarf Green, a variety with angled or star-shaped pods. Lowest yields were recorded from French Market.

Dwarf Green produced 5.69 tons per acre with an average pod-size of 13 grams. Louisiana Velvet produced 5.07 tons with 10-gram pods, Louisiana Market 4.95 tons with 12-gram pods and Emerald 5.20 tons with 10-gram pods.

Cultural Studies

A test involving the practice of topping okra plants at various stages during the growing season has been conducted for the past two seasons. Topping consisted of cutting the plants back to a height of 18 inches. Variations included a control, which was not topped, topping the plant approximately one week after beginning harvesting, or in June, topping one month later, and topping two months later. Largest yields were produced by the untopped plants. Yields produced by untopped plants were 5.4 tons per acre in comparison with 2 tons from the topped plants.

This test clearly indicates that if late okra production is desired, a late planting is the most economical and desirable method.

Fertilizer Tests

Fifteen variations were used in the rate of application of the three major elements. Highest yields, measured by the number of pods and tons per acre, were produced by the application of 32 pounds of nitrogen, 96 pounds of phosphoric acid and 32 pounds of potash per acre.—W. F. Wilson, Jr. and M. J. Giamalva

BRUSH CONTROL WITH CHEMICALS

Hardwood brush, woody vines and blackberries grew throughout the forest plots established to study the combined production of pine straw and commercial timber. The size of the brush varied from a few inches in height to 4 or 5 inches in diameter. Species found on the area included cherry, chinquapin, black and red gum, huckleberry, French mulberry, persimmon, sweet bay, smilax gallberry, wax myrtle and Yaupon; and live, post, red, water and willow oaks. Yellow jessamine, smilax, grape and blackberry were very dense in spots.
All brush was cut close to the ground but no chemical was applied to the root stock when the plots were established. Later, the one-fifth acre center plots were cut a second time. Sprouts continued to be numerous and vigorous.

Chemical treatments were next tried. Ammate was applied using \( \frac{1}{2}, 1, 2 \) and 4 pounds per gallon of water. Solutions of 1 and 2 per cent of both the ester and amine of 2,4,5-T were used. Also, mixtures of 2,4,5-T and 2,4-D were applied at the 1 and 2 per cent levels.

The large root stocks do not get enough poison to kill them immediately and they sprout again when the old growth is killed back. However, the brush continues to diminish, and the one-fifth acre center plots after two cuttings and two sprayings are relatively free of brush. Smooth-leaved evergreens such as yaupon, gallberry and smilax are noticeably resistant to poisons. When kerosene and varsol were used as carriers for 2,4,5-T and 2,4-D, the kill was not much greater than when water was used as a carrier. Blackberries are easily killed with 2,4,5-T.

The various brush species will probably require different concentrations of plant poisons to obtain the greatest kill. Results to date indicate that the plant must be thoroughly covered with the spray if a maximum kill is to be obtained. Heavy concentrations will not offset partial coverage of the plant to be killed.

—B. A. Bateman, M. B. Applequist and W. F. Wilson, Jr.

**FOREST WOODLAND MANAGEMENT—STRAW AND TIMBER PRODUCTION**

Thinnings were made in a 23-year-old pine stand to study the cutting practices best suited for the combined production of pine straw and merchantable timber. Twelve plots consisting of five treatments and a check, each duplicated once, were established in the fall and winter of 1947. The plots were thinned so that the per-acre basal area on each pair of plots was 80, 85, 90, 95 and 100 square feet. The unthinned check plots contained 121 and 122 square feet of basal area per acre.

A second cut was made in the winter of 1952-53 five years after the first cut. Net basal area increase for each pair in the order listed above was 17.58-17.59, 14.66-17.66, 11.88-18.80, 12.03-15.58 and 15.45-17.59; it was 9.90-13.82 on the check plots. The average growth was lowest for the two check plots and highest on the two plots thinned to 80 square feet of basal area.

The average net increase per thinned plot was 17.65 per cent. Most of this volume would have been lost through natural mortality had no thinnings been made. Actually, heavier thinnings would have prevented most of the loss in trees noted below.
There was some abnormal loss of trees during the first two years following thinning due to a tropical storm and an ice storm. In the last two years before the second thinning, the average tree loss per acre in order as above, 80, 85, 90, 95 and 100 square feet B. A., was 6, 15, 22, 13 and 21, with 37 on the check plots. Mortality was in small trees that had not been released from severe competition by the first thinning.

Three additional plots were thinned during the winter of 1951-52. One hundred trees were left per acre. This cut made rather large crown openings on a plot with smaller trees—average diameter, 10.8 inches—but smaller openings on a plot with larger trees—average diameter, 12.6 inches. Additional cuts will not be needed soon.

Twenty-four mil-acre plots were raked twice each month throughout the year to determine the rate of straw fall. The greatest fall does not occur at the same time each year, this probably being the result of seasonal differences in rainfall. Some years, strawfall is heavy up to December 15, and earlier raking would result in a lower straw yield.

The center one-fifth acre of each plot has been hand-raked and the straw weighed each year. Yields have been somewhat erratic; however, where basal area has been approximately equal, the plots with larger but fewer trees have usually produced more straw. In these tests, one pound of straw has covered about one and one-third feet of bed. At this rate, from two to three acres of pine have been required to straw one acre of berries.

—B. A. Bateman, C. O. Miller and W. F. Wilson, Jr.

North Louisiana Experiment Station, Calhoun

Ralph S. Woodward, Superintendent
John C. Taylor, Assistant Horticulturist
J. L. Heath, Jr., Assistant Animal Husbandman
A. V. Davis, Research Associate in Animal Industry

AGRONOMY

Corn Spacing Experiment

This experiment has been run for four years and the 1953 results followed the trend of the past three years. A given number of plants per acre will produce approximately the same yield at several different hill arrangements on the row. One plant per hill 12 inches apart produced the same yield as 2 plants at 24 inches.
or 3 at 36 inches. The size of ear and quality of corn were the same for all. In general, the quality of corn decreased as the number of plants increased although total yield was greater at the larger populations. On the basis of this and other work with spacing of corn, it is evident that 24 inches on 40-inch rows will give the best yields of high-quality corn on the upland soils of this area. If good, productive bottom land is available, 18-inch spacing will be satisfactory.

**Corn Fertilizer Test**

Results of several years’ work with corn indicate that a 60-30-30 is probably the best general fertilizer for corn on the drier upland soils and an 80-30-30 or 90-30-30 on the more moist bottom land. In an effort to determine the effect of the method and time of application, an experiment was begun in which all fertilizer was put in the furrow under the crop compared to a broadcast application which was plowed in during the soil preparation. This was also varied in that the mixed fertilizer only, was applied before planting in both the above, with nitrate being added as a side-dressing. Two-year results show very little, if any, difference.

Another feature of this experiment is that nitrogen alone (60 pounds per acre) is applied in three different ways as follows: All before planting, under the crop; all before planting, as a broadcast application; and no fertilizer before planting, but 60 pounds of nitrogen in two equal side applications. Of these last three treatments, the one receiving no fertilizer before planting has failed to equal the others to date.

**Corn-Soybean-Cotton Rotation Test**

In 1953 the growth and development of this experiment was such that no consideration could be made of the results.

**The Use of Pre-emergence Sprays on Hill Land Cotton**

This program, which gave excellent results in 1952, was again used in 1953. A newly developed hill-drop planter was used with a commercial-type applicator which was redesigned and fitted to a one-row tractor for use on the contour-planted hill farms. The equipment proved highly successful in field operation but failed to get a stand of cotton and to control grass. This failure was due to two causes. The planter proved to pack the soil to a depth of two or more inches in actual planting operation. This was followed by seven inches of rain in 48 hours which completely packed the soil to the extent that seedlings could not break through. The failure of the chemical to control the grasses was probably due to the complete leaching which followed the rains.

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The chemical was used on a planting of corn and, although the field conditions as described above prevailed, no material damage could be attributed to its use.

Irrigation

In the fall of 1952 farm ponds were built to store water for crop irrigation. An irrigation system was bought in the early summer of 1953 and used in the fall to establish supplemental pasture for the dairy cows, and no actual research was done. Through the use of this system 16 acres of pasture was prepared, fertilized and planted on September 25 and 26. After planting, 11/2 acre inches of water was applied at the rate of 1/2 acre inch per hour. On October 7, 8 and 9, an additional 1/2 acre inch was applied and again on October 21, 22 and 23. Growth was slow at first because of the unusually hot weather that prevailed but a general rain, 1.67 acre inches, fell on October 26, and the cooler weather which followed caused a very rapid growth of both wheat and oats. On November 10, a cow per acre was turned on this pasture and it afforded ample grazing through December 29.

It is quite evident that the small, shallow farm ponds will not retain enough water for a continued irrigation program. The pond used in the above work has a total volume of 7.35 acre feet of water when full. After losses to evaporation and other causes, only 18 acre inches were available in mid-September unless the entire pond was pumped dry. It would have required in excess of 40 feet of suction pipe to pump any additional water at this level due to the normal slope of the shore line and the water-logged soil around the pond. This can be avoided by preparation of a sump when the pond is built. It is possible that cutting the shore line deeper when building the pond will increase the volume against evaporation losses and result in more usable water in mid-to-late summer.

—Ralph S. Woodward

Corn and Cotton Variety Trials

The cotton variety test was abandoned because of poor stand. The yields of corn reflected the general crop conditions in the area. Dixie 11, one of the leading varieties which prior to 1953 had a four-year average of 48 bushels per acre, produced only 24.3 in 1953. Other varieties performed in about the same way.

—Ralph S. Woodward, F. W. Self and Lee Mason

ANIMAL INDUSTRY

Beef

In 1953 brucellosis was found in the Devon herd and six cows were sold. Eight replacements were purchased along with eight
registered Hereford cows to be used in a crossbreeding program, which is to begin early in 1954. Eleven calves were dropped during the year, which gave a 100 per cent calf drop after Bang's infected cows were sold. The heifers are being raised for herd replacements and enlargement. The herd now consists of 22 head of registered Devons and 10 head of registered Herefords.

A Devon bull will be used to sire the entire herd, thus initiating the crossbreeding program with the Hereford and Devon breeds.

—Arthur V. Davis and Ralph S. Woodward

Comparison of Two Swine Breeding Systems

In the third phase of the swine breeding program four Landrace x Duroc-Jersey x Hampshire gilts were mated to a purebred Duroc-Jersey boar, and four Duroc-Jersey gilts were mated to same Duroc boar. One Landrace x Duroc x Hampshire sow lost her entire litter at birth and was removed from the experiment. The three Landrace x Duroc x Hampshire sows, bred to Duroc boar, farrowed 27 pigs and raised 21 that averaged 2.88 pounds at birth and 39.3 pounds at the end of eight weeks. The four purebred Duroc sows that were bred to the Duroc boar farrowed 40 pigs and raised 25 that averaged 2.47 pounds at birth and 36 pounds at the end of eight weeks. The average weight, at time of grazing, for the pure Duroc-Jersey pigs was 67.4 pounds; for Landrace x Hampshire x Duroc pigs, it was 81.6 pounds.

The three-year average for the crossbred hogs was 7.7 pigs farrowed that weighed 2.85 pounds at birth, 38.0 pounds at eight weeks and 97.9 pounds at the time they were put on the grazing program. The three-year average for Duroc-Jersey was 9.9 pigs farrowed that weighed 2.82 pounds at birth, 36.9 pounds at eight weeks and 84.3 pounds at time to graze field crops.

Cost of Producing Feeder Pigs

The sows and pigs used in the swine breeding program were used to determine the cost of producing feeder pigs. For the third consecutive year results obtained showed that feeder pigs could be produced cheaper than the same quality pigs could be bought on the local market, but the margin of profit was less than in the two previous years.

Seven brood sows and 46 pigs consumed 5,600 pounds of feed during the first eight weeks. The total feed cost of raising the pigs to eight weeks of age was $243.60, or $5.35 per pig. The same quality pigs were selling on the local market for $7 to $8. The brood sows were sold when the pigs were eight weeks of age.

The 46 pigs consumed 10,300 pounds of feed from eight weeks through eleven weeks of age. The average feed cost from eight weeks to the end of feeding period was $9.74 and the total cost was
$15.04 per head. Feeder pigs of the same quality were selling on the local market for $16 to $17.

The average cost of feeder pigs for the three years was $15.09 per pig and the average selling price was $19.50 per pig on the local market. The cost of growing feeder pigs does not include the original cost, cost of feeding and pasturing of the sows prior to farrowing. The cost of growing feeder pigs was from the time of farrowing until pigs were grazing field crops.

—J. L. Heath, Jr., C. B. Singletary and Ralph S. Woodward

DAIRY

The Station dairy herd consists of 31 registered Jersey females. In 1953 an average of 18 cows were milked and they produced an average of 6,637 pounds of milk and 343 pounds of butterfat per cow. The ration fed through the year was a home-mixed one in which corn produced on the Station was mixed with cottonseed meal at the rate of three parts of corn to one part of cottonseed meal. A good quality alfalfa hay was fed, and pasture was allowed at all times. The average cost of feed (including hay and pasture) was $157.69 per head. Profit per cow over feed cost was $296.61.

Oats Versus Wheat for Winter Grazing

With the introduction of Atlas 66 wheat in this area as a supplemental winter grazing crop a series of grazing trials was begun to determine its value as compared to oats.

In November 1952, 3 1/2 acres of Nortex 107 oats and 4 1/2 acres of Atlas 66 wheat were planted, with treatments and management of each pasture being the same. The soil was dry when these pastures were planted but the oats came up to a fair stand in about two weeks, while it was about five weeks, or after a general rain, before the wheat came up. The oats started ahead of the wheat and consistently furnished more grazing than did the wheat throughout the grazing periods. The wheat furnished 55.7 cow days of grazing and approximately 1,520 pounds of hay per acre, while the oats furnished 98.3 cow days of grazing and approximately 1,740 pounds of hay per acre.

On September 25, 1953, 8 acres were planted to Atlas 66 wheat and 8 acres planted to Nortex 107 oats. Management and treatments were the same on both pastures. As in 1952, it was dry at planting time but irrigation was used immediately after planting and as needed until there was sufficient general rain to maintain good moisture conditions. Grazing began on these pastures on November 10 and continued until December 29. The oats furnished a total of 44.7 cow days of grazing per acre, while the wheat furnished only
36.2 cow days of grazing per acre. These pastures are still being grazed and a complete accounting of them will be given in the next annual report.

Comparison of Two Dairy Rations

A feeding trial was started in July 1953 in which the economy of a commercial dairy ration is being compared with the home-grown, home-mixed ration which has been used for the past six years. At the beginning of the trial the herd was divided into two similar groups. One group was placed on the commercial feed and the other on the home-mixed feed. At the end of 3 months the ration of each group was switched. This will continue through 12 months, or until each group has had two periods of 3 months on each ration. The commercial ration being used is a 16 per cent protein ration, and the home ration is made up of 2½ parts of crushed corn and 1 part cottonseed meal, which approximates a 16 per cent protein ration.

The trial has just reached its half-way mark and no conclusion can be made at this time. However, in the first six months of the trial a comparison of the milk production and cost of each feed showed that the milk production was about the same, but the butter-fat content of the milk from the cows on the commercial feed was slightly greater. This increase in butterfat production was great enough to offset the added cost of the commercial feed during the summer and fall months.

Calf Raising

A calf raising program is being conducted in which the cost of raising dairy calves on a specific system is determined. Under the system being used at this time whole milk is fed in limited amounts through 8 weeks of age. A calf starter is allowed free choice from the first week until the calves are consuming four pounds a day, and is fed this amount until they are six months old, at which time the calves are placed on the herd ration. The calf starter ration being used is a home ration containing about 20 per cent protein. Alfalfa hay is allowed free choice at all times from the first week of age. Calves are placed in individual pens and are kept there for 12 weeks; they are then put in groups in larger pens and are kept there until pasture is allowed. Pasture is allowed after the fourth to sixth month depending upon the weather.

To date 12 calves are on the trial. The cost of raising 9 of these calves to 12 weeks of age was $26.88 per calf. Five calves at 8 months of age cost $63.26 per calf, and four calves at one year of age cost $86.02 per calf.
Production records of each group of calves will be kept and used, along with other factors, to determine the value of the method of raising the calves.—Arthur V. Davis and Ralph S. Woodward

**HORTICULTURE**

**Cowpea Breeding**

Approximately 75 F4 generation seedlings from original crosses made in 1951 have been kept. A number of these seedlings are very promising, especially some of the blackeyes and creams, and are almost pure enough for seed increase.

**Cowpea Variety Observations**

Nineteen varieties of the cowpea were grown and observed under field conditions, in cooperation with the southern pea trials. Based on the standards as set up by the Southern Pea Trials Committee, coupled with performance of the varieties under local conditions, the newly released variety Louisiana Purchase (L-3) ranked first followed by Dixie Lee and Mississippi S-1.

**Sweet Corn Varieties**

Five years’ work with sweet corn indicates that an acre of sweet corn will produce approximately 12,000 ears if given proper fertilization and spaced 12 inches apart on 40-42 inch rows. Under conditions on this Station an application of 600 pounds of 6-8-8 or 8-8-8 under the crop plus 200 pounds of nitrate of soda when plants are 3-5 inches tall has given excellent results.

Aristogold Bantam Evergreen has consistently produced good yields of high quality corn and is the recommended variety.

**Sweet Corn Earworm Control**

In previous research into the control of this pest a 10 per cent DDT dust applied when silking began and at 2-day intervals until harvest gave excellent control. In 1953 two types of hand dusters were compared using the same treatment as above but varying the times of application as follows: (1) 2-day intervals until harvest; (2) 3-day intervals until harvest, and (3) 4-day intervals until harvest. A “puff” or bellows type duster was compared to a standard rotary duster under each of the above, beginning when silks first appear.

The application of 10 per cent DDT at 2-day intervals gave the best control with both dusters. However the “puff” type gave 98.8 per cent worm-free ears as compared to only 88.8 per cent from the rotary type. The check plots had only 12.5 per cent worm-free corn.
In Treatment No. 2 (top picture) 98 per cent worm-free ears and 100 per cent marketable were produced from the application of a 10 per cent DDT dust at 2-day intervals beginning at silking and continuing until harvest. The lower picture portrays results where no dusting was done; only 2 per cent of the ears were worm-free, 98 per cent were damaged and only 52 per cent were marketable.
Sweet Potato Variety and Seedling Test

No yields were recorded in this trial because of a poor stand and a shortage of plants in some varieties.

The seedling 0-85 appears to be a high-quality, edible type and in 1952 trials produced good yields. The seedling 0-123, which showed up so prominently in 1952, failed to repeat this year.

The Goldrush and Unit 1 Porto Rico are recommended for North Louisiana.

Sweet Potato Wilt Studies

In cooperation with the Department of Horticulture some 125 different seedlings and varieties of the sweet potato were inoculated with wilt and set to the field. After two months’ growth these were lifted to determine the extent of wilt damage, if any. The result of this and other trials is given the Horticulture Section of the report for the Main Station, Baton Rouge.

Tomato Varieties

Excessive rains in May followed by extreme hot, dry weather in June and July resulted in a near crop failure. This, plus a severe outbreak of mosaic and wilt, caused this experiment to produce very low yields. Moreton hybrid led the test with 5.4 tons followed by Vancross with 4.6 tons per acre. Kopiah was most susceptible to mosaic. Marglobe, Rutgers, Stokedale and Vancross are the leading varieties.

Watermelon Breeding

The Calhoun Sweet variety continues to sell well on the early local markets and there are still no reports of it wilting under any conditions. A tougher rind strain of this variety was grown in an isolated fertilizer test and 50 pounds of the seed were saved for commercial purposes. A number of seedlings from previous crosses were grown and a few additional crosses were made. Several strains of the Calhoun Sweet x Black Diamond cross look very promising in quality, wilt resistance and shipping ability. These strains are large in size, have very tough rinds, and one of the most outstanding features is their apparent resistance to hollow heart.

Chemical Control of Weeds and Grasses in Watermelon Fields

The material used in this work was not received until late in season so the results were taken from a planting of the Calhoun Sweet variety which was made in early June. Excellent control of weeds and grasses was obtained by the use of 1.3 pounds of
Alanap-1 in 25 gallons of water which was applied on a band two feet in width, at planting time. The test was irrigated at planting time and again two weeks later. The treated strips were almost free of weeds and grasses two months after application, while the check plots contained numerous weeds and grasses. There was no apparent damage to the watermelon plants.

**Watermelon Dusting Test**

A comparison of the old recommended mixture of 20 parts of cryolite, 10 parts of Fermate, 7 parts of Black Leaf dry concentrate, and 63 parts of inert materials was made with two other combinations, one consisting of 8 per cent Dithane Z-78 and 1 per cent Parathon, and the other containing 8 per cent Dithane Z-78 and 1 per cent Lindane in the control of insects and diseases of watermelons.

Each dust was applied every five days. At no time during the test did any appreciable insect damage appear until dusting was discontinued just prior to harvest. Within two weeks after the last application a considerable number of aphids did appear, especially on the plants which received the cryolite, Fermate, and nicotine combination. The Lindane seemed to have a longer lasting residual effect than the other two insecticides, since practically no aphids were present on plants receiving Lindane until 15-20 days after the last application. There was no evidence of anthracnose or downy mildew until after harvest, and at no time during the season was there a serious outbreak of these diseases in this area, which was probably due to the extremely dry season. Even though there were no outstanding differences in the treatments used, these materials seem worthy of further testing under conditions which may be conducive to an outbreak of diseases and insects.

In addition to the above mentioned materials, a 5 per cent Malathion dust was tested against a 1 per cent Parathion dust for the control of the cucumber beetle and was not found as effective against this insect as the 1 per cent Parathion.

**Watermelon Fertilizers**

The Calhoun Sweet variety was used in this test. Three of the more common fertilizer ratios, namely, 5-10-5, 6-8-8 and 8-8-8, were used in various amounts up to 1,000 pounds per acre plus a side-dressing of 150 pounds of nitrate of soda. An application of 800 pounds of 8-8-8 plus 150 pounds of nitrate of soda per acre produced the highest yield of marketable fruit, with a total of 1,087 melons per acre averaging 25.2 pounds per melon. Only those melons weighing 20 pounds or more were counted. Recommended fertiliza-
tion for watermelons under North Louisiana conditions is 600-800 pounds of a 6-8-8 or 8-8-8 fertilizer plus a sidedressing of 100-150 pounds of nitrate of soda or the equivalent.

Wilt Resistant Watermelon Varieties and Seedlings

In cooperation with the Southern Regional Trials a total of 16 varieties and seedlings were tested on wilt infested soils. Based on local demand, yield, quality, etc., the Calhoun Sweet variety was best, followed by the Missouri Queen.

Strawberry Varieties and Seedling Observations

Seedling 7-42, which has looked good for several years, produced a very low yield. Seedling 0-242 was the most outstanding of all tested. Konvoy, the recommended variety, along with seedling L-27, also produced good yields.

Peach Orchard Management Studies

The orchard in which these studies are being conducted was planted to Sullivan's Early Elberta variety during the winter of 1948-49. Throughout the first three years of the test six different cropping systems or treatments were used. Each treatment consisted of 7 trees replicated three times for a total of 21 trees. All treatments received basically the same fertilization, with a slight variation in time of application in order to conform to the cropping systems used. The performance of each treatment was based on the amount of tree growth. Following each growing season growth measurements, both linear and circumference, were taken and recorded.

At the end of this three-year period there was found to be no outstanding difference between any of the following treatments: (A) winter cover of hairy vetch followed by clean cultivation, (B) a winter cover of oats followed by clean cultivation, (C) year-round clean cultivation, and (E) a winter cover of 50 per cent oats and 50 per cent hairy vetch plus an annual addition of 500 pounds of lime per acre followed by clean cultivation. The average circumference of trees from these treatments at the end of the first three years was approximately 12.00 inches. Treatment (D), which received clean cultivation during the spring but was planted broadcast to a crop of Crotalaria in June, produced trees with an average circumference of 11.27 inches, while treatment (F), which received a spring cash crop and was clean tilled during the late summer, produced the poorest tree growth of all, having an average circumference of 9.63 inches.

Following the first three years of these studies, treatments D, E and F received the same management, which is a winter
cover of crimson clover fertilized at planting time with 400 pounds of 8-8-8 per acre plus a topdressing of 100 pounds of nitrate of soda in April followed by clean cultivation. Treatment C gets the same fertility as treatments D, E, and F, but gets clean cultivation at all times. Treatment A is never cultivated but the fertilizer and cover crop seeds are applied on the soil surface. Treatment B differs from A only in the fact that the fertilizer is plowed in at the time the winter cover crop is planted. Both A and B are close-mowed each time treatments D, E and F are cultivated.

No yield records were taken during the 1952 peach season because of severe delayed dormancy resulting in a very short crop. Good yields were obtained in 1953, when treatment C led all others in yields of number 1 fruit with a production of 226.34 bushels per acre. Next in yield was treatment E, which produced 204.67 bushels, followed by treatment D with 191.00 bushels, treatment B with 170.15 bushels, and treatment A with 156.25 bushels. Treatment F was below all others with a production of only 110.36 bushels per acre.

Preliminary results of this test indicate that anything growing in a peach orchard during the spring and summer months under North Louisiana conditions tends to reduce both tree growth and fruit yields. It is also apparent that should it be possible for a peach tree to recover from an early stunt in growth, several years are necessary for this recovery to take place.

**Peach Seedlings**

This work is being conducted in cooperation with P. L. Hawthorne of the Department of Horticulture at the Main Station. Many of the local seedlings fruited for the first time in 1953 and 11 of these seedlings have been propagated for further work. Several of these seem to fall in the low chilling group and should prove well adapted to our climatic conditions. A number of new seedlings were planted and a number of new crosses were made during the spring.

