TWENTY-EIGHTH
ANNUAL REPORT
1947-1948

GEORGIA COASTAL PLAIN
EXPERIMENT STATION

GEORGE H. KING, Director
Tifton, Georgia

BULLETIN 46 JULY, 1948
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OFFICERS OF THE REGENTS

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Vice-Chairman .... SANDY BEAVER
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Vice-Chancellor ... HARRY L. BROWN
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*J. G. Gaines, Pathologist (Tobacco)
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*Earle H. Devane, Agronomist (Grass Breeding)
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*W. A. Carnes, Agricultural Aide (Grass Breeding)

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W. C. McCormick, Assistant Animal Husbandman
Geo. K. Dillard, Assistant Animal Husbandman
Garrett Jones, Dairy Manager
****J. G. Whigham, Farm Supt.

* In cooperation with the United States Department of Agriculture.
** In cooperation with the United States Department of Agriculture and the Georgia Experiment Station.
*** In cooperation with the United States Department of Agriculture and the University of Georgia.
**** Deceased.
*J. W. Stevenson, Animal Husbandman
*Paul C. Lemon, Forest Ecologist (Range Grazing)
*John S. Williams, Range Conservationist (Range Grazing)
*F. E. Knox, Bio-Chemist

Animal Diseases
W. L. Sippel, Animal Pathologist

Entomology
*P. M. Gilmer, Entomologist
*D. W. LaHue, Entomologist
*J. D. Crump, Jr., Entomologist
*Oliver Kendrick, Field Aide

Horticulture
Otis Woodard, Horticulturist
W. T. Brightwell, Associate Horticulturist
S. A. Harman, Associate Horticulturist

**Naomi C. Woodroof, Botanist (Peanut Breeding)
*Huey I. Borders, Pathologist (Vegetable Plants)
*LeRoy Wheeler, Agricultural Aide

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*J. H. Machmer, Nematologist

Plant Pathology
Harvey W. Rankin, Pathologist

Parasitology
*John S. Andrews, Swine Parasitologist
*D. J. Jones, Agricultural Aide

Soils
Robert L. Carter, Soil Scientist

Shade Tobacco Branch Station
Attapulgus
E. J. Gibson, Pathologist
Susie Cox, Secretary
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TWENTY-EIGHTH ANNUAL REPORT
1947-1948

INTRODUCTION

The primary aim of the research work at the Georgia Coastal Plain Experiment Station is to point the way toward increased income for the farmers of the Coastal Plain. As we pause in our work to make this report, it will be interesting and worthwhile to partially evaluate in dollars and cents the contribution of agricultural research to the farmer in the past. The results of agricultural research in terms of income are often considered intangible as it is difficult to measure the costs and returns from specific developments. We do know, however, that the major portion of agricultural research work is conducted by state experiment stations and by the United States Department of Agriculture. The records maintained by them will substantiate the expenditures for agricultural research.

The first appropriation for agricultural research was made by Congress in 1887. From 1887 through 1946 the government has appropriated $150,000,000 to aid this work at the state experiment stations. The states themselves have spent an estimated $450,000,000, and approximately $900,000,000 has been spent by the United States Department of Agriculture. The latter two are generous estimates and it may be safely stated that the expenditures for agricultural research by the states and by the Federal Government have not exceeded $1,500,000,000. The State of Georgia has appropriated annually about $500,000 for agricultural research during the past several years. These are the main costs of agricultural research—what of the returns?

Corn, the nation’s leading crop, is a good example of profitable agricultural research. In 1920, over 101,000,000 acres of land were planted in corn and we produced 3,070,000,000 bushels. In 1943 we produced 3,085,000,000 bushels of corn on 94,000,000 acres. Without diminishing our corn production, 7,000,000 acres of land were saved for other production and this saving was accomplished mainly through two agricultural research developments. These were (1) an increased understanding of fertilizing and spacing practice and (2) better varieties and hybrids. Furthermore, conservative estimates by leading authorities credit the corn hybrids with increasing production in 1944 by 706,000,000 bushels. If we value this corn at $1.50 per bushel, hybrids meant an additional $1,059,000,000 in the farmers’ bank accounts. In other words, two years of hybrid corn production more than paid the entire agricultural research bill for sixty years. The nation’s farmers know how to show their appreciation for this development. In 1933, only one-tenth of one per cent of the total corn acreage was planted in hybrids; in 1948, 75 per cent of the total corn acreage was in hybrids. This development is just beginning to be profitable.
Corn is an important crop in Georgia too. Georgia farmers, in a few short years, have increased the yield of corn from 12 to 15.5 bushels per acre. In 1948, these same farmers increased the production of corn by 1,107,000 bushels, yet they planted 32,000 less acres to corn than they did in 1947. With agricultural research leading the way, Georgia farmers have learned better practices for corn production and the increased production will easily pay the State's annual appropriation for agricultural research.

Few farmers in the tobacco belt will disagree that control of blue mold on tobacco beds has increased production by ten per cent. Using this percentage, this development by agricultural research has added $5,000,000 to the yearly income of Georgia tobacco farmers. This one agricultural research development will pay the annual State appropriation ten years.

We could go on citing one agricultural enterprise after another: cotton, peanuts, small grains, livestock. In each of these and many others, it would be possible to demonstrate the economic returns of agricultural research.

There is increasing evidence that agricultural research work is appreciated. At this Station this year, more farmers than ever before came to observe first-hand the work conducted in their interest. In addition to the personal interest, we received more requests for agricultural publications. On a national level, Congress, in 1946, passed the Research and Marketing Act which will provide more funds and make possible an expanded agricultural research program for several years.

Agricultural research is profitable—profitable for the farmer and for the man with whom he does business. Agricultural research leads the way toward agricultural progress, and this is a report of our progress in increasing the income of the Coastal Plain farmer.

In addition to this publication, the following were released by this Station during the year. They may be secured by a written request.

Bulletin 44—Twenty-seventh Annual Report
Bulletin 45—Dehydrated Sweet Potatoes for Fattening Steers—January 1948
Mimeo. Paper 52—Release of Dixie 18 Hybrid Corn—February 1948
Mimeo. Paper 54—Control of Leaf Spots on Peanuts—June 1948
Mimeo. Paper 55—Control of the So-called "Army Worm" on Corn, Cotton, and Peanuts—June 1948
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**Average**

25 Years: 4.48  3.85  4.75  4.28  3.10  4.95  6.17  5.67  3.75  1.73  2.02  3.51  48.26
## TABLE 2

DATES ON WHICH FIRST AND LAST KILLING FROSTS (32°) OCCURRED AND THE NUMBER OF GROWING DAYS AT TIFTON, GEORGIA, FOR THE YEARS 1923 TO 1947, INCLUSIVE

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Last killing frost in spring</th>
<th>First killing frost in fall</th>
<th>Number of growing days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1923</td>
<td>March 20</td>
<td>November 10</td>
<td>235</td>
</tr>
<tr>
<td>1924</td>
<td>March 17</td>
<td>November 26</td>
<td>254</td>
</tr>
<tr>
<td>1925</td>
<td>March 3</td>
<td>November 23</td>
<td>265</td>
</tr>
<tr>
<td>1926</td>
<td>March 16</td>
<td>November 11</td>
<td>240</td>
</tr>
<tr>
<td>1927</td>
<td>March 5</td>
<td>November 18</td>
<td>258</td>
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<tr>
<td>1928</td>
<td>February 21</td>
<td>November 21</td>
<td>273</td>
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<tr>
<td>1929</td>
<td>February 23</td>
<td>November 30</td>
<td>280</td>
</tr>
<tr>
<td>1930</td>
<td>March 4</td>
<td>November 1</td>
<td>242</td>
</tr>
<tr>
<td>1931</td>
<td>March 5</td>
<td>November 4</td>
<td>301</td>
</tr>
<tr>
<td>1932</td>
<td>March 15</td>
<td>November 3</td>
<td>243</td>
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<td>1933</td>
<td>March 5</td>
<td>November 9</td>
<td>249</td>
</tr>
<tr>
<td>1934</td>
<td>March 12</td>
<td>November 13</td>
<td>246</td>
</tr>
<tr>
<td>1935</td>
<td>March 2</td>
<td>November 25</td>
<td>268</td>
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<tr>
<td>1936</td>
<td>February 20</td>
<td>November 26</td>
<td>279</td>
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<tr>
<td>1937</td>
<td>March 17</td>
<td>October 24</td>
<td>221</td>
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<tr>
<td>1938</td>
<td>February 26</td>
<td>November 25</td>
<td>272</td>
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<tr>
<td>1939</td>
<td>February 24</td>
<td>November 28</td>
<td>277</td>
</tr>
<tr>
<td>1940</td>
<td>April 13</td>
<td>November 15</td>
<td>216</td>
</tr>
<tr>
<td>1941</td>
<td>March 18</td>
<td>November 26</td>
<td>253</td>
</tr>
<tr>
<td>1942</td>
<td>February 28</td>
<td>November 12</td>
<td>257</td>
</tr>
<tr>
<td>1943</td>
<td>April 15</td>
<td>November 10</td>
<td>209</td>
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<tr>
<td>1944</td>
<td>March 21</td>
<td>November 22</td>
<td>246</td>
</tr>
<tr>
<td>1945</td>
<td>February 10</td>
<td>November 5</td>
<td>268</td>
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<tr>
<td>1946</td>
<td>February 10</td>
<td>December 3</td>
<td>296</td>
</tr>
<tr>
<td>1947</td>
<td>March 17</td>
<td>December 2</td>
<td>260</td>
</tr>
<tr>
<td>Averages</td>
<td></td>
<td>November 21</td>
<td>257</td>
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</tbody>
</table>

## TABLE 3

TEMPERATURE BY MONTHS FOR THE YEAR 1947

<table>
<thead>
<tr>
<th>Month</th>
<th>Average</th>
<th>Average maximum</th>
<th>Absolute maximum</th>
<th>Average minimum</th>
<th>Absolute minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>56.8</td>
<td>67.9</td>
<td>81</td>
<td>45.7</td>
<td>27</td>
</tr>
<tr>
<td>February</td>
<td>45.9</td>
<td>59.0</td>
<td>75</td>
<td>32.8</td>
<td>21</td>
</tr>
<tr>
<td>March</td>
<td>51.3</td>
<td>62.0</td>
<td>81</td>
<td>40.5</td>
<td>24</td>
</tr>
<tr>
<td>April</td>
<td>69.5</td>
<td>80.2</td>
<td>89</td>
<td>58.8</td>
<td>45</td>
</tr>
<tr>
<td>May</td>
<td>73.7</td>
<td>84.7</td>
<td>91</td>
<td>62.7</td>
<td>53</td>
</tr>
<tr>
<td>June</td>
<td>79.2</td>
<td>90.2</td>
<td>99</td>
<td>68.2</td>
<td>57</td>
</tr>
<tr>
<td>July</td>
<td>79.2</td>
<td>90.3</td>
<td>96</td>
<td>68.0</td>
<td>61</td>
</tr>
<tr>
<td>August</td>
<td>80.6</td>
<td>90.8</td>
<td>96</td>
<td>70.3</td>
<td>66</td>
</tr>
<tr>
<td>September</td>
<td>77.2</td>
<td>87.8</td>
<td>96</td>
<td>66.6</td>
<td>48</td>
</tr>
<tr>
<td>October</td>
<td>70.7</td>
<td>80.1</td>
<td>86</td>
<td>61.2</td>
<td>51</td>
</tr>
<tr>
<td>November</td>
<td>55.7</td>
<td>65.2</td>
<td>81</td>
<td>46.2</td>
<td>35</td>
</tr>
<tr>
<td>December</td>
<td>51.4</td>
<td>62.0</td>
<td>78</td>
<td>40.8</td>
<td>30</td>
</tr>
</tbody>
</table>
Peanuts are being dug with regular tractor digging equipment after tops have been cut and harvested for high-quality hay.

AGRICULTURAL ENGINEERING

Peanut Harvesting: Studies were directed toward general objectives of improving peanut harvesting and curing methods by (1) reducing labor requirements, (2) reducing costs through increased machine efficiencies, (3) improving soil fertility, and (4) effecting higher qualities of the finished product in both hay and peanuts.

Procedures were detailed for the following specific objectives:

Observe operational characteristics and evaluate the merits of special peanut harvesting equipment constructed by the farmer and jobber.

Determine the practicability of harvesting peanut vines for hay prior to digging nuts with respect to quality of hay and nuts.

Compare the time required for harvesting nuts the usual way to that of harvesting nuts where the vines are removed for hay prior to digging.
Determine what special equipment will be needed, or modifications required on present standard equipment, to harvest and process peanuts after vines have been removed for hay.

Compare picking efficiencies of a carding type picker and cylinder type picker in picking nuts from the stubble and from the vines.

Determine the practicability of picking, with regular pickers, peanuts in green form immediately after digging with and without vine tops attached; this to include study of picker design modifications which might be necessary to accomplish the operation.

Study characteristics of peanut curing methods to include mechanical methods applied immediately after removal of nuts from the ground.

Compare qualities of finished products from natural and mechanical curing methods.

PRELIMINARY CONCLUSIONS: 1. Many devices designed and built by farmers and jobbers are mainly for the digger-shaker purpose. This machine is limited in ability to reduce man-hour requirements for harvesting. Curing problems in the Southeast have discouraged efforts toward the use of combines for peanut harvesting in this area.

2. With curing procedures made practicable, the need for a peanut combine to dig and pick the nuts with one or two trips through the field would be urgent.

3. Peanut vines may be removed prior to digging the nuts. The results in better quality of hay, reduction in bulk of nuts to be handled for further processing by at least two-thirds for Spanish and one-half for Runners, reduces picking time, and no detected damage to the nuts. The vines may be left on the land for adding humus to the soil.

4. Harvesting time is materially reduced by first cutting the tops, and stacking the nuts in stubble form.

5. Some standard farm machine modification will be necessary to dig and handle the nuts in stubble form.

6. Present standard pickers will pick the nuts in stubble form efficiently; the cylinder type machine doing a slightly better job of picking than the carding type.