**Chemically Controlled Peach Maturity**

Results of preliminary work indicate that the maturity, firmness of ripe fruit and a slight increase in size of fruit can be effected through the use of a spray containing maleic hydrazide and 2,4,5-T. Best results were obtained on a Dixigem variety when it was sprayed 4-5 weeks prior to normal ripening with a solution of 400 PPM of maleic hydrazide and 30 PPM of 2,4,5-T in water. For further details consult the Horticulture Research section of the Annual Report.
Peach Varieties

Blossoming dates, ripening rates, observed yields and characteristic notes were taken on 51 varieties. All varieties with the exception of the Golden Globe, Merrill's Beauty and Ozark produced a very good yield in number of fruits. However, some were lacking in size, quality and other respects. Recommended varieties for commercial purposes listed in the approximate order of ripening are as follows: Dixired, Dixigem, Sunhigh, Southern Glo, Triogem, Southland, Summercrest, Burbank Elberta, Hale Harrison Brilliant and Elberta. These varieties plus the Raritan Rose, Golden Jubilee and Belle of Georgia are recommended for home use.

Thermograph Records

In order to compare the performance of several varieties of peaches under different winter conditions and to record the actual number of hours at various temperatures, a recording thermograph has been kept in operation each winter. Records of 1953 and past years are available for late fall through early spring.

Rose, Camellia and Lilac Studies

In cooperation with the Department of Horticulture in its research program with ornamental plants, variety plantings were first made in January 1950. The first planting consisted of 15 varieties of azaleas, 16 of camellias and 20 of roses. The azaleas all died during the summer of 1950 but the roses and camellias did fairly well. The severe winter of 1950-51 resulted in a complete kill of all camellias and severe damage to the roses. A few of the roses survived but have not done well.

In the early spring of 1952, 22 varieties of roses, 9 varieties of azaleas, 23 varieties of camellias and 22 varieties of lilac were set to a new location. With the exception of the azaleas, all of which died before midsummer, this new planting has survived very well. The roses have done well, except for black spot, and growth has been satisfactory. The camellias did not suffer from the drought as much as was expected and produced a good bud crop. The majority of the earlier types lost most of their buds to the cold but the later ones did produce some nice blooms during the spring of 1953. The lilac plants made very little growth during the summer of 1952 but 14 of them flowered in the spring of 1953.

The summer of 1953 was severe on all plants because of the extreme heat and drought of late May and June. The roses were damaged as much if not more than the other plants because of the added effect of a severe infestation of black rot which defied all efforts of control. Sulphur dust was used in the early season fol-
owed by a sulphur spray and when this failed a Fermate spray was used, none of which effected a control.

The planting is on an eastern slope and is fully exposed both to summer sun and to the cold, northeasterly winds. There has been no irrigation to date nor has any kind of cold protection been used on the camellias.—John C. Taylor and Ralph S. Woodward

POULTRY

Broiler Experiment

The program of research in the production of broilers on a commercial scale was continued in 1953. Four broods of approximately 3,000 chicks each were produced during the year. A comparison of two L. S. U. crosses was made with Nichols New Hampshires during the winter trial. The spring, summer, and fall trials compared three broiler breeds, (1) Arbor Acre White Plymouth Rocks, (2) Indian Rivers and (3) Nichols New Hampshires. The relative evaluation of the L. S. U. crosses with the Nichols New Hampshires was not possible because the two groups of chicks intermingled, from one lot to the other, during the experiment. Livability of this group was 91.8 per cent for the house, which was slightly lower than the average for the past year, and the average weight for the entire house was 3.1 pounds. Feed efficiency was satisfactory with 2.95 pounds of feed consumed per pound of gain for the winter trial (January 9 through March 19). The two

In experiments on breed comparison the White Plymouth Rock broilers shown above have made the most efficient use of their feed and a larger margin of profit than other breeds tested.
L. S. U. crosses have very promising possibilities. More complete studies including them should be made in the future.

In the next three trials (spring, summer and fall) comparisons of the White Plymouth Rock, Indian River and New Hampshire stock were made. In the spring trial the White Plymouth Rocks made a net profit of $9.61 more than the New Hampshires and $89.74 more than the Indian Rivers. Feed efficiency varied from 2.63 pounds of feed per pound of gain for the White Plymouth Rocks to 2.76 pounds for the New Hampshires and 3.21 pounds for the Indian Rivers. In the summer trial the White Plymouth Rocks had a net profit of $45.23 more than the New Hampshires and $41.64 more than the Indian Rivers. The mortality was practically the same in all three groups. Feed efficiency was good in all three groups, with the White Plymouth Rocks utilizing feed better than the Indian Rivers and New Hampshires. The fall trial using the three breeds was of no value for comparative purposes because all three groups suffered a severe outbreak of intestinal coccidiosis at three weeks of age and were more or less affected for the remainder of the period. The breed comparison is being continued in winter and spring trials of 1954.

The close relationship of selling price and cost of medication to margin of income (i.e., income over all cost except labor) is shown by the second four trials as it was shown in the first four trials. The winter broilers sold for 27 cents per pound but, because of high medication cost, the margin of income was only $37.14 for the group of 3,000; the spring price was 26 cents and income was $385.04; for the summer group the selling price was 27 cents and income was $542.40; and for the fall group the selling price was 22 cents, with a high medication cost resulting in a net loss of $420.52. The margin of income for 22,490 broilers sold in 1952 and 1953 was $2,590.56, or 11.5 cents per broiler sold. The income for labor was $107.95 per month.

The cost of brooding on a per-chick basis with different types of brooders is summarized below.

Butane heated, closed canopy type brooder, 500 capacity, used for seven broods, 0.80 cent; butane heated, open canopy type brooder, 1,000 capacity, used for eight broods, 1.43 cents; electric canopy type brooder, 500 capacity, used for ten broods, 1.23 cents; Infrared electric 250-watt bulbs brooder, 500 capacity, used for three broods, 2.47 cents; Infrared electric 125-watt bulbs brooder, 500 capacity, used for two broods, 2.28 cents; Infrared electric Merco tube brooder, 500 capacity, used four broods, 2.76 cents.

**Laying Flocks—Meat Type Versus Dual Purpose New Hampshires**

In the second year of comparing the economy of production of the laying type with the meat type New Hampshire, two pens,
One pen of meat strain and the other laying strain, sexed chicks, were started in the brooder house on March 31, 1952, and were kept there until they were culled and placed on range at 12 weeks of age. The pullets remained on the range until they were culled and placed in the laying house August 13, 1952. The culls, from the two flocks, were sold and the amount credited to each flock. The amount of grain fed the meat strain, while on range, was one-third of the amount of mash consumed by the flock. The laying strain was fed grain and mash ad libitum. Both flocks ranged on green pastures during entire time on range and were confined on separate ranges. The cost of growing pullets to laying age in the meat strain was 35 cents per bird (including culls sold) and in the laying strain the cost per bird was 84 cents. On August 12, 1952, both flocks were culled and 100 birds from each flock were placed in separate pens in the laying house. The culls were sold from the two flocks and each group was given credit in tabulation of net returns from each flock. The meat strain birds consumed 65.84 pounds mash, 19.90 pounds of chops and 7.71 pounds of oats. The total feed cost per bird was $5.22. The laying strain consumed 55.57 pounds of mash, 24.38 pounds chops and 10.11 pounds of oats for a total feed cost of $5.44 per bird for the 44-week laying period. The meat strain while in the laying house received about one-third grain and two-thirds laying mash and the laying flock were fed $\frac{1}{2}$ grain and $\frac{1}{2}$ laying mash.

The flock of Nichols New Hampshire broiler strain pullets shown above proved to be equally as profitable for hatching egg production as did the regular production type pullets of the same breed when eggs were sold at market price.
The meat strain total production was 11,758 eggs, and average production was 118.7 eggs (or 38.5 per cent production) per hen, and the egg strain produced 12,998 eggs with an average of 145.2 eggs (or 47.1 per cent production) per hen. During the laying period both flocks were affected with infectious Bronchitis which materially reduced the production.

—J. L. Heath, Ralph S. Woodward and C. W. Upp

North Louisiana Hill Farm Experiment Station, Homer

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ALLEN C. GOODLING, Research Associate in Poultry
HARRY E. HATHAWAY, Assistant Economist in Marketing
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AGRONOMY

Date of Planting Sudan and Millet Variety Test

Three varieties of Sudan and three millet varieties were tested in plots for the effect of date of planting on yield. They were: Golden, Pearl and Starr millet and Tift, Sweet and Common Sudan. The planting dates were April 1, May 1, August 1 and September 1. Pearl millet was the highest yielding grass in the test, producing 20, 24, 15 and 6 tons of green matter for the succeeding plantings. It was followed closely by Starr millet, which yielded 12, 20, 15 and 4 tons of green matter for the successive plantings. The Sudan grasses all produced approximately the same yields, 10-12 tons green matter for the April 1 and May 1 plantings, but produced practically no growth at the two later plantings.

Golden millet was a very low yielding variety for all four planting dates producing less than two tons green matter.

—G. E. Wilcox, D. M. Johns and C. R. Owen

1Appointed Feb. 1, 1954.
3Transferred to Dairy Department, L.S.U. Campus, effective Feb. 1, 1954.
Oat Variety Test

The ten highest yielding oat varieties in a 33-variety test were as follows: Victorgrain 48-93: Cokers 53BRS, S.F. x (Stanton-Fulgrain): Cokers 52-22, Tenn. 09 x Bond: Tenn. 280-8, Tenn. 090 x Bnd : Tenn. 313-2, Nortex x Trelle Dwarf : Stone 41793, Atlantic, (Lee-Victoria) x Fulwin: Tex 3770-1, Mustang, (Lee-Victoria) x Fulwin: Tex. 3770-7, and Applier. These varieties all produced over 65 bushels per acre.—G. E. Wilcox, D. M. Johns and John Gray

Wheat Variety Test

A test of six wheat varieties was made with very small yield differences between varieties. The average yield of all varieties was 36 bushels, with a low of 33.6 bushels for Atlas 66 and a high of 39.6 bushels for Chancellor. Other varieties in the test were Coker 51-3, Coker 51-2, FW 806, and Coker 47-27: 1953BRS.

—G. E. Wilcox and D. M. Johns

Corn Alone vs. Corn and Soybeans

A four-year test in which yields from corn alone were compared with corn yields from plots of a corn and soybean combination showed that the soybeans grown with the corn depressed the corn yield by 50 per cent. The fertilizer practices were the same for both plots, but in the corn and soybean combination the soybeans were worked into the soil for organic matter. On the Ruston fine sand on which the test was conducted, the competition of the soybeans with the corn for moisture more than offset any beneficial manurial properties of the soybeans.

—G. E. Wilcox and D. M. Johns

Corn Fertilizer-Spacing Test

The plant population of corn is important when attempting to produce optimum yields per given amounts of applied fertilizer. Moisture and fertility are principal factors governing the yield per acre for a given plant population. In a dry season it is possible to get too many stalks per acre and thus reduce the yield. The thicker stand results in smaller ears. Two rates of fertilization, 600 and 1,200 pounds of an 8-8-8 fertilizer per acre in the row together with respective applications of 50 and 100 pounds of nitrogen as a sidedressing, were used with plant spacings of 12, 18 and 24 inches in 40-inch rows. There was no increase in corn yield at the higher rate of fertilization. At the 600-pound rate of fertilization the corn yield was slightly higher at the 12-inch spacing, which was equivalent to a population of 13,000 plants per acre.

—G. E. Wilcox and D. M. Johns

Corn Fertilizer Placement and Rate Test

Corn was treated in the row with 600- and 1,200-pound-per-acre applications of an 8-8-8 fertilizer at 3-4 and 8-9 inch depths
before planting. A nitrogen sidedressing of 50 and 100 pounds per acre, respectively, was applied to the 600- and 1,200-pound treatments. The corn was spaced 18 inches with one plant to a hill, giving a population of 8,700 plants per acre. The four-year average yields do not indicate any benefit attributable to depth of fertilizer placement. The 1,200-pound-per-acre rate of application increased corn yields by 10 bushels per acre at the 3-4 inch placement and by 5 bushels at the 8-9 inch placement over the 600-pound applications at the respective depths of applications.

—G. E. Wilcox and D. M. Johns

**Corn Fertilizer Test**

The application of 75 pounds of nitrogen, 30 pounds P₂O₅ and 30 pounds K₂O per acre in the row resulted in a four-year average corn yield of 35.2 bushels per acre, an increase of 23.8 bushels over the yields of corn to which no fertilizer had been applied. The omission of K₂O from the above fertilization rates did not change the yield, while the omission of P₂O₅ reduced the yield 20 per cent, showing that in these plots phosphorus is a limiting element at this level of production.—G. E. Wilcox and D. M. Johns

**Corn Hybrid Yield Test**

In three hybrid corn tests at different locations on the Station, Dixie 18 was in the top five highest yielding hybrids at each site. The test was fertilized at the rate of 600 pounds 8-8-8 per acre in the row at planting and sidedressed with 60 pounds per acre of nitrogen. N.C. 27 produced the highest yield, 26.9 bushels per acre, followed by Coker 811 with 26.4 bushels per acre.

—G. E. Wilcox, D. M. Johns, L. E. Mason and Hugo Stoneberg

**Cotton Fertilizer Studies: Lime, Sulfur and Minor Elements**

An investigation into cotton fertilization on a Ruston fine sandy loam indicates that increased cotton yields are obtained with applications of sulfur, borax, copper sulfate and Es-Min-El in addition to the 8-8-8 fertilizer. The greatest increase due to the addition of one element was obtained with the application of 44 pounds of sulfur per acre. This may have been due to the sulfur alone, but was probably due partly to the effect of the sulfur on the availability of other nutrient elements.

The addition of lime in the fertilizer had a depressing effect on the foliage growth during the season and on the yield of seed cotton. The plants growing on the plots to which no sulfur was applied were stunted and light green in color early in the season but seemed to partially outgrow this as the season progressed and their root systems became more developed.

—G. E. Wilcox, M. B. Sturgis, J. G. Marshall and D. M. Johns

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Cotton Nematode Study

The yields of cotton grown on Lakeland sand heavily infested with root knot nematodes were doubled when the soil was treated with soil fumigant DD or EDB. The rate of application of the soil fumigant per acre in the seedbed was 10.56 gallons of EDB and 8.65 gallons DD.

—G. E. Wilcox, L. D. Newsom, W. J. Martin and D. M. Johns

Magnesium-Potassium Test with Cotton

A magnesium fertilization study is being carried out on a Ruston sandy loam soil, a soil analysis of which shows an available nutrient level of 20 pounds per acre phosphorus, 72 pounds per acre potassium, 1,000 pounds per acre calcium and 80 pounds per acre magnesium and a pH of 6.2. Magnesium fertilization at the rates of 12, 24 and 36 pounds per acre increased the yields of cotton on all plots receiving equal nitrogen, phosphorus and potassium treatments. There were also increased yields on plots receiving magnesium with less applied potassium, indicating that magnesium at this level is a limiting available nutrient in these soils for the optimum growth of cotton.—G. E. Wilcox and D. M. Johns

Coastal vs. Common Bermuda Grass

A test comparing the forage production of Common and Coastal Bermuda grass was conducted. The yield of air-dry hay per acre for Common Bermuda was 6,020 pounds as compared with 10,920 pounds of Coastal Bermuda, an increase of 80 per cent.

—G. E. Wilcox and D. M. Johns

Effect of Split Applications of Nitrogen on Common Bermuda

A study is being made of the effect of split applications of nitrogen on Common Bermuda sod of native fertility, and with 100 pounds of P₂O₅ and 60 pounds of K₂O applied per acre. The nitrogen treatments included at the two fertility levels were as follows in pounds per acre: 30 + 30 + 0, 30 + 30 + 30, 60 + 0 + 0, 60 + 30 + 0, 60 + 30 + 30. The nitrogen was applied with a "Blue Nitroshooter" applicator as anhydrous ammonia on April 25, July 2 and August 27. The yield of Bermuda grass receiving the 30 + 30 + 0 treatment was 20 per cent higher than that of the grass receiving 60 + 0 + 0 treatment. The 60 + 30 + 30 treatment resulted in the highest yields. Application of the phosphorus and potassium increased yields from 10 to 75 per cent on the nitrogen-treated plots over the yields on plots of native fertility. However, the benefits of the phosphorus and potassium applications were not apparent until sufficient nitrogen was applied so as not to be limiting.

—G. E. Wilcox, D. M. Johns and M. B. Sturgis
BEEF CATTLE

In a study of pasture crop combinations, a crimson clover and rye grass pasture and an S-1 white clover and fescue pasture were grazed to measure beef gains with 500-pound steers beginning March 14. In the 105-day period that followed, the steers on the crimson clover and rye grass pasture made a total gain of 164 pounds per acre and the steers on the S-1 white clover and fescue pasture gained 111 pounds per acre in 77 days. The steers were fed a mineral mixture along with the grazing.

—Jack K. Mims and D. M. Johns

DAIRYING

The program of work in crossbreeding at the North Louisiana Hill Farm Station parallels that at the Main Station with the exception of the breeds of cattle involved. The current herd inventory is as follows: Brown Swiss, 38; 1/2 Red Sindhi × 1/2 Brown Swiss, 23; 1/4 Red Sindhi × 3/4 Brown Swiss, 20; 3/4 Red Sindhi × 1/4 Brown Swiss, 2; Jersey, 25.

During the past year, a schedule of body weights and measurements was initiated and carried out.

Heat tolerance studies initially called for making observations on 37 related animals (Brown Swiss and Red Sindhi). The scope of the study was increased during May through August so as to include unrelated animals of varying stages of lactation and pregnancy and included a limited number of available Jerseys. This raised the number of animals of milking age and over from 17 to 40. Body temperatures, pulse rate and respiration rate data were taken concomitant with climatic information. Approximately 9,000 physiological observations were recorded from November 12, 1952, to August 8, 1953.

A grazing study was carried out 24 hours a day for 21 consecutive days starting July 27. Observations of grazing habits were made on 15 Brown Swiss, 10 1/2 Sindhi × 1/2 Swiss and 10 Jersey animals, all over 23 months of age and representing various stages of lactation and gestation. Climatic information was taken hourly. During the grazing study a comparison of the relative value of Pearl millet and native Bermuda was made. The cows on millet produced an average of 3.1 pounds of milk per cow per day more than they did on Bermuda. With milk priced at $6.00 per hundred-weight, the 35 cows made $6.51 per day more on millet.

Blood studies were conducted on 24 animals of Brown Swiss and crossbred cattle selected on the basis of age and breed. They were bled on three consecutive days each month starting in October 1952 in an effort to find a means of predicting the ability of the animals to withstand the climate. These samples were analyzed
for hematocrit, hemoglobin, plasma calcium and plasma inorganic phosphorus. Preliminary analysis shows considerable variation between breeds in some of the criteria studied.


**FORESTRY**

**The Use of Chemicals in Timber Stand Improvement**

Chemicals continue to offer excellent opportunities for better timber stand improvement practices. Hormone type chemicals and ammonium sulfamate were used. There were seven treatments applied in frills, one as dry ammonium sulfamate in cups, one where double frills were used and a check treatment. An average of 237 hardwoods averaging 3.5 inches DBH were removed per acre. Pines that remained averaged 3.5 inches DBH and totaled 264 in number. There is heavy pine reproduction throughout the treated area. Growth of pine will be measured at yearly intervals at the end of the growing season.

In the hormone treatments a 1 per cent solution of 2,4-D in oil sample 6 produced a kill of 64 per cent and 2,4-D in water produced a kill of 26 per cent, which was the lowest. In the over-all treatments ammonium sulfamate produced the highest kill, which was 96 per cent. The cost per treatment varied somewhat, with a range of $1.10 per 100 trees treated for 2,4,5-T in No. 3 oil to a high of $3.60 per 100 trees treated with ammonium sulfamate crystals in cups. The average cost per 100 trees treated over the entire treatment area was $2.89.

The merchantable volume of saw timber averaged 2,398 board feet per acre.—Jack K. Mims

**Control-Burned Study of Loblolly and Slash Pine**

Plantings of loblolly and slash pine in pure and mixed stands to study the effect of control burning are being continued. The plots will be control-burned at definite intervals as soon as height growth is considered sufficient to protect the trees against total kill. It is felt that within the near future the trees will be of sufficient height to burn. Diameter measurements will begin next year.

Survival of both loblolly pine and slash pine is around 84 per cent. Height growth at the end of the growing seasons is as follows: 1950—loblolly 16 inches, slash 13 inches; 1951—loblolly 32 inches, slash 22 inches; 1952—loblolly 52 inches, slash 49 inches; 1953—loblolly 86 inches, slash 75 inches. Crown closure has not been accomplished and therefore species or spacing of trees has no effect on height growth.—Jack K. Mims

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Spacing Study of Loblolly Pine

The study of the effect of spacing on height and diameter growth of loblolly pine and its relation to the production of wood is being continued. The original plantings were made during the spring of 1950 and in order to obtain as near a uniform planting as possible the skips were planted during the late winter of 1951 and 1952. Height growth was such that further replanting was not advisable. Survival is between 70 and 80 per cent.

At this early date spacing has shown little or no effect on the survival, diameter or height growth since crown competition has not taken place. The 4 x 4 planted plots have progressed to the point where crown closure has in a few instances closed in and should after another year be a factor in height growth. Up to the present time diameter measurements were not taken but will begin at the end of the next growing season.

The planted stand has made good growth since it was established. The following will give some indication of the growth in inches by plots: (1950 height, 1953 height, respectively) 4 x 4 : 21—86; 6 x 6 : 19—79; 6 x 8 : 15—102; 8 x 8 : 16—87; 10 x 10 : 15—78.—Jack K. Mims

Some Observations of Weed Control
With Chemicals Along Fence Rows

An observational study began during the summer using a hormone-herbicidal oil mixture and herbicidal oil alone. The applications were made during the morning of June 4 and consisted of a 1 per cent 2,4-D solution in herbicidal oil No. 1 and herbicidal oil No. 6 alone. Daily observations were made for the next two weeks and at other times when considered advisable. There was little if any difference between the two in kill but the hormone herbicidal oil treatment was higher in cost owing to the addition of the hormone. A band 36 inches wide was treated along the fence row. Since the oil is a contact poison it was necessary to completely wet the plant thereby causing some loss of material. This was checked closely and was held to a minimum. The material was applied with a tractor-driven pump spray rig using a nozzle with a No. 5 hole and only about one-third open. The tractor was operated at about 3 miles per hour. The kill produced was outstanding and considered successful. During the afternoon after applying the chemicals it was noticed that there was a curling and discoloration of the leaves. On June 6, there was a noticeable killing effect when observed from the road.

The grasses and more succulent broadleaved species were dead and/or deformed two days after application. Six days after application the treated area had the appearance of winter kill.
This observation should not be considered as the answer to the control of weeds along fence rows but as a means of control. These oils break down in a very short time and it would be necessary to make two or three applications during the growing season.

—Jack K. Mims

HORTICULTURE

Fertilizer Studies with Dixigem Peach Trees

The third crop of peaches was harvested from the Dixigem trees for the purpose of studying the comparative yield of 14 replicated fertilizer treatments. Yields ranged from 46 pounds per tree on the unfertilized check plots to 76 pounds per tree on plots fertilized with 8-8-12 at the rate of 600 pounds per acre. Yields for the current season closely followed the trend set previously, with no corresponding increase noted in treatments containing more units of plant food. Thinning was required to remove a heavy set of doubles and hail damaged peaches.

Fruit sized well for the variety but the number per tree was low, owing to poor fruit set and the removal of doubles and hail damaged peaches. Blossom counts on individual trees ranged from 2,447 to 5,011 per tree on March 12, 1953. The average for the 14 fertilizer treatments was 244 peaches per tree, 0.244 pound per peach and 205 peaches per bushel. The various fertilizer treatments had practically no effect on the size of fruit, as indicated by the count of 207 peaches per bushel on the unfertilized check compared with 198 per bushel for the plots fertilized with 1,200 pounds of 8-8-8 per acre.

The average date of heaviest ripening for the unfertilized check treatment was June 8, a full month earlier than the July 10, 1952, ripening date. Fertilizer treatments had no effect on ripening date this season, with all treatments reaching their peak at the same time.

Growth measurements at the end of the growing season indicated that all treatments made satisfactory growth, with an average increase of 4.2 inches in circumference. The trees receiving 600 pounds of 8-8-8 per acre were largest at the end of the fifth year, averaging 22.1 inches in circumference at one foot above ground level. Only minor differences in height and spread were noted between the 14 fertilizer treatments.—R. E. Wright

Peach Varieties

All of the 30 varieties blossomed and set some fruit this season. Ripening dates ranged from June 6 for Dixired to August 5 for Augbert. Three varieties were white fleshed and 27 were yellow fleshed. A total of 1,161 hours below 45 degrees was recorded during
the period November 1, 1952—February 28, 1953. This time was ample to break the rest period for blossoming in all varieties; however, eight varieties showed evidence of delayed foliation.

—R. E. Wright

Peach Insecticide Studies

The test for evaluating the effectiveness of EPN, parathion, dieldrin, lead arsenate-DDT, and sulphur check, for the control of insects attacking peaches, was continued for the third season. No significant differences were noted in the effectiveness of the poison treatments, and each insecticide resulted in satisfactory insect control.

—R. E. Wright, C. E. Smith, L. D. Newsom and J. S. Roussel

Okra Variety-Nematode Studies

Okra production has been limited in North Louisiana, owing to nematode injury and other causes. Five varieties were grown in split plots, and half the area was treated with Dowfume W-85 one month prior to planting. Outstanding differences were noted in yields, as indicated in the accompanying table:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Treated</th>
<th>Untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Louisiana Market</td>
<td>3,512</td>
<td>1,617</td>
</tr>
<tr>
<td>2. Dwarf Velvet</td>
<td>7,858</td>
<td>3,774</td>
</tr>
<tr>
<td>3. (Camp. No. 1 x L. Market) x Camp. No. 22</td>
<td>7,662</td>
<td>3,921</td>
</tr>
<tr>
<td>4. Gold Coast</td>
<td>7,139</td>
<td>2,369</td>
</tr>
<tr>
<td>5. La. Green Velvet</td>
<td>2,777</td>
<td>2,238</td>
</tr>
<tr>
<td>Average</td>
<td>5,730</td>
<td>2,784</td>
</tr>
</tbody>
</table>

The treated plots made more growth, maintained better stands and had lower root-knot indices than untreated plots.

—W. J. Martin, L. D. Newsom and R. E. Wright

Cowpea Variety Studies

Twelve varieties of cowpeas were planted in replicated plots to determine the yield of dry peas for seed and table use. L-3, recently released by the Station as Louisiana Purchase, was the highest producing variety in the “table” group, with a yield of 14.5 bushels. Bunch Brabham produced 18.8 bushels, thus leading in the hay or field pea group.

Green pea yields for market purposes were obtained from seven edible varieties. Production ranged from 5,640 pounds for Louisiana Purchase to 1,189 for Blackeye. The Louisiana Purchase has a light eye, matures somewhat later than the Blackeye, but ripens over a longer period. It is an excellent variety for freezing or table use.—R. E. Wright
Watermelon Varieties

The variety studies at this station were conducted as a part of the Southern Cooperative Watermelon Trials. Based on their performance in the 1952 regional trials, the following varieties were grown in replicated plots: Black Diamond, Dixie Queen W. R., Ironsides, Congo, Fairfax and 51-27. Black Diamond ranked first in the test, producing 18,651 pounds per acre, or 595 melons averaging 31.3 pounds each.

Sixteen varieties in the observational planting were rated for yield, freedom from defects, quality and disease resistance. W-453-1-6 and Calhoun Sweet were the best varieties in this group. —R. E. Wright

Sweet Potato Variety-Nematode Studies

Ten sweet potato varieties and seedlings were tested for degree of resistance to nematode, as possible parents for breeding stock; and for a sweet potato that can be grown commercially in nematode infested soil. Nine varieties responded favorably to an application of 4 gallons of Dowfume W-85 per acre. The average yield of smooth sweet potatoes was 162 bushels per acre for the treated plots and 113 bushels for the untreated plots.


Rose Variety Performance

Twenty-four varieties of roses have been scored for their adaptability to this area on the basis of their performance for three seasons. Based on growth, blossoming and disease and insect resistance, the following varieties are recommended: Radiance, Red Radiance, Forty-Niner, Picture, Crimson Glory, Texas Centennial, Editor McFarland, Charlotte Armstrong, Countess Vandal and Nocturne. Several varieties are making poor growth on account of nematode damage to the root system.

—R. E. Wright, W. D. Kimbrough and R. H. Hanchey

Camellia Variety Performance

The camellia planting, containing 25 varieties planted in full sun and clean cultivated, has been scored for performance after three years. Debutante, Magnoliaflora, Rose Dawn, Purple Dawn and Daikagura are the leading varieties at present.

—R. E. Wright, W. D. Kimbrough and R. H. Hanchey

MARKETING

Broiler Management and Production Study

Data were collected from 16 broiler growers located in five parishes in North Central Louisiana. The parishes covered were
Lincoln, Union, Ouachita, Jackson and Claiborne. Growers were representative of various sizes of operation, were geographically scattered throughout the area and were feeding different brands of feed and securing chicks from different hatcheries. To offset differences in results due to climatic conditions records were secured from four consecutive broods of chicks of each producer. A total of 303,194 chicks was grown in 72 broods of chickens. Cost of production records on 16 farms exhibited a 69.91 per cent and 22.73 per cent cost from feed and chick, respectively. Other variable costs accounted for only 3.40 per cent of total costs. It is difficult to convince the average grower that fixed costs have some degree of importance. Fixed costs in the area studied were 3.96 per cent of total costs of production. This cost must be considered by the grower when his net return for the year is calculated. The average variable cost and the fixed cost to produce a pound of meat in this study were 23.75 cents and 0.98 cents, respectively. Total average cost to produce a pound of meat was 24.73 cents.

The average mortality was 6.74 per cent and an average age of each brood when sold was 65.5 days. At 9 weeks and 3 days the average selling weight was 2.74 pounds, with a feed conversion of 2.88 pounds of feed per pound of gain. This weight and feed conversion demonstrated that all of the 16 growers were doing a good job of raising chickens even though management practices differed. Most of the growers of broilers studied were diversified hill farmers, some with cattle, row crops and outside employment. The labor required for the growing of broilers constituted 70 per cent of the total farm labor. The broiler income as a per cent of total farm income was 89 per cent. This high income per cent and low labor per cent would indicate broiler growing to be a worthwhile enterprise.

The average cost of growing a pound of broiler in this study was 24.73 cents and the average selling price was 28.8 cents per pound. This combination yielded an average income of 4.07 cents per pound for the broiler grower of North Central Louisiana. This study bears out the recommendations of Extension personnel who suggest to a grower just beginning operations that 10 cents per bird marketed is a good net profit.

—R. J. Duddy, M. D. Woodin, D. M. Johns and H. E. Hathaway

POULTRY

Laying Cages vs. Floor Managed Hens for Market Egg Production

The use of individual single-deck laying cages for market egg production has gained prominence throughout the South during the past few years. This system entails the placing of young pullets in a cage, usually 10” x 18” in size, and keeping the individual
pullet there as long as she is productive. A hen that is not laying at the rate of 50 per cent, depending of course on price of eggs and replacement pullet costs, is culled and replaced with a young pullet.

Thus far the cage system has been less profitable, but one must remember that this covers only a four-month period of production (Aug. 26, 1953 through Dec. 31, 1953). The floor birds probably had their peak efficiency during these four months whereas the efficiency of the cages should hold more constant throughout the year.

Some of the advantages listed for the cage method of producing market eggs have not materialized in this experiment thus far. Eggs from the floor birds are just as clean as those produced in the cages. Another advantage claimed for the cages is the ease of preventing roundworm infestation. In this experiment all birds were wormed with individual capsules when housed but at the end of four months all birds from the floor and cages which were autopsied were found to be heavily infested with the large roundworms. Cannibalistic habits are more pronounced in the cages in this experiment than with the floor managed birds. Although there were no death losses from cannibalism in either group, the cage birds have picked feathers and caused bleeding frequently.

—A. C. Goodling and C. W. Upp

Broiler Studies

On December 24, 1953, 4,000 broilers were put on trial to determine the effects of flock worm treatments of broilers on growth rate, feed efficiency, mortality and economy of production. These 4,000 birds were divided into 8 pens of 500 birds each. Duplicate tests are being conducted on four different treatments: (1) no worm treatment, (2) worm treatment at 6 weeks of age, (3) worm treatment at 5 and 7 weeks of age and (4) worm treatment at 4, 6, and 8 weeks of age.

Two thousand other broilers were housed on the same date to determine the effect of growing the sexes separately as to feed efficiency, mortality and economy of production. These birds are divided into four pens of 500 birds each: (1) sexes grown together (straight run), (2) males only, (3) females only and (4) sexes grown together but marketed separately as they reach market weight.

Both of the above experiments will extend throughout the year. Four broods of broilers will be raised. The data collected will be reported in the next Annual Report.

—A. C. Goodling and C. W. Upp
Northeast Louisiana Experiment Station,

St. Joseph

Christopher B. Haddon, Agronomist; Superintendent
John C. Carpenter, Jr., Assistant Animal Husbandman
John A. Hendrix, Assistant Agronomist
Sherman A. Phillips, Assistant Agronomist
LeGrand W. Sloane, Research Associate in Agronomy

BLACKLAND SOIL MANAGEMENT

This test was begun in 1950 on typical black buckshot land and was designed to determine the best practice in management of such soils under row-crop farming. Approximately 12 acres was set aside for this work and divided into three sections. The first step was to properly drain and level the land, as this seems to be essential in handling such lands.

The cropping plan that has been used consists of a 3-year rotation as follows: (1) Corn and soybeans interplanted; (2) cotton; (3) soybeans alone to be harvested as beans. The procedure has been to break the land as early as possible and put it into rows. These rows are not disturbed again until planting time. The section planted to corn and beans interplanted is fertilized at rate of 80 to 100 pounds N per acre and planted in late March or early April. The cotton is fertilized at rate of 60 pounds N per acre and planted first week of April, or as near thereafter as seasons permit. The soybeans receive no fertilizer and are usually planted during the first half of May. Corn and beans are planted 1½ to 3 inches deep and cultipacker is run over land immediately after planting. Cotton is usually planted somewhat deeper than is the practice on lighter land.

By following the above system of preparation and planting excellent stands have been obtained with the exception of one year when the cotton stand was so poor that the crop was abandoned for that year. The lack of stand was due to poor seed, however, and not to method of planting. The two sections planted to corn and beans and beans alone are flat broken immediately after harvest of the crops. Cultivations are at a minimum, just sufficient to keep down weeds and grasses.

The results from this work have been very gratifying. The four-year average yield of corn has been about 50 bushels, soybeans about 30 bushels, and cotton one to one and one-half bales.
per acre, except for the one year when the crop was abandoned, as noted above. Two of the years during this test have been unusually dry, no appreciable amount of rain being received from soon after planting to harvest. It appears that the early preparation, early planting and a system of cropping that maintains ample organic matter are the practices responsible for the yields obtained.

—C. B. Haddon

COTTON VARIETIES

The cotton variety test was conducted as in the past, using 18 to 20 varieties, about half of which were commercial, the other half new strains. The tests are fertilized each year with 67 pounds nitrogen, all applied in deep furrow at time of seedbed preparation. The seven leading commercial varieties (4-year average yields of lint per acre) are Stoneville 3202—1,065 pounds, Delfos 9169—1,062 pounds, Deltapine 15—1,044 pounds, Fox—1,004 pounds, Coker 100 WR—978 pounds, Stoneville 2B—975 pounds, Bobshaw—974 pounds. All of the above varieties are well adapted to machine harvest and may be recommended for the alluvial lands of Northeast Louisiana.—C. B. Haddon

CORN VARIETY TEST

Commercial corn variety test consisted of 24 varieties and hybrid strains. The test was fertilized with 100 pounds of nitrogen, all applied at time of seedbed preparation, and planted in late March or early April. The 5-year average yields of the leading hybrids were: Dixie 22—107.8 bushels, Dixie 11—104.9 bushels, Dixie 18—103.6 bushels, La. 521—102.7 bushels, Funk’s G-791W—100.9 bushels. Jarvis, an open-pollinated variety well adapted to Northeast Louisiana, averaged 78.0 bushels for the same 5-year period. Corn is spaced in hills two feet apart, two stalks per hill, rows 40 inches wide.—C. B. Haddon

CORN FOLLOWING OATS

A corn variety test planted after oats was harvested has been carried for seven years. In these tests the oat straw is removed, stubble burned, and land deeply broken. Spacing is as nearly as possible one plant every 18 inches, rows being 40 inches wide. Fertilizer, which is 50 to 100 pounds of nitrogen per acre, is applied before planting. The 7-year average of the four leading varieties is 51.9 bushels per acre. During the period of this test some extremely dry years have occurred, but no failure has been encountered.—C. B. Haddon

CORN-BEANS-COTTON ROTATION

Tests have been carried for three years in which (1) corn is planted alone, (2) corn is interplanted with soybeans and (3) two rows of corn and two rows of beans are planted. All treatments are

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fertilized uniformly, using 67 pounds of nitrogen per acre. During the three years, the corn alone has produced 32 per cent more than corn and beans interplanted and 23 per cent more than corn and beans in alternate double rows. These treatments are followed the next year by cotton, the 3-year average yields of which have been corn alone 1,599 pounds, corn and beans interplanted 2,203 pounds, and corn and beans alternate double rows 2,202 pounds per acre. It is indicated from this test that the loss of corn when grown with beans is more than made up by the increase in yield of cotton the following year.—C. B. Haddon

PASTURE STUDIES

The study of different combinations of grasses and clovers was continued about the same as in previous years with the exception that Plot No. 5 was omitted and two new plots were used this year. Controlled grazing was practiced on all plots and cattle were wormed and sprayed as needed. Salt was given free choice on all plots. Following are combinations used, gains per acre and other information on plots:

<table>
<thead>
<tr>
<th>Plot No.</th>
<th>Pasture Combination</th>
<th>No. Cows Per A. Gazed</th>
<th>Gain Per Day (lbs.)</th>
<th>Gain Per Head Per A. (lbs.)</th>
<th>Nitrogen Per A. (lbs. &amp; date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Persian Clover, Prairie Brome</td>
<td>1.3</td>
<td>150</td>
<td>2.4</td>
<td>458</td>
</tr>
<tr>
<td>2</td>
<td>White Dutch Clover, Bermuda Grass</td>
<td>.9</td>
<td>182</td>
<td>1.9</td>
<td>311</td>
</tr>
<tr>
<td>3</td>
<td>Atlas 66 Wheat followed by Millet</td>
<td>1.75</td>
<td>93</td>
<td>2.62</td>
<td>427</td>
</tr>
<tr>
<td>4</td>
<td>Ky. 31 Fescue</td>
<td>1.19</td>
<td>166</td>
<td>1.73</td>
<td>342</td>
</tr>
<tr>
<td>5</td>
<td>Omit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fescue—White Dutch Clover with some Bermuda</td>
<td>1.03</td>
<td>210</td>
<td>2.12</td>
<td>456</td>
</tr>
<tr>
<td>7</td>
<td>Harding Grass, Red Clover</td>
<td>1.18</td>
<td>133</td>
<td>3.2</td>
<td>507</td>
</tr>
<tr>
<td>8</td>
<td>Rye Grass over-seeded on Bermuda Sod</td>
<td>1.42</td>
<td>104</td>
<td>2.38</td>
<td>352</td>
</tr>
</tbody>
</table>

—John C. Carpenter, Jr.

COTTON ROW WIDTH TEST

A test was conducted in 1953 in which cotton was planted flat in rows 20 inches wide and blanket treated with chemicals for grass and weed control. The three chemicals used, Di-nitro, CIPC and CMU, were all applied at the recommended rates. This method of planting was compared to cotton planted in standard 40-inch
rows and hoed and cultivated according to normal practices. The cotton planted in the 20-inch rows was never hoed or cultivated. The yields were as follows: 20-inch rows—2,959 pounds, 40-inch rows—2,982 pounds seed cotton per acre. While the narrow row method may not presently be practical, it is an indication that cotton can be grown without cultivation.—C. B. Haddon

**WINTER GRASSES**

The winter grass test has consisted of five varieties of fescue, seven brome, eight rye, three rescue, and two canary grasses. Fescue is widely adapted as to climate and soil. It does well on heavy soil too wet for most other winter grasses and is very drought resistant and winter hardy. In seven years' work with fescue, five years in permanent pasture, diseases have not reduced the stand. Fescue is considered a winter grass, will grow during a mild winter but makes its best growth in late winter and spring and will grow some into summer if kept grazed and rainfall is ample. The palatability of fescue has not been considered as good as that of some winter grasses, but if kept closely grazed or clipped and amply fertilized to keep new growth, livestock will graze it as readily as most other grasses. Alta, Ky. 31 and 144 strains have given excellent growth, but only Ky. 31 has been used in pasture grazing trials. Though fescue makes excellent growth alone when ample nitrogen is used, it is better with clover. Because of its heavy sod and extensive root system, fescue tends to crowd out clover. When this occurs, the clover should be reseeded in the sod by discing to destroy some of the fescue.

Brome grass does well on the heavy soils, is drought resistant and will give ample grazing when supplied with adequate nitrogen. Varieties Prairie and Harlan have produced more forage than the other varieties and make their growth earlier. Achenbach, Oklahoma, Manchar, Lincoln and Mountain brome make best growth in May and June. Only Prairie brome has been used in pasture trials.

Rye grass is one of the best winter grasses. It may be seeded on sod or on a well-prepared seedbed, with or without clovers. Rye grass is winter hardy and will give early growth if supplied with adequate nitrogen. Of the eight varieties or strains used in the tests, Domestic rye, S-12, New Zealand H 1 and S-22 gave best growth. S-12 was most productive. The perennial rye did not live through the summer. Results in pounds of green weight per acre on small plot trials were: S-12—42,325; S-22—39,792; New Zealand—38,980; Domestic—38,885, and perennial—30,724. Rye grass is susceptible to rust under certain seasonal conditions but was not
affected during the season of 1953. Only Domestic rye has been used in pasture work.

Three strains of rescue grass have been tested to determine their value for winter and early spring forage. Four cuttings were made in 1953. Results in pounds of green weight per acre were: Texas 46—44,337; S.C.F.C. No. 24260—43,470; and Commercial rescue—29,424. Two clippings were made in March, one in April and one in June. Texas 46 looks very promising for early spring growth.

Two strains of little canary grass were tested to determine the adaptation and forage production. Three cuttings were made and the results in green weight per acre were as follows: Canary grass from Uruguay—49,993 pounds; little canary grass from California—47,481 pounds. Little canary grass shows possibilities for early spring and summer grazing.

Nine varieties and strains of red clover have been in tests for the past four years to determine adaptation and forage yield. Red clover makes its best growth in spring and will continue growth until fall provided it is not overgrazed and rainfall is ample in summer. Four-year averages in pounds of green matter per acre for the leading varieties and strains are as follows: Kenland—32,793; Midland—28,943; La. Red—18,890, and La. Red Strain I—18,643. La. Red is the only variety used in pasture work.

—John A. Hendrix and C. R. Owen

OUTFIELD PASTURE STUDIES

In 1952, experimental work was started on temporary winter grazing studies at Chase, Louisiana, on Olivier silt loam soil. Four different pastures were established using common rye grass, Atlas 66 wheat, Coker's 48-93 oats and Abruzzi rye. All pastures were overseeded with Common crimson clover with volunteer vetch prevalent. The pastures were fertilized with a 56-48-48 formulation at time of planting and topdressed with 50 pounds available nitrogen in February. Because of the high fertilizer rates the clover and vetch gave little, if any, benefit. The results are as follows:

<table>
<thead>
<tr>
<th>Pasture Combination</th>
<th>Steers Per A.</th>
<th>Number Days Grazed</th>
<th>Average Daily Gain</th>
<th>Gain Per A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oats, Vetch &amp; Crimson Clover</td>
<td>1.42</td>
<td>85</td>
<td>1.85</td>
<td>223</td>
</tr>
<tr>
<td>Atlas 66 Wheat, Vetch, &amp; Crimson Clover</td>
<td>2.69</td>
<td>45</td>
<td>2.23</td>
<td>270</td>
</tr>
<tr>
<td>Abruzzi Rye, Vetch, &amp; Crimson Clover</td>
<td>2.27</td>
<td>45</td>
<td>2.14</td>
<td>219</td>
</tr>
<tr>
<td>Rye Grass, Vetch &amp; Crimson Clover</td>
<td>2.68</td>
<td>85</td>
<td>2.04</td>
<td>465</td>
</tr>
</tbody>
</table>
The pastures were rebroken after removal of steers in late spring and planted to summer grazing crops. Fertilizer (76-36-36) was disc'd in at planting time. The results of this experiment were as follows:

<table>
<thead>
<tr>
<th>Pasture Combination</th>
<th>Steers Per A.</th>
<th>Number Days Grazed</th>
<th>Average Daily Gain</th>
<th>Gain Per A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet Sudan</td>
<td>1.5</td>
<td>43</td>
<td>1.28</td>
<td>83</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>2.0</td>
<td>43</td>
<td>1.54</td>
<td>132</td>
</tr>
<tr>
<td>Starr Millet</td>
<td>2.1</td>
<td>49</td>
<td>1.64</td>
<td>169</td>
</tr>
<tr>
<td>Common Sudan</td>
<td>1.0</td>
<td>43</td>
<td>1.51</td>
<td>65</td>
</tr>
</tbody>
</table>

—Sherman A. Phillips

OUTFIELD COTTON FERTILIZER TEST

A cotton fertilizer test conducted on Sharkey clay soil in East Carroll Parish gave greatest yields from the application of 120 pounds of available nitrogen. Nitrogen varying from 40 to 120 pounds in 20-pound increments was used. As nitrogen was added the yield of cotton increased progressively. When 80 pounds nitrogen was used phosphate and potash at 60 pounds per acre were used in all different combinations. The 80-60-0 formulation gave a higher yield of cotton than 80 pounds of nitrogen but not as much as 120 pounds of nitrogen alone. This is one year's results on this work and cannot be considered as conclusive.—Sherman A. Phillips

OUTFIELD DEEP PLOWING AND SUBSOIL TEST

This is the second consecutive year deep plowing and subsoil work has been conducted on Olivier silt loam soil. Four treatments were used in 1953: normal breaking 3 inches deep, subsoil chisel 18 inches deep 20 inches apart, middle buster with wings off 12 inches deep, and mold board 9 inches deep. For two years, breaking with a mold board plow gave greater yields of cotton than any of the other methods used. Two years' results indicate that 200-300 pounds of seed cotton can be expected above the check plot. Tests indicate that deep plowing and subsoiling for two years on the same plots gave no greater yield than could be expected from one years' deep breaking and subsoiling. Plots that received deep plowing and subsoil treatment in 1952 were left, and normal cultural practices were followed in 1953. No increase in yield of cotton was obtained in any treatment over check plots, indicating no residual effect.—Sherman A. Phillips

OUTFIELD VETCH FERTILIZER TEST

Greater tonnage of vetch was obtained on Olivier silt loam soil from a fall application of phosphate. Nitrogen, phosphate
and potash at the rate of 40 pounds per acre were applied in the fall, followed by additional spring treatments on various plots. Plots receiving no fertilizer yielded 4,167 pounds of green weight as compared to 13,460 pounds on plots receiving 40 pounds of phosphate, or an increase of 8,044 pounds from the phosphate. The addition of nitrogen and/or potash to phosphate did not increase yields significantly. Cotton which followed vetch received one shower of rain from emergence to maturity; yields were therefore very low.—Sherman A. Phillips

OATS

The oat work consisted of a commercial variety test, uniform fall sown, and rust nursery, with 74 varieties or strains. The commercial test included proven leading varieties and promising new strains and hybrids, planted in large plots in order to use mechanical equipment in planting and harvesting. The fall sown and rust nursery are in cooperation with the U.S.D.A. and Station at L.S.U. These tests were in small plots and were planted, harvested and threshed by hand operation.

The leading varieties and average yields for the past four years in the commercial test have been as follows: Coker’s VICTOR grain 48-93—78.9 bushels; Coker’s Fulgrain—77.1 bushels; Nortex 107—68.9 bushels; La. Alber—66.8 bushels; and Camellia—58.9 bushels per acre.

The oats usually follow soybeans, and no fertilizer is required to make good yields.—John A. Hendrix

SOYBEANS

Tests conducted on this Station have shown that soybeans can be profitably grown on most soils in the Delta. Most of the land used in the production of soybeans has been the heavier buckshot type that has been idle. This type of soil, if well prepared, planted to soybeans, and cultivated to control weeds and grasses, will increase farm income. It has been found that in a soybean-corn-cotton rotation soybeans have played an important part in the production of corn and cotton by maintaining soil fertility and requiring less commercial fertilizer. The variety tests conducted in the past few years show that the leading variety is Ogden for commercial production. The grouping of the varieties in maturity is of great importance to the soybean grower. Using varieties of different maturity dates will increase the number of hours for the farm machinery without much loss from the beans shattering. The leading varieties according to maturity are: Early—Dortchsoy 67 and Dorman; medium — Ogden; medium late—Roanoke, Dortchsoy 31 and Volstate; late—Mamotan 6680, Acadian, Pelican
and Nela. A new variety, Jackson, in the medium late group has given good yields.—John A. Hendrix

CHEMICAL WEED CONTROL

1. Cotton

A continuation of the program of testing various herbicidal agents was carried on in 1953. These specific herbicides were studied to obtain information as to cost and effectiveness. Best results were obtained with di-nitro chemicals at the 12-pound rate, with a 79 per cent residual control of weeds at the end of 40 days and no reduction in stand. Chloro IPC gave a 51 per cent control residual at 40 days with no reduction in stand at the 9-pound rate. Di-nitro and Chloro IPC at 9 pounds may be applied effectively on mixed land or buckshot. On loam 6 pounds di-nitro and 9 pounds Chloro IPC should be used. Di-nitro should not be used late in the season when temperatures are high. Savings over handhoeing approximate $2 to $6 from the use of Chloro IPC and di-nitro at the recommended rates. New chemicals, CMU, Weed Killer M and Weed Killer D, were tested; more information will be necessary before these herbicides find their way to the farmer.

Post-emergence herbicidal oils and chemicals were applied too late to render effective control of weeds, owing to weather conditions. Nevertheless oils proved cheaper than handhoeing, using 5 gallons per acre with three applications. Flame cultivation cost 44.7 cents per acre, which was the cheapest phase of weed control.

2. Corn

Mechanical harvesting of corn necessitates relatively clean rows. Di-nitro, CMU, Crag No. 1, E. H. Sesin and 2,4-D were tested. The experimental herbicide Sesion proved best at the 6-pound rate, with a 42.9 per cent control at the end of a 4-month period. As this material was not on the market and 2,4-D is very cheap and just about as effective, ¾ pound technical 2,4-D applied when corn is 10 to 12 inches tall and a 1 to 1½ pound application at lay-by should produce good results.