7. Present standard pickers will pick peanuts as they are dug from the ground. The cylinder type picker does better in this respect; however, the damage to the nut is greater with this machine. The carding type machine did better where vines were attached. Some modification of the cleaning element of present pickers will be desirable for picking green nuts.

8. Peanuts in stubble form can be cured, naturally, in as much as five-acre quantities if protected from the weather and provided
good ventilation. This may be accomplished by using a single portable shed approximately 10x14x9 feet with a hog-wire floor and hog-wire vent 1½x4 feet in the center from bottom to top. A tarpaulin cover is not recommended in areas where high wind at harvest time may be expected.

9. The temperature during natural curing of peanuts is, in general, lower than atmospheric temperatures.

10. Green picked peanuts offer lower resistance to airflow than small grains. North Carolina Runner peanuts have more resistance than Improved Spanish.

11. Green picked peanuts in wire baskets of practicable size and shape will not cure satisfactorily under static conditions.

12. Unheated forced air, although it will cure peanuts, is not recommended due to the time required and high relative humidities in much of the peanut-producing area.

13. Heated air at 115 degrees F. forced through peanuts at the rate of 30 cubic feet per minute per square foot will cure the peanuts to a safe moisture content in from 24 to 48 hours when placed as much as 15 inches deep.

14. Heat without forced air is not satisfactory due to impracticability of time element and irregularity of curing.

15. Germination and quality measured by germination tests and chemical analysis were not impaired by mechanical curing. The commercial grade was improved.

16. A simply modified tobacco barn offers an excellent possibility for curing green peanuts.

17. It is apparent that justification is ample for intensified studies toward the development of machines and mechanical curing facilities for harvesting and curing peanuts fresh from the soil.
Cotton Variety Test: Cotton varieties that are most widely planted throughout the Coastal Plain area are included in this test. As will be noted from Table 4, average yields obtained for the past five seasons have not varied widely between these cottons. There was also very little variation in staple lengths obtained, although boll size and per cent lint did vary between varieties. It should be noted that this test was conducted on land that was not heavily infested with wilt. Since this disease is common in the South Georgia area and often causes serious losses, it is desirable to use varieties that are reasonably resistant to this disease. W. W. Wannamaker’s Stonewilt, Empire, and Coker’s 100 Wilt are resistant to wilt, and for this reason are considered more reliable under Coastal Plain conditions. Deltapine and Stoneville 2B are not resistant to wilt and should not be used unless the land is known to be free from this disease. Pandora, a product of the breeding work at this Station, has given good comparative yields since 1945. This variety is being tried in three communities during the 1948 season. Seed stocks of Pandora are not available in quantities to justify a wide planting of this variety at the present time.

In order to obtain more accurate data on wilt resistance of commercial varieties and breeders’ strains, a test is being conducted on land that has been artificially inoculated with wilt. This test was begun in the spring of 1948 in cooperation with the Pathology Department. Observations made early in the season indicated that artificial inoculation had been entirely satisfactory, although data will not be available until the end of the season.

<table>
<thead>
<tr>
<th></th>
<th>Yield in pound of lint per acre</th>
<th>Per cent lint</th>
<th>Avg. number balls per pound</th>
<th>Staple length 32nd inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wannamaker’s Stonewilt</td>
<td>403</td>
<td>609</td>
<td>443</td>
<td>551</td>
</tr>
<tr>
<td>Deltapine</td>
<td>389</td>
<td>670</td>
<td>477</td>
<td>403</td>
</tr>
<tr>
<td>Empire</td>
<td>379</td>
<td>580</td>
<td>435</td>
<td>525</td>
</tr>
<tr>
<td>Maret’s White Gold</td>
<td>386</td>
<td>616</td>
<td>414</td>
<td>488</td>
</tr>
<tr>
<td>Coker’s 100 Wilt</td>
<td>386</td>
<td>568</td>
<td>421</td>
<td>500</td>
</tr>
<tr>
<td>Stoneville 2B</td>
<td>369</td>
<td>611</td>
<td>393</td>
<td>486</td>
</tr>
<tr>
<td>Rhyne’s Stoneville</td>
<td>354</td>
<td>623</td>
<td>403</td>
<td>449</td>
</tr>
<tr>
<td>Pandora</td>
<td></td>
<td></td>
<td>482</td>
<td>574</td>
</tr>
</tbody>
</table>
Cotton Fertilizer Tests: Plant food studies with cotton include tests with primary and minor elements and the residual effect of potash. Since 1940, two developments have occurred that are likely to influence cotton fertilizer practices. The expansion of the peanut acreage in South Georgia has resulted in a severe drain on plant food resources of many farms. Where peanuts are harvested for market, the removal of potash from the soil is particularly severe. This becomes evident when cotton is planted on land that has been heavily cropped to peanuts. Potash content of mixed fertilizers is not normally sufficient to replace the potash removed by a good crop of peanuts. When cotton is planted on such land, a separate application is often needed to prevent potash deficiency or "rust". Tests begun in 1941 indicate that heavy applications of potash may be made to Tifton sandy loam soils without serious leaching losses. Potash materials may be broadcast prior to planting or may be applied as a side dressing to the cotton.

A more recent development likely to affect cotton fertilization is the use of more efficient insecticides. Toxaphene and gamma benzene hexachloride (BHC) appear to be much more efficient in controlling weevils and other cotton insects than the older poisons. With the use of better insect control measures, heavier rates of fertilization will be more practical. In other words, if top bolls are to be protected from insect damage, sufficient plant food must be supplied to the crop to mature these bolls. A test was begun in 1947 with varying levels of nitrogen, phosphoric acid, and potash applied to cotton that had been dusted with arsenic as compared with a newer material, Toxaphene. This test has not been in progress long enough to give conclusions at this time.

Formulas and Rates: For average South Georgia conditions, cotton should receive 500 to 600 pounds of a 4-8-8 or 3-9-9 fertilizer at the time of planting. This should be supplemented with a side dressing that will supply 15 to 25 pounds of nitrogen from some quickly available nitrogenous material. Where cotton is following harvested peanuts, or where it is planted on land on which cotton plants have a tendency to "rust", additional potash should be supplied. On such land, 50 to 100 pounds of muriate are recommended.

On land that is well adapted to cotton, and where the best known weevil control measures are taken, it is advisable to use 700 to 800 pounds of fertilizer per acre. The side dressing also should be increased in proportion. Where heavy rates are used, side placement of fertilizer is recommended in order to avoid injury to cotton seedlings. Fertilizer should either be stirred into the soil or placed in bands 2½ inches to the sides of the seed row, and slightly below seed level.
Increase field of Pandora cotton. Pandora is a development of the cotton breeding program at this Station.

UPLAND COTTON BREEDING

The 956 plant selections, 1200 crosses, 105 selfed progeny rows selected in 1947, and the backcrosses from the greenhouse plants gave a wealth of promising material for study in 1948. There were 75 inbred lines, 52 hybrids, 265 second and third generation progenies for segregation, and over 200 progenies approaching uniformity planted in the regular breeding plots in 1948.

The breeding project also included strain tests, pollination tests, isolation blocks, and increase fields of Pandora.

Progress being made in the breeding program at this Station might be summarized under three headings as follows:

1. **Pandora Cotton:** (For a full account of this new cotton write for Circular No. 12.) Approximately 500 acres of Pandora cotton were grown in 1948 by Coastal Plain farmers on a trial basis. These
plantings were made with foundation seed from this Station. One or two communities having the proper organization will be selected to increase the foundation seed from the Station in 1949. Such communities will plant enough acreage each year to meet the demand for registered seed.

Maintenance and improvement work with Pandora is being continued in the breeding program at the Station. Many widely different cottons have been crossed on Pandora or its parents and selections following these crosses show much promise. Improved lines of Pandora will be used for increase as rapidly as possible, once they are proved superior.

2. New Strains: Rapid changes are taking place throughout the cotton industry. Such progress as shown by mechanized production and reliable weevil control methods bring to light new problems for the cotton breeding program. Certain plant characteristics, which in the past have either been disregarded or considered undesirable, are now being selected because of their importance in the broadened objectives.

Several promising strains of cotton, entirely different in plant type from Pandora, are in the process of development. This phase of the breeding program will not only be concerned with a plant type suitable for machine harvest and highly prolific to take advantage of weevil control, but will involve a careful search for cottons possessing resistance to nematodes, diseases, and insects. These are among the plant characters contributing to higher yields in the Coastal Plain. At the same time, extensive fiber testing is done to determine the quality of many selections. This eliminates plants having inferior fiber properties in the early stages, leaving more space and time for a more rigid testing of advanced strains. Only the high yielding strains which prove to possess a fiber of the quality needed will be considered for increase and distribution.

3. Hybrid Vigor Studies: A study of the possibilities of producing hybrid cotton on a practical scale was begun in 1946. From 492 different hybrids grown in 1947, there were 14 combinations which displayed enough vigor, as measured by yield, to warrant further study. These hybrids gave an increase of 18 to 44 per cent over the best variety. Crosses are being made this year in sufficient quantity to insure a thorough testing of these combinations in 1949. Tests thus far are positive in showing that combinations can be found which could be expected to consistently outyield regular varieties. However, the technique for producing hybrid seed in quantity has long been the problem which has seemed insurmountable.

A self-sterile plant was found in the breeding plots at this Station in 1947. This plant was transferred to the greenhouse for the winter studies and further verified its sterility. Between 60 and 70 cuttings were rooted from this plant to grow in 1948. Crosses with many inbred lines are being made for the purpose of determining
the possibility of using this stock as it was found and also an attempt to transfer this unusual character into a better parent. This stock is being used by investigators at other locations to study the cause of the phenomenon and the manner of inheritance. Many studies remain to be conducted before hybrid cotton can become a reality in general production. The preservation and multiplication of this self-sterile plant show greater promise for solving the problem than any other character yet displayed by the cotton plant.

SEA ISLAND COTTON BREEDING

In recent years all Sea Island breeding work in the United States has been previously conducted at this Station and in South Carolina. In 1948, the breeding project in South Carolina was transferred and the breeding stocks were sent to Tifton and consolidated into one project. At present, this is the only location in the Southeast where such a breeding program is being conducted.

Since the selections from Sea Island-Egyptian-Tanguis hybrid combinations have shown more promise than Sea Island crossed lines, more emphasis is being placed on the former. Many progenies of Sea Island-Egyptian hybrids were in the fourth and fifth generations in 1948 and appear superior to Sea Island in production, picking quality, and have a much higher lint percentage than Sea Island. From current fiber strength tests, it is believed that some of the Sea Island-Egyptian combinations will produce fiber equal in strength to any of the present Sea Island lines.

The new long staple Upland-Sea Island Cross, known as Sealand, was first introduced in Berrien County, Georgia, in 1947. Approximately 35 acres produced 20 bales. Through an agreement with the growers, this Station purchased all of the planting seed in 1947. This was done to protect the purity of the seed and to insure that this seed would be further increased. Since Berrien County farmers increased the original seed and since adequate isolation from short staple cotton could be secured, the seed was again placed in this county and approximately 390 acres were planted in 1948.

A farmers’ organization known as the Berrien Staple Cotton Cooperative was established in January, 1948. This organization has 100 per cent control over the Sealand seed produced in this county. The control of the seed is most important to protect the market reputation of this specialty cotton. The long cotton spinners which buy the Sealand cotton, demand uniform staple of high quality. Any expansion in the future will be confined to the counties where little or no short staple cotton is produced and where the seed will be controlled.

1 In cooperation with the Division of Cotton and Other Fiber Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.
CORN

Corn Varieties and Hybrids: Table 6 gives data on yield and weevil resistance of varieties and hybrids included in this test since 1940. Considering both yield and weevil resistance, the best adapted open-pollinated varieties continue to be Whatley’s Prolific and Good’s Golden Prolific. Florida W-1, a hybrid produced by the Florida Experiment Station, has given highest yields and shows a good degree of weevil resistance. Coker’s Garrick, Coker’s Ellis, and Hastings’ Prolific have given good comparative yields, but weevil resistance of these varieties has been very poor. Dixie 18, a yellow hybrid bred at this Station, has given excellent yields for the past two years. This hybrid has a very stiff stalk and has about the same weevil resistance as Whatley’s Prolific.

Corn Fertilizer Tests: Nutrition studies with corn include experiments with several nitrogen materials, rate and time of application, and spacing tests at varying levels of nitrogen. Good fertilization of corn will not give profitable returns unless every effort is made to obtain good stands. Tests indicate that average South Georgia soils, when well fertilized, will support about 6000 plants per acre. On the other hand, thick spacing is risky unless the corn is well fertilized.

Under normal conditions, corn should receive 300 to 400 pounds of a 4-8-8 or 4-8-6 fertilizer at the time of planting and a side dressing of 150 to 200 pounds of nitrate of soda, or its equivalent of some other quickly available nitrogenous material. The side dressing should be applied 40 to 45 days after planting.

Where a large part of this nitrogen is derived from a slow-acting form of nitrogen such as Uramon or Cyanamid, the application should be made at the time of planting. This is shown in Table 5 where Uramon gave good results when applied at planting and poor increases when used as a top dressing. Corn in this test received 300 pounds of a 3-8-8 in addition to the indicated rate of Uramon.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield in bushels of shelled corn per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1942</td>
</tr>
<tr>
<td>No added nitrogen</td>
<td>31.9</td>
</tr>
<tr>
<td>100 Lbs. Uramon side dressing</td>
<td>43.2</td>
</tr>
<tr>
<td>200 Lbs. Uramon side dressing</td>
<td>41.7</td>
</tr>
<tr>
<td>100 Lbs. Uramon at planting</td>
<td>50.5</td>
</tr>
<tr>
<td>200 Lbs. Uramon at planting</td>
<td>50.3</td>
</tr>
</tbody>
</table>
### TABLE 6
CORN VARIETY TEST

<table>
<thead>
<tr>
<th>Variety</th>
<th>1940</th>
<th>1941</th>
<th>1942</th>
<th>1943</th>
<th>1944</th>
<th>1945</th>
<th>1946</th>
<th>1947</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida W-1</td>
<td>46.4</td>
<td>49.3</td>
<td>36.8</td>
<td>30.1</td>
<td>43.2</td>
<td>50.8</td>
<td>52.1</td>
<td>45.2</td>
<td>44.2</td>
</tr>
<tr>
<td>Coker's Garrick</td>
<td>38.6</td>
<td>50.4</td>
<td>39.0</td>
<td>34.7</td>
<td>46.4</td>
<td>48.2</td>
<td>50.9</td>
<td>45.0</td>
<td>44.1</td>
</tr>
<tr>
<td>Whatley's Prolific</td>
<td>42.3</td>
<td>44.8</td>
<td>34.7</td>
<td>27.1</td>
<td>44.1</td>
<td>51.3</td>
<td>52.1</td>
<td>44.6</td>
<td>42.6</td>
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<tr>
<td>Hastings' Prolific</td>
<td>37.0</td>
<td>47.2</td>
<td>36.7</td>
<td>24.7</td>
<td>47.3</td>
<td>47.9</td>
<td>46.9</td>
<td>44.6</td>
<td>41.5</td>
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<td>Good's Golden Prolific</td>
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<td>46.4</td>
<td>44.0</td>
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<td>41.8</td>
<td>41.1</td>
<td>43.4</td>
<td>41.4</td>
<td>41.1</td>
</tr>
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<td>Coker's Ellis</td>
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<td>42.0</td>
<td>34.8</td>
<td>30.8</td>
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<td>39.5</td>
<td>33.6</td>
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<td>42.1</td>
<td>48.1</td>
<td>41.4</td>
<td>37.3</td>
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<tr>
<td>Whatley's Yellow Prolific</td>
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<td>44.0</td>
<td>36.9</td>
<td>21.2</td>
<td>40.8</td>
<td>39.1</td>
<td>41.6</td>
<td>38.3</td>
<td>36.8</td>
</tr>
<tr>
<td>Hastings' Yellow White Dent</td>
<td>33.9</td>
<td>40.6</td>
<td>27.8</td>
<td>22.7</td>
<td>47.8</td>
<td>36.1</td>
<td>34.1</td>
<td>34.8</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Per cent ears damaged by weevils — October 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida W-1</td>
</tr>
<tr>
<td>Coker's Garrick</td>
</tr>
<tr>
<td>Whatley's Prolific</td>
</tr>
<tr>
<td>Hastings' Prolific</td>
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<tr>
<td>Good's Golden Prolific</td>
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<tr>
<td>Coker's Ellis</td>
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<tr>
<td>Hastings' Yellow Prolific</td>
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<tr>
<td>Florident Yellow</td>
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<tr>
<td>Whatley's Yellow Prolific</td>
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<tr>
<td>Hastings' Early White Dent</td>
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</table>
Corn Breeding: ² Twenty-four corn performance experiments were conducted in 1947 at five different locations in the Coastal Plain. These tests included 110 different hybrids and varieties, 97 of which were new experimental hybrids made at this Station under observation for the first time this year. Other tests included single crosses of 13 yellow and 10 white inbreds in all possible combinations. Results of the yield trials of these experimental hybrids failed to reveal any hybrid which was better in general performance than Dixie 18.

Twenty bushels of Dixie 18 (formerly GCP 6001) seed were distributed to farmers and county agents in the Coastal Plain for the purpose of comparing this hybrid with farmers’ varieties. Reports were received from 21 of these strip plantings. The results of these comparisons are presented in Table 7 with the results of 21 experimental trials in which Dixie 18 was compared with Whatley and Florida W-1. From the results obtained, Dixie 18 was about 20 per cent higher yielding than the average of the check varieties and hybrids, most of which were Whatley. It was about the same in weevil resistance as the check varieties in these tests but it had much more resistance to lodging.

Dixie 18 is a full season yellow hybrid of about the same maturity and plant height as Whatley. It is slightly earlier than Florida W-1. Although the ears of Dixie 18 are larger than those of Whatley or Florida W-1, it has about the same amount of prolificacy as Whatley at ordinary fertility levels. The grain is of medium texture, being harder than Whatley but not so hard as Florida W-1.

Dixie 18 was released to farmers in the spring of 1948. Enough seed of this hybrid had been produced to plant approximately 20,000 acres or one per cent of the corn acreage in the Coastal Plain. Dixie 18 has proved to be adapted to a rather large area of the Coastal Plain and is being grown in Mississippi, Alabama, Florida, and South Carolina and has been tested in Louisiana and North Carolina.

Foundation seed production was carried on in cooperation with Greenwood Plantation. Production was expanded and sufficient foundation seed were produced in 1947 to plant 500 acres for production of Dixie 18 and 1,000 acres of Florida W-1. Foundation seed are produced on inbred lines and yields must necessarily be low. One line averaged only fifty pounds of cleaned seed per acre. It has been through the cooperative efforts and facilities of Greenwood Plantation that the foundation seed program has been maintained and increased.

² In cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.
Sample ears of Dixie 18, the yellow hybrid developed at this Station.

TABLE 7

SUMMARY OF THE PERFORMANCE OF DIXIE 18 IN 1947

<table>
<thead>
<tr>
<th></th>
<th>Acre Yield</th>
<th>Erect Plants</th>
<th>Ears per 100 plants</th>
<th>Weevily ears</th>
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<tbody>
<tr>
<td></td>
<td>Dixie 18</td>
<td>Check</td>
<td>Dixie 18</td>
<td>Check</td>
</tr>
<tr>
<td></td>
<td>Bu.</td>
<td>Bu.</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>
| Av. of 21 experi-
  ments*          | 43.7       | 33.6         | 130                 | 86           | 72         | 114          | 113          | 16.4         | 18.8         |
| Av. of 21 farmer
  strip tests**    | 52.7       | 46.5         | 113                 |              |            | 158          | 159          | 14.1         | 14.9         |
| Av. of all plantings | 48.2       | 40.0         | 120                 | 86           | 72         | 140          | 140          | 15.2         | 16.7         |

* Check—Whatley in 19, Florida W-1 in two.
** Check—Whatley in 13, Florida W-1 in six, Local in two.

PEANUTS

Peanut Varieties: The peanut variety test includes several new strains of both bunch and runner types. During the past few seasons, two new strains of Spanish-type peanuts have given yields significantly better than Spanish. Seed of No. 146 and No. 205 are being increased for distribution. Other peanut strains are being studied for their keeping quality in the soil with a possibility of finding better lines for hogging-off purposes.

Peanut Fertilizer Tests: Peanuts are not so sensitive to applications of fertilizer as other field crops, and heavy fertilization is seldom profitable; however, a number of fertilizer tests have shown that reasonable returns may be expected from moderate applications of fertilizer. On the basis of these tests, it is recommended
that peanuts receive 300 to 400 pounds of a 4-8-8 or 4-8-6 per acre. It should be noted that this fertilization does not replace all of the potash removed by a good crop of peanuts. Where a good crop of peanuts is harvested for market, 50 to 100 pounds of actual potash are taken from the land. This is the amount of potash contained in 100 to 200 pounds of 50 per cent muriate. Crops that follow peanuts in the rotation should receive additional potash to make up this deficit.

Other nutritional studies with peanuts include tests with various forms of limestone and gypsum. These tests have not been conducted long enough to justify recommendations at this time.

**Peanut Breeding:** Line selections for disease resistance, yield, and other desirable characteristics were continued on 112 strains for commercial varieties and 863 hybrid strains. A collection of 268 varieties and strains, mostly of foreign origin, is being maintained and screened for desirable breeding material. When the characteristics of a strain become fairly well fixed, the strain is placed in preliminary yield tests at Tifton. Those that appear promising are then given more extensive and rigid comparison in the regional tests. These regional tests included three tests of 16 early-maturing bunch varieties and hybrid selections with Small Spanish as a check and three of 16 late bunch varieties, with North Carolina Bunch as the check, planted in Tift, Crisp, and Dougherty Counties; two tests of 16 white-seeded varieties, with Pearl as the check, in Tift and Dougherty Counties; two tests of 16 small-seeded runners, with North Carolina Runner as check, in Candler and Dougherty Counties; two tests of large-seeded types, with Virginia Runner as check, in Bulloch County. For all types, one or more of the hybrid strains have surpassed the standard (check) in yielding ability.

Several of the most promising strains are being increased for processing tests and for release to growers. A selection of North Carolina Runner, designated Selection 56-15, has proved significantly superior to commercial strains in yielding ability and appears to be quite resistant to concealed damage. Several tons of seed should be available this fall. A selection, 67-14, from a small-seeded strain of Virginia Bunch appears to be more widely adapted than the large-seeded strains, giving remarkably good yields wherever planted in Georgia. It is being increased and will be available for processing tests this fall.

**Peanut Leaf-Spot Control:** Five materials—sulphur; copper (Tribasic)—sulphur, 10-90; copper A. (Oxichloride)—sulphur, 10-90; Fermate—sulphur, 20-80; and Zerlate—sulphur, 20-80, were compared as to efficiency in controlling peanut leaf-spot. A period of severe drought as the peanuts were maturing prevented the usual

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1 In cooperation with the United States Department of Agriculture and the Georgia Experiment Station.
damage from the disease and no significant differences in leaf-spot counts or in yield of nuts were obtained.

In tests designed to determine the effect of leaf-spot control upon date of maturity of Spanish and North Carolina Runner, the drought greatly extended the growing period of both varieties—138 days for Spanish and 161 days for Runner.

**SMALL GRAINS**

**Oat Varieties:** For the past two seasons, oat yields obtained by many farmers in the Coastal Plain area have been unsatisfactory. In some instances low yields may have been due to unfavorable seasonal conditions, but disease conditions are believed to have been the principal cause of poor production. The most reliable varieties under these conditions have been those belonging to the old Red Rustproof type, such as Rustproof 14, Hundred Bushel, Bancroft, and Texas Rustproof. A new disease known as Victoria blight, or Helminthosporium blight (*H. victoriae*), caused severe damage to Victorgrain and Fulgrain varieties during the past two seasons. Although these two varieties are more reliable on the red soils of the Upper Coastal Plain area, they should not be used in the Middle and Lower Coastal Plain areas. Stanton has been the most reliable beardless oat in the tests at Tifton. This variety is not immune to Victoria blight, but has given better production than Victorgrain or Fulgrain.

In addition to the use of resistant varieties, other disease control measures are necessary in order to reduce losses to a minimum. Crop rotation, seed treatment, and proper planting dates are all valuable in reducing oat diseases. For grain production, oats should be planted in the South Georgia area between October 15 and November 15. Where early grazing is needed, it is sometimes desirable to plant earlier, but it should be noted that oats planted early are more susceptible to seedling diseases than oats planted the latter part of October or early November.

**Oat Fertilizer Test:** Oats planted for grain should receive 300 to 400 pounds of a 4-8-6 or 4-8-8 at the time of planting. A top dressing of 100 to 200 pounds of nitrate of soda or its equivalent in some other quickly available nitrogen, should be applied about the middle of February.

**Oat Grazing Test:** Two oat varieties are under test for combination forage and grain production. This test also includes studies with time and rate of nitrogen fertilization as it affects the grazing value and grain production.

**Wheat Variety Test:** Wheat yields have been inconsistent due to frequency of severe rust attacks. The most reliable varieties in this test have been Sanford, Hardired, and Chancellor.
Small Grain Nursery: Uniform nurseries of wheat and oats which are grown in several southeastern states are grown at the Station. These plantings include promising new disease resistant varieties and strains from the breeding programs of the southeastern small-grain breeders. Results of the oat tests for the past three years indicate that CI 4599 (Lee-Victoria) x Fulwin and Carolina Red (CI 4813) have some promise in this area. For this period Rustproof 14 has had an average yield of 40.9 bushels per acre and CI 4599 has yielded 49.3 and Carolina Red 51.1 bushels per acre, an increase of 8.4 and 10.2 bushels per acre respectively. These varieties are to be included in a more expanded testing program to secure more information on their performance. Their behavior in areas where the disease, Helminthosporium victoriae, is present, however, may prove disappointing.

FLUE-CURED TOBACCO

The research project for improvement of flue-cured tobacco production in Georgia is in cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture, and the University of Georgia College of Agriculture.

Fertilizer: Potash applications of 90 pounds K₂O per acre (1000 pounds of a 3-9-9 per acre) produced a better quality tobacco than lower or higher rates of potash. There was no significant increase in yield when more than 90 pounds (K₂O) per acre were applied. As the rate of potash application was increased, there was a decrease in the percentage of lug and cutter grades and an increase in the percentage of leaf grades.

Fertilizer mixtures containing no sulphur produced a lower yield and later maturing tobacco. Most commercial fertilizers contain sufficient sulphur for normal growth of tobacco.

On Tifton sandy loam and Norfolk sandy loam soils, fertilizer applications in excess of 1400 pounds of a 3-10-10 per acre showed a slight increase in yield but the quality of the tobacco was lower.

Varieties: Virginia Bright Leaf and Gold Dollar varieties were earlier maturing and produced a higher quality tobacco. Varieties of the 400 group produced approximately 200 pounds per acre more than Virginia Bright Leaf, Gold Dollar, and some of the other standard varieties but the quality of the tobacco was lower. Varieties of the 400 group were also later maturing. During extended dry periods, varieties of the 400 group seemed to be more drought enduring than the standard varieties.

Fertilizers and Weed Control in Seedbeds: Good weed control was obtained six consecutive years where one pound of Uramon plus one-half pound of Cyanamid per square yard (urea-calcium cyanamide) were broadcast and worked into the top six inches of

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1 In cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.
soil 60 days before seeding. On the same bed, there was no difference in the number and size of tobacco plants when one pound per square yard of a 0-9-3 fertilizer was applied at the time of the Uramon-Cyanamid treatment, and when the same fertilizer was applied at seeding time. The fertilizer was broadcast and worked into the surface inch of soil. No nitrogen has been used in the plant bed fertilizer, and top dressing with nitrates after the plants emerged was not necessary. However, where Uramon was used alone in wet places or preceding frequent rains, the tobacco plants were sometimes yellow, indicating a need for more nitrogen. Where Uramon and Cyanamid are not used for treating seedbeds, two pounds per square yard of a 4-9-3 or similar fertilizer should be applied.