3. Soybeans

Several treatments were applied to soybeans, but the weed control value was rendered rather invalid as drought prevailed for several weeks after treatment. Neither the di-nitro nor Chloro IPC damaged the stand. Three herbicidal oils and one flaming were applied to two different treatments without any lasting damage to the beans. The rapid growth of soybeans, producing shade, coupled with herbicide and dry weather, produced a cheap crop in 1953.—L. W. Sloane
CITRUS

Control of Scale and Spider Mites on Owari Satsumas

An experiment started in 1952 to study control of scales and spider mites of citrus was continued on Owari Satsuma oranges in 1953. Six spray combinations of the following insecticides were tested: Ovotran, malathion, sulphur, nicotine sulphate, parathion, DN dry mix, and Florida Volk. The best insect control was obtained in plots receiving the treatment as listed below:

<table>
<thead>
<tr>
<th>Date of application</th>
<th>Insecticide and dose per 100 gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 16</td>
<td>1 lb. ovotran, 2 lbs. 15% WP parathion</td>
</tr>
<tr>
<td>May 16</td>
<td>1 lb. ovotran, 2 lbs. 15% WP parathion, 4 lbs. copper A</td>
</tr>
<tr>
<td>June 25</td>
<td>1 gallon Florida Volk, 2 lbs. 15% WP parathion</td>
</tr>
<tr>
<td>August 31</td>
<td>1 lb. ovotran, 2 lbs. 15% WP parathion, and 5 lbs. of wettable sulphur.</td>
</tr>
</tbody>
</table>

A second treatment which showed considerable promise was one in which malathion, at the rate of 1 pound actual toxicant per 100 gallons of water, was substituted for parathion in above schedule. Florida Volk was not included with the malathion in the June spraying.

In the treatment outlined above no scale insects were observed and only 8 per cent of the leaves were showing spider mite damage on January 4, 1954, compared to the check plot in which 83 per cent of the leaves showed spider mite damage, and 8 per cent were infested with purple scale, 7 per cent cottony cushion scale, and 3 per cent with soft brown scale. In this effective treatment 41.2 pounds of fancy fruits were produced per tree compared to 22.1 pounds on the check plot.

Treatments which received parathion or malathion without the addition of ovotran showed no reduction in spider mite population on dates of counts. Although both insecticides will effectively control the adult mite population present at time of application, their residual control is limited, resulting in rapid reinfestation from survivors.

From results of tests conducted during 1952 and 1953 it is evident that where a limited number of applications are to be made a material with long residual effectiveness against spider mites must be included in the spray program. The addition of ovotran to parathion or malathion gives this desired residual control. Ovotran is compatible with all insecticides commonly used on citrus.
and therefore may be used in combination with other insecticides in a spray program.—Ralph Brown and John S. Roussel*

Fertilizer Studies with Bearing Owari Satsuma Trees

To date the application of phosphorus or potassium has not affected growth, yield or quality of fruit, although these same treatments have been used for four years. These thirteen-year-old Owari satsuma trees received 3.25, 6.50 and 9.75 pounds of nitrate of soda per tree in the spring of 1953 plus 3.25 pounds in June. The average yields of fruit per tree for 1951, 1952 and 1953 were 39.7, 45.2 and 53.7 pounds, respectively, as compared with 37.8 for the check. The gain in trunk circumference for this same period was 14, 16 and 20 per cent, as compared with 11 per cent for those plots receiving no fertilizer. These soils contained 60 to 125 parts per million of phosphorus and 522 to 626 parts per million of available potassium in the surface soil at the outset of the experiment, which is extremely high for potassium but rather low for phosphorus in soils in this area.

The yield of Satsumas in the fertilizer test at the Plaquemines Parish Experiment Station failed to show any consistent difference for treatment, although there was a trend for higher rates of nitrogen to increase growth and yield up to \( \frac{3}{4} \) pound of nitrate of soda per year of age in the spring and \( \frac{1}{4} \) pound in June.

Much of this variation was due to poor drainage conditions, which is being improved by the Plaquemines Parish Jolice Jury. The average yield of six treatment plots per tree in a poorly drained area was 21.5 pounds as compared with 44.5 pounds per tree for these same treatments in a well-drained area of the field. It is quite evident that good drainage is essential for profitable citrus production in this area.

Exocortus Transmission Studies

Where Washington Navels from sources showing exocortus were budded on Rangpur Lime stock Aug. 2, 1951, 77 per cent were showing veinal chlorosis on June 25, 1953, and gumming from the stock union to the soil line on Aug. 31, 1953.

In the variety collection 83 per cent of Valencia trees budded on trifoliata are showing exocortus at the end of fourth growing season. Where this same source of budwood was used in the rootstock trials 75 per cent of the trees on Rangpur Lime were showing

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*Associate Entomologist, Main Station, Baton Rouge.

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*In cooperation with Dr. Julian C. Miller and Dr. Walter Peevy, L.S.U.

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*In cooperation with Dr. Charles Schexnayder, L.S.U., and Dr. Knorr, Florida Citrus Experiment Station, Lake Alfred, Florida.
gumming from stock union to soil line at the end of second growing season. These results indicate that exocortus (scaley butt) is transmitted through budding and that there might be some association between gumming on Rangpur Lime stock and scaley butt on trifoliata.

**Citrus Rootstock Studies**

Another rootstock planting was made in 1953. In that planting Owari Satsuma, Washington Navel, Valencia and Ruby Red grapefruit were budded on Carrizo Citrange, Troyer Citrange, Morton Citrange, Norton Citrange, Uvaldi Citrange and Cleopatra mandarin stocks to further study the effect of rootstock on yield and quality of citrus fruits under South Louisiana conditions and to obtain a stock better adapted to our conditions than trifoliata or sour orange.

**Cold Injury Recovery Studies with Young Washington Navel Trees**

Following the freeze on February 6, 1951, 12 two-year-old Washington Navel trees at the Plaquemines Parish Experiment Station were paired off according to size and degree of cold injury. Six trees were pruned July 1951 following the second flush of growth and the other six were pruned July 1952, or 18 months after the freeze. Those trees pruned following the second flush of growth after the freeze have made 15 per cent more growth, to date, than those pruned 18 months after the freeze. No fruit has been harvested from any of the trees.

**VEGETABLE CROPS**

**Insect Control Studies with Vegetable Crops**

**Corn Earworm Control**—Corn earworm control studies were continued this year and the results were similar to those in the two years previous, in that best control was obtained where a 10 per cent DDT dust was applied with a puff duster every other day starting at silking. With this treatment 11,296 worm-free ears were produced per acre as compared with 762 where no control measures were used.

Where four applications were made with a puff duster at 3-day intervals starting at first silking, 8,356 worm-free ears were produced as compared with 6,206 where a rotary type duster was used with the same treatment.

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3In cooperation with Dr. Frank Gardner, U.S. Sub-tropical Fruit Field Station, Orlando, Florida, and Dr. Julian C. Miller, L.S.U.

4In cooperation with Mr. E. H. Floyd, L.S.U.
In the planting made in 1953, that treated with 3 ounces of 50 per cent chlordane per bushel produced 6,348 marketable ears;

**Corn Seed Treatment**—Where corn seed maggots or southern rootworms were not present a slight reduction in stand and yield was obtained where chlordane was added to the slurry, as shown by results of the seed treatment test in 1953.

In the planting made in 1953, that treated with 3 ounces of 50 per cent chlordane per bushel produced 6,348 marketable ears; 1.12 ounces of Arasan S. F. per bushel, 10,356 marketable ears; 1.12 ounces of Arasan and 3 ounces of 50 per cent chlordane per bushel, 9,540 ears. Where no treatment was used 7,812 marketable ears were produced per acre. Where a commercial mixture was used 9,612 marketable ears were produced. Heavy infestations of rootworm have reduced stands as much as 75 per cent.

For details as to treatment see Insecticide Pest Control Service Leaflet No. 36, revised January 1953, entitled “Control of Soil Insects Affecting Corn,” by E. H. Floyd and C. E. Smith.

**Cucumber Insecticide Studies**—Tests were continued this season to compare the effectiveness of certain new organic insecticides with the standard cryolite, Black Leaf concentrate mixture. All mixtures were formulated with 8 per cent Dithane and applied at 5-day intervals with a puff duster, starting when the plants were thinned and continuing until the harvest season was half over.

The best yields were obtained where .5 per cent Lindane, 5 per cent Malathion or 20 per cent cryolite and 1 per cent nicotine sulfate dust were used. The yields were 289, 273, and 249 bushels of marketable cucumbers per acre, respectively, as compared with 77 bushels per acre where only one dusting was made. The vines were in better condition at the conclusion of the test where 5 per cent Malathion was used, but because of dry weather most of the cucumbers were classed as culls so the test was terminated before the Malathion treated plots were killed by aphids and leaf miners. Some injury was observed following the first application of the 5 per cent Malathion on the young plants but later applications failed to show injury. Slight injury was also observed with the 1 per cent Lindane dust. The cucumber pickle worm injury was the lightest since growing of fall cucumbers was begun at the Station; therefore, the effectiveness of these materials in the control of pickle worms could not be evaluated.

**Root Aphid Control**—In previous tests effective control of root aphids and increased yields of cabbage have been obtained by the application of 4 pounds of 25 per cent Lindane powder per acre with fertilizer. In 1951 where root aphids were numerous, 14,058 pounds of cabbage was produced per acre where this treatment was used compared with 9,900 pounds where no treatment was used.
Considerable damage to cabbage, cauliflower and turnips has been observed where root aphids are numerous under dry weather conditions. However, applying Lindane with the fertilizer is difficult; therefore, it was thought advisable to test the feasibility of applying Lindane in the transplanting water as a means of controlling root aphids.

Further studies with other forms of Lindane are necessary to determine the cause of injury and feasibility of using Lindane in a transplanting solution. Where Lindane emulsion was used in the transplanting water at the rate of \( \frac{1}{2} \) pint per 100 gallons considerable injury to cabbage roots was observed; reduced stand, delayed maturity and reduced yield also resulted, as shown in the table below.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Per cent plants which died following transplanting</th>
<th>Per cent plants harvested first cutting 1/19/53</th>
<th>Per cent plants showing slight root aphid damage at conclusion of test</th>
<th>Yield in pounds per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1—( \frac{1}{2} ) pint of water per plant</td>
<td>4</td>
<td>54</td>
<td>12</td>
<td>8,357</td>
</tr>
<tr>
<td>2—( \frac{1}{2} ) pint of solution containing ( \frac{1}{2} ) pt. of Isotox 200 emulsion per 100 gals. of water</td>
<td>12</td>
<td>34</td>
<td>2</td>
<td>3,784</td>
</tr>
</tbody>
</table>

**Bush Beans**

The average yields for 1949-1953 for Contender, Wade and Stringless Black Valentine were 160, 152 and 77 bushels per acre, respectively. In observation trials this spring a new breeding line, B 2456, produced 287 bushels per acre as compared with 170 for Contender and Wade and 132 for Stringless Black Valentine. Other varieties and breeding lines that looked promising were EES 207 (Seminole) and B 2194-1-1, which had yields of 234 and 215 bushels per acre, respectively.

**Bush Lima Beans**

The yields in this year's test were well above those of previous years. Here again Clark's Bush and Early Thorogreen were two of the top producers. Clark's Bush, Early Thorogreen and U.S. 252 (a nematode-resistant breeding line) gave the highest yields, producing 222, 206 and 219 bushels, respectively, as compared with 140 bushels per acre for Henderson Bush. All three were easier to shell and had fewer flat beans than Henderson Bush. Of the

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5In cooperation with Dr. Julian Miller and Dr. James Hoffman.

6In cooperation with Dr. Julian C. Miller and Dr. Wester, Beltsville, Md.
Fordhook types, U.S. 451 was the most promising, producing 241 bushels per acre as compared with 186 for Fordhook 242.

**Broccoli Trials**

Texas 107 gave the highest yield, producing 4,137 pounds per acre as compared with 3,049 for DeCicco, the variety most widely grown for fresh market in this area. It is as early as DeCicco but more concentrated in maturing.

**Cabbage Method-of-Planting Studies**

Ten of the leading varieties of cabbage for fall planting, based on results of previous trials, were planted in a test to determine the effect of method of planting on time of maturity and yield. However, all varieties with the exception of Medium Copenhagen and Wisconsin All Season were killed out by yellows, as determined by Dr. Tims and Dr. Martin of the Plant Pathology Department at L.S.U. The results, as shown in the table below, indicate that good stands can be established where cabbage is transplanted on a cloudy day. Under such conditions slightly larger heads were produced from those which were transplanted than from direct seeded, but they matured one to two weeks later.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Method of planting</th>
<th>Yield of marketable heads/acre</th>
<th>Yield in pounds per acre</th>
<th>Av. wt. in lbs. per head</th>
<th>Date of cutting</th>
<th>Date of cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Copenhagen</td>
<td>direct seeded 7/13/53 and thinned</td>
<td>6,533</td>
<td>11,405</td>
<td>1.7</td>
<td>10/6</td>
<td>10/31</td>
</tr>
<tr>
<td></td>
<td>transplanted 8/20/53</td>
<td>7,077</td>
<td>13,746</td>
<td>1.9</td>
<td>10/17</td>
<td>11/19</td>
</tr>
<tr>
<td>Wisconsin All Season</td>
<td>direct seeded 7/13/53 and thinned</td>
<td>6,805</td>
<td>19,408</td>
<td>2.9</td>
<td>10/23</td>
<td>11/19</td>
</tr>
<tr>
<td></td>
<td>transplanted 8/20/53</td>
<td>6,533</td>
<td>24,716</td>
<td>3.8</td>
<td>10/31</td>
<td>12/12</td>
</tr>
</tbody>
</table>

In cooperation with Dr. John J. Mikell.

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**Cauliflower**

The results of the time-of-planting test this season further show the importance of warm weather for best plant growth with cauliflower. Since warm weather is essential for best plant growth and cool weather for best head development, it seems that it would be to a grower’s advantage to extend his harvest season by planting early, medium, and late maturing varieties rather than extending his harvest season by extending his planting dates, since weather conditions are frequently unfavorable for plant growth when plantings are made after September 1 in this area.

In the early maturing groups Snowball A and Snowdrift for the plantings made in the fall of 1950, 1951, 1952 and 1953 have averaged 4,844 and 4,550 marketable heads per acre, weighing an average of 2.6 and 2.4 pounds per trimmed head, respectively. Both varieties start maturing heads about the same time, but 92 per cent of Snowball A was cut the first two weeks of harvest as compared with 50 per cent for Snowdrift during this same period. Snowball E has been in the trials for three years and has averaged 4,442 heads per acre, which averaged 2.5 pounds per head. It is similar to Snowdrift, but shows fewer leaves in the curd. Master has been in the trials for two years and has produced 4,509 heads per acre with an average weight of 2.7 pounds per head. It cannot be distinguished from Snowball A. In the medium early maturing group Snowball M (intermediate), Stella Nova and Supersnowball averaged 4,313, 4,007 and 3,807 heads per acre, weighing 2.6, 2.5 and 3.0 pounds per head. Snowball M and Stella Nova are slightly more concentrated in maturity. Stella Nova has had more leaves in the curd than the other two varieties.

Herkules was tried for the first time this season and is similar to Stella Nova but produced fewer heads with leaves in the curd. It produced 5,444 heads with an average weight of 3.4 pounds per head.

In the late maturing group Ferry’s Y and X produced an average of 3,922 and 3,891 marketable heads per acre weighing 2.9 and 2.8 pounds, respectively. Ferry’s Y was more concentrated in maturity and had fewer leaves in the curd. Snowball A, Master and Supersnowball have shown considerable more “whip-tail” than the other varieties under conditions favorable for its development.

**Cucumbers**

A mildew-resistant, Marketer-type breeding line from Charleston, S. C., listed as S. C. 10-3 again produced the highest yield. It produced 287 bushels per acre in fall tests in comparison with 183 and 186 bushels for Marketer and Palmetto.

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*In cooperation with Dr. John J. Mikell.*
Irish Potatoes

Red LaSoda shows considerable promise as a replacement for the regular LaSoda. It has dark red skin and has less tendency to produce jumbo size potatoes and growth cracks under fall growing conditions. (For data on yield, see report from Main Station at Baton Rouge, Louisiana.)

Sweet Corn

Sweetangold is a promising new early sweet corn variety. It produced 972 dozen marketable ears per acre weighing .69 pound per ear as compared with 708 dozen marketable ears weighing .66 pound per ear from Aristogold Bantam Evergreen. Experimental Golden No. 2057 is the most promising late sweet corn variety. It produced 1,026 dozen marketable ears per acre averaging .70 pound per ear.

Tomatoes

The varieties producing the best yields in the early maturing group were Lakeland and Vancross, with 19,331 and 15,659 pounds of marketable tomatoes per acre as compared with 15,189 for Grothen Globe. Lakeland is a little small under unfavorable conditions. The highest yields were obtained from Foremost and Jefferson, which yielded 23,355 and 22,593 pounds per acre, respectively. Both are later than Grothen Globe.

Tomato Fertilizer Studies

Results of 1953 trials indicate that heavy fertilization increases tomato size and yield. In 12 different fertilizer treatments in which the nitrogen, phosphorus and potassium ratios were varied, the best yields were obtained in 1953 when 160 pounds of nitrogen, 160 pounds of P2O5 and 160 pounds of K2O were applied per acre. Half was applied March 25 and the other on May 1. The yield of marketable tomatoes was 25,478 with 57 per cent weighing one-half pound or better, as compared to 18,237 with 30 per cent weighing one-half pound or better where 160 pounds of nitrogen, 80 pounds of P2O5 and 80 pounds of K2O were applied per acre, the phosphorus and potash being applied on March 25 and half of the nitrogen then and the other half on May 1. The plots which received no fertilizer produced 14,808 pounds per acre with only 13 per cent weighing one-half pound or better.

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8 In cooperation with Dr. Julian C. Miller, L.S.U.
7 In cooperation with Dr. John J. Mikell.
9 In cooperation with Dr. John J. Mikell and Dr. Walter Peevy, L.S.U.
"Stick Water" as a Fertilizer for Shallots

To further study the possibilities of "stick water" (a waste product from a fish factory in Plaquemines Parish) as a fertilizer material for certain vegetable crops in this area, a planting of shallots was made on December 3, 1952, where a comparison was made between 1,000 pounds of 5-2-2 fertilizer and 125 gallons of "stick water" per acre, which furnished an equivalent amount of nitrogen, phosphorus and potassium. Results were as follows: 4,210 dozen bunches (figuring 4 pounds of trimmed shallots per dozen) of shallots where the "stick water" was used as compared with 2,201 dozen bunches where the commercial fertilizer was used.

—Ralph T. Brown

Okra

Six varieties of okra and three plant spacing treatments were used in a test which was harvested three times weekly from June 8 until July 18. Emerald, Clemson (angular podded) and Dwarf Green Velvet were the best varieties, with the six-inch spacing giving the highest yield.

Globe Artichokes

Past experiences have shown a wide turtleback row (12 feet) to permit tractor cultivation, with plants set 4 feet apart in the row, will reduce labor and permit good growth. Several seedlings, as well as the California strain, are being increased.

Strawberries

L-27, with 173 crates per acre, and Klondyke, with 161 crates per acre, were the leading varieties in the strawberry planting.

Lettuce

The Great Lakes variety is superior in this area, but plants should be spaced at least 12 inches in the row for best production.

Fig

The planting has been expanded to include nine varieties. The original six varieties will produce their first crop in 1954.

FLORICULTURE

Chrysanthemum

The best chrysanthemum variety (standard) for All Saint's Day utilization was Ambassador (white and pastel yellow). The plants were set in June.

39In cooperation with Dr. Walter Peevy, L.S.U.
Hibiscus

The hibiscus collection has been extended to include 30 varieties. Very little winter damage has been noted since the plants were set out in 1951. Indian Chief (red single) and Kona (pink double) are the most vigorous varieties.

Gladiolus

The gladiolus time-of-planting test will be repeated for the third year. Because of the dry weather in late spring and the soil-borne diseases which hamper reproduction, it has been necessary to purchase new bulbs each year. This fact should be considered by cut flower growers.

Creole Easter Lilies

The diseases of the Creole Easter lily have been controlled by seed selection, seed treatment, rogueing and a spray program. Several selections are being increased, and no seedlings have been planted for observation.—Frederick B. Schmitz

Red River Valley

Experiment Station, Curtis

J. Y. Oakes, Superintendent
L. L. McCormick, Assistant Agronomist
W. A. Nipper, Assistant Animal Husbandman

The Red River Valley Agricultural Experiment Station has completed six years’ work since its opening in January 1948. The experimental program has advanced much more rapidly than originally anticipated. The work continues to deal with crops common to the area. Fertilizer and varietal studies are the major issues with cotton, corn, soybeans and forage crops. Since cotton is the major crop of the valley area, extensive studies are carried on with fertilizers, cultural practices, spacing, mechanical and chemical weed control, varieties, insecticides and the use of mechanical pickers in relation to varieties. All will aid in completely mechanizing the cotton program.

Since good livestock depend upon good pastures, extensive studies are being carried on with beef cattle in relation to both summer and winter pastures. In addition to this, fall calves are being
compared to spring calves for the benefit of farmers or ranchers who prefer to get the calf crop at a particular season.

In 1953 irrigation studies were inaugurated for the purpose of evaluating various grasses and clovers for continuous grazing during prolonged summer drouths.

**CORN STUDIES**

**Commercial Hybrid Corn Test**

In 1953, corn yields were below the three-year average owing to the extremely dry weather. However, even under this unfavorable condition, the four highest producing hybrids averaged 66 bushels per acre as compared to an average yield of 32 bushels per acre for the four open-pollinated varieties. This difference in yield between hybrids and open-pollinated varieties was much greater than for previous years.

Hybrids that have been grown three years or longer and have given best results are Dixie 11, Dixie 18, La. 468, Dixie 22, Funk's G-791W, N. C. 27 and Funk's G-714A. Of the new hybrids, Funk's G-779W, La. 0016 and La. 0010 appear to be well adapted to the Red River Valley.—*J. Y. Oakes, L. L. McCormick and Lee Mason*

**Early Hybrids**

In the past, early hybrids have been used primarily in combination with soybeans for hogging off. The use of early hybrids is becoming somewhat more popular due to recent developments in newer varieties that have better shuck coverage and produce satisfactory yields. Some of the more desirable early hybrids that have performed satisfactorily are Funk's G-50, U. S. 523W and Mo. 804. Some of the early hybrids appear to have considerable possibilities in the hill sandy land areas due to early maturity ahead of the July and August drouths.—*L. L. McCormick and J. Y. Oakes*

**Corn Fertilization**

Lack of moisture during the 1953 growing season reduced corn yields considerably. There were no significant differences between 64, 96 and 128 pounds of nitrogen but all treatments yielded significantly greater than the check plot. The 96-pound rate of nitrogen gave the most economical return. There was no increase in yield from the addition of various amounts of phosphorus and potassium with 96 and 128 pounds of nitrogen. Ninety to 100 pounds of nitrogen has consistently given the most economical yields at this Station and no significant difference has been noted between the sources of nitrogen.—*J. Y. Oakes and L. L. McCormick*
Corn Spacing

The spacing of corn for best yields depends on several factors. The depth of seedbed preparation, fertility measures and moisture conditions probably influence yields more than any other three factors. The spacing of plants from 12 inches to 24 inches with one to two stalks per hill has given variable results the last two years owing to inadequate moisture. Results for several years, however, indicate that a stalk population of 10,000 to 12,000 plants per acre will give best yields. A stalk population of this amount will average one stalk spaced 12 to 18 inches in the drill.

—L. L. McCormick and J. Y. Oakes

Corn and Soybeans Fertilization

Fertility studies were begun in 1951 to determine the effects of soybeans interplanted with corn and two rows of corn and two rows of soybeans planted alternately in comparison with continuous corn. Three years' results show continuous corn has outyielded corn and soybeans interplanted in each of the fertilizer treatments, 40-40-40, 80-40-40 and 120-40-40. In 1952 where corn and soybeans were interplanted the yields were greater than from continuous corn in the check plot. In 1951 and 1952 corn alternated with soybeans yielded more than either continuous corn or corn and soybeans interplanted, but in 1953 corn alone and corn and soybeans planted in alternate rows produced almost equal yields.