For ten consecutive years, one pound of Cyanamid per square yard has given good weed control and produced good plants. Fertilizer containing no nitrogen was applied at the time of seeding. Leaching of the cyanamid nitrogen due to heavy rains has rarely been sufficient to produce yellow or nitrogen-starved plants. Cyanamid used alone has been unsuccessful in preventing root knot.

**FLUE-CURED TOBACCO DISEASES**

**Disease Survey:** The 1947 supply of flue-cured plants was greatly reduced by a very severe attack of blue mold (*Peronospora tabacina*). A dry December delayed germination of tobacco seed, while a warm cloudy January favored early mold development on hold-over tobacco plants in discarded 1946 seedbeds. Disease symptoms were observed on small plants in the 4-leaf stage as early as January 28, at which time stands generally were incomplete. Following the early mold establishment, cold weather persisted during most of February and March. The combination of mold and low temperatures destroyed approximately 85 per cent of the flue-cured plants in the State. The peak of disease activity was reached March 15. This was in sharp contrast to the slow spread and negligible loss in the shade area. Since many extra beds had been sown, the remaining plants, together with a limited number from South Florida, were sufficient to set the allotted acreage.

The majority of growers who sprayed their seedbeds used only two pounds of Fermate per 100 gallons of water. They failed to control the disease. Those who used four or more pounds per 100 gallons secured satisfactory control.

The 1947 field crop was set three weeks late. Conditions were most favorable for transplanting April 15-22 at which time plants in protected beds were ready to be set. The growing season was favorable for late tobacco, with the result that a crop almost normal in quality was produced. It was one of the largest tobacco crops Georgia has ever grown.

No mosaic or other virus disease was observed at any time during the seedbed season. During May, several fields in Grady County and one in Tift were reported affected with tobacco etch virus. At
this time, these fields were generally infected, and disease symptoms were evident on the bottom as well as top leaves. Etch was not observed except in a limited number of fields set with plants from South Florida. Cured tobacco from these affected farms was light in weight and poor in quality. Estimated yields were reduced 20 to 50 per cent. The disease observed in 1947 was in some respects similar to a tobacco etch reported on one Thomas County farm in 1928.

Angular leaf spot (*Pseudomonas angulatum*) was negligible in 1947. Dry weather in May, June, and July was unfavorable for this bacterial leaf spot.

Root knot was the most important field disease and it occurred throughout the area. Except in a few instances, losses were very slight, the average loss being estimated at 6 per cent of the crop. Southern root rot (*Sclerotium rolfsii*) and sore shin (*Rhizoctonia solani*) affected a few scattered plants throughout most fields. Some growers reported these diseases most pronounced after peanuts. Average loss was estimated to be one per cent of the crop.

**Blue Mold Control:** The severe mold attack of 1947 provided ideal conditions for critical evaluation of control methods. Excellent disease control was secured in every spray test with Fermate or Karbam (ferric dimethyl dithiocarbamate) in a concentration of four pounds per 100 gallons of water. Of equal value was a spray mixture containing one pound of Fermate or Karbam plus four ounces of salicylic acid powder plus two ounces of a wetting agent (Vatsol-K or Dreft) per 100 gallons. This latter mixture, distributed as Dimole, gave almost perfect disease control in one test, while in adjoining untreated beds, over 95 per cent of the tobacco leaves were destroyed and more than 50 per cent of the plants were killed outright by disease. Dithane Z-78 (zinc ethylene bisdithiocarbamate) spray used at three pounds per 100 gallons of water was one of the most effective materials tested.

Dust mixtures containing 10 per cent Dithane Z-78 and 15 per cent Fermate or Karbam were as effective as spray mixtures when used in ample quantities. At least 2 to 3½ pounds of dust per 100 square yards were required at each application to give satisfactory control under local conditions. Dusts were more expensive than sprays. Latest instructions for using the above sprays and dusts may be obtained from the Experiment Station at Tifton or County Agents.

Spray materials that gave perfect disease control were strontium salicylate (1/2 pound per 100 gallons water), manganese ethylene bisdithiocarbamate (1½ pounds per 100 gallons), and combinations of Dithane Z-78 with salicylic acid and other salicylates. These materials were not practical for grower use in the forms tested.

A commercial form of wettable bismuth subsalicylate spray, distributed as Tobisal, was equally as effective as the usual home-mixed bismuth subsalicylate-Vatsol mixture. All bismuth subsalicy-
late sprays caused marked yellowing and plant stunting when applied during the cold weather of February and March. The plants remained stunted and failed to recover from slight mold attack until temperatures rose to normal in late March. Despite this handicap, bismuth-treated plants rapidly recovered with the advent of warm weather and were among the very best at setting time. Bismuth supplies are scarce and are no longer adequate for general use.

Control of Root Knot and Weeds in Plant Beds: Recommended applications of one pound per square yard of Uramon (urea) plus one-half pound of Cyanamid (calcium cyanamide) applied 60 to 90 days before seeding were superior to other treatments in (1) control of root knot, (2) control of weeds and grasses, and (3) producing high yields of early plants. The treatment was equally effective in both old and new locations. Where beds were located in low wet places with poor drainage, or where the soil remained dry from the time of application until December, poor stands and stunted yellow plants resulted. The first handicap was corrected by selecting more suitable locations or by digging adequate drainage ditches, and the second by adding sufficient water to keep the soil well moistened during the two weeks prior to seeding. No root-knot control was evident where one material was applied the first of October and the other in early November; whereas both Uramon and Cyanamid applied at the same time gave good control of disease as well as weeds.

Applications of 50, 100, 200, 300, and 400 pounds per acre of 2, 4-D to seedbed soil 90 days before seeding were less effective against weeds than the standard treatment, gave no control of grass and root knot, and failed to increase plant yields. Table salt broadcast at rates of 1/2 pound, 1 pound, and 1 1/2 pounds per square yard failed to reduce grass and weed growth.

Soil fumigation of seedbeds with two quarts per 100 yards of D-D mixture (dichloropropane-dichloropropene) or Dowfume W-40 (ethylene dibromide) gave more significant root-knot control than the Uramon-Cyanamid treatment, but the fumigants were more difficult to apply. They did not control weeds and at times caused stunted tobacco plants. When fumigants were used in combination with either Cyanamid or Uramon, both weeds and root knot were effectively controlled. Allyl alcohol, applied at 1 1/2 gallons per 100 square yards one week before seeding, controlled weeds and increased plant yields. The liquid was first diluted in water and sprinkled on the bed, after which more water was added to soak the soil to a depth of three inches. This material failed to control root knot.

Root-Knot Control in Tobacco Fields: Past experiments have shown crop rotation to be the most practical method of controlling root knot, and that peanuts (harvested), oats, and cotton were the most beneficial rotation crops for preventing disease damage in tobacco. Crotalaria, or a combination of oats and crotalaria, grown for two successive years prevented any root-knot damage to follow-
ing tobacco crops, despite the fact that the soil had been heavily infested with root-knot nematodes. Tobacco after crotalaria, or oats and crotalaria, produced yields more than 600 pounds greater than those following nematode susceptible crops. However, lower leaf grades accompanied these higher yields. While Spanish peanuts (harvested) did not significantly lower leaf grade, Southern root rot was sometimes more pronounced in rotations involving this crop.

Soil fumigation of nematode-infested Norfolk sandy loam, with Dowfume W-40, improved leaf grade and resulted in an average yield of 1350 pounds per acre as against only 600 pounds in adjoining untreated check plots. In another field of Tifton sandy loam, fumigation with W-40 and D-D mixture increased yields more than 700 pounds per acre over untreated plots without lowering leaf grade. Cost of the treatment was slightly over $40.00 per acre for applications of 15 to 20 gallons of fumigant. Extensive tests have shown that applications made in the drill, by pouring a single stream in each four-foot row, are cheaper and more practical than broadcast applications made by pouring streams of the liquid in parallel furrows 12 inches apart. Drill applications, moreover, have been highly effective against disease. Preliminary tests indicate that the present cost of broadcast fumigation may be cut in half by applying reduced amounts in the drill. Soil fumigation for flue-cured tobacco is impractical for present grower use, except where it is possible to employ experts.

SHADE TOBACCO

The 1947 season as a whole was successful for the majority of Georgia shade tobacco growers. The green peach aphid, a new insect pest on tobacco, appeared in late May and caused considerable damage to a few fields. Fortunately this damage was not sufficient to cause a crop failure. Tests were started immediately in search for a suitable and effective insecticide to combat this pest. The several materials tested were either ineffective or unavailable in sufficient quantity for use on the 1947 crop. Rainfall during the growing season was above normal but not sufficiently high to cause any serious water damage. The high rainfall in March and April were instrumental in obtaining good field stands. There were no serious outbreaks of diseases during the season.

Following is a brief progress report showing results of nutrition work in 1947.

Nitrogen: Nitrogen (N) applied at the rate of 300 pounds per acre gave the highest yield and grade but gave lowest fire-holding capacity. The 200-pound rate gave best fire-holding capacity.

Phosphorus: Phosphorus (P₂O₅) made its best showing in 1947 applied at the rate of 300 pounds per acre.

Potash: The 200-pound rate of K₂O was best in 1947 for yield and grade but the 300-pound rate gave superior burning qualities.
Calcium: Calcium (CaO) applied at the rate of 225 pounds per acre appeared to be optimum for the 1947 season.

Magnesium: The 70-pound rate of magnesium (MgO) was best for this nutrient.

Sulphur: Higher rates than 125 pounds SO₃ per acre gave a little increase in yield but the burning quality was cut considerably. Higher rates than 125 pounds SO₃ per acre should not be used until a more thorough study can be made.

Boron: The use of boron in 1947 did not reduce yields but lowered grade and fire-holding capacity.

Forms of Nitrogen: Cottonseed meal and stable manure were of approximately equal value when combined with nitrate and urea (Uramon) nitrogen in the fertilizer formula. The manure gave slightly higher yields than the cottonseed meal but the cottonseed meal slightly improved fire-holding capacity. There was practically no difference in grade quality.

Single Nitrogen Sources: Stable manure was slightly superior to cottonseed meal and considerably better than tung meal and castor pomace as a single source of nitrogen in 1947.

Split Application Series: The side application of 95 pounds Uramon and 100 pounds sulphate of ammonia per acre at first plowing gave an increase in yield but decreased considerably the fire-holding capacity.

The use of 146 pounds calcium cyanamide per acre as side application did not cause a decrease in yield but the grade of tobacco was very poor. It caused marked leaf mottling.

The use of muriate of potash to obtain chlorine showed that as the application was increased, the yield, grade, and fire-holding capacity were decreased. Potash should be derived from sources other than muriate of potash.

The side application of 188 pounds of nitrate of soda per acre at first plowing gave an increase in yield and only a slight decrease in fire-holding capacity.

Seedbed Fertilizer Tests: Results for 1947 showed that one pound per square yard of a 10-6-10 formula was better than other mixed goods tested. This formula gave more early plants at the first and second pullings.

SHADE TOBACCO DISEASES

The shade tobacco plant bed season of 1947 was favorable for the production of plants. Blue mold (Peronospora tabacina) caused slight damage to some tobacco beds in this area. First symptoms appeared on February 13 but there was very little spread until late in the plant bed season. The late attack on large seedlings caused no damage except a slight delay in transplanting. There was no definite peak of mold activity. Most beds were dusted with a 20 per
cent Fermate dust at the rate of one to two pounds per 100 square yards, depending on size of plants. Good control was obtained in these beds.

Control of Weeds and Root Knot in Seedbeds: The control of weeds and root knot (Heterodera marioni) is the most serious problem in shade tobacco seedbeds. A combination treatment of one pound urea (Uramon) plus one-half pound calcium cyanamide (Cyanamid) per square yard is still considered best for weed and root-knot control. The materials should be worked into the soil uniformly to a depth of six inches. In years of high rainfall during the fall and winter, it is advisable to make a second application of one-half pound Cyanamid in the top two inches of soil 30 to 40 days before planting. The initial treatment should be made 60 to 90 days prior to seeding. This treatment should be applied only on well drained soils.

Root-Knot Control in Shade Fields by Soil Fumigation: The control of root knot in the field by applications of 10 per cent ethylene dibromide (Dowfume W-10) and a mixture of dichloropropane-dichloropropene (D-D) was continued in 1947. At least 30 gallons of W-10 and 15 gallons D-D per acre were required to insure control of root knot in the field. Both higher and lower rates were used but these two amounts appeared most economical for practical control. Tests indicate these materials should be applied at least 30 days in advance of transplanting. The soil should be treated annually prior to each tobacco crop, because little residual protection has been observed 12 months afterwards. Fall applications made before December or in warm loose soil did not give satisfactory disease control the following season.

Methods of Applying Soil Fumigants: Since only liquid fumigants are available, they must be applied by pouring or injecting them into the soil at controlled rates, and at correct distances and depths. Materials have been applied in the row and broadcast. The row treatment involves marking off the rows with deep furrows and pouring a single stream of fumigant in the bottom of each row to a depth of at least 8 inches. This stream should be covered instantly as it reaches the furrow. In most tests the liquids have been covered with two furrows that made a bed or list over each row. This bed was not disturbed afterwards, except to freshen preparatory to transplanting. Fertilizer was applied to the side at the time of planting with satisfactory results.

The broadcast method requires pouring the liquids in parallel furrows approximately 12 inches apart and instantly covering to a depth of 6 to 8 inches. A tractor-drawn applicator, regulated to apply the exact amount of liquid, has been used successfully for making broadcast applications in commercial fields. The fields were first thoroughly plowed and leveled. It was necessary that the soil be in excellent tilth and free of trash and stubble at the time of application. Power applicators that have been used successfully are provided with several feet 12 inches apart that cut into the soil 6
to 8 inches deep, so that an entire section between shade posts may be treated at one time.

Burn tests made with cured tobacco from treated soils indicated that soil fumigation has not affected the burn or aroma of wrapper tobacco.

**FORAGE CROPS AND PASTURE EXPERIMENTS**

The United States Department of Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering, Division of Forage Crops and Diseases, cooperates with the Station in conducting experiments on pastures, forage, and soil-building crops. The pasture and grazing experiments include cooperation with the Bureau of Animal Industry.

**Soybeans:** Studies in the adaptation of various varieties, hybrids, and selections of soybeans are being conducted in cooperation with the United States Regional Soybean Laboratory. Two groups are being grown at this Station. In addition to this, several of the better southern varieties are grown in competitive yield tests for both hay and grain.

The Palmetto variety is a good dual-purpose bean, producing high yields of both hay and seed. The Oooturan variety is a good hay bean, but it produces low seed yields.

**Lespedeza:** Nematode control experiments indicate that all of the annual lespedezas tested are susceptible to nematodes. Successful growing of annual lespedeza in the Coastal Plain is limited to soils free of this pest.

*Lespedeza sericea* may be grown but it is not very palatable to livestock in this area.

**Velvet Beans:** About 50 varieties and selections are being tested for seed yield and hardiness. There is considerable variation in velvet beans, particularly in vegetative growth, seed yield, and date of maturity.

**Kudzu:** Several selections of kudzu types have been made including some that produce an abundance of flowers and others that are vegetative. Several types of trellises are being studied for their effect on flower and seed production. Grazing tests are being conducted on kudzu.

**Crotalaria and Other Summer Legumes:** *Crotalaria lanceolata* is being used in crop rotation studies. This species is non-poisonous to livestock and is also a hardy re-seeder. Adaptation studies are being made with several miscellaneous legumes including Indigofera, Alysicarpus, Meibomia, lespezesas, etc.

**Rotations:** Crop rotation experiments are being conducted. A three-year rotation includes six crops—corn, oats, *Crotalaria lanceolata*, Dixie Wonder winter peas, peanuts, and lupines. Annual and periodic fertilization are also included in the experiment.
Winter Cover Crops: Yield tests are being made on lupines, winter peas, vetches, serradella, and clovers.

The Dixie Wonder winter pea is less winter hardy than some varieties but may be used to advantage in the Lower Coastal Plain. It develops rapidly and may be turned under early enough to avoid cut worm injury to the following crops.

The blue lupine is a good rapid growing, heavy yielding cover crop. It should not be used in rotation with tobacco, melons, or tomatoes because of interchangeable diseases. Lupines usually should not be planted on the same land year after year because of disease trouble. Tests indicate that lupines can be planted in Bermuda grass pastures and build up the nitrogen in the soil to a great advantage for the pasture.

Ladino clover produces good growth on moist soil when fertilized, but seed production is very low.

Dixie Crimson clover has been grown successfully on Bermuda grass sod. Occasional failures occur because of prolonged fall droughts.

GRASS BREEDING

The grass breeding project is being conducted cooperatively by the Division of Forage Crops and Diseases of the United States Department of Agriculture, the Georgia Coastal Plain Experiment Station, and the Georgia Experiment Station.

Revegetation Project: In 1946 a new phase of this work was begun in cooperation with the United States Forest Service. Under the title of the Piney Woods Revegetation Project, the objective of this research became the discovery of ways of increasing the productivity of cut-over timber lands through the introduction of better grasses and legumes. A preliminary report of this project appears in another section of this report.

Foreign Introductions: Forty-nine new grass introductions from foreign countries were under observation in 1948. None of these introductions was equal to grasses now being developed in the grass breeding projects.

Breeding: Breeding and selection within the following species were continued in 1948: Bermuda grass, Dallis grass, Bahia grass, Sudan grass, and cattail millet. A brief report concerning some of the products of this research follows:

BERMUDA: Coastal Bermuda continued to give outstanding results in 1948. Grazing tests conducted over a 4-year period indicate that it may be expected to produce nearly twice as much beef as common “cotton patch” Bermuda. When fertilized heavily, Coastal Bermuda produced over seven tons of hay per acre that ranged from 11 to 17 per cent protein. The digestible protein in the hay was produced at approximately half the cost of the protein in cottonseed meal. Lupines drilled into Coastal Bermuda sod made excellent
growth during the past two winters and when disked into the sod in late March tripled the yield of grass the following summer.

**DALLIS:** Selected progenies from hybrids between a Dallis grass introduction from Uruguay and the D-1 selection looked very promising in 1948.

**BAHIA:** The Pensacola X Common Bahia hybrid 28-61 continued to make a good showing in 1948. This hybrid combines many of the desirable features of its two parents. Numerous tests have demonstrated that Pensacola Bahia hybrids superior to the commercial variety have been developed.

**SUDAN:** Fifteen hundred F₃ progenies of crosses between disease resistant Tifton material and sweet Sudan were subjected to thorough testing in 1948. The performance of some of these progenies proved that progress has been made in the development of a disease resistant, low-prussic-acid, sweet Sudan.

**CATTAIL MILLET:** A newly created leafy variety of cattail millet, short enough to permit combining of the seed, was superior to common cattail millet in beef production in 1948.

**Small-grain Varieties for Winter Grazing:** Studies on the use of small grains for winter grazing begun in 1943 were continued. Flooding and disease resulting from unusually heavy rains reduced the yields of most varieties in the 1948 tests. Several new oat selections, as yet unnamed, produced significantly more forage than the standard varieties now in general use. None of the winter grains under test made any appreciable growth during the cold month of January 1948, however.

**Turf Research:** In the spring of 1947 a turf research program was begun in cooperation with the United States Golf Association and a number of southern golf associations. The preliminary results of this work suggest that many southeastern turf problems can be solved.

**COOPERATIVE PASTURE INVESTIGATIONS**

**Limed Lowland Pastures Continue to Show Better Cattle Gains:** The lowland pasture sodded to a mixture of carpet grass, Dallis grass, and white clover produced 40 pounds more liveweight gain per acre than a comparable pasture that had not received lime. Both pastures received an 0-14-10 commercial fertilizer treatment of 600 pounds every three years. The limed pasture had previously received dolomitic limestone at the rate of 1½ tons per acre. The limed pasture produced cattle gains at the rate of 197 pounds of liveweight gain per acre while the unlimed pasture produced only 157 pounds. Animals used in this test in 1947 were in excellent flesh at the beginning of the grazing test. It is thought that thinner fleshed animals would have shown more gain per animal and greater gains per acre.
Cattle grazing a new leafy cattail millet developed at this Station by the Grass Breeding Department.

Steers Gain More on Cattail Millet Planted in Rows: Steers grazing cattail millet planted in rows during June, July, and August of 1947 made an average daily gain of 2.18 pounds and produced 304 pounds of liveweight gain per acre. Similar steers grazed on cattail millet sown broadcast during the same period made an average daily gain of 1.78 pounds and made a liveweight gain per acre of 219 pounds. The row-planted millet which was cultivated once, supplied 14 more grazing days, and produced 85 pounds more cattle gain per acre than that sown broadcast.
ANIMAL HUSBANDRY

In the animal husbandry research program special emphasis is being placed on forage production, forage utilization, and wintering. This special attention is being placed on these phases of livestock production because the climatic and soil conditions of the Coastal Plain area are so conducive to forage production. Efforts are being made to develop a year-round grazing system for dairy cattle that will enable the dairymen to get maximum and economical production. On the range grazing project at Alapaha, Georgia, studies are in progress concerning cattle management practices for native range together with better utilization of native forage. With dairy cattle, beef cattle, and swine, emphasis is also being placed on breeding programs whereby superior strains for milk, beef, and pork production may be obtained. The beef cattle and swine investigations are in cooperation with the Bureau of Animal Industry. The range grazing studies at Alapaha are in cooperation with the Forest Service, the Bureau of Plant Industry, and the Bureau of Animal Industry, all of the United States Department of Agriculture.

BEEF CATTLE

Dehydrated Sweetpotatoes equal ground Snapped Corn on Carpet Grass Pasture: During the summer of 1947, dehydrated sweetpotatoes were compared with ground snapped corn as a grain supplement for fattening steers on carpet grass. The grain mixture consisted of six parts of corn or dehydrated sweetpotatoes and one part of cottonseed meal by weight. Steers on full-feed of the dehydrated sweetpotato-cottonseed meal mixture gained 1.87 pounds per head per day as compared with 1.55 pounds per head per day for steers on ground snapped corn-cottonseed meal mixture. Grain requirements to produce 100 pounds of liveweight gain were 551 pounds and 791 pounds, respectively. The steers were fed for an 84-day period, June 4 to August 27. No grain supplement was fed for the first two months of the grazing period in the early spring.

Cracked Shelled Corn and Ground Snapped Corn Give Good Results in Steer Feeding Trials: In one year’s test, 15 steers on cracked shelled corn made an average daily gain of 3.01 pounds, and comparable steers on ground snapped corn made an average daily gain of 2.81 pounds. In each case the corn and cottonseed meal were fed in proportion of 6 to 1 by weight. Peanut hay was full-fed to each group. Steers fed cracked shelled corn consumed 671 pounds of grain mixture per 100 pounds gain as compared with 852 pounds for steers fed the ground snapped corn mixture. The steers on cracked shelled corn consumed 20 pounds more peanut hay per 100 pounds of gain than the group on ground snapped corn. Steers weighing approximately 800 pounds consumed daily 20 pounds of the cracked shelled corn-cottonseed meal mixture while comparable steers consumed 24 pounds of the ground snapped corn-cottonseed meal mixture.
Field Corn Versus Grain Sorghum for Wintering Brood Cows: One year’s comparison indicates that grain sorghum is better than thickly planted field corn for wintering brood cows during the first half of the winter feeding period. Cows grazing grain sorghum made 1.51 pounds average daily gain as compared with 1.23 pounds for comparable cows grazing thickly planted corn. The grain sorghum gave 78 cow-grazing days per acre while corn gave only 61 grazing days. These results were obtained where dwarf type combine sorghum was planted in the normal manner but where field corn was planted twice as thick as is ordinarily planted for optimum grain production. The corn and sorghum yields as determined by random sampling were 25 bushels per acre for each of the two crops. The cattle wasted a quantity of grain that could have been picked up by pigs. Considerable corn grains fell to the ground while the cows were eating the small ears. A good portion of the sorghum grains passed through the cows undigested. In addition to the 25 bushels of grain, the corn produced approximately 1,000 pounds of stover, while grain sorghum produced approximately 2,000 pounds of stover per acre. In neither case was all of the stover consumed by the cattle.

FOREST RANGE GRAZING STUDIES

Studies on the Range Grazing Project at Alapaha, Georgia, and at other points in the State are in cooperation with the United States Forest Service, the Bureau of Plant Industry, and the Bureau of Animal Industry, of the United States Department of Agriculture. Problems in cattle management, forest range management, and reseeding practices on the range are being studied.

These studies are of interest to owners of both timber and cattle. Timber owners are interested in the possibility of planting more palatable forage plants on fire lanes. These lanes, when closely grazed, will provide barriers to wild fires. Effective barriers might yield an annual profit through cattle instead of an annual expense as do most fire lanes. Timber owners are interested also in more economical means of using cattle for an annual income from poorly stocked and newly cut over areas that will not yield much income from timber for several years. Moreover, cattlemen have long been interested in range forage improvement realizing that increasing the grazing capacity of forest ranges will continue to expand an important cattle industry in the Southeast.

Revegetation on Forested Lands: Good stands of Common Bahia, Pensacola Bahia, Dallis grass, and carpet grass have been successfully established on the poorly drained Plummer and Leon soils of the Georgia flatwoods. The Bahia grasses, Common and Pensacola, also have responded well on the better drained Tifton and Norfolk soils. Common lespedeza continues to be the most promising summer legume for grazing in the flatwoods section. Nematode infestation, however, may limit growth of this legume on well-drained sandy soils. Applications of lime and complete fertilizers
are essential for the successful establishment of all of the improved legumes on the forest range. The legumes, white Dutch clover and common lespedeza, do not require a seedbed prepared by tillage. Good stands have been secured by controlled burning an area, applying lime and fertilizer, and seeding the legume at the opportune season. Most of the improved grasses, however, require a prepared seedbed for successful establishment on forest ranges. Best stands of Bahia grass, Dallis grass, and carpet grass were found on land that was disked to remove the competition of native grasses and shrubs. Although all improved grasses were successfully established without lime or fertilizer, the application of fertilizer and in some cases lime increased their growth materially. Close grazing seems to benefit the plants during their establishment, possibly by lessening disease infestation and competition from wire grasses.

During the fall, six new experiments were begun on the Alapaha Experimental Range near Alapaha and on the Walton Forest near Cordele. These studies were designed to ascertain information on the following:

1. The effect of chemical sprays on the eradication of noxious shrubs from forest ranges.

2. The optimum time of the year for controlled burning of wiregrass ranges to establish promising legumes.

3. The effects of different ratios of nitrogen, phosphorus, and potassium fertilizers on the growth of white clover-Dallis grass mixtures.

4. Beneficial effects of adding minor element mixtures to the usually complete fertilizer applications.

5. The effect of tree canopy density on the growth of clover-grass mixtures.

6. The optimum amount of fertilizer required and the frequency it should be applied for the best growth of improved forages on forest ranges.

The Use of High Protein Meal as a Supplement to Grazing on Native Forest Range: Two systems of supplement feeding were found to be practicable on native forest range in a 5-year study set up to evaluate the practice of feeding a high protein meal. The first system consisted of feeding either cottonseed or peanut meal at the rate of 1 pound per head daily on range from about the middle of October to the first of February. At this time the cattle were removed from the range to a feed lot and received a ration composed of 2 pounds of protein meal plus 25 pounds of chopped sugarcane per cow daily. From about the middle of March until mid-October the cattle grazed on range without any supplementary feed.