—J. Y. Oakes and L. L. McCormick

Mechanical Corn Harvesting

In an effort to keep abreast of the trend toward the mechanization of corn, each year new hybrids that yielded well in the commercial hybrid test and have desirable characteristics for mechanical harvesting are tested in comparison with varieties that have proved satisfactory. In the following table results are given for 1953.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield, Bushels</th>
<th>Bushels Picked</th>
<th>Bushels Hand Picked</th>
<th>Machine Picked</th>
<th>Husk Covering</th>
<th>Per Cent</th>
<th>Plants Erect</th>
<th>Ear Height, Height, Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dixie 11 (W)*</td>
<td>68.3</td>
<td>64.5</td>
<td>3.8</td>
<td>94.4</td>
<td>Fair</td>
<td>91.7</td>
<td>88</td>
<td>52</td>
</tr>
<tr>
<td>Coker's Co. 811 (W)</td>
<td>64.7</td>
<td>61.5</td>
<td>3.2</td>
<td>95.1</td>
<td>Fair</td>
<td>100.0</td>
<td>84</td>
<td>48</td>
</tr>
<tr>
<td>Dixie 22 (Y)</td>
<td>61.7</td>
<td>58.5</td>
<td>3.2</td>
<td>94.8</td>
<td>Poor</td>
<td>100.0</td>
<td>88</td>
<td>52</td>
</tr>
<tr>
<td>La. 468 (W)</td>
<td>60.1</td>
<td>57.6</td>
<td>2.5</td>
<td>95.8</td>
<td>Fair</td>
<td>87.5</td>
<td>90</td>
<td>56</td>
</tr>
<tr>
<td>Dixie 18 (Y)</td>
<td>58.9</td>
<td>53.6</td>
<td>5.3</td>
<td>91.0</td>
<td>Good</td>
<td>98.9</td>
<td>106</td>
<td>64</td>
</tr>
<tr>
<td>Funk's G-785W (W)</td>
<td>58.7</td>
<td>54.0</td>
<td>4.7</td>
<td>92.0</td>
<td>Fair</td>
<td>97.8</td>
<td>88</td>
<td>54</td>
</tr>
<tr>
<td>N. C. 27 (Y)</td>
<td>56.8</td>
<td>54.8</td>
<td>2.0</td>
<td>96.5</td>
<td>Poor</td>
<td>100.0</td>
<td>86</td>
<td>52</td>
</tr>
<tr>
<td>Coker's Co. 911 (W)</td>
<td>55.8</td>
<td>53.3</td>
<td>2.5</td>
<td>95.5</td>
<td>Fair</td>
<td>100.0</td>
<td>84</td>
<td>50</td>
</tr>
<tr>
<td>La. 0010 (Y)</td>
<td>55.4</td>
<td>50.1</td>
<td>5.3</td>
<td>90.4</td>
<td>Good</td>
<td>99.4</td>
<td>85</td>
<td>54</td>
</tr>
<tr>
<td>Funk's G-714A (Y)</td>
<td>52.3</td>
<td>50.6</td>
<td>1.7</td>
<td>96.7</td>
<td>Fair</td>
<td>97.6</td>
<td>86</td>
<td>54</td>
</tr>
<tr>
<td>Funk's G-737 (Y)</td>
<td>50.4</td>
<td>45.7</td>
<td>4.7</td>
<td>90.7</td>
<td>Good</td>
<td>98.2</td>
<td>100</td>
<td>64</td>
</tr>
<tr>
<td>La. 0016 (Y)</td>
<td>48.6</td>
<td>46.0</td>
<td>2.6</td>
<td>94.7</td>
<td>Good</td>
<td>98.0</td>
<td>88</td>
<td>54</td>
</tr>
</tbody>
</table>

*White or Yellow

—L. L. McCormick, J. Y. Oakes and Lee Mason

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Cotton Fertilization

Only very small increases in yields have been obtained where phosphorus, potassium or both were applied with nitrogen. This increase from mixed fertilizers over nitrogen alone has not been great enough to justify using the mixed fertilizers. From 48 to 70 pounds of nitrogen has given the most economical yield, with the sandy soils requiring the higher rates. Neither the source of nitrogen nor time of application, before planting or sidedressing, has significantly affected the yield.—J. Y. Oakes and L. L. McCormick

Cotton Varieties

Twelve commercial varieties were tested during 1953, most of which had been in tests at this Station before. Because of the heavy rains in May, the stand was not sufficient for the data to be analyzed statistically. However, from the data obtained the pounds of lint per acre were as follows: Coker's 100 Staple—1,220; La. 33—1,171; Delfos 9169—1,128; La. 33X14—1,128; Plains—1,118; Coker's 100-WR—1,113; Fox—1,085; Bobshaw—1,079; Empire—1,037; Stoneville 2B-6283—919; Stoneville 5A-3202—893; and Deltapine 15—845.—J. Y. Oakes, L. L. McCormick and F. W. Self

Mechanical Harvesting of Cotton

Mechanical studies were made on 14 entries, 13 numbered strains of the Louisiana Agricultural Experiment Station and Deltapine 15, which was used as a check. Yields of lint cotton varied from 1,250 pounds to 827 pounds per acre and mechanical efficiency varied from 60 to 91 per cent. Three of these strains yielded significantly greater than Deltapine 15, each with staple length equal to or exceeding Deltapine 15. However, only two of these three strains, La. DS 524-9 and La. DS 518-11, approached Deltapine 15 in percentage of cotton harvested with the machine. The grade for all entries tested was middling.

—L. L. McCormick, J. Y. Oakes and F. W. Self

Chemical Weed Control

The use of chemicals for controlling grasses and broad-leaved weeds is being emphasized in the production of cotton. Hand labor can be almost omitted each year and in years when weather conditions will not permit normal cultural practices, expenses can be materially reduced.

Four herbicide materials were tested in 1953, two dinitros, Chloro-IPC and CMU. Under conditions of heavy rainfall, best
results were obtained from the use of Chloro-IPC, followed by CMU and then the dinitros. At the rate of three-fourths pound of CMU per acre on a 14 inch band, results comparable to Chloro-IPC were obtained.

Post emergence oils were tested with very good results. Beginning about five weeks after planting, two applications of seven gallons per application per acre were made. The seven-gallon rate was applied due to a front-mounted nozzle being added to each shoe to spray ahead of the shoe. The cotton was hand-hoed once and flamed twice. Total cost per acre for weed control was $11.02.

—J. Y. Oakes and L. L. McCormick

Cotton Defoliation

Most of the ten materials tested caused a high percent of leaf drop, especially on the upper two-thirds of the plants. Lower branches were not defoliated satisfactorily as the bending plants overlapped in the middles. As there were practically no dews at the time the defoliants were applied, most sprays caused greater leaf drop than did Aero Cyanamid dust. All spray materials caused from 80 to 85 per cent defoliation except Shed-A-Leaf, which was about 94 per cent.—J. Y. Oakes and L. L. McCormick

Insect Control Studies on Cotton

General Insecticide Test—Several new insecticides were included in the 1953 test for the control of cotton insects. The insecticides were applied at five-day intervals beginning August 6 and ending September 10. Sprays used and yield in pounds of seed cotton per acre were as follows: Endrin—2,708; 3-5-0—2,655; Dieldrin—2,601; and Heptachlor and DDT—2,541. The dusts used and yields in pounds of seed cotton per acre were as follows: Heptachlor (Fine) and DDT—2,900; 3-5-40—2,794; Heptachlor (Granular) and DDT—2,791; Methyl Parathion and DDT—2,705; and Methyl Parathion—2,651. The DDT was not added to the Heptachlor treatments until August. The boll weevil population remained very low and the boll worm potential was high only during the latter part of the season.—L. L. McCormick and J. Y. Oakes

Rate, Interval and Use of Ground Equipment in Applying Insecticides—Endrin and Dieldrin were applied at five- seven- and nine-day intervals, with the rate being increased in proportion to the interval between applications. Toxaphene and DDT at a five-
day interval was used as a check. Pounds of technical material, interval of applications and pounds of seed cotton per acre are shown in the following table:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Results from Use of Tractor Equip.</th>
<th>Average Total Yield Seed Cotton Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rows Under Tractor</td>
<td>Side Rows</td>
</tr>
<tr>
<td>5 Day—2 lbs. Toxaphene &amp; .5 lb. DDT</td>
<td>2,226</td>
<td>2,905</td>
</tr>
<tr>
<td>5 Day—2 lb. Endrin</td>
<td>2,128</td>
<td>2,926</td>
</tr>
<tr>
<td>7 Day—3 lb. Endrin</td>
<td>2,425</td>
<td>2,905</td>
</tr>
<tr>
<td>9 Day—4 lb. Endrin</td>
<td>2,506</td>
<td>3,283</td>
</tr>
<tr>
<td>5 Day—18 lb. Dieldrin</td>
<td>2,110</td>
<td>3,383</td>
</tr>
<tr>
<td>7 Day—27 lb. Dieldrin</td>
<td>2,306</td>
<td>2,737</td>
</tr>
<tr>
<td>9 Day—36 lb. Dieldrin</td>
<td>2,394</td>
<td>2,737</td>
</tr>
</tbody>
</table>

Owing to the dry season, there were few boll weevils and only a few boll worm eggs were deposited the latter part of the season.

In trying to evaluate the damage that occurs from the use of ground equipment used in applying insecticides, the six rows covered by the spray machine were harvested separately. Yields were taken from the two rows under the tractor, the two rows adjacent to the wheels of the tractor and the two rows that were not affected by the tractor. In applying these insecticides, the same rows were followed with the tractor traveling in the same direction for each application. The front and rear wheels of the Farmal “M” tractor were shielded. Cotton plants were 4-5 feet in height. As the interval of application was increased the yield from the rows under the tractor increased.—L. L. McCormick and J. Y. Oakes

**SOYBEANS**

Each year the Station tests the leading varieties of soybeans that are being grown and new ones that have been released by the U.S.D.A. Soybean varieties can be divided into four groups according to their date of maturity. They are early, medium early, medium late and late maturing varieties. The better yielding varieties for each group are as follows: early—S-100 and Dorman; medium early—Ogden; medium late—Volstate and Roanoke; and late maturing varieties—Acadian, Mamotan and Improved Pelican.

This Station has been cooperating with the U. S. Regional Laboratory in testing new strains for yielding ability, oil content, resistance to diseases, lodging and seed quality. Outstanding strains from this test are increased and put into production as new varieties.

—J. Y. Oakes, L. L. McCormick and J. P. Gray
FORAGE CROP STUDIES

Alfalfa Varieties

The highest yielding varieties in 1953 were also near the top in 1949. Five years' results show the best adapted varieties or strains for this area to be Buffalo, Southwestern common, Oklahoma common, Kansas common, Ranger and Atlantic, Hairy Peruvian and Chilean strains produced high yields for the first two years; after that time their yields dropped rapidly owing to loss of stand from winter kill. The Chilean strains last year produced better than one-half of their total yield from the first cutting. Buffalo is highly recommended as it produces a high yield of excellent quality hay and is more resistant to bacterial wilt than some of the other varieties.

Grasses

Perennial grasses that have given good results are the tall fescues, perennial rye grass and some of the brome grasses. Of the bromes, Prairie brome is the most promising for early grazing and Mountain and Lincoln for medium late grazing. Phalaris minor appears to offer some promise for medium early grazing.

Three widely used summer grasses are common Bermuda, Coastal Bermuda and Dallis grass. Of the three, Coastal Bermuda produced the most forage. Several other new strains of Bermuda grass that produced high yields are Tift 3, Indiana 13 and Suwannee.

White Clover

Four strains of white clover and two strains of Ladino were included in this test. The S-1 strain of white clover was superior to both the Ladinos and white clovers; next in rank were Breeders and certified Ladino. Earlier recovery in the fall and longer grazing in late spring and early summer can be expected from the S-1 clover.

Red Clover

In 1953 six strains of red clover were tested at the station. Of the six, the La. Red Regional strain, La. Red No. 1 and Kenland produced about the same amount of forage. The three remaining strains or varieties, the Midland, Tenn. Purple and La. Red V. M., were very near the top three in amount of forage produced.

Red clover is well adapted to the soil conditions of the Red River Valley. Fifteen pounds of seed per acre is required for a full seeding, but this rate may be reduced by about one-half if the clover is planted in a mixture.

Crimson Clover

Six varieties of reseeding crimson clover were tested and all
made excellent growth. The Autauga was the earliest variety to bloom and the Mississippi selection the latest. An early light disk- ing or harrowing has aided in obtaining a stand from reseeding varieties at this Station, especially on the heavier types of soils.

—L. L. McCormick and J. Y. Oakes

SMALL GRAINS

Oat Varieties

Sixteen varieties of oats were tested in 1952-53 and were rated according to forage production and grain yield. Varieties that were top forage producers and ranked high in the production of grain were Southland—78.6 bushels, Victorgrain 49-92—78.3 bushels, P. I. 6600—76.8 bushels, Fulgrain—74.5 bushels, Arlington—74.5 bushels and Arkwin—71.9 bushels. The remaining varieties are poorer forage producers and are listed only in yield of grain per acre: Coker's 52-49—80.9 bushels, Coker's 52-22—78.3 bushels, Mustang—77.5 bushels and Camellia—53.8 bushels.

Fulgrain, Victorgrain 49-92, Coker's 52-22, Coker's 52-49 and Floriland mature one to two weeks before the other varieties. Southland, Nortex 107 and the preceding varieties did not lodge as badly as the other varieties. No fertilizer was applied to the oats as the land had previously been in alfalfa for several years.

Wheat Varieties

Ten varieties of wheat were tested in 1953 and yield data was collected from grazed and ungrazed plots. All varieties tested made good growth; however when a part of each ungrazed plot was clipped in late February, great differences were noted in the rate of recovery between varieties. Atlas 66, Anderson, Chancellor and Atlas 50 recovered the fastest and Coker's Coastal recovered the slowest.

Sixty units of nitrogen was applied to the grazed plots before seeding. The ungrazed plots were not fertilized as they were planted on an area that had been in alfalfa for several years.

The following table gives the grain yields of the varieties:

<table>
<thead>
<tr>
<th>Variety</th>
<th>Ungrazed Bu./Acre</th>
<th>Grazed* Bu./Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coker's 42-27</td>
<td>43.7</td>
<td>30.4</td>
</tr>
<tr>
<td>Chancellor</td>
<td>40.2</td>
<td>29.5</td>
</tr>
<tr>
<td>Anderson</td>
<td>38.4</td>
<td>28.7</td>
</tr>
<tr>
<td>Sanford</td>
<td>34.1</td>
<td>27.3</td>
</tr>
<tr>
<td>Atlas 66</td>
<td>33.0</td>
<td>29.1</td>
</tr>
<tr>
<td>Coker's 51-3</td>
<td>31.2</td>
<td>29.8</td>
</tr>
<tr>
<td>Atlas 50</td>
<td>30.1</td>
<td>26.1</td>
</tr>
<tr>
<td>Coker's Coastal</td>
<td>29.4**</td>
<td>18.0**</td>
</tr>
<tr>
<td>Percam</td>
<td>27.6</td>
<td>25.3</td>
</tr>
<tr>
<td>Coker's 51-2</td>
<td>20.1</td>
<td>15.8</td>
</tr>
</tbody>
</table>

*Not grazed heavily. **Severely attacked by rust.

—L. L. McCormick and J. Y. Oakes
ANIMAL INDUSTRY

Pasture Studies

Winter pasture experiments have been conducted at this Station for four consecutive years. Several changes have been made since 1949 to test different mixtures of grasses and legumes. In 1952, two pasture treatments containing oats were replanted to Atlas 66 wheat and Singletary peas and Abruzzi rye and Singletary peas. One each of the old fescue pastures containing white Dutch or Ladino clover were plowed up and reseeded to the same combination. The Ladino clover had to be reseeded in the remaining fescue-Ladino clover pasture. The fescue pastures were reseeded to check the comparative value of new and old stands of fescue. The fescue and Singletary pea pastures were seeded in 1951. All pastures were duplicated except the new 1952 planting of fescue, where comparisons are to be made between old and new plantings.

Each pasture in the test was five acres in size. The pasture combination, length of grazing period and pounds of beef produced per acre were as follows: 1949 seeding of fescue-Ladino clover and fescue-white Dutch clover were grazed from March 5 until August 7 and produced 270 and 307 pounds of beef per acre, respectively; the 1952 seeding of the same combinations were grazed from April 1 until August 7 and produced 243 and 269 pounds of beef per acre, respectively; the fescue-Singletary peas were grazed from March 17 until August 7 and produced 341 pounds of beef per acre; the Abruzzi rye-Singletary peas were grazed from February 4 until May 27 and produced 367 pounds of beef per acre; the Atlas 66 wheat-Singletary peas were grazed from February 4 until June 16 and produced 511 pounds of beef per acre.

All cattle were wormed before the experiment began. The cattle were weighed every 28 days and sprayed when necessary to control flies. Minerals and salt were fed free choice in all pastures.—W. A. Nipper and J. Y. Oakes

Summer Pasture Studies

Three pastures, each four acres in size and replicated twice, were started in the spring of 1951. Duplicate pastures of Coastal Bermuda, common Bermuda and Dallis grass were included in this study. Each of these pastures was also seeded to 2 pounds of white Dutch clover and 25 pounds of rye grass, in order to afford some grazing in late fall and spring. The rye grass was included also for the purpose of providing a supplement to the clover to reduce bloat. The Coastal Bermuda grass pasture was grazed from March 5 until July 16, and from July 29 until November 12, giving a total of 636 pounds of beef per acre. The common Bermuda and Dallis grass pasture provided grazing from March 5 until July 16,
and from August 28 until November 12, giving a total of 448 and 414 pounds of beef per acre, respectively.

Thirty pounds of nitrogen was applied on all pastures, followed by irrigation. Each pasture received approximately one and one-half inches of water every two weeks during August, September and the first half of October.

The results indicate that Coastal Bermuda is apparently more resistant to drouth as it continues to make new growth during drouthy periods whereas common Bermuda becomes dormant and tough and Dallis grass, when severely grazed, has a tendency to hug the ground still growing but providing a minimum of grazing.

—W. A. Nipper and J. Y. Oakes

Production Cost of Feeder Pigs

Feeder pigs have been grown at the Station with much less expense than equal quality pigs could be bought on the local market. In these tests all costs except the labor required in feeding and handling the pigs were included. All feed costs were figured on local prices at time used.

In 1953 the spring litter of pigs was produced at a cost of $15.14 per hundredweight. Thirty feeder pigs of equal quality were purchased on May 21, 1953, at a cost of $22.21 per hundredweight. From May 21 to July 10, at which time the feeder pigs went on the corn and soybeans, the 30 pigs gained 1,030 pounds at a cost of $16.12 per hundredweight. This gain was from drylot and pasture feed.

The three-year average cost of producing feeder pigs is $12.96 per hundredweight as compared to approximately $20.00 per hundredweight for equal quality pigs on the local market.

If feeder pigs are purchased about six weeks prior to the time needed, the cost will be less, the pigs can be vaccinated, wormed and sprayed and will be in better condition to utilize the feed.

—W. A. Nipper

Hogging Off Corn and Soybeans

The marketing of corn through feeder pigs has been a profitable enterprise at this Station for each of the four years that this experiment has been conducted. For greatest profit only good quality feeder pigs should be used; shade, water, tankage and minerals should be located near the field; pigs should be free from internal and external parasites, and adapted hybrid corn and soybean varieties should be planted. The surest way to obtain good quality feeder pigs is to raise them on the farm. At this Station the raising of feeder pigs for a three-year period has resulted in an average saving of about $7.00 per hundredweight as compared
with costs of the same quality pigs purchased from local markets. A part of the acreage should be planted to an early maturing hybrid corn and an early maturing soybean variety. Any high-yielding early hybrid with Dorman or Ogden soybeans is satisfactory. The remainder of the acreage should be planted to a high-yielding later maturing hybrid corn and later maturing soybean.

Feeder pigs grown on the Station and pigs bought on the local market were used in the 1953 test. Three hundred seventy-nine pounds of corn with green beans produced 100 pounds of pork in 1953 and 374 pounds of corn with green beans was required to produce 100 pounds of pork in 1952. A smaller net return was obtained in 1953 than in 1952 because of lower yield of corn and higher cost of the pigs purchased for the test. The average selling price for the finished pigs was $24.09 per hundredweight.

A net profit of $159.22 per acre was realized after deducting cost of the pigs. This represented $4.04 per bushel for the corn when sold through the pigs.—W. A. Nipper and L. L. McCormick

Rice Experiment Station, Crowley

RUFUS K. WALKER, Superintendent
NELSON E. JODON, Agronomist (U.S.D.A.)
ROBERT W. HELM, Entomologist (U.S.D.A.)
L. GEORGE COONROD, Assistant Agricultural Engineer
ROY JEAN MIEARS, Assistant Agronomist
DAVID E. BLACK, Assistant Agronomist

Experimental studies were conducted during 1953 at the Rice Experiment Station in the general fields of Agronomy, Agricultural Engineering, Entomology and Plant Pathology. The agronomic studies consisted of investigations of pasture-rice rotations, supplementary winter and summer grazing and hay crops, adaptability of various grasses and legumes to the rice area, rice fertilization, pasture fertilization, forage fertilization, seed production of rice and forage plants, rice breeding and variety testing. The agricultural engineering studies pertained to drying and storage of rice. The entomological studies consisted of investigations of the rice water weevil and the stinkbug. Work at the Station by plant pathologists consisted of studies with herbicides, chemical desiccation of rice and nematode control in rice.

New physical facilities added to the Station during 1953 consisted of a 40' x 80' building with several divisions which include
a room for fertilizer storage, a room for the plant breeder’s rice, a work room for the entomologist, and two workrooms for the plant breeder. A new residence for a staff member was also constructed during 1953.

The entomology and the rice breeding and variety testing projects are cooperative projects with U.S.D.A. Bureau of Entomology and Plant Quarantine and the U.S.D.A. Bureau of Plant Industry, Soils, and Agricultural Engineering, respectively. The rice drying and storage project is a cooperative project with the U.S.D.A. Agricultural Marketing Service.

As in previous years, numerous foreign visitors from most of the rice producing countries of the world made studies of the Rice Experiment Station for varying lengths of time.

A brief summary of the work conducted at the Station during 1953 is presented below.

**PASTURE AND FORAGE STUDIES**

**Pasture-Rice Rotation**

Rice, following three years of improved pastures, unimproved pastures, and oat and lespedeza supplementary grazing and hay production plots, was planted for the first year at the Rice Experiment Station. Increase in yield of rice due to improved pasture over unimproved pasture was 7.03 barrels per acre, which conforms with results obtained since 1945 in this series of experiments throughout the rice area.

One source of irrigation water, a deep well, at the Rice Experiment Station.
A new type of pasture-rice rotation experiment was begun in the fall of 1952 to test varying lengths of time that land is devoted to pasture and to rice in an attempt to determine the optimum length of time of pastures and rice in a rotation. During 1953 the pasture plots were grazed and some plots planted to rice as designed.—D. E. Black and R. K. Walker

Winter Grazing Studies

The third consecutive year of winter grazing tests showed that Southland oats continued to furnish a longer grazing period with larger gains of beef per acre than Atlas 66 wheat, rye grass, or Kentucky 31 fescue grass. The oats furnished 134 days grazing, carried 0.81 animal per acre and produced 188 pounds of beef per acre.—D. E. Black and R. K. Walker

Forage Crops

Ten varieties and strains of summer grasses were tested for adaptability and forage yield during 1953. Pangola and Coastal Bermuda continued to be outstanding in forage yield.

—D. E. Black and R. K. Walker

Seedbed Preparation for Winter Grazing

A study was made of three methods of seedbed preparation for planting oats for winter grazing. On February 1, 1953, the best growth and the best land condition for wet weather grazing was observed in the plots that had the seed broadcast in rice stubble without any seedbed preparation, while the poorest growth and footing conditions were in the plots where oats were drilled in a well-prepared seedbed. Although certain limitations are recognized, the results of this study show promise of cheap winter grazing that is superior during wet soil conditions.

—D. E. Black and R. K. Walker

FERTILIZATION STUDIES

Rice Fertilization

Rates and Ratios of N, P and K—Five identical randomized factorial designed experiments to determine the effect on the yield of rice from the application of different amounts and combinations of nitrogen, phosphorus and potassium were carried out in four outlying parishes (Allen, Calcasieu, Evangeline and Vermilion) and at the Rice Experiment Station. At these various locations, which had different cropping histories, varying results were obtained with respect to response to individual elements, combinations of elements and rates of application, but in general this work definitely shows that the use of commercial fertilizers within certain rates and combinations is highly profitable to the average rice
Planting rice for fertilizer experiment with a special band-type fertilizer-grain drill.

farmer. In these five experiments an average yield of 16.3 barrels per acre was obtained from the check plots that received no treatment, while an average of the maximum yield (regardless of fertilizer treatment) was 22.2 barrels per acre.

A rate and ratio experiment as described above for the five locations was carried out in conjunction with the pasture-rice rotation experiment at the Station on the first-year rice crop following three years of unimproved and improved pastures. Following unimproved pastures significant increases were received from the application of nitrogen and phosphorus. The average increase was 7.2 barrels per acre. Following three years of improved pastures a response to nitrogen only was received. A 6-barrel increase from 20 pounds of nitrogen per acre was received, but no additional response was obtained from higher rates of application.

**Time of Application**—Three separate experiments designed to determine the optimum time of application of fertilizer to rice were carried out in 1953. The results indicate that applications made from time of seeding to 20 days after planting produce maximum yields and that split applications may be superior to total application at one time.

**Milling Quality**—An intensive study was made of the effect of fertilizers on the milling quality of rice. Milling quality deter-
minations were made on rice from fertilizer treatments and check plots from three different experiments during 1953. The results of this study show that applications of single elements or elements in combination do not affect the milling quality of rice.

Forage Fertilization

Rate of Nitrogen on Bermuda Grass—On an established Bermuda grass sod under irrigated and non-irrigated conditions, 0, 40, 80, 120 and 160 pounds per acre of nitrogen as anhydrous ammonia were applied in 40-pound increments following each clipping for forage yield. The results show that each clipping depleted 40 pounds of nitrogen and that at least this amount should be applied after each clipping for yields above check yields. During dry periods yields of forage can also be greatly raised by irrigation.

Rate and Ratio of Nitrogen, Phosphorus and Potassium on Oats, Wheat and Rye Grass—Five randomized factorial designed experiments were conducted to determine the effect of the application of different amounts and combinations of nitrogen, phosphorus and potassium on the forage yield of oats, wheat and rye grass and on the grain yield of oats and wheat. Results of these experiments show that application of both nitrogen and phosphorus greatly increased yields of all forage crops both in forage and grain.

—R. J. Miears, M. B. Sturgis and R. K. Walker

PASTURE FERTILIZATION

Effects of Nitrogen, Phosphorus, Potassium, Lime and Minor Elements on Pastures—An improved pasture fertilization experiment was established on the Rice Experiment Station during 1953. Through a combination of cage clippings and cattle grazing, information on the fertilization requirements for maximum production of improved pastures will be obtained. Fertilization factors under investigation are various rates and combinations of nitrogen, phosphorus, potassium, limestone and minor elements. Sources of phosphorus and various times of application are also being studied in this experiment.