The second system provided for feeding cottonseed or peanut meal at the rate of 2 pounds per head per day from mid-October to the middle of March. No harvested roughage was fed, but the cows
were placed in a special winter pasture from the first of February to the middle of March. Approximately three to four acres of native range per cow was used during this 6 weeks grazing period. This range was not grazed during the summer.

Several features were common to both systems of management. Some of these were (1) access to mineral mixture at all times, (2) controlled burning of sufficient area to provide five to seven acres of freshly burned range each year, (3) deferred spring grazing until forage was adequate on freshly burned range (usually 6 to 8 inches high), (4) limited breeding season (May and June), and (5) weaning calves at the end of the unsupplemented grazing season (mid-October).

Each of the two systems resulted in practically eliminating death losses due to starvation and insuring a 50 per cent calf crop with calves averaging about 280 pounds at 8 months of age, and in maintaining body weight of brood cows over a period of years. A choice between the two systems of management should be largely determined on the basis of adaptability of each to any particular form of range layout. Any slight advantage in returns from the second system might be offset by the expense of maintaining the special wintering pasture.

NOTE: Details of this 5-year study will be found in Georgia Coastal Plain Experiment Station Mimeograph Paper No. 56.

DAIRY CATTLE

Crimson clover, vetch, oats, and Abruzzi rye planted in early October provided considerable grazing during the early winter of 1947-48. Five acres of oats, vetch, and crimson clover furnished 10 cows 2 hours’ grazing daily from November 10 to December 7, while an equal acreage of Abruzzi rye, vetch, and crimson clover furnished almost as much grazing for the same period. Due to excessive wet and cold weather, very little grazing was furnished by either mixture between December 7 and February 17. The oats combination furnished approximately 20 per cent more grazing during the entire grazing period (November 10 to April 20) than the Abruzzi rye mixture. The former mixture supplied about 70 grazing days per acre while the latter furnished approximately 56 grazing days. These mixtures are two of several being tested in the development of a year-round grazing system for dairy cattle.

Dehydrated Feeds an Aid to High Milk Production: There was not a great difference in the value of soybeans, corn, cowpeas, and grain sorghum when the whole plant was dehydrated artificially and fed as a roughage to dairy cattle as indicated by one year’s result. Four comparable groups of four cows each were full-fed these roughages for a period of four weeks. In addition, the cows were fed a grain mixture, corn silage, and cowpea hay.

The consumption of these dehydrated feeds per cow for the four-weeks period was 152 pounds for the corn group, 161 pounds for
Oats, Italian ryegrass, and crimson clover provide ideal winter grazing for the Station dairy herd. Note irrigation in background.

the soybean group, 182 pounds for the cowpea group, and 189 pounds for the grain sorghum group. The average milk production per cow for the groups was 774 pounds, 763 pounds, 740 pounds, and 772 pounds, respectively. As a check, a fifth group of cows was fed a mixture of 83 parts by weight of ground peanut hay and 17 parts of molasses. This group consumed 179 pounds per cow and produced 793 pounds of milk for the period. A chemical analysis of the feeds used in this test is given in Table 8.

The feeds were harvested in the following stages of growth: the cowpeas were blooming and had only a few young pea pods formed; the soybeans were in full bloom, and the grain sorghum and corn were in the milk or dough stage.

A seven-day palatability study with these four dehydrated feeds showed corn to be the most palatable and cowpeas to be the least palatable. Dehydrated sorghum was almost as palatable as corn, with soybeans about midway between sorghum and cowpeas. Forty cows were used in the palatability test. When the dehydrated feeds
were full-fed, silage consumption dropped from 30 to 15 pounds per cow per day. Milk production increased slightly for all four groups.

**TABLE 8**

CHEMICAL ANALYSIS OF FEED SAMPLES

<table>
<thead>
<tr>
<th>Feed</th>
<th>Moisture</th>
<th>Crude fiber</th>
<th>Crude protein</th>
<th>N-free extract</th>
<th>Fat</th>
<th>Calcium</th>
<th>Phosphate</th>
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</thead>
<tbody>
<tr>
<td>Soybeans—dehydrated</td>
<td>11.18</td>
<td>31.90</td>
<td>13.93</td>
<td>43.61</td>
<td>3.18</td>
<td>1.12</td>
<td>0.23</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn—dehydrated</td>
<td>10.99</td>
<td>27.65</td>
<td>6.22</td>
<td>59.23</td>
<td>2.26</td>
<td>0.36</td>
<td>0.19</td>
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<td>whole plant</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cowpeas—dehydrated</td>
<td>10.82</td>
<td>25.38</td>
<td>18.70</td>
<td>40.44</td>
<td>3.94</td>
<td>1.70</td>
<td>0.28</td>
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<tr>
<td>whole plant</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum—dehydrated</td>
<td>10.51</td>
<td>23.75</td>
<td>6.39</td>
<td>62.33</td>
<td>1.90</td>
<td>0.44</td>
<td>0.18</td>
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<tr>
<td>whole plant</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut hay and molasses</td>
<td>13.40</td>
<td>39.60</td>
<td>9.89</td>
<td>40.68</td>
<td>2.33</td>
<td>0.98</td>
<td>0.16</td>
</tr>
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</tbody>
</table>

Note: All results calculated to moisture-free basis.
SWINE INVESTIGATIONS

Pigs Self-Fed Shelled Corn When Hogging-Off Mature Oats Make Greater Gains than Pigs Hogging-Off Mature Oats Alone: A group of 40-pound pigs hogging-off mature oats for 70 days beginning May 15, 1947 made an average daily gain of 1.12 pounds when self-fed shelled corn in addition. A comparable group made an average daily gain of .70 pound when on oats alone. Both groups were fed equal amounts of protein supplement. The corn-fed pigs consumed 235 pounds of corn, 77 pounds of protein supplement, and hogged-off 73 pounds of oats to produce 100 pounds of gain, while pigs on oats alone consumed 122 pounds of protein supplement and hogged-off 338 pounds of oats to produce 100 pounds of gain. A third group fed a limited amount of corn consumed 145 pounds of corn, 95 pounds of protein supplement, and hogged-off 209 pounds of oats to produce 100 pounds of gain. The third group on limited corn feeding made an average daily gain of .90 pound which was about

Hogging-off crops provide cheap feed and promote sanitary practices. Here, purebred pigs are hogging-off mature oats. Over an eight-year period, hogs grazing mature oats gained 306 pounds per acre at this Station.
midway between the first and second group. Pigs hogging-off mature oats and fed only protein supplement produced 422 pounds of liveweight gain per acre.

**Cracked Shelled Corn is Superior to Ground Snapped Corn for Hogs:** Thirty-nine pigs averaging approximately 120 pounds in weight made an average gain of 1.58 pounds per day for 50 days when full-fed cracked shelled corn and protein supplement, while comparable pigs full-fed ground snapped corn (whole ear corn, including shuck) and protein supplement made an average daily gain of 1.04 pounds. Pigs on cracked shelled corn consumed 393 pounds of corn and 69 pounds of protein supplement to produce 100 pounds of liveweight gain. The ground snapped corn group consumed 627 pounds of corn and 111 pounds of protein supplement to produce 100 pounds of gain. This one year’s test indicated that pigs self-fed a mixture of 85 parts of cracked shelled corn and 15 parts of protein supplement in dry lot will make 52 per cent faster and 36 per cent more economical gains than similar pigs full-fed a mixture of 85 parts of fine ground snapped corn and 15 parts of protein supplement. With cracked corn valued at $3.90 per 100 pounds and ground snapped corn valued at $2.80 per 100 pounds, the cost of producing 100 pounds of gain from pigs fed ground snapped corn was 23 per cent greater than from pigs fed cracked shelled corn.

**Management of Brood Sows — Spring 1947 to Spring 1948:**

1. **Spring Litters 1947.** The spring litters of pigs were farrowed from February 7 to February 28. The sows were placed in the farrowing lots four days prior to farrowing and remained there until the pigs were weaned on April 23. The farrowing lots had been seeded to oats in the fall of 1946 and ample grazing was available. Just prior to and immediately following farrowing, the sows were fed a limited ration. Thereafter, they received a liberal ration of shelled corn and protein supplement. The pigs were creep-fed shelled corn and protein supplement.

2. **Gestation Period — Spring and Summer 1947.** Breeding of the brood sows and the gilts that were added to the herd was completed from April 17 to May 6. Following breeding, the sows and gilts were transferred to a field of mature oats. They were fed ½ pound of protein supplement per animal daily during the gestation period. By July 15, the animals had practically completed hogging-off oats. At this time, the gilts and thinner sows were separated from the group and fed a limited amount of shelled corn. Hogging-off oats is considered a good feeding practice with brood sows. The animals gain the desired amount in weight without becoming excessively fat. Volunteer native vegetation in the oat field furnishes ample palatable grazing. The sows acquire plenty of exercise in hogging-off the grain, and labor is saved in feeding.

3. **Fall Litters 1947.** The fall litters were farrowed from August 9 to August 27. The sows were managed similar to the spring litters. Cattail millet was planted four weeks in advance of farrow-
ing which furnished sufficient grazing. The fall litters were weaned on October 24, 1947.

4. Gestation Period — Fall and Winter 1947-48. Following breeding (October 20 to November 2) the animals were used to glean a corn field which had been harvested with a picker. On December 29 they were transferred to a field of sweetpotatoes where they remained until January 16, 1948. From January 16 until they were returned to the farrowing lots on February 9, a limited amount of corn was fed. The sows were fed ½ pound of protein supplement as long as grazing was available and 1½ pounds thereafter.

SWINE PARASITE INVESTIGATIONS

The Swine Parasite Laboratory in cooperation with the Animal Husbandry Department continued investigations outlined in the preceding annual report. The results of these investigations are reported below under the appropriate headings.

Infection with Internal Parasites Causes Unthriftiness and Poor Utilization of Feed: Spring pigs farrowed and maintained after farrowing on an unsanitary lot for the fourth consecutive year reached a final market weight of approximately 210 pounds four weeks later than similar pigs farrowed on clean soil from which feces were removed daily. The decrease in the growth rate of the infected pigs occurred before they attained a weight of 30 pounds. The average number of internal parasites recovered from the pigs in the unsanitary lot was 9,538 as compared to 7,321 in 1946. The average number of parasites recovered at slaughter from the pigs in the clean lot was 482. The results of this experiment corroborated those of 1946 in that the pigs in the unsanitary lot required .5 pound more feed per pound of gain than was required by pigs in the clean lot.

Two species of nodular worms, stomach worms, and lungworms were recovered in greater numbers from the pigs in the unsanitary lot than in 1946. The number of large roundworms, intestinal threadworms, and liver lesions due to the larvae of the large roundworms and the kidney worm was approximately the same as was found in 1946. The red stomach worm (*Hyostrongylus rubidus*), the nodular worm (*Oesophagostomum brevicaudum*), and the whipworm (*Trichuris suis*), were not found, although these parasites had been present in 1946.

Small Increase in Number of Internal Parasites Harbored by Pigs Occupying for the Sixth Consecutive Summer a Previously Clean Area: Twenty-four pigs were autopsied from a group hogging-off various field crops during the summer season of 1947. The average number of internal parasites recovered post mortem from this group was 4,249 compared with 4,187 the previous year. This increase is small as compared with previous years.

More large roundworms, thornheaded worms, lungworms (*Meta-
Strongylus elongatus), nodular worms, stomach worms, and whipworms, were found in these pigs than were found in 1946. Fewer lungworms (Choerostrongylus pudendotectus), intestinal threadworms, and lesions due to kidney worm larvae in the liver were found in these pigs than in those autopsied in 1946. No adult kidney worms were found in the kidney fat or kidneys of these pigs.

**Sodium Fluoride Was Found to be a Good Anthelmintic for the Removal of Large Roundworms from Swine Under Field Conditions When Properly Administered:** The results of this experiment show that early treatment of pigs with sodium fluoride (ordinary cockroach powder) administered in the feed at the rate of 1 per cent by weight of the quantity of feed the pigs will eat in a 24-hour period is effective in removing large roundworms from the digestive tract.

The pigs were treated when they were about seven and again when they were about 13 weeks old. They ate about .3 pound of the ground corn-sodium fluoride mixture per pig at the first treatment and approximately two pounds of the medicated feed per pig at the second treatment. No other treatments were given. A few days after the second treatment the treated and untreated pigs were each divided into two groups. One treated and one untreated group were put on a green oat pasture, and a treated and an untreated group were confined to small bare lots.

Each treatment resulted in an immediate marked reduction in the number of large roundworm eggs passed per gram of feces as compared to that passed by the untreated pigs. The treatment also retarded the rate of reinfection as determined by the number of eggs per gram of feces passed by the pigs. The maximum number of large roundworm eggs passed by the treated pigs on pasture was only 23.23 per cent of that passed by the untreated pigs on pasture. Although the treated pigs in the bare lot passed a maximum of 91.54 per cent of the number of roundworm eggs passed by the untreated pigs similarly confined, this maximum occurred 12 weeks later when the pigs were 85 to 100 pounds heavier, and they were thus more able to combat the effects of the infection. The larger number of roundworm eggs passed by the treated pigs in the bare lot as compared to the number passed by the treated pigs on pasture was probably due to the more favorable conditions for infection on the small area to which they were confined.

No other species of parasite was affected by the treatment administered.
ANIMAL DISEASE INVESTIGATIONS

Diagnostic Service: The diagnostic service made available by this department has been utilized to an increasing extent by farmers and their veterinarians during the past year. Specimens were received from 217 farms for diagnostic assistance in disease outbreaks or routine tests in disease control. In many cases, this assistance enabled veterinarians to make a diagnosis in outbreaks of disease where the symptoms were indefinite and thus save animals that otherwise would have been lost.

Investigation of “Summer Itch” of Mules: The symptoms and course of this disease were described in the 27th annual report. The cause is thought to be the presence of larval worms in the skin. The parents of the larvae are called Onchoerca cervicalis and usually live in the large ligament of the neck.