—R. J. Miears, M. B. Sturgis and R. K. Walker

FOUNDATION SEED PRODUCTION

Rice

Approximately 1,235 barrels of foundation rice seed of three varieties were produced during 1953 which will be distributed through the Louisiana Seed Growers Association to approximately 100 farmers for the purpose of producing certified seed.

—Charles N. Bollich and R. K. Walker
Combining Louisiana S-1 white clover seed. Nine thousand pounds were produced on 15 acres at the Rice Experiment Station during the past two years.

Clover

Three thousand, three hundred pounds of foundation La. S-1 White clover seed was produced during 1953 and distributed through the Louisiana Seed Growers Association to farmers for the production of certified La. S-1 clover seed.

—D. E. Black and R. K. Walker

DRYING, AERATION AND STORAGE OF RICE

Drying Rice in Bins with Atmospheric Air

The experimental work on the drying and storage project during 1953 was concentrated on studies of drying rice in bins by forcing atmospheric air through rice at different rates. Air flow rates of 1, 2, 3 and 4 cubic feet of air per bushel were used in drying rice. With an 8 foot depth of rice the higher rates produced a static pressure of 8 inches of water. With the 4 cubic feet of air per bushel and low relative humidity, the rice was dried satisfactorily with 56 hours of fan operation. With 1 cubic foot of air per bushel and high rate of humidity, some spoilage was found when it required 365 hours to dry rice.

—L. G. Coonrod, H. T. Barr and R. K. Walker
Aeration bins used in rice drying experiments at the Rice Experiment Station.

Aeration of Dried Rice in Storage Bins

No difference was detected in quality or otherwise between two lots of rice in bulk storage, one lot of which had been aerated at intervals during storage and the other lot had not been aerated.

—L. G. Coonrod, H. T. Barr and R. K. Walker

RESEARCH ON RICE FIELD INSECTS

Studies on rice-field insects were begun in Louisiana late in 1952 and continued throughout 1953, major attention being given to the rice stinkbug and the rice water weevil. Sampling techniques
were improved, and a number of important facts learned about these insects and their damage to the rice crop.

In order to count larvae of the rice water weevil, it was necessary to wash, re-wash and screen the soil adhering to the clumps of the roots. The injury to the root system was in direct relation to the total number of adults and larvae to which the plant had been exposed. In survey work both adults and larvae should be counted.

An effort was made to correlate infestation of the rice stinkbug with damage found at harvest time. While fields in certain areas had more damaging infestations than those in other areas, there was considerable variation between fields, and often between portions of the same field.

It has been reported that where rice water weevils occurred in damaging numbers the rice plants seemed to tiller excessively. Tests with four varieties of rice indicated that there was no excessive tillering, and that there may have been a significant decrease in tillering of the two long-grain varieties Rexoro and Sunbonnet.

In order to check the period in the ripening of the rice when the infestation was most damaging, rice stinkbugs were confined to rice heads under cages in the field. The infestation was the most damaging during the late milk and soft-dough stages of the rice. This period is rather long because individual heads in a field differ widely in maturity. The intensity of the infestation was also related directly to the amount of pecky rice produced. Although other insects may damage the rice, sufficient numbers of the rice stinkbug alone can cause up to 100 per cent of pecky rice.

To determine whether all varieties of rice will produce equal amounts of pecky rice under equal rice stinkbug infestation, stinkbugs were confined to rice heads of five varieties for the entire ripening period. There was no apparent difference between the short-grain varieties, Zenith, Magnolia and a selection from cross 44C507, but there was a marked decrease in damage to the two long-grain varieties, Rexoro and a selection from cross 45C554.

Studies on the control of the rice stinkbug were conducted on large acreages of rice, in cooperation with commercial aerial spray operators, insecticide distributors and farmers. In spite of adverse weather two experiments were completed. They compared the effectiveness of toxaphene, dieldrin, aldrin and heptachlor. All four insecticides gave good control, but dieldrin showed the most promise.

Aerial spray operators used toxaphene for rice stinkbug control at the beginning of the 1953 season, because they were also using it for control of the fall armyworm. As the season progressed,
dead fish were noticed in the canals and bayous after toxaphene had been applied to nearby rice fields. Tests were therefore conducted to determine the relative toxicity of the four insecticides to fish normally found in such waters. At dosages similar to those probably needed for control of the rice stinkbug, dieldrin, aldrin and heptachlor had little effect on the fish population, but toxaphene killed many fish.—Robert W. Helm

**BREEDING FOR IMPROVED VARIETIES OF RICE AND OTHER CEREAL GRAINS**

Investigations at the Rice Experiment Station bearing on the development of improved varieties are conducted cooperatively with the Section of Cereal Crops and Diseases, Field Crops Research Branch, U. S. Department of Agriculture. The writer, a U.S.D.A. employee, is in charge of the cereal breeding and is assisted by an LSU employee who has particular responsibility for the foundation seed program. The latter position, however, has been vacant during most of 1953. While work is primarily with rice, some attention is also given to oats, wheat, barley and sorghum because of the importance of these crops for forage and grain feed in the area.

**Rice**

The objectives of the rice improvement work are to develop and make available to growers superior medium and long-grain varieties of early, midseason and late maturity. Growers generally prefer early-maturing varieties but use varieties differing in the length of growing period in order to spread the harvest season. High-yielding capacity, disease resistance, suitability for combining and drying, milling quality and good table quality are the principal characteristics being sought.

Rice breeding, as conducted in 1953, included the following principal phases:

1. The making of crosses between varieties, and growing the F₁ plants of over 60 crosses made in 1952.

2. Superior plants were selected from 20 F₂ populations, and 8 F₂ populations were grown for genetic studies.

3. Magnolia and Rexoro plants grown from X-Rayed and Neutron-treated seed to be checked for possible valuable mutations.

(5) Selection in some 2,500 progeny rows grown from individual plant selections drawn from bulk hybrid plots, or pedigreed continuation of such selections.

(6) Evaluation of outstanding selections: About 160 plots were grown, each consisting of about 20 individual plant rows, for elimination of off-types and increase of pure seed for plot testing.

(7) Four replicated drill-strip field plot tests of nearly 60 selections and varieties.

(8) Nursery plot experiment on the effect of different dates of seeding on 17 varieties and selections.

(9) Uniform nurseries, consisting of about 70 varieties and selections arranged in five groups according to the length of the growing period. Superior selections from all rice experiment stations are included in these tests.

(10) Small increase fields of six superior selections under consideration for release grown to increase seed stocks in sufficient quantity for possible seeding for production of foundation seed.

Other experiments included (1) oat, wheat and barley tests in nursery row and drill-strip plots, and (2) selection of combine type grain sorghum.

**Outstanding Selections Compared with Standard Varieties**—When seeded at an average date (about mid-April) the well-known varieties Zenith, Bluebonnet, Blue Rose and Rexoro mature successively at intervals of approximately two weeks. Varieties with similar lengths of growing period are grouped with the above varieties for testing in field and nursery plots.

At the present time one outstanding new selection in each of the four groups is under consideration for increase and possible release as a new variety. These are described and compared below with the standard varieties they are expected to replace.

**Rexoro-Purpleleaf x Magnolia, 44C507**—This selection was advanced to the row-block plots in 1951 and sufficient seed was obtained for 1952 field plots and uniform nurseries. Data obtained from tests at various stations indicated satisfactory yielding ability in comparison with Zenith, and superiority with respect to milling.

44C507, in eight replicated tests at Crowley in 1952 and 1953, gave yields equal to or slightly higher than Zenith and Magnolia in each test.

Laboratory milling tests indicate head rice yields at least equal to Magnolia and definitely higher than Zenith. The grain
is about the size of Zenith but more cylindrical. It is clear and would make an attractive package rice, although it probably does not quite equal Zenith in luster.

44C507 is superior to Zenith and Magnolia in several other characteristics: (1) It is two to four inches shorter, making it less subject to wind damage. (2) It is smooth-hulled, so that irritating dust is eliminated. (3) It matures very uniformly and apparently two or three days earlier than Zenith. (4) It has greater resistance to Cercospora leafspot and possibly to white top. (5) It threshes very easily, reducing losses due to grains remaining on the straw.

4-11-14-8-x Bluebonnet, 46C711—This selection was advanced to the row-block plots in 1951 and to the field-plot, uniform nursery and date-of-seeding tests in 1952. Data obtained from tests at various stations indicated satisfactory yielding ability in comparison with Bluebonnet, and superiority with respect to milling quality.

46C711, in 11 replicated tests at Crowley in 1952 and 1953, averaged 17.7 barrels per acre as compared to 15.8 barrels for Bluebonnet and 16.0 barrels for Sunbonnet.

Milling tests indicated that 46C711 is higher in milling quality than is Sunbonnet or Bluebonnet. One sample showed a yield of 105 pounds of head rice per barrel in a laboratory test. The grain is of Bluebonnet type.

Other points of superiority include (1) shorter and more uniform plant type and (2) possibly less susceptibility to smut.

This selection may prove to be somewhat too difficult to thresh. Rexoro-Purpleleaf x Selection G, 45C554—This selection matures about a week or ten days later than Bluebonnet and 7 to 10 days earlier than Texas Patna. Thus it would fit into the gap in the harvest schedule left by Blue Rose which is no longer grown to any extent.

45C554 is a long slender-grain selection that was advanced to the row-block plots in 1951 and to the field-plot, uniform nursery and date-of-seeding tests in 1952. Data obtained from tests at various stations indicated that it is very productive and that its milling quality is satisfactory.

45C554 was included in 10 replicated tests at Crowley in 1952 and 1953 and averaged 20.1 barrels as compared to 17.6 for R-D, which is a high yielding variety maturing a few days later. It outyielded Texas Patna and Rexoro by a wider margin.

Laboratory tests indicate that 45C554 will mill as well or better than Rexoro. The grain is slightly larger than Rexoro but more slender than Bluebonnet 50.

This selection may grow rather tall on highly fertile land but apparently is no taller than Texas Patna.
Rexoro\(^4\) x Blue Rose, 45C 15/16 Rex-3-22—This is a backcross selection carrying Cercospora leafspot resistance but otherwise very similar to Rexoro. It was entered in the row-block test in 1950 and advanced to field-plot and uniform nursery tests in 1951 and to date-of-seeding tests in 1952.

This selection matures at the same time as Rexoro and apparently yields the same. Its resistance to Cercospora leafspot enables the leaves to remain green after the grain is ripe, just as Rexoro did for many years before it was attacked by a new form of the disease. Neither Rexoro nor the backcross is resistant to stem rot, a fungus disease that attacks the stalk at the water line.

Laboratory tests made in 1952 indicated that the backcross Rexoro mills as well as the original, but further information is needed on quality.

**Louisiana Releases in Production in 1953, and Recommendations for 1954**—Approximately 20 per cent of total state acreage in 1953 was devoted to varieties developed at the Rice Experiment Station, about 13 per cent being in Rexoro and 7 per cent in Magnolia. Rexoro acreage was proportionately only about two-thirds of that of 1952, while Magnolia increased slightly. Nira and Fortuna have practically disappeared from production, being replaced by Bluebonnet varieties.

Sunbonnet was released to growers for production of certified seed in 1953. There were 21 growers with a total of 177 acres passing field inspection.

Varieties recommended for general production in 1954 are: Zenith, Magnolia, Sunbonnet, Bluebonnet, Bluebonnet 50 and Rexoro.

**Oats and Wheat**

Alamo oats may prove to be adapted to local conditions. It appears to be superior to Southland in resistance to rust and culm rot, and makes ample growth in the fall for grazing. It is especially attractive because of its short, stiff straw. It matures at about the same time as Southland.

Atlas wheat remains unrivaled among those tested at the Rice Experiment Station.

**Combine Sorghums**

New dwarf types of sorghums, adapted to this region, and which may be seeded with the rice drill and harvested with the combine, should be available soon.—*Nelson E. Jodon\(^5\)*

\(^4\)Field Crops Research Branch, Agricultural Research Service, U.S.D.A.
Southeast Louisiana Dairy and Livestock Experiment Station, Franklinton

H. D. Ellzey, Jr., Superintendent
Denis E. Simon, Jr., Research Associate in Dairying
David R. Melville, Research Associate in Agronomy

GRAZING EXPERIMENTS

Winter Pastures Grazed by Lactating Dairy Cattle

Winter pasture experiments consist of combinations studies under uniform fertilization and management. The following combinations were under trial during the winter of 1952-53.

<table>
<thead>
<tr>
<th>Combination</th>
<th>No. days grazed</th>
<th>Ave. No. cows/acre</th>
<th>Tot. lbs. 4% FCM per acre</th>
<th>Value milk above feed &amp; past. cost per-acre*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phalaris minor-crimson clover</td>
<td>84</td>
<td>2.6</td>
<td>5,733</td>
<td>$267.75</td>
</tr>
<tr>
<td>Oats-red clover</td>
<td>98</td>
<td>1.9</td>
<td>4,707</td>
<td>213.01</td>
</tr>
<tr>
<td>Oats-crimson clover</td>
<td>98</td>
<td>2.0</td>
<td>5,187</td>
<td>241.69</td>
</tr>
<tr>
<td>Wheat-crimson clover</td>
<td>98</td>
<td>1.9</td>
<td>4,873</td>
<td>222.55</td>
</tr>
<tr>
<td>Rye-crimson clover</td>
<td>84</td>
<td>1.3</td>
<td>3,059</td>
<td>124.38</td>
</tr>
<tr>
<td>Rye grass-crimson clover</td>
<td>84</td>
<td>1.9</td>
<td>4,566</td>
<td>215.03</td>
</tr>
</tbody>
</table>

*Only material costs are included—lime, seed, fertilizer.

It may be observed from the table above that Phalaris minor (little Canary grass)—crimson clover produced the most milk and provided the greatest net return per acre. This is a new grass of Australian and/or South American origin that is particularly promising after only one year of testing. For early grazing, however, wheat or oats in combination with crimson clover is superior. Rye grass, in combination with crimson clover, is also extremely dependable as a grazing crop whenever temperatures drop below the point favorable for the growth of oats.

Experiments conducted in preceding years indicated that tall fescue is generally inferior to one of the cereal grains or rye grass in combination with crimson clover. Plantings of fescue should be limited to fertile sites and/or sites too poorly drained for the successful growth and grazing of a cereal grain and crimson clover.

Winter Pastures Grazed by Beef Animals

These are combination studies of a perennial and/or self seeding nature under uniform fertilization and management.
<table>
<thead>
<tr>
<th>Combination</th>
<th>No. days grazed</th>
<th>Ave. No. cows per acre</th>
<th>Ave. daily gain per animal</th>
<th>Tot. lbs. beef prod. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchard grass-La. S1 clover</td>
<td>84</td>
<td>2.33</td>
<td>2.02</td>
<td>396</td>
</tr>
<tr>
<td>Rescue grass-La. S1 clover</td>
<td>63</td>
<td>2.89</td>
<td>2.08</td>
<td>379</td>
</tr>
<tr>
<td>Fescue-rye grass-La. S1 clover</td>
<td>84</td>
<td>2.33</td>
<td>2.13</td>
<td>417</td>
</tr>
</tbody>
</table>

In addition to the data presented above, these pastures were grazed by dairy heifers and dry cows at the rate of 2.3 cows per acre during the period May 21-Aug. 10. It should also be pointed out that the grazing during this period was provided solely by the La. S1 clover.

The rescue grass (Texas 46)—La. S-1 clover was extremely productive for a short period of time during the spring. Orchard grass (Danish) appears to have no particular merit. The fescue contributed no appreciable amount of forage where it occupied a part of the mixture. La. S1 clover, however, was outstanding in that it provided considerable summer grazing and earlier winter grazing than can be expected from any other white clover.

**Permanent Pastures Grazed by Lactating Dairy Cattle**

Permanent pasture experiments consist of a study of rates of nitrogen on a Dallis grass-white Dutch clover-common lespedeza mixture. All pastures are treated uniformly insofar as lime, phosphorus and potash are concerned. Management is also uniform for all rates of nitrogen.

The treatments and results are as follows:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. days on pasture</th>
<th>Ave. No. cows per acre</th>
<th>Tot. lbs. 4% FCM per acre</th>
<th>Value milk above feed &amp; past. cost per acre*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No nitrogen</td>
<td>126</td>
<td>2.31</td>
<td>5,647</td>
<td>$290.27</td>
</tr>
<tr>
<td>64 lbs. N. 1 application</td>
<td>126</td>
<td>2.53</td>
<td>6,341</td>
<td>313.24</td>
</tr>
<tr>
<td>64 lbs. N. 2 applications</td>
<td>126</td>
<td>2.69</td>
<td>6,319</td>
<td>314.09</td>
</tr>
<tr>
<td>128 lbs. N. 1 application</td>
<td>126</td>
<td>2.53</td>
<td>6,644</td>
<td>316.05</td>
</tr>
<tr>
<td>128 lbs. N. 2 applications</td>
<td>126</td>
<td>2.47</td>
<td>5,842</td>
<td>274.83</td>
</tr>
<tr>
<td>192 lbs. N. 1 application</td>
<td>126</td>
<td>2.42</td>
<td>5,736</td>
<td>266.53</td>
</tr>
<tr>
<td>192 lbs. N. 2 applications</td>
<td>126</td>
<td>2.61</td>
<td>6,455</td>
<td>293.51</td>
</tr>
<tr>
<td>192 lbs. N. 3 applications</td>
<td>126</td>
<td>2.64</td>
<td>7,022</td>
<td>322.62</td>
</tr>
</tbody>
</table>

*Only material costs are included—lime, seed and fertilizer.

This is the third year this test has been conducted and in no year has the anticipated response to nitrogen been obtained. This, it is believed, is due largely to the fact that all three years have been unusually dry and water, rather than nitrogen, has been the limiting growth factor. Pastures receiving the heavier rates of nitrogen were less productive during prolonged dry periods than were the pastures receiving either no nitrogen or 64 pounds of nitrogen. Apparently the relatively heavy rates of nitrogen as a top-
dressing caused the development of a shallow root system, thereby causing these pastures to suffer more during drouth periods. The rate of growth, however, during adequate moisture periods was truly remarkable on the high-rate plots. We believe that during such periods the amount of growth can be regulated to that needed by simply applying nitrogen.

Because all pastures are uniformly fertilized insofar as phosphate, potash and lime are concerned, the spring clover growth in the "no nitrogen" pastures has been just as good as that in any other pasture. This good clover growth and the fixation of some atmospheric nitrogen by the clover has probably caused the response to applied nitrogen to be less pronounced and has narrowed the production gap between the "no nitrogen" plots and plots receiving applied nitrogen.

A good stand of common lespedeza was obtained the first year. After the white clover was seeded, however, the lespedeza quickly disappeared and has contributed nothing to the mixture since that time. Lespedeza has no place in a well-fertilized Dallis grass-white clover pasture because the clover will so completely dominate the area during the spring as to crowd out lespedeza. If lespedeza is desired, leave out the white clover.

**FORAGE CROP VARIETAL AND STRAIN TESTING**

**Perennial Pasture Mixture Trial**

Commercial Dallis grass, strain B-230 Dallis grass, Pensacola Bahia grass, Coastal Bermuda grass, Alta fescue grass, La. white clover, La. S1 white clover, Kenland red clover, alsike clover, Autauga crimson clover and common lespedeza were tried in all likely combinations varying from very complex mixtures to very simple mixtures. After one year's trial the following observations were apparent from the data.

1. The more complex mixtures generally produced a greater total yield than did the simpler mixtures.

2. At no time did the fescue contribute any forage to the total produced.

3. Common lespedeza was completely crowded out in all cases where one or more clovers were also included in the mixtures.

4. No advantage was gained by including both alsike and white clover in the mixture—choose one.

5. No advantage was gained by including either white clover or alsike clover whenever Kenland red clover and Autauga crimson were both included in the mixture.
6. There seems to be no point in having more than one of Dallis, Bermuda or Bahia grass, as Bahia will dominate both Dallis and Bermuda while Dallis grass will dominate Coastal Bermuda grass.

7. The percentage cover of Bahia increased as the season progressed, while that of Dallis and Coastal Bermuda generally declined.

8. Generally, it appears that one grass and two clovers (crimson, white or alsike for early grazing and red clover for later grazing) is the best choice. If lespedeza is desired, seed it with a grass only.

**Summer Grasses**

1. **Dallis and Bahia Grass Strains**—No significant differences were obtained in total production for the season, but the Bahia grasses in general produced more forage during dry periods than did the Dallis grass strains. Dallis grass strain B-230 remained green later in the fall than did the other Dallis grasses. Dallis grass strain B 430 and Pensacola Hybrid 14X108 were heavy producers at the time of first cutting. Total yields of dry forage for all entries varied from a low of 4,709 pounds per acre for commercial Dallis grass to a high of 6,017 pounds per acre for Pensacola hybrid 14X108.

2. **Millet and Sudan Grass**—The millets were generally superior to the Sudan grasses. Hybrid D millet was particularly outstanding in that it produced 11,481 pounds of dry forage per acre as compared to 4,289 pounds for common Sudan and 6,371 pounds for pearl millet, a commonly used millet variety.

**Winter Growing Grasses**

1. **Cereals**—Several varieties of oats, wheat, barley and rye were compared with rye grass and Phalaris minor insofar as forage production is concerned. The oat varieties produced more forage than did the other entries. Coker 47-27 wheat was superior to Atlas 66 wheat. Rye grass, rye and Phalaris compared favorably in total production but the growth was much later than oats, wheat or barley. Goliad barley, a forage type, is particularly promising as an early fall producer. Total forage production for the season varied from a low of 4,002 pounds of dry matter per acre for Phalaris minor to a high of 6,102 pounds per acre for Nortex 107 oats.

2. **Orchard Grasses**—Palestine and Akaroa are the best adapted orchard grasses but, owing to the low production of all entries, none are currently being recommended as pasture crops.
Top production for the season was only 3,942 pounds of dry forage per acre.

3. Tall Fescues—Alta 4-36 and Goar were the top performers in this test, having a total production for the season of 7,279 and 7,313 pounds of dry forage per acre, respectively. The fescues generally produced a comparatively poor quality forage.

4. Brome Grasses—Prairie brome was the outstanding performer in this trial, having a total production for the season of 5,325 pounds of dry forage per acre. This grass reseeds well and in some years may act as a perennial. It can be recommended to farmers interested in a self-seeding winter grazing crop. La. S1 clover or reseeding crimson clover can be expected to perform very satisfactorily when interplanted with this grass. Do not, however, expect grazing as early as can be obtained from oats or wheat.

Winter and Spring Growing Clovers

1. White Clovers—Varietal differences in white clover are very important—choose a La. strain. La. S1 clover is currently the outstanding white clover in that it produces more forage per acre, makes earlier winter growth and can be expected to provide considerable summer grazing.

2. Red Clovers—Red clover has a place in any pasture program wherein it is desired to lengthen the clover grazing period. Tenn. purple was the high producer during 1952-53. In addition to being a top yielder, it is also a so-called early strain. La. strains 1 and 2 are also early but slightly less productive. Kenland and Midland are productive but are later than desirable.

3. Crimson Clovers—Several reseeding crimson clovers and common crimson were included in this test. All have reseeded very satisfactorily since 1951 with the exception of common. The latter, of course, is not expected to reseed since the percentage of hard seed is low. There were no significant differences in the yields of any hard seeded varieties in 1952-53. Those included in the test were Dixie, Auburn, Autauga, Talladega and Miss. Selection.

4. Sub Clovers—The sub clovers have been narrowed down to three that are adapted and resistant to mildew. These include Tallarook, Mt. Barker and Nangela. There were no significant differences in 1952-53 but it should be pointed out that Nangela provides more early growth than the remaining two. We believe that sub clover has a place on soils too poorly drained to grow crimson satisfactorily.
FORAGE CROP FERTILITY WORK

Phosphate Studies

1. Effect of Phosphate on the Forage Yield of a Dallis Grass-White Clover Mixture—Three sources of phosphate, raw rock phosphate, 20 per cent superphosphate and basic slag, are being compared at rates varying from 40 pounds P₂O₅ per acre to 200 pounds P₂O₅ per acre in 20-pound increments. Nitrogen and potash are applied uniformly. The purpose of this experiment is to determine the relative degree of effectiveness of these sources of phosphate at varying initial rates and the residual effects of same. No significant differences were exhibited in 1953.

2. Effect of Rate, Increment and Interval of Application of Maintenance Phosphate at Two Initial Rates on the Yield of a Dallis Grass-White Clover Mixture—Varying amounts of P₂O₅ are applied at one-, two- and three-year intervals to Dallis grass-white clover sods that were fertilized initially with 60 and 100 pounds of P₂O₅ per acre. The purpose of this experiment is to determine the amount of maintenance phosphate needed and the most effective interval of application at so-called minimum and liberal initial rates. Significant differences were obtained during 1953 but no observations will be noted at this point since all treatments have not been executed.

Potash Studies

Varying amounts of potash are applied in single and split application at one- and two-year intervals in an effort to determine the amount of maintenance potash needed, if this amount should be applied in single or split application for any given year and the desirability of making annual applications versus biannual applications. Significant differences were obtained in 1953 but no observations will be noted at this point since all treatments have not been executed.

Lime Studies

1. Effect of Source of Liming Material on Yield of Dallis Grass-White Clover Mixture—Three sources of lime (calcium silicate slag, dolomitic limestone and calcitic limestone) are being compared at rates varying from 3,000 pounds per acre to 9,000 pounds per acre in 1,000-pound increments. The purpose of this experiment is to determine the relative degree of effectiveness of these sources of liming material at varying rates and the residual effect of same. No significant differences were obtained during 1953.
2. Effect of Rate, Interval and Increment of Application of Dolomitic Limestone on Yield of a Dallis Grass-White Clover Mixture—Initial rates vary from 3,000 pounds per acre to 9,000 pounds per acre in 1,000-pound increments. Maintenance lime is applied in varying amounts at one-, two- and four-year intervals in an effort to determine the amount and frequency of maintenance lime needed at varying initial rates. No significant differences were obtained in 1953.