During the past season for this disease, attempts at treatment have been undertaken. A new drug that has been very successful in the treatment of a similar disease of humans was tried.

Two of three mules treated at the recommended dosage rate for two weeks appeared to be temporarily cured of the infection. Their coats became smooth and sleek and no parasites were found in the skin. However, at the end of three months symptoms of the disease returned and the larvae were again found in the skin. Apparently, the immature parasites were destroyed but the adults were not.

A second trial of the drug using a longer dosage period was completed but it will not be possible to evaluate the results until the summer of 1949. Therapeutic trials will be continued.

The parasites considered to be the cause of this condition were found in the skin of normal animals. Investigation of the sensitivity of normal and diseased animals to this parasite is planned.

Investigations of Hyperkeratosis (X-Disease) of Cattle and Dystrophic Rhinitis (Sneezing Disease) of Swine: The causes of these diseases are unknown. Attempts were begun in the spring of 1948 to isolate viral agents from cases of these diseases. This work is not ready to be reported as yet and is being continued.

Mastitis Control Program: By continued application of the mastitis control program outlined in Mimeograph Paper No. 41 from this Station and sale of chronic cases as replacements became available, mastitis has been controlled in the Georgia Coastal Plain Experiment Station dairy herd.

The service of testing milk samples for mastitis has been continued. Eight hundred and seventy samples from 50 dairies were tested during the year.

In order to eliminate mastitis from a herd of cattle, it is necessary to know which cows are affected. Sterile tubes containing a preservative can be obtained free of charge from this department
by veterinarians and dairymen wishing to control mastitis in their herds.

**Baby Pig Disease:** A project on the study of a so-called "baby pig disease" was started during the spring farrowing season of 1948. Some very interesting observations about the cause of baby pig losses have been made. Our work indicates that a high percentage of pigs mashed by the sow were probably too sick to get out of her way. This work is being continued.
ENTOMOLOGY

Problems investigated during the year included (1) a continuation of the work on control of pickleworm in cucumbers; (2) investigations in the relative efficiencies of the new cotton insecticides in comparison with the standard-used calcium arsenate-nicot ine mixture; (3) further investigations into the control of green peach aphid on tobacco; and (4) general field trials on control methods for outbreaks of the climbing cutworm, Feltia subterranea, and the fall armyworm, Laphygma frugiperda. The usual cotton insect survey was conducted from June 15 until September 1.

Cucumbers: The work during the current season was an expansion of that of the previous season. Materials tested included gamma benzene hexachloride 3%, DDT 5%, chlorinated camphene (Toxaphene) at 20%, parathion at 1%, and cryolite with 85% to 90% sodium fluoaluminate content.

All materials gave excellent control, reducing infestations below significance among treatments, even in the checks. Under these conditions, it was difficult to evaluate relative efficiencies of the dusts used. Preliminary observations indicated that BHC 3% gamma and parathion at 1% were giving the best control.

No injury from organic insecticides was encountered although all of these organics have been reported causing serious damage in other areas. None, however, are recommended for use on squash.

Tobacco: Work on tobacco was confined to attempts to control the heavy outbreak of green peach aphids, Myzus persicis. Two materials were used both as dusts and sprays—one a specially purified benzene hexachloride 1.5% gamma and the other various concentrations of tetraethyl pyrophosphate.

For plant bed control, the purified benzene hexachloride was used almost exclusively. Attempts to control were made in a few cases using preparations of rotenone and other materials. None gave satisfactory control. The BHC gave the best results of the materials used, but it was exceedingly variable in the degree of control either in plant beds or in the field.

In mid-season, tetraethyl pyrophosphate was used and found to give excellent control where properly formulated and used correctly. A special dust carrying 0.66% tetraethyl pyrophosphate was first used with good success where applied with ground machinery. Airplane dusting was not quite as effective as ground applications, usually requiring two or three applications to insure “clean-up” of the infestation. Somewhat later, various formulations of sprays carrying tetraethyl pyrophosphate were tried with excellent success. The finally recommended formula calls for one pint of 40 per cent emulsion of tetraethyl pyrophosphate to 100 gallons of water applied at the rate of 50 gallons per acre. Care should be taken to get as thorough coverage as possible. Usually, a single application
of this material gave a complete "clean-up" except for small isolated spots easily handled with hand sprays.

The treatment was worked out in conjunction with the Tobacco Pathology Department. It constitutes one of the major accomplishments of the season.

**Cotton:** Very little was accomplished this season in the study of control of cotton insects. A very light infestation in the Coastal Plain area gave little opportunity to study boll weevil control. The earliness of cotton and the lateness of corn threw the usual corn ear worm-bollworm cycle out of time, so that in the Coastal Plain, there was practically no damage from true bollworm. Aphids were light throughout most of the season but were noted in sufficient numbers to be damaging where pure calcium arsenate without nicotine was used to control weevils. All organics gave excellent control of boll weevils and aphids in the Coastal Plain area.

In some areas of the Coastal Plain, considerable damage to bolls was encountered from fall armyworms early in the season. Where Toxaphene at 20 per cent was used, there was good control of this insect. Neither calcium arsenate nor the 3-5-40 mixture of BHC-DDT-sulphur gave satisfactory control of fall armyworms. Reports of unsatisfactory control with Toxaphene came from some areas but apparently complaints were due to a lack of knowledge of just how this poison operates. Such yield data as are available from these areas indicate that good control of weevils and other insects was obtained.

**General Field Crop Insects:** Severe damage, particularly in the southwestern part of the State, occurred from fall armyworms. At Tifton, the insect was not particularly abundant and such work as was done was in the shape of field trials rather than duplicated plat work. Of all insecticides tried, only Toxaphene at 20 per cent concentration gave satisfactory control. A 10 per cent mixture gave fairly good control of small larvae but appeared rather ineffective against larger worms. Good results were obtained on all crops except corn, where the kill was not satisfactory and losses in poisoned fields were very serious, often amounting to practically 100 per cent of the grain crop. Early in the season, a considerable acreage of small corn, knee high or less, was completely ruined by these insects with none of the treatments used giving control. Dosages of 15 to 25 pounds per acre of Toxaphene at 20 per cent are recommended for these insects, the amount depending upon the type of crop involved.

The use of Toxaphene on pastures cannot be recommended because of the "residue" problem. In some cases where the insecticide was used on cattail millet, no effects were noted when cattle were subsequently grazed on the field. Stock should not be pastured on dusted pastures within two weeks of application.

The climbing cutworm, *Feltia subterranea*, also appeared in some numbers in the southwestern part of the State. It did not ap-
pear in the Tifton area and only field experiments were attempted. Toxaphene alone gave satisfactory control. DDT (10%) occasionally gave a good “clean-up”, and where 20% DDT was used at 25 pounds per acre in one field, excellent control was obtained. Except in corn, Toxaphene gave uniformly excellent results when used at 20 per cent concentration and at rates of about 15 pounds per acre. The crops mainly attacked were corn, peanuts, and cotton.

Preliminary experiments in the control of sorghum midge, Contarinia sorhlc;la, on Sudan grass using a dust of 5% DDT gave encouraging results. Further work will be necessary before the exact value of this insecticide in controlling this serious pest can be fully evaluated.

STORED CORN INSECT INVESTIGATIONS

Research work on the development of methods of protecting stored corn and corn products from insects in the Southeastern States was inaugurated during the year. This is a cooperative project of the Coastal Plain Experiment Station and the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture. It is conducted by an allotment of funds to that Bureau under the Research and Marketing Act of 1946, and is directed toward the development of practical control measures.

Insecticides Applied to Seed Corn and Oats: Preliminary laboratory tests involving various insecticidal materials indicate that it is possible to protect shelled seed corn from insect injury for a period of nine months without injuring germination. Further experiments are now in progress for the determination of minimum rates of application. Piperonyl butoxide .1%—pyrethrin .01% mixture in a dust base, applied at the rate of .5% by weight of oats treated, gave excellent control of Angoumois grain moth when the insecticide was mixed thoroughly with the seed oats.

Tests with Fumigants: Several fumigating materials are being compared in a study which includes different rates of applications on husked and unhusked corn. The absorption of the fumigant by the husks in the unhusked corn is great, necessitating a greater rate of application than in husked corn.

Resistance of Field Corn to Rice Weevil Infestation: Studies concerning the resistance of field corn to rice weevil infestation in the field and in storage are now in progress.
HORTICULTURE

In addition to the projects listed below, the Department of Horticulture is cooperating with the Pathology Department in disease control studies in tomatoes, watermelons, cantaloupes, and roses; with the Entomology Department in pickle worm control on cucumbers, and with the Soils Department in a study of minor plant food elements in corn, tomatoes, sweetpotatoes, okra, and snap beans.

SWEETPOTATOES

Sweetpotato Variety Test: A study of the leading sweetpotato table varieties is being continued. Results thus far indicate that Bunch Porto Rico is the most desirable table potato for this area. It is more productive, requires a shorter growing period, has a higher percentage of No. 1 potatoes, is of slightly better color, shape and appearance than the Vining Porto Rico, and, because of its short vines, is less expensive to cultivate and harvest. Unit 1 (also called “Copper Skin”) Porto Rico is considered second in importance as a table potato for the Coastal Plain area.

Sweetpotato — Cooperative Seedling and Variety Tests: This Station is conducting cooperatively with the United States Department of Agriculture and the state experiment stations in the sweetpotato belt a preliminary study of all new varieties and recently introduced seedlings. These studies are for the purpose of determining the varieties and/or seedlings best suited for use (1) in Georgia and (2) in a regional variety test that is being conducted jointly by all cooperating agencies. Greater emphasis is placed on table potatoes, the primary object being to find varieties with both local and regional adaptation that are superior to the kinds now in commercial use, in such characters as increased productivity, higher quality, higher nutritive value, better appearance and disease resistance. As a result of this work, three table varieties already have been introduced under the names Queen Mary, Ranger, and Australian Canner. These varieties, however, are not so good as Bunch Porto Rico for the Coastal Plain area.

Another study, similarly conducted, has as its object the development of varieties better suited for use as a livestock feed. Two varieties in this group—Pelican Processor and Whitestar have either wide regional adaptation or are especially well adapted to particular localities and for that reason have been introduced as new varieties. They are not considered superior to Bunch Porto Rico as a livestock feed for the Coastal Plain of Georgia.

Sweetpotato — Spacing and Rates of Applying Fertilizer Test: In this test the rows are spaced 3½ feet apart, while the drill spacings vary at six-inch intervals from a minimum of 6 to a maximum of 24 inches, and the rate of application of fertilizer varies at 400-pound intervals from a low of 400 to a high of 2000 pounds per
acre for each drill spacing. The test is incomplete but the resulting data indicate that the highest net return may be expected from the 6-inch spacing when the rate of application of fertilizer is 800 pounds or more per acre, although from the 400-pound rate of application the 18-inch spacing is giving the highest net return.

**Sweetpotato — Foundation Seed Stock Production:** The seed stock production program reported in detail in the 1946-47 annual report is being continued and a limited quantity of seed will be available in 1950. Seed stocks of Bunch Porto Rico, Australian Canner, and Whitestar are being increased.

**Sweetpotato Breeding:** The breeding program started in 1946 is being continued. Parental breeding stock with stem-rot resistance and reportedly nematode resistance is being used this year. Selections from Japan and the Tinian Islands have been added to the breeding nursery.

More than 3000 seeds from known crosses were produced last season. From these, some 2000 plants were grown this year.

Thus far, several seedlings with exceptionally high carotene content have been produced. Selections of high yielding ability and stem-rot resistance also have been made.

**MISCELLANEOUS VEGETABLES**

**Watermelon — Variety Trials:** Trials over a two-year period indicate that Black Diamond (also known to the trade as Cannon Ball and Florida Giant) is the most productive and also the largest melon in the test. Seed which were received and planted under the name Cannon Ball produced not only a lighter yield but also a smaller melon. Other high yielding varieties were Blacklee and Dixie Queen. Among the promising new varieties and recent introductions are Georgia Sweetheart, 46-40 (anthracnose resistant), and Wilt Resistant Dixie Queen.

**Tomatoes:** Tests with fruit-setting harmones on fall tomatoes are being conducted. Certain of these materials seem to hold promise of a solution to the blossom-drop problem.

**Snap Bean — Variety Test:** Work with snap beans in 1948 was confined to testing recently developed seedlings and varieties, many of which appear to be more productive than the generally used kinds such as Tendergreen, Giant Stringless Green Pod, Florida Belle, Bountiful, and Logan.

**Lima Bean — Variety Test:** In the 1948 lima bean variety test, the five high producing varieties, listed in order of decreasing yield, are Oklahoma 8-2, Henderson Bush, Clark’s Bush, Peerless, and Early Thorogreen. In a three-year test, Peerless (U. S. 243) has produced the highest average yield, Henderson Bush produced second highest, and Triumph (U. S. 343) third.

**English Pea — Variety Test:** In a three-year test including standard English pea varieties and newly introduced seedlings,
Wando appears to be the best of the named varieties with Thomas Laxton a second choice for this area, although some of the newer seedlings are more productive.

**Sweet Corn — Variety Test:** Because of increased interest in sweet corn in recent years a large number of new varieties are being developed and released annually for testing. It has seemed advisable therefore to include in the Station trials, as many of these varieties as could be obtained. As a result, more than 50 were in test this year. Among the recent introductions that are showing to best advantage are—Oto, Golden Hybrid, Tri-State, Golden Security, Ioana, Seneca Giant, Victogold, Improved Sencross, and D-6795.

**Cucumber — Variety Test:** In a two-year variety test, Producer, Model, Snow’s Perfection, and Earliest of All are among those that have consistently produced high yields.

**Cow Pea — Variety Test:** Table cow pea variety trials were continued in 1948. Data from the two-year test indicate that under the conditions of this test Brown Crowder, Sugar Crowder, Purple Hull, Alacrowder, and Conch are among the most productive of the desirable table varieties and that all the blackeye varieties are shy bearers.