Nitrogen Studies

1. Effect of Rate of Nitrogen on the Forage Production of B-230 Dallis Grass, Coastal Bermuda Grass and Pearl Millet—Rates of nitrogen, varying from 0 to 231 pounds per acre, were applied at varying intervals of time in varying amounts in an effort to determine the optimum total amount and the optimum increment of application of this total. The higher rates of nitrogen generally produced the greatest total yield of dry forage. There were no significant differences between increments of application for any given rate. Increment of application did, however, influence the distribution of forage and tend to level out the ups and downs in seasonal production. From one year’s data it appears that maximum yields and good distribution can be obtained from the application of 200 pounds of N per acre applied in two or three separate applications during the season.

2. Effect of Rate of Nitrogen on the Forage Production of Oats, Rye Grass—Crimson Clover and Tall Fescue—La. S1 Clover—Experimental procedure was the same as stated above. The same general trend of production also prevailed, i.e., the higher the rate of nitrogen, the greater the total yield. There were no significant differences in the total production for the season as a result of applying a given rate at varying intervals. The distribution of yield was, however, affected. Two hundred pounds of nitrogen applied in three separate applications appears capable of giving maximum yields and a good distribution of forage production.

It should also be pointed out that no advantage was gained as a result of applying a minor element mixture.

Phosphate and Potash Studies on Winter Growing Crops

1. Rye Grass—Crimson Clover—Varying amounts of phosphate and potash were applied at two levels of nitrogen—60 pounds and 120 pounds per acre. One hundred pounds of P$_2$O$_5$ per acre was capable of producing top yields at both levels of nitrogen. No significant response was obtained from the addition of potash or a minor element mixture. The higher rate of nitrogen generally caused the production of more forage.
2. **Tall Fescue—La. S1 Clover**—Procedure was same as above. One hundred pounds of \( P_2O_5 \) per acre plus 50 pounds of \( K_2O \) provided maximum yields at both levels of nitrogen. Yields were generally higher at the 120 pound per acre rate of nitrogen. No response was obtained from the addition of a minor element mixture.

**ALYCE CLOVER FERTILIZATION STUDY**

In this experiment nitrogen was varied from 0 pounds to 60 pounds in 20-pound increments, phosphate was varied from 0 pounds to 200 pounds in 40-pound increments and potash from 0 pounds to 160 pounds in 20-pound increments. No significant differences in yields were obtained in 1953. The probable explanation for this is the fact that the site on which this experiment was located has been liberally fertilized with a complete fertilizer since 1949 and there was a sufficiently large accumulation of phosphate and potash to meet the plants' needs. In preceding years maximum yields were obtained from the addition of 80 pounds of phosphate plus 40 pounds of potash. No advantage has been gained by applying nitrogen material.

**WINTER COVER CROPS**

The following observations are apparent from the data:

1. Barre Sweet Blue and Common Blue are the most productive lupines for both early and late turning under. These lupines produced roughly twice as much dry matter per acre as did any other entries in the test.

2. Auburn wooly pod, smooth hairy and Monantha are the most productive vetches for early turning under.

3. Madison, Monantha and Auburn wooly pod are the most productive vetches for late turning under.

4. Romac and Dixie Wonder are the most productive winter peas for early turning under.

5. Singletary and Romac are the most productive winter peas for late turning under.

**CORN**

**Yield Testing**

All commercially available hybrids and open-pollinated varieties that are generally adapted for this area were included in the test. The following white hybrids were recommended for this
area: La. 521, Funk's G 791W and Cokers Coastal 811. The following yellow hybrids are also recommended for this area: Dixie 18, Funk's 737 and Funk's G 714A. Dixie 18 is the outstanding forage corn.

**Rate-of-Nitrogen Study**

The purpose of this experiment is to determine the most efficient level of nitrogen fertilization and the manner in which nitrogen should be applied for most efficient utilization. Five methods or times of application and five rates of nitrogen were used. These rates were 60, 90, 120, 150 and 180 pounds of N per acre. These amounts were then applied in the following manner: 1, All at planting; 2, all as a sidedressing; 3, half at planting, half as a sidedressing; 4, thirty pounds at planting, the remaining as a sidedressing; 5, thirty pounds at planting, the remaining in split applications as a sidedressing.

All plots received uniform spacing and phosphate and potash fertilization. As a result of the dry seasonal condition which prevailed in 1953, 60 to 90 pounds of N was capable of providing maximum yields. It was apparent that all of the nitrogen should not be applied as a sidedressing; otherwise there was no difference in manner of application.

**Fertilization**

In this test phosphate is varied from 0 to 100 pounds per acre in 20-pound increments and potash is varied from 0 to 100 pounds per acre in 25-pound increments. All treatments received 30 pounds of nitrogen at planting. Each treatment is duplicated in order that two levels of nitrogen sidedressing be applied, that is, 60 and 120 pounds N per acre. Maximum yields in 1953 were obtained by simply applying 60 pounds of N as a sidedressing. The apparent lack of response to applied phosphate and potash is explained by the fact that this test was located on a site that has been liberally fertilized with complete fertilizer since 1949 and it is therefore probable that there was a sufficiently large accumulation of phosphate and potash to meet the plant's needs under inadequate moisture conditions.
During 1953, research at this Station consisted of experiments in soil fertility, yields of forage crops, beef cattle grazing, a comparative study of two breeds of beef cattle, beef cattle grazing problems, forestry studies and a poultry project.

**Pasture**

A grazing experiment was started in the spring of 1950 and continued through 1953. The yields of these pastures were measured by recording the gains in weight of cows and calves. Cattle were rotated from pasture to pasture to aid in eliminating livestock differences. Cattle were weighed at the end of each calendar month, and when animals were changed from one pasture to another. All animals were treated periodically for internal parasites. They were sprayed, when needed, to control flies and lice. The herd had access to steamed bone meal, salt, fresh water and shade.

<table>
<thead>
<tr>
<th>Pasture Mixture</th>
<th>Number Days Grazed</th>
<th>Animal Units* Per Acre</th>
<th>Number Animal Unit Days Grazed Per Acre</th>
<th>Daily Gain Per Animal Unit</th>
<th>Gain Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singletary Peas, Rye Grass, Common Bermuda</td>
<td>244</td>
<td>.95</td>
<td>233</td>
<td>2.55</td>
<td>595</td>
</tr>
<tr>
<td>White Clover, Dallis, Rye Grass</td>
<td>247</td>
<td>1.03</td>
<td>255</td>
<td>2.32</td>
<td>592</td>
</tr>
<tr>
<td>White Clover, Dallis</td>
<td>251</td>
<td>1.09</td>
<td>273</td>
<td>2.04</td>
<td>557</td>
</tr>
<tr>
<td>White Clover, Fescue</td>
<td>273</td>
<td>1.05</td>
<td>287</td>
<td>1.91</td>
<td>548</td>
</tr>
<tr>
<td>White, Crimson Clover, Fescue, Carpet, Dallis Grass, Lespedeza</td>
<td>244</td>
<td>1.16</td>
<td>282</td>
<td>1.51</td>
<td>426</td>
</tr>
<tr>
<td>White Clover, Dallis, Rye Grass†</td>
<td>256</td>
<td>1.01</td>
<td>259</td>
<td>1.57</td>
<td>406</td>
</tr>
<tr>
<td>Ladino Clover, Fescue</td>
<td>256</td>
<td>.87</td>
<td>222</td>
<td>1.28</td>
<td>284</td>
</tr>
<tr>
<td>Crimson Clover, Fescue</td>
<td>214</td>
<td>.96</td>
<td>205</td>
<td>1.31</td>
<td>268</td>
</tr>
</tbody>
</table>

*An animal unit is one mature cow or equivalent.
†Failing stand of fescue was replaced by rye grass.
Cows grazed the rye grass in the foreground until it was short, leaving the fescue in the background to grow tall.

CLOVER VARIETIES

White Clover

A study of eight strains of white clover was continued. The strains were harvested three times. The highest yields were from S-1 Louisiana white clover, St. Mary, and breeders Ladino. Other white clovers, included were Avoyelles, Mother white, certified Ladino, New Zealand and white Dutch. All strains produced a good seed crop. S-1 was the highest producer of seed and the Ladino strains were the lowest seed producers.

Crimson Clover

The strains of reseeding crimson clover studied were Dixie, Auburn, Mississippi Selection, Autauga, Talledega and Common. The highest yields were obtained from Talledega, Mississippi Selection and Dixie.

Red Clover

Six strains of red clover were harvested twice for forage yields. The highest yield was obtained from Louisiana Red No. 2,
certified Kenland and Louisiana Red. Other strains studied were Louisiana Red No. 1, certified Midland and Tennessee Purple.

Sub Clovers

The three varieties of sub clovers studied were Nangela, Mt. Barker and Tallarook. There was no significant difference in yields. The sub clovers produced less forage yield than the white and red clovers. They make a rapid growth and tend to crowd out other plants; are usually affected by powdery mildew, and their growing season is for a short period, after which they die out, leaving very little growth of companion grasses.

WINTER GRASSES

Brome Grass

Six varieties of brome grass were harvested through the second year. In another test, 13 varieties were harvested for the first year. The highest yielding strains are Prairie, Harlan and Mountain.

The better strains of brome grasses compare favorably in yield with fescue and rye grass, but they fail to withstand the dry, hot summers. The stand deteriorates rather rapidly during the second and third year, making it necessary to allow a crop of seed to mature and shatter to the ground each year.

Orchard Grass

Twelve strains of orchard grass were harvested four times during the period from March to June. There were significant differences in forage yields. The three highest yielding strains were Beltsville, Palestine and Akaroa. All strains are winter hardy but suffer from heat and drouth in summer and usually die out.

Fescue Grass

Five strains of fescue were harvested four times during the period March to June. There was a significant difference in forage yields. The three highest yields were obtained from Alta, Alta 144 and Goar.

Ordinarily fescue grass becomes dormant in June and starts new growth after fall rains.

Rye Grass

Eight strains of rye grass were harvested three times during the period March to June. There were significant differences in forage yields. The highest yields were from Common, S-22 and
S-12. Although the common variety produces the highest yield, it is more susceptible to rust than some of the other strains.

Oats

Four varieties of oats were harvested three times. There were significant differences in yields. Ferguson gave the highest yield, followed by Nortex and Alber. Although Southland gave the lowest total yield, it was earlier than the other varieties and led all varieties in yield at the first cutting.

Pasture plant strains and varieties are cut and weighed to determine their yields.

SUMMER GRASSES

Sudan Grass and Millet

Six strains of millet and eight strains of Sudan were harvested in August. The three highest yields were obtained from the hybrid millets C, A and D. The three highest yielding strains of Sudan were Wheeler, Sweet Commercial Sudan and Sweet Sudan 3-72. All six strains of millets gave significantly higher yields than the highest yield of Sudan.

Dallis Grass

Three strains of Dallis grass and five strains of Bahia were harvested three times. There was no significant difference between
the strains of Bahia and no significant difference between the yields of the Bahia and the two highest yielding Dallis grasses. The Dallis grasses were earlier, giving their best yields at the first cutting, while the maximum growth of Bahia was made later in the season.— H. E. Harris and C. R. Owen

FERTILITY STUDIES

Nitrogen

Nitrogen was used at different levels to study its effects on a clover-winter grass mixture. This test has been conducted over a three-year period. Nitrogen levels of 33.5, 67, 100 and 134 pounds per acre were applied as topdressing to a Louisiana white clover and fescue grass mixture. The results for three years show that 67 pounds of nitrogen gives the most satisfactory clover-grass mixture, providing other fertilizer needs have been supplied.

—Harold E. Harris

Minor Elements

This experiment is to determine the effects of Es-min-el on lespedeza yield. Es-min-el is a commercial product containing a mixture of manganese sulphate, copper sulphate, ferric sulphate, magnesium sulphate, zinc sulphate, calcium and borax. It was applied at an annual rate of 75 pounds per acre. During the three-year period, there has been no significant differences in forage yields as a result of adding Es-min-el to a complete fertilizer on limed soil.— H. E. Harris and M. B. Sturgis

Sulphur

This experiment was started in the fall of 1952 to determine the need for sulphur. Sulphur was added to the following sources of phosphate: calcium meta, treble, basic slag, fused rock and rock phosphate. Sufficient sulphur was added to be equivalent to the ratio of sulphur to $P_2O_5$ carried by 20 per cent superphosphate.

In a mixture of white clover and rye grass followed by Dallis grass, three cuttings of forage showed no significant difference in yield when sulphur was added to the different sources of phosphate. Where sulphur was used, a slight decrease in yield was evident from all sources of phosphate except calcium meta, which showed a slight increase.— Harold E. Harris, M. B. Sturgis and C. B. Roark

Sources of Phosphorus

The purpose of this experiment is to test the residual effects of different sources of phosphorus when applied in one application
and in split applications. The experiment was initiated in the fall of 1952. Three sources of phosphorus were used, including 45 per cent super, 20 per cent super and rock phosphate. The indicator plants were Louisiana white clover, rye grass and Dallis grass. The three sources were used at different levels of $P_2O_5$. Treatments used ranged from 15 pounds of $P_2O_5$ to 300 pounds $P_2O_5$ per acre from 45 per cent super; 60 pounds $P_2O_5$ to 300 pounds $P_2O_5$ from 20 per cent superphosphate; and 300 pounds $P_2O_5$ to 600 pounds $P_2O_5$ from rock phosphate.

**Rates and Ratios of a Complete Fertilizer**

This experiment was started in the fall of 1952 to determine the most efficient ratio in a complete fertilizer for soils at the West Louisiana Experiment Station. Two elements were held constant while testing a third element at different levels. The nitrogen rates ranged from 20 to 60 pounds of nitrogen in 20-pound increments. The phosphorus rates ranged from 40 to 120 pounds of $P_2O_5$ in 40-pound increments. The potassium rates ranged from 20 to 60 pounds of $K_2O$ in 20-pound increments.

When the rates of phosphorus and potassium were held constant at different levels for the nitrogen, the yield was increased at each level of nitrogen from 0 to 60 pounds.

When the nitrogen and potassium were held constant for different levels of phosphorus, the yield was increased for each level of phosphorus from 40 to 120 pounds $P_2O_5$.

When the nitrogen and phosphorus were held constant for each level of potassium, the yields at different levels of potassium were irregular. At the top level for nitrogen and phosphorus, that is, 60 pounds nitrogen and 120 pounds $P_2O_5$, the yield decreased as the level of potassium was increased. The highest yield was from 60-120-20. These three experiments were established on land converted from open range in the fall of 1952.

—Harold E. Harris, M. B. Sturgis and C. B. Roark

**GRAZING HABITS OF HEREFORD AND ABERDEEN ANGUS CATTLE ON IMPROVED PASTURES**

This project, initiated in 1951, has been continued through 1953 in an effort to determine the number of hours in a day that beef cattle of various age classes should be left on highly improved pastures in order to obtain their grazing needs for maximum gains.

Data taken during the early grazing period while the average maximum temperature was approximately $73^\circ$ F. show that heifer yearlings weighing an average of 550 pounds will graze about 4
hours and 19 minutes a day from 6 A.M. to 6 P.M. when on a good, lush pasture. Two-year-old heifers that weighed an average of 797 pounds were observed to spend 5 hours and 45 minutes of the day grazing. Mother cows that averaged 923 pounds in weight were observed to spend an average of 4 hours and 52 minutes a day grazing.

Average daily gains for the heifer yearlings, two-year-old heifers, and mother cows were 2.19, 4.15 and 2.98 pounds, respectively.

During the late spring and summer grazing period, in which the average maximum temperature was 90° F., the mother cows were observed to spend an average of 4 hours and 20 minutes a day grazing from 6 A.M to 7 P.M. and their calves spent 2 hours and 46 minutes grazing.

Breed differences in respect to grazing habits were not evident under the above conditions.—A. H. McDaniel

PERFORMANCE AND GRAZING HABITS OF HEREFORD AND ABERDEEN ANGUS CATTLE GRAZING IMPROVED PASTURES WITH NATURAL SHADE AND WITHOUT SHADE

Data collected during 1953 are in general agreement with previous work; however, the study was enlarged greatly in that information was collected on 24 separate test groups which involved 198 head of cattle of various age classes of the two breeds.

Average daily gains recorded during the test periods while the average maximum temperature was 90° F. strongly indicate that shade is beneficial.

Mother cows grazing pastures with shade were observed to spend an average of 4 hours and 20 minutes a day grazing from 6 A.M. to 7 P.M., and their calves, which weighed an average of 324 pounds, spent 2 hours and 46 minutes of the day grazing. Mother cows on pasture without shade spent an average of 3 hours and 32 minutes a day grazing, and their calves, which averaged 293 pounds in weight, spent 2 hours and 19 minutes of the day grazing.

Cattle on pastures without shade were frequently observed panting and they stood most of the day. In contrast, the cattle with shade were lying down most of the day. Rumination was also greatly reduced for the cattle without shade. Average rectal temperatures of cows grazing pastures without shade were recorded as high as 105.62° F.

Average daily gains recorded from pastures with artificial shade compared very favorably with pastures having areas of natural shade.

Differences in respect to heat tolerance for the respective breeds have not been evident.—A. H. McDaniel
A DETAILED COMPARISON OF THE HEREFORD AND ABERDEEN ANGUS BREEDS OF CATTLE GRAZING IMPROVED PASTURES

This study was started in 1951 and considerable progress has been made during the past three years. The study includes both major and minor phases of producing registered and grade cattle of the Hereford and Aberdeen Angus breeds. All four herds are managed and treated alike. The experimental herd consists of approximately 100 head of mother cows and 50 head of heifer yearlings and two-year-old heifers.

Data collected during 1953 on various production phases for the registered and grade herds of the two breeds follow:

### Performance Data of the Registered and Grade Herds

<table>
<thead>
<tr>
<th></th>
<th>Hereford Cows (1953)</th>
<th>Aberdeen Angus Cows (1953)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reg.</td>
<td>Grade</td>
</tr>
<tr>
<td>Score or Grade</td>
<td>96</td>
<td>87</td>
</tr>
<tr>
<td>Disposition</td>
<td>95</td>
<td>94</td>
</tr>
<tr>
<td>Ave. Weight of Cows(^1)</td>
<td>Lbs. 1043</td>
<td>1007</td>
</tr>
<tr>
<td>Ave. Weight Range</td>
<td>Lbs. 957</td>
<td>893</td>
</tr>
<tr>
<td>Ave. Weight Range</td>
<td>Lbs. 1128</td>
<td>1104</td>
</tr>
<tr>
<td>Ave. Weight Gains on Pasture</td>
<td>Lbs. 147</td>
<td>162</td>
</tr>
<tr>
<td>Ave. Weight Loss—Dec. through Feb.</td>
<td>Lbs. 67</td>
<td>85</td>
</tr>
<tr>
<td>Cows Calving</td>
<td>% 82</td>
<td>90</td>
</tr>
<tr>
<td>Cows Weaning Calves</td>
<td>% 82</td>
<td>90</td>
</tr>
<tr>
<td>Ave. Birth Weight</td>
<td>Lbs. 67</td>
<td>65</td>
</tr>
<tr>
<td>Ave. Gestation Period</td>
<td>Days 285</td>
<td>285</td>
</tr>
<tr>
<td>Ave. Weaning Weight, 205 Days</td>
<td>Lbs. 387</td>
<td>419</td>
</tr>
<tr>
<td>Ave. Daily Gain, Birth to Weaning</td>
<td>Lbs. 1.56</td>
<td>1.73</td>
</tr>
<tr>
<td>Production per Cow(^2)</td>
<td>Lbs. 317</td>
<td>377</td>
</tr>
</tbody>
</table>

\(^1\)The average weight is a weighted average of the average monthly weights.

\(^2\)Production per cow is the average weaning weight of calves at 205 days, multiplied by the percentage of cows weaning calves.

—A. H. McDaniel

POULTRY

A study is being made of the production of spring-hatched versus fall-hatched flocks of White Leghorn hens. Thirteen hundred baby chicks were acquired for each flock. Beginning with the
Young replacement bulls that were born on the Station.

sixth month for each flock, production was compared for a period of ten months, as shown in the following table.

<table>
<thead>
<tr>
<th>Month</th>
<th>Spring Flock</th>
<th>Dozens of Eggs</th>
<th>Fall Flock</th>
<th>Dozens of Eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept.</td>
<td>1331</td>
<td>1050</td>
<td>March</td>
<td>1137</td>
</tr>
<tr>
<td>Oct.</td>
<td>1111</td>
<td>1620</td>
<td>April</td>
<td>1097</td>
</tr>
<tr>
<td>Nov.</td>
<td>1091</td>
<td>1710</td>
<td>May</td>
<td>1050</td>
</tr>
<tr>
<td>Dec.</td>
<td>1068</td>
<td>1890</td>
<td>June</td>
<td>1007</td>
</tr>
<tr>
<td>Jan.</td>
<td>1051</td>
<td>1890</td>
<td>July</td>
<td>977</td>
</tr>
<tr>
<td>Feb.</td>
<td>1007</td>
<td>1530</td>
<td>Aug.</td>
<td>957</td>
</tr>
<tr>
<td>March</td>
<td>934</td>
<td>1710</td>
<td>Sept.</td>
<td>942</td>
</tr>
<tr>
<td>April</td>
<td>878</td>
<td>1500</td>
<td>Oct.</td>
<td>926</td>
</tr>
<tr>
<td>May</td>
<td>857</td>
<td>1470</td>
<td>Nov.</td>
<td>915</td>
</tr>
<tr>
<td>June</td>
<td>844</td>
<td>1350</td>
<td>Dec.</td>
<td>907</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15,836</td>
</tr>
</tbody>
</table>

15,720

—C. B. Roark

FORESTRY

Planted Pine Seedlings

A study of pine seedling survival and growth was started in the winter of 1951-52. A fire break was plowed down a ravine beginning at its head and extending to a small branch. One side
was burned, the other side left unburned. Longleaf, slash and loblolly pines were planted in 10-row alternating strips; each row had 23 seedlings in the burned and an equal number in the unburned areas. Four strips were planted to each species.

The heights of all trees were measured in each fifth row and a complete survival check was made on loblolly and slash on February 2, 1954. Longleaf survival was so poor that a detailed check was not made.

The survival and height growth are given below, beginning at the highest elevation and following down the ravine to the branch. The greater number of trees living, from drier site to a more moist site, is very noticeable. The growth rate in the center of the ravine, however, was less than on the better drained slopes.

<table>
<thead>
<tr>
<th>Strip</th>
<th>Survival (Per Cent)</th>
<th>Height (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Burned</td>
<td>Unburned</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lobolly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>61.30</td>
<td>38.2</td>
</tr>
<tr>
<td>6</td>
<td>73.04</td>
<td>55.65</td>
</tr>
<tr>
<td>9</td>
<td>85.22</td>
<td>55.22</td>
</tr>
<tr>
<td>12</td>
<td>89.13</td>
<td>86.96</td>
</tr>
<tr>
<td>Averages</td>
<td>77.17</td>
<td>69.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>49.13</td>
<td>55.26</td>
</tr>
<tr>
<td>5</td>
<td>59.13</td>
<td>57.82</td>
</tr>
<tr>
<td>8</td>
<td>66.95</td>
<td>71.34</td>
</tr>
<tr>
<td>11</td>
<td>74.48</td>
<td>84.78</td>
</tr>
<tr>
<td>Averages</td>
<td>52.17</td>
<td>68.05</td>
</tr>
</tbody>
</table>

Natural Longleaf Reproduction

Two adjoining areas bearing longleaf seed trees were selected to study natural restocking. One area was burned in early October of 1951 before seed fall. The other area was not burned. During the winter of 1952-53 a check was made to determine the number of seedlings established from the seed fall one year earlier. Eight strips, four links by 200 links (2.64 x 132 ft.) were located at random on each area.

On a per acre basis, the strips on the burned area had 250-250-250-375-500-4625-6250-6300 seedlings. The unburned area had 0-125-125-250-750-875-1000-1150 seedlings.

Factors affecting the number of seedlings established are:
1. Ground cover, grass and pine straw.
2. Distance from seed trees.
3. Competition from surrounding seed trees.

Growth of Young Longleaf Pine on Fertilized and Unfertilized Pastures

Longleaf pine formerly grew on most of the area now occupied by the West Louisiana Experiment Station. Scattered groups of
young longleaf from six inches to twenty feet tall are growing on areas now managed as woodland pastures. One such pasture has been fertilized for the last two years with 400 pounds of 15-15-15 fertilizer per acre. One and one-half tons of lime per acre were applied in 1952. An adjoining pasture is not fertilized. Two plots, one in each pasture, were established during the winter of 1952-1953. Trees were numbered and their exact location mapped. Diameter measurements at 4½ feet above ground and total heights were taken.

The average diameter of all trees that were at least 4½ feet tall when first measured was 2.3 inches on the unfertilized plot and 2.4 on the fertilized plot.

Each plot was remeasured February 3, 1954. The average diameter was 2.8 inches on the unfertilized plot and 2.9 on the fertilized plot, a gain of one-half inch on each plot. Height measurement on trees not completely over topped shows an average height gain of 3.4 feet on the unfertilized plot and 3.8 feet on the fertilized plot.—Bryant A. Bateman and C. B. Roark
Value of Honeybees to White Clover Seed Producers

Honeybees are effective pollinating agents of white clover in Louisiana. Some producers of white clover seed provide colonies of bees for pollination purposes, but other do not. A study of the number of pollen grains in white clover florets and in the pellets of clover pollen brought to the hive by the worker bees was made to learn how many blossoms might be visited by a bee in order to get a load (2 pellets) of pollen.

The average number of pollen grains in a white clover floret was 3,000, and in a pellet of pollen 390,000. If the honeybee takes all of the pollen grains when she visits a floret she would have to visit 260 florets to obtain two average pellets. If she took half of the pollen from a floret she would have to visit 520 florets to obtain two pellets. If 3 seeds were set per floret then one bee on one pollen gathering trip could set from 780 to 1560 seeds. Two thousand pollen gathering bees could easily set from 1 to 3 pounds of clover seed in a day. A strong colony of bees may have several thousand workers in the field gathering pollen. In addition to the pollen collectors, many of the nectar gathering bees set seed, so the estimates given above are believed to be extremely conservative. It is possible that under favorable conditions a single strong colony of bees would set 10 or more pounds of white clover seed in one day. We recommend that at least one strong colony of bees per acre be provided for pollination purposes.

The following table gives the potential seed yield of an acre of white clover under varying conditions of stand and pollination.

<table>
<thead>
<tr>
<th>Blossoms per sq. yard</th>
<th>Blossoms per acre</th>
<th>Florets per blossom</th>
<th>Seeds per blossom</th>
<th>Approximate potential yield¹ (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>484,000</td>
<td>50</td>
<td>50</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>96</td>
</tr>
<tr>
<td>300</td>
<td>1,452,000</td>
<td>50</td>
<td>50</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>288</td>
</tr>
<tr>
<td>600</td>
<td>2,904,000</td>
<td>50</td>
<td>50</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>290</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>580</td>
</tr>
</tbody>
</table>

¹At the rate of 1 million seeds in a pound.
A combination of a heavy stand of clover blossoms; an abundance of pollinating insects; highly efficient harvesting machinery; plus favorable weather for clover growth, bee flight and harvesting, will likely insure a high yield of white clover seed.—*Everett Oertel*

**Biological Control Investigations**

It is commonly recognized that many of the newer organic insecticides have an extremely adverse effect upon the beneficial insects. Under the control programs involving the older inorganic insecticides these beneficial insects in many cases had a contributing part in the effective control of many crop pests, but their value has been largely nullified by indiscriminate use of the organic insecticides.

A project was initiated in 1953 to study, in cooperation with the Louisiana Experiment Station, the effect of insecticides on beneficial insects. The objective of this project is to evaluate the contribution to pest control made by the beneficial parasites and predators; to assess the effect of the insecticides upon them; and to determine what modifications of the control programs may be possible so that the benefits from the use of these insecticides can be retained, while still giving an opportunity for the farmer to secure the maximum benefit from the natural parasitic and predatory insects of crop pests. Thus the large sums spent annually for insecticides may in some instances be reduced, or more effective control of the crop pests may be obtained for the same expenditure.

It is proposed initially to concentrate the major effort on a study of the natural enemies of sugar cane pests since there are known beneficial insects which hold some promise of increased usefulness. Preliminary field surveys have shown that the egg parasites of the sugar cane moth borer kill a high proportion of the eggs late in the season. Correlations between control programs and the development of adequate populations of parasites and predators will comprise a part of this project. This is very closely related to present attempts of the Louisiana Experiment Station to secure increased benefits from the natural control afforded by insectary propagation and field release of certain of these beneficial insects.—*R. W. Burrell*

**COTTON DISEASE INVESTIGATIONS**

During the past year the cotton disease investigations conducted by the Field Crops Research Branch, Section of Cotton and Other Fiber Crops and Diseases, United States Department of Agriculture, in cooperation with the Louisiana Agricultural Experiment Station, were concerned with bacterial blight, fusarium wilt, and seedling diseases.
Bacterial Blight

Screening for bacterial blight, *Xanthomonas malvacearum*, resistance was continued with the blight-resistant strains, Stoneville 20 × Deltapine 14-312 and Stoneville 20 × Deltapine 14-312 × Deltapine 14-312 from Louisiana, and a massed-hybrid strain with considerable Stoneville 2B background developed in Texas by Dr. L. M. Blank. Because of unfavorable weather conditions progenies of these strains were not planted until May 26. They were thinned to 2 plants per hill on June 22 and inoculated on July 2. Readings for blight infection were made on July 24. The infection resulting was not as satisfactory as in previous years and it is believed that dry weather may have had an adverse effect on the development of the disease. During the weeks following inoculation all of the best plants were selfed and a fair amount of seed stocks for increase was obtained. During 1954, efforts will be directed toward increasing these blight-resistant strains in the Red River Valley area of the state, where the disease is most prevalent.

Fusarium Wilt

Testing of progenies for wilt resistance on reniform-nematode-wilt infested soil at Baton Rouge was continued during 1953. While other parasitic species of nematodes occur in the test plots at this locality, the predominant one concerned in the incidence of wilt appears to be the reniform nematode, *Rotylenchulus reniformis*. Progenies of 9 selfed strains and 7 hybrid lines were observed for resistance and agronomic characters under this nematode-wilt complex. Among the selfed strains the more promising from the standpoint of resistance, good lint per cent, and staple length are Stoneville 2 B-R and Coker 100-97. Other strains showing high resistance but whose fiber properties have not been evaluated are Auburn 56, Acala N. M. 113-4, Coquette 17-2-2-2 and Roxie. Among the hybrids studied, Louisiana 33 × Deltapine 14-312 (designated now as Louisiana hybrid 3314), Deltapine 6102 × Deltapine 6, Delfos 9169 × Cook 307-6, and Delfos 425-920 × Deltapine 6 were also highly wilt resistant. The Louisiana hybrid 3314 used in a seed treatment test at Baton Rouge gave an average lint yield of 972.6 pounds per acre, or 1.94 bales.

This hybrid also was tested the past season at other localities in the state. In a test of 18 commercial varieties conducted by C. B. Haddon and F. W. Self at the St. Joseph Station, it was first in lint yield per acre with 1,229 pounds. The lint per cent was 39.7 and staple length was 1 1/16 inches. At the Homer Station in a yield trial of 14 varieties conducted by Dawson Johns and F. W. Self, this hybrid also gave the highest yield, with 592 pounds of lint per acre. The lint per cent was 39.9 and staple length 1 1/32 inches. Two strains of this hybrid also were first and second,
respectively, in production in a yield trial of 30 strains at Arnaudville, Louisiana. It is not wilt resistant in areas which are heavily infested with the root-knot nematode and wilt, but where that disease complex is not a serious problem, it produces well and has been received favorably by growers and others. It is a Deltapine type with good gin turnout and is being increased in Alabama and Louisiana for ultimate planting in districts which are not heavily infested with root-knot nematode and wilt.

In a test conducted at Natchitoches, La., on root-knot-nematode-wilt infested soil at J. H. Williams' plantation and discussed in the report of the Crops and Soils Department by J. E. Jones, L. D. Newsom, D. C. Neal and M. T. Henderson, the strains developed for wilt resistance at Baton Rouge under reinform-nematode-wilt infestation were with three exceptions susceptible to the root-knot-nematode-wilt complex at Natchitoches. The exceptions were two Stoneville 2 B-R strains and one Coker 100-70 strain from Georgia. Also, notwithstanding the development of wilt in the Baton Rouge strains tested at Natchitoches, eight of them were in the higher brackets for lint yield per acre, the four highest in the order named being Coker 100-70-B-8 Ga. (860 lbs.), Deltapine 6 × Delfos 6102-B-17 (832 lbs.), Coker 100-70-B-7 (797 lbs.) and Stoneville 2 B-R-B-6 (786 lbs.).

Seedling Diseases

Soil drench treatments for control of "soreshin," Rhizoctonia solani, were made in 1953 with several chemicals. In one test planted May 12, treatments included Gallotox (pheny mercuric ammonium acetate) at rates of 2, 4, 6 and 10 pints per acre and Vancide 51 at concentrations of 0.25, 0.50, 0.75 and 1.00 per cent. In another test planted April 14 and 15, CBP-Emulsible, Mathieson No. 275, Orthocide No. 75, Vancide 51 and Zerlate, respectively, were used as soil drenches in 1-foot band treatments at rates of 8, 16 and 32 pounds per acre. In the first test neither the rates indicated per acre for Gallotox nor the concentrations employed with Vancide 51 gave significant differences in plant survival over the untreated areas. The second test, which was practically ruined by prolonged heavy rainfall following planting, gave some indication that seedling emergence and survival was improved by the intermediate and high rates for CBP-Emulsible. These rates also had lower seedling mortality. The emergence at the low rate for this chemical was extremely poor in all replications. This was due unfortunately to clogging of the planter shoe because of wet soil following an intermittent rain. The only other chemical which gave a higher emergence over the untreated areas was Orthocide No. 75. There was evidence, however, of phytotoxicity in 5 of the 12 replicates of this treatment.
Six materials were used as a slurry for seed treatment for stand improvement. The seed lots were treated April 28, 29 and 30 and randomized plantings were made by hand on May 12 in hills spaced 15 inches for 20-foot row sections. Each treatment was replicated four times. The treatments were Agrox, Ceresan M, Gallotox, MEML, Orthocide 75 and Panogen. All gave some improvement over the untreated seed in plant survival, but the increases were not significant, due mostly to very favorable growing conditions following late planting. Heavy and prolonged rainfall prevented earlier planting. Highest in plant survival in the order named were Orthocide 75, Gallotox, Agrox, Panogen, and Ceresan M. Yield differences were not significant, but Ceresan M and Orthocide 75 were highest with 1,045 and 1,021 pounds of lint per acre, respectively.—D. C. Neal

Financial Statement

L.S.U. AGRICULTURAL EXPERIMENT STATION
RESEARCH FUNDS
July 1, 1952 — June 30, 1953

FEDERAL RESEARCH FUNDS

<table>
<thead>
<tr>
<th>Appropriation</th>
<th>Hatch</th>
<th>Adams</th>
<th>Purnell</th>
<th>Sec. 5</th>
<th>9b 1-2</th>
<th>9bs</th>
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<tbody>
<tr>
<td>$15,000.00</td>
<td>$15,000</td>
<td>$60,000</td>
<td>$60,813.78</td>
<td>$78,146.78</td>
<td>$20,050.00</td>
<td></td>
</tr>
</tbody>
</table>

EXPENDITURES—FEDERAL FUNDS

| Salaries & Wages  | 12,902.15 | 12,967.43 | 50,191.80 | 47,631.33 | 63,608.91 | 13,005.63 |
| Supplies & Expense| 1,035.49  | 1,684.63  | 7,160.49  | 10,457.25 | 10,230.57 | 2,325.96  |
| Travel            | 22.08     | 347.94    | 1,487.45  | 1,654.53  | 2,429.09  | 1,498.47  |
| Capital Outlay    | 1,040.28  |          | 1,160.26  | 1,070.67  | 1,878.21  | 2,619.94  |
| TOTAL             | $15,000.00| $15,000.00| $60,000.00| $60,813.78| $78,146.78| $20,050.00|

EXPENDITURES—STATE FUNDS

| Salaries & Wages  | $383,008.11 | $728.42 | $531,301.96 | $45,974.49 | $961,012.98 |
| Supplies & Expense| 65,273.67   | 10,638.61| 367,234.43  | 9,147.12   | 452,293.83  |
| Travel            | 18,776.56   | 4.92    | 20,738.90   | 4,844.73   | 44,365.11   |
| Capital Outlay    | 33,171.45   | 5,511.08| 108,521.76  | 9,656.41   | 156,860.70  |
| TOTAL             | $500,229.79 | $16,883.03| $1,027,797.05| $69,622.75| $1,614,532.62|

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Agricultural Experiment Station Staff

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Martha E. Hollinger, Ph.D., Associate Nutricienist
William Holden James, Ph.D., Associate Agricultural Biochemist
Socrates Kaloyereas, Ph.D., Associate Food Preservationist
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1Virginia Rice Williams, Ph.D., Associate Nutritionist

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Henry J. Casso, M.S., Research Associate
1J. Norman Efferson, Ph.D., Agricultural Economist
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Arthur R. Gerlow, B.S., Research Associate (resigned Aug. 31, 1953)
Alvin C. Harper, M.S., Research Associate
1James F. Hudson, M.S., Assistant Agricultural Economist
George Joubert, Jr., M.S., Research Associate
1Joseph F. Montgomery, M.S., Associate Agricultural Economist
Ewell P. Roy, M.S., Research Associate
Thomas Ard Sylvest, B.S., Research Associate (resigned June 30, 1953)
1Fred H. Weigman, Ph.D., Assistant Agricultural Economist (appointed July 16, 1953)
1Martin D. Woodin, Ph.D., Agricultural Economist
Agricultural Engineering

Harold T. Barr, M.S., Agricultural Engineer; Head of Agricultural Engineering Research  
Philip L. Benfield, B.S., Research Associate  
1John H. Hough, B.S., Assistant Agricultural Engineer (transferred to Experiment Station  
August 1, 1953)  
Wiley D. Poole, M.S., Agricultural Engineer  
Carl H. Thomas, B.S., Assistant Agricultural Engineer

Animal Industry

1John B. Francioni, Jr., M.S., Animal Husbandman; Head of Animal Industry Department  
Joseph E. Bertrand, M.S., Research Associate  
1Paul B. Brown, Ph.D., Associate Animal Husbandman  
1R. M. Crown, M.S., Associate Animal Husbandman  
1Richard A. Damon, Jr., Ph.D., Associate Animal Husbandman  
1T. M. DeRouen, M.S., Assistant Animal Husbandman  
1Swayze E. McCraine, M.S., Associate Animal Husbandman  
1Clifton B. Singletary, M.S., Assistant Animal Husbandman

Crops and Soils

1Madison B. Sturgis, Ph.D., Agronomist; Head of Crops & Soils Department  
H. B. Brown, Ph.D., Agronomist (retired)  
Robert H. Brupbacher, Jr., M.S., Assistant Agronomist  
David S. Byrside, M.S., Assistant Agronomist  
C. T. Dowell, Ph.D., Agronomist (retired)  
Bertrand N. Driskell, Ph.D., Associate Agronomist  
John P. Gray, Ph.D., Agronomist  
Martin W. Heitzmann, B.S., Research Associate (appointed August 1, 1953)  
1Merlin T. Henderson, Ph.D., Agronomist  
Jack E. Jones, M.S., Assistant Agronomist  
Monroe C. Lutrick, B.S., Assistant in Agronomy (resigned July 14, 1953)  
Sherman A. Lytle, B.S., Associate Soil Scientist  
Charles W. McMichael, M.S., Assistant Agronomist (located at Houma, La., c/o Sugar  
Plant Experiment Station)  
James G. Marshall, M.S., Assistant Agronomist  
Lee F. Mason, M.S., Assistant Agronomist (appointed April 1, 1953)  
Roy J. Miears, B.S., Assistant Agronomist (located at Rice Experiment Station,  
Crowley, La.)  
Clifford L. Mondart, Jr., M.S., Research Associate in Agronomy  
Corbin R. Owen, M.S., Associate Agronomist  
1Wm. H. Patrick, Jr., M.S., Assistant Agronomist (appointed July 1, 1953)  
1Walter J. Peevy, Ph.D., Agronomist  
1Clarence E. Scarsbrook, Ph.D., Associate Agronomist (resigned June 18, 1953)  
Ferd W. Self, M.S., Associate Agronomist  
1William H. Willis, Ph.D., Agronomist

Dairy

1Jennings B. Frye, Jr., Ph.D., Dairy Husbandman; Head of Department of Dairy  
1Cecil Branton, Ph.D., Associate Dairy Husbandman

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'B. J. Burch, M.S., Assistant Dairy Husbandman (resigned July 25, 1953)
Alcee J. Gelpi, Jr., M.S., Associate Dairy Technologist
James Edward Johnston, Ph.D., Associate Dairy Husbandman
George D. Miller, M.S., Research Associate
Thomas E. Patrick, Ph.D., Associate Dairy Husbandman
Louis L. Rusoff, Ph.D., Dairy Nutritionist
Edward J. Stone, M.S., Assistant Dairy Husbandman (transferred from North La. Hill Farm Experiment Station Feb. 1, 1954)

Entomology
C. Egan Smith, M.S., Entomologist; Head of Entomology Research Department
James Roland Brazzel, B.S., Research Associate (resigned Aug. 31, 1953)
Edward C. Burns, M.S., Assistant Entomologist (appointed February 4, 1954)
Emile J. Concienne, B.S., Research Associate (located at Centreville, La.)
Alvan L. Dugas, M.S., Entomologist
Ernest H. Floyd, M.S., Associate Entomologist
L. Dale Newsom, Ph.D., Associate Entomologist
John S. Roussel, Ph.D., Associate Entomologist
Lonnie M. Sibley, M.S., Research Associate (appointed August 5, 1953)

Fertilizer and Feedstuffs Laboratory
Ernest A. Epps, Jr., M.S., Chief Chemist; Head of Department
Hugh C. Austin, Jr., B.S., Research Associate in Chemistry
Frances L. Bonner, M.S., Associate Chemist
William P. Denson, B.A., Associate Chemist
Jesse L. Farr, M.S., Assistant Chemist (retired)
Joseph George Kowalczuk, B.S., Research Associate
John B. McDevitt, B.S., Assistant Chemist
Clayton C. Moreland, B.S., Associate Chemist
John W. Torbert, B.S., Research Associate

School of Forestry
Ralph W. Hayes, M.F., Forester; Director of School
Martin B. Applequist, M.F., Assistant Forester
Bryant A. Bateman, Ph.D., Forester
A. Bigler Crow, M.F., Associate Forester
Leslie L. Glasgow, M.S., Assistant Forester
Arne K. Kemp, M.F., Associate Forester (appointed August 17, 1953)
Robert W. McDermid, M.F., Associate Forester
Charles O. Minor, M.F., Assistant Forester

Home Economics
Clara W. Tucker, Ph.D., Home Economist; Head of Department of Home Economics
Mina Glidden, M.S., Research Associate (appointed Sept. 5, 1953)
Ray Loree, Ph.D., Associate Home Economist
Laureame C. McBryde, M.S., Research Associate
Dorothy S. Moschette, M.A., Associate Home Economist

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Horticultural Research

Julian C. Miller, Ph.D., Horticulturist; Head of Horticultural Research Department
James F. Fontenot, M.S., Assistant Horticulturist
Richard H. Hanchey, M.S., Associate Horticulturist
P. Lynwood Hawthorne, M.S., Associate Horticulturist
Teme P. Hernandez, Ph.D., Associate Horticulturist (in charge, Sweet Potato Farm, Chase, Louisiana)
Travis P. Hernandez, M.S., Research Associate
Lloyd G. Jones, Ph.D., Assistant Horticulturist
Richard W. Jones, M.S., Research Associate (resigned August 31, 1953)
August E. Kehr, Ph.D., Associate Horticulturist
William Duke Kimbrough, Ph.D., Horticulturist
John R. King, Ph.D., Associate Horticulturist (appointed August 15, 1953)
John J. Mikell, Ph.D., Associate Horticulturist
William A. Sistrunk, M.S., Assistant Horticulturist (resigned August 14, 1953)

Plant Pathology

S. J. P. Chilton, Ph.D., Plant Pathologist; Head of Department
John Bee Baker, M.S., Assistant Plant Pathologist (appointed Sept. 1, 1953)
Arthur R. Colmer, Ph.D., Associate Bacteriologist
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
Norman L. Horn, Ph.D., Assistant Plant Pathologist
Weston J. Martin, Ph.D., Associate Plant Pathologist
Percy J. Mills, M.S., Assistant Plant Pathologist
Charles F. Moreland, Ph.D., Botanist (transferred to Experiment Station July 1, 1953)
Antonios G. Plakidas, Ph.D., Plant Pathologist
Walter K. Porter, Jr., Ph.D., Assistant Plant Pathologist (appointed July 1, 1953)
Ernest R. Stamper, M.S., Assistant Plant Pathologist
René J. Steib, Ph.D., Assistant Plant Pathologist
William H. Stroube, M.S., Assistant Plant Pathologist (appointed June 1, 1953)
Eugene C. Tims, Ph.D., Plant Pathologist

Poultry

Charles W. Upp, Ph.D., Poultry Husbandman; Head of Department
Clayton C. Brunson, M.S., Assistant Poultry Husbandman (appointed Sept. 16, 1953)
William A. Johnson, Ph.D., Assistant Poultry Husbandman
Benjamin A. Tower, M.S., Associate Poultry Husbandman
Alva Burl Watts, Ph.D., Associate Poultry Husbandman

Rural Sociology

Homer L. Hitt, Ph.D., Rural Sociologist; Head of Department
Alvin L. Bertrand, Ph.D., Associate Rural Sociologist
Paul H. Price, Ph.D., Associate Rural Sociologist

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Sugar Station

Edwin C. Simon, M.S., Agronomist & Head of Sugar Station

Outfield Sugars

Claude B. Gouaux, B.S., Agronomist, In Charge of Outfield Sugar Cane Work (located at Lafayette, Louisiana)

Veterinary Science

William T. Oglesby, D.V.M., Veterinarian; Head of Department
Alfred H. Bjorkgren, B.S., Research Associate in Agronomy (located at Springhill, La., P.O. Box 433)
Charles H. Bridges, D.V.M., Research Associate in Veterinary Science (resigned March 31, 1953)
Lon E. Foote, D.V.M., Assistant Veterinarian (appointed October 1, 1953)
Robert B. Lank, D.V.M., Veterinarian
Helen E. Levy, B.S., Assistant in Veterinary Science
Roy L. Mayhew, Ph.D., Parasitologist
James G. Miller, D.V.M., Assistant Veterinarian (resigned August 30, 1953)
Betty Johnson Torbert, B.S., Assistant in Veterinary Science

Substations

Fruit and Truck Experiment Station, Hammond
Walter F. Wilson, Jr., M.S., Associate Horticulturist and Superintendent
Henry G. Barwood, M.S., Assistant Horticulturist (appointed June 1, 1953)
Mike J. Giamalva, M.S., Assistant Horticulturist

North Louisiana Experiment Station, Calhoun

Ralph S. Woodward, M.S., Associate Horticulturist and Superintendent
Arthur V. Davis, M.S., Research Associate in Animal Industry
James L. Heath, Jr., B.S., Assistant Animal Husbandman
John C. Taylor, M.S., Assistant Horticulturist

North Louisiana Hill Farm Experiment Station, Homer

Dawson M. Johns, M.S., Associate Agronomist and Superintendent
Allen C. Goodling, M.S., Research Associate in Poultry (appointed June 2, 1953)
Harry Ellis Hathaway, M.S., Assistant Agricultural Economist in Marketing (appointed February 1, 1954)
Joseph Lloyd Keogh, Ph.D., Assistant Soil Chemist (appointed January 4, 1954)
Jack K. Mims, M.S., Assistant Forester
Gerald E. Wilcox, Ph.D., Assistant Agronomist (appointed July 15, 1953)
Robert E. Wright, M.S., Assistant Horticulturist

Northeast Louisiana Experiment Station, St. Joseph

Christopher B. Haddon, B.S., Agronomist and Superintendent
John C. Carpenter, Jr., M.S., Assistant Animal Husbandman
John A. Hendrix, M.S., Associate Agronomist
Sherman A. Phillips, B.S., Assistant Agronomist
LeGrand W. Sloane, B.S., Research Associate in Agronomy

PLAQUEMINES PARISH EXPERIMENT STATION
(Route 1, Port Sulphur)

Ralph T. Brown, M.S., Assistant Horticulturist and Superintendent
Frederick B. Schmitz, M.S., Assistant Horticulturist

RED RIVER VALLEY EXPERIMENT STATION
(P. O. Box 5008, Bossier City)

Jared Y. Oakes, M.S., Agronomist and Superintendent
Lowell L. McCormick, B.S., Assistant Agronomist
David R. Melville, B.S., Research Associate in Agronomy (transferred from Southeast La. Dairy & Livestock Experiment Station February 15, 1954)
Weldon A. Nipper, M.S., Assistant Animal Husbandman

RICE EXPERIMENT STATION, CROWLEY

Rufus K. Walker, M.S., Associate Agronomist and Superintendent
David E. Black, B.S., Assistant Agronomist
Charles Nelson Bollich, B.S., Research Associate in Plant Breeding (resigned June 26, 1953)
L. George Coonrod, B.S., Assistant Agricultural Engineer
Earl A. Sonnier, B.S., Research Assistant in Agricultural Engineering

SOUTHEAST LOUISIANA DAIRY AND LIVESTOCK EXPERIMENT STATION, FRANKLINTON

H. DeWitt Ellzey, Jr., M.S., Associate Agronomist and Superintendent
Buck Green, M.S., Research Associate in Dairy Husbandry (transferred from Dairy Dept., L.S.U., March 3, 1954)
Denis E. Simon, Jr., B.S., Research Associate in Dairy Husbandry

WEST LOUISIANA EXPERIMENT STATION, DERIDDER

Cecil B. Roark, M.S., Associate Agronomist and Superintendent
Harold Eugene Harris, B.S., Research Associate in Agronomy
Archie H. McDaniel, M.S., Assistant Animal Husbandman

UNITED STATES DEPARTMENT OF AGRICULTURE
(Located at State Station, Baton Rouge, La.)

Robert W. Burrell, B.S., Entomologist (assigned March 8, 1953)
Theodore P. Dykstra, Ph.D., Senior Pathologist
Wm. J. McCormick, Entomologist (assigned March 8, 1953)
Otto Mackensen, Ph.D., Apiculturist
Troy H. Mullins, Ph.D., Agricultural Economist
David C. Neal, Ph.D., Senior Pathologist
Everett Oertel, Ph.D., Apiculturist
Irwin L. Saveson, B.S., Drainage Engineer
Hugo Stoneberg, M.S., Associate Agronomist
Stephen Taber, B.S., Apiculturist
Warren Whitcomb, Jr., Ph.D., Apiculturist in Charge
Finis T. Wratten, M.S., Agent (in Agricultural Engineering)

1Part-time teaching.
2On sabbatical leave.

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