**Cow Pea — Weevil Control:** Work with insecticides in cow pea weevil control has been in progress two years. The resulting data are too incomplete to justify recommendations although there are indications that weevil injury can be considerably reduced by the use of insecticides.

**Okra — Variety Test:** The okra variety test has been in progress two years. In it were included 29 varieties and breeding lines. This study is being conducted for the purpose of finding a better fresh market okra, one better adapted for use in soup, for freezing, and one that possesses nematode resistance.

**VEGETABLE DISEASE INVESTIGATIONS**

The production of vigorous, disease-free tomato plants is of vital importance to the approximately ten-million-dollar South Georgia plant industry and to the producers of the canning crop in the North. In his efforts to produce the type of plant required by the canning industry, the South Georgia plant grower is faced with problems relating to disease control, cultural and nutritional practices, packing methods, and methods of transportation. All of these problems have received and are receiving attention by this Station in an effort to obtain conclusive data on which to base recommendations. The research work of this Station consists of (1) fungicide tests for control of tomato diseases in the field which include tests of many of the more recently developed materials in an effort to obtain fungicides which are more efficacious and at the same time

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1 In cooperation with the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.
more economical than those being used at present, (2) shipping tests to determine effects of various fungicides on plants during transit and their efficacy in the prevention of disease development while the plants are undergoing shipment, (3) laboratory, greenhouse, and field experiments on control of certain soil-borne disease organisms, (4) cooperative field tests of effects of certain insect-eradication practices upon subsequent growth of tomato plants in such treated soil and upon the effect in transit of certain insect-eradication materials when applied to plants immediately before packing and shipping, (5) cooperative tests of nutritional practices and their effects upon the growth and development of tomato transplants, and (6) laboratory studies of pathogenicity, genetic constitution, and other studies of certain of the plant-pathogenic microorganisms.

Statistically significant results were obtained from several phases of the research work this year. In a crop as affected by the vagaries of the weather from season to season as are tomato plants, one cannot afford to draw conclusions on which to base definite recommendations from the results of one or two years data. One can, however, discern the trend indicated and use the information derived from the tests as a foundation for future work. In the case of this year's endeavors it will be possible to carry forward the work established upon this foundation. Also, it will be possible to eliminate some of the material and/or practices tested and replace them with others that have not yet been tested here.

FRUIT CROPS

Peach — Nematode Control Study: A project has been initiated for the purpose of determining satisfactory methods of controlling nematodes in peaches growing in the light soil types of the Coastal Plain area. This work embraces preplanting, chemical soil treatments, and growing nematode resistant cover crops in the orchard.

Pecan — Variety Test: This test, embracing 32 varieties, has been in progress 26 years. Because of the constantly increasing disease menace, many of the one-time commercially important varieties are entirely unprofitable unless protected by spray materials applied in a regular spray schedule. Among the leading varieties that require spray protection are Schley, Success, Mobile, Van Deman, Pabst, Alley, Moneymaker, and Mahan. Varieties that are showing to best advantage in the Station trial grounds and that possess high scab resistance are Farley, Bradley, Stuart, Moore, and Curtis. Other varieties with high scab resistance that are just coming into bearing are Desirable and Brooks.

Pears: A collection of pears is being assembled which includes recent introductions of dessert and blight resistant kinds. In the established planting, Baldwin is still the outstanding variety. Hood shows marked blight resistance but is not equal to Baldwin in quality and is subject to internal break-down before the fruit is mature.
Citrus: Satsuma trees in the trial grounds, now 25 years old, have produced 21 consecutive crops. Some crops have been light because of cold injury but there has never been a complete failure. Owari is the best variety and should be included in all home orchards in the Lower Coastal Plain. Kumquats are equally as hardy while Myers lemon and grapefruit are sufficiently hardy to be grown in the extreme southern tier of counties. All citrus fruits should be grown on Citrus trifoliata stock in this area. The only protection given trees at this Station consists of a 2-foot mound of soil around the base of the tree. It should be placed around the tree in late November and removed in early March.

Tung: As the tung trees in the Station grounds attain age they show increased cold resistance and also greater productivity. The average annual yield over the entire bearing period has been 58.12 pounds per tree, or 3/4 of a ton of nuts per acre annually for the life of the grove. The last ten crops, however, have averaged 1 1/4 tons of nuts per acre annually. This should indicate the yield that can be reasonably expected from a grove in which the trees are spaced 40 feet apart and are given the best cultural treatment.

Chestnuts: Blight resistant chestnuts growing in the trial grounds are vigorous, productive and well adapted, but the nuts generally are of poor quality and cannot be held over long periods except when placed on refrigeration or processed to prevent spoilage.

Muscadine Grape Spacing and Trellising Tests: One acre each of the Hunt and Yuga varieties was set in February of 1945 for the purpose of studying the effect of row and drill spacing and also trellising on yield. Some interesting data have been recorded but the project has not been in progress long enough to warrant recommendations.

During the first growing season the lateral shoots were pinched back when about 12 inches long. This early training resulted in greater growth of the arms along the trellis, with the result that many plants produced arms as long as six feet the first summer. This has resulted in increased production in subsequent seasons.

Muscadine Variety Trials: Yield records are being continued on 34 varieties of muscadine grapes, the first of which were set in 1922. Several new varieties have recently been added to this planting including some of the perfect flowered kinds.

Figs: Plants of 125 varieties and selections of figs have been grown from cuttings and are ready to be planted in the field this winter. Many plants in a small planting which was set in 1946 were so severely injured by cold that the planting has been abandoned.

Blueberry Propagation Studies: Propagation studies with the rabbiteye blueberry are being continued. Results indicate that a mixture of two parts of ground acid peat and one part each of sand and old sawdust is the most satisfactory rooting media for softwood cuttings and that a 1-1-1 ratio of these materials is preferable for hardwood cuttings.
A light application of an acid-forming fertilizer every two weeks after the cuttings are well rooted will result in increased growth.

**Blueberry Breeding Work:** Promising selections from crosses made in 1939 have been increased and are being distributed for the purpose of determining both local and regional adaptation.

Records were taken on 1500 seedlings which fruited for the first time in 1948 and the plants of this number, which possess outstanding qualities were tagged for further observation. Also an additional five thousand seedlings were set in the spring of 1948.

**Dewberries:** Fifteen varieties and selections of dewberries were set in the spring of 1945. Yield records over a two-year period show Thornless Boysenberry to be the most productive, followed in decreasing order of yield by Boysenberry, Youngberry, Austin, and Thornless Youngberry.
Blackberries: Twelve varieties and selections of blackberries are being compared for yield records and general adaptability. Texas Wonder was the most productive the first two seasons followed in order of yield by Wolfe's Dewblack, Early Harvest, Healthberry, Macatawa, and native selections.

Preliminary pruning tests indicate that heading back of laterals increases yield. Removing the tips of the new shoots when they reach a height of about 30 inches results in stouter canes with more fruiting laterals.

**PLANT PATHOLOGY**

The position of General Plant Pathology was established at this Station on October 1, 1947. The projects conducted during the year are not conclusive and cannot be considered a basis for recommendation.

The following plant disease control projects were started:

**Comparison of Fungicides for Control of Watermelon Diseases:** This study was conducted in cooperation with the Department of Nematology. Plots fumigated with dichloropropane and unfumigated plots were each treated with Parzate, Tri-basic copper, Copper Compound A, Fermate, Dithane, and Dithane spray. Very little disease was observed during the growing season and root examination after harvest showed no difference in nematode root knot. Fumigated plots were consistently a little higher in yield except in the check plot where no dust or spray was applied.

**Comparison of Fungicides for Control of Field Tomato Diseases:** This study was conducted in cooperation with the Department of Nematology. Plots fumigated with dichloropropane and unfumigated plots were each treated with Fermate, Tribasic Copper, Copper Compound A, Dithane, Parzate, and Tri-basic Copper Dust. Soil fumigation gave consistent yield increases throughout the experiment. Due to dry weather, disease prevalence was below normal, but spraying or dusting with fungicides gave consistently increased yields over checks. Copper fungicides were better than organic fungicides. Tri-basic Copper, spray or dust, gave the best results.

**Comparison of Fungicides for Control of Cantaloupe Diseases:** This study was conducted in cooperation with the Department of Nematology. Plots fumigated with dichloropropane and unfumigated plots were each treated with Copper Compound A, Fermate, Parzate, Tri-basic Copper, Dithane, and Parzate Dust. Root readings of 162 plants from fumed soil and 159 plants from unfumeted soil showed the unfumid with a significantly greater amount of nematode root knot than the plants from the fumed soil. Fumigation, however, depressed the yield. Some disease was prevalent, but less than that of a normal year due to dry weather. Tri-basic Copper spray gave the best results of any treatment. The other fungicides used gave more significant yield increases or depressed the yield.
Internal Cork of Sweetpotatoes: Several experiments have been run through the year, but results are incomplete as of this date.

Seed Treatment of Blue Lupine: Blue lupine has shown great promise as a winter legume in South Georgia, but diseases have seriously damaged it by killing the plants in the seedling state and also attacking them at maturity. Seed treatment tests were run in the greenhouse during the winter. These tests were not conclusive but indicated that intensive field tests should be conducted.

Comparison of Fungicides for Control of Rose Diseases: Weekly sprays have been applied to a new planting of roses on the Station using several fungicides. Tests will not be completed for several weeks and data are not available at this date.

Production of Inoculum for Testing Corn Inbreds, Hybrids, and Varieties for Disease Resistance: In cooperation with Station Corn Breeding Department. Pure corn disease inoculum was multiplied and produced in bulk quantity.

Production of Disease Inoculum for Testing Cotton Varieties for Disease Resistance: In cooperation with Agronomy Department. Similar to work described in preceding project with corn diseases.

Production of Disease Inoculum for Testing Strains of Sudan Grass for Disease Resistance: In cooperation with Grass Breeding Department.

Production of Disease Inoculum for Testing Sweetpotato Seedlings for Disease Resistance: In cooperation with Horticultural Department.

Testing of Soil Fumigants for Fungicidal Value: Four soil fumigants were tested against cotton wilt organisms. Results indicated chloropicrin and allyl bromide have considerable fungicidal value. Dichloropropane and ethylene dibromide have little practical fungicidal value.

Use of Fungicides in Fertilizers for the Control of Southern Blight: The following materials are being used in a mixture with fertilizers at the rate of 25 pounds per acre: Urea, Copper Compound A, Parzate, Dithane, and Fermate. These materials are used under tomato plants and compared with untreated checks in an effort to control Southern Blight. The experiment is still in process.

CROP IMPROVEMENT

Cooperative Testing: A series of cooperative experiments were conducted on farms in the various sections and on the different soil types of the Coastal Plain area. These tests are conducted in order to determine which varieties are best adapted to each section of the Coastal Plain. A total of sixteen tests were planted with cooperative farmers in nine counties. This included three cotton tests with eight varieties, three peanut tests with five varieties, two small grain tests with seven varieties, five corn tests with seven varieties,
and three pasture grass tests with eight varieties. These tests were located on five different soil types found in South Georgia. The varieties included in these tests were those eligible for certification by the Georgia Crop Improvement Association or were new varieties included to measure their merits against established varieties. A variety of the above crops must prove its worthiness in these cooperative tests before being considered for increase of seed and released for distribution to the farmer.

Additional data is collected to aid in recommending certain varieties for a particular soil type.

A number of farm demonstrations in cooperation with County Agents were made with these cooperative experiments to familiarize farmers with varieties of certain crops.

**Seed Certification:** Assistance was given in cooperation with the Georgia Crop Improvement Association in maintaining the genetic identity and purity of those superior adapted varieties of field crops through certification. Seeds certified are inspected in field and storage, packaged in special bags, and are sealed and tagged to insure their purity and identity.

A total of 3,795 acres of field crops were certified in the Coastal Plain area alone. This acreage included 460 of hybrid corn, 350 of cotton, 1,950 of small grains, and 345 of peanuts. The Association certified 14,550 acres of seeds of all varieties in the State.

Assistance was given in an educational campaign emphasizing the merits of certified seed.

**SOILS**

**Soil Testing:** Soil samples are collected from various plots and experimental areas on Experiment Station property as requested by the different departments of the Station. These samples are tested usually by means of rapid soil tests for available nitrogen, potash, phosphoric acid, calcium, and magnesium. Soil reaction and lime requirement tests are made when needed.

**Soil Studies of Lime Rotation Test:** (Tifton sandy loam, Norfolk sandy loam, Plummer loamy sand): Soil samples are collected periodically to determine the available nitrogen (N), phosphoric acid (P₂O₅), and potash (K₂O) content, the soil reaction, organic matter, and base exchange capacity. Physical soil studies involving the measurement of moisture equivalent and volume weights are also conducted in conjunction with this study. No conclusions can be made at this time.

**Minor Element Test with Corn:** 1. (Ruston sandy loam): This test is located on Greenwood Plantation in Thomas County. Four elements—magnesium, zinc, copper, and boron—are being used as soil amendments to determine the nutritional effect on corn. During the first year of the test (1947 growing season), zinc deficiency showed up early in the growing season, as reported in the 1946-47
Annual Report. Those plots receiving zinc in the form of zinc sulphate at the rates of 2.5 and 5.0 pounds per acre of the elemental zinc showed some indication of a response to zinc fertilization. Yields were slightly higher on those plots receiving zinc, especially at the heavier rate. The same was true of the plots receiving 12 and 24 pounds to the acre of magnesium, as magnesium sulphate, in that the 24-pound rate showed a slight increase in yield. No definite conclusions can be made on this test with only one year's data.

2. (Ruston sandy loam): A test was set up at Greenwood Plantation in Thomas County in which zinc was the only minor element used at rates of 5.0 and 7.5 pounds per acre of elemental zinc, as zinc sulphate. Three hybrid corns—Florida W-1, Dixie 18, and GCP 7073—and two single crosses are included in this test. No conclusions have been drawn.