

---

UNIVERSITY SYSTEM OF GEORGIA  
RAYMOND R. PATY, *Chancellor*

---

TWENTY-SEVENTH  
ANNUAL REPORT  
1946-1947

**Georgia Coastal Plain  
Experiment Station**

GEORGE H. KING, *Director*  
Tifton, Georgia

---

BULLETIN 44

JULY, 1947

---

## REGENTS OF THE UNIVERSITY SYSTEM OF GEORGIA

DISTRICT	REGENTS	ADDRESS
State-at-Large	JOHN J. McDONOUGH . . . . .	Rome
State-at-Large	ALBERT S. HARDY . . . . .	Gainesville
State-at-Large	FRANK M. SPRATLIN . . . . .	Atlanta
State-at-Large	EARL B. BRASWELL . . . . .	Athens
State-at-Large	POPE F. BROCK . . . . .	Atlanta
First	JAMES PETERSON . . . . .	Soperton
Second	H. L. WINGATE . . . . .	Macon
Third	CASON J. CALLAWAY . . . . .	Hamilton
Fourth	C. JAY SMITH . . . . .	Newnan
Fifth	RUTHERFORD L. ELLIS . . . . .	Atlanta
Sixth	MILLER R. BELL . . . . .	Milledgeville
Seventh	ROY N. EMMET . . . . .	Cedartown
Eighth	S. PRICE GILBERT . . . . .	Atlanta
Ninth	SANDY BEAVER . . . . .	Gainesville
Tenth	WILLIAM S. MORRIS . . . . .	Augusta

### OFFICERS OF THE REGENTS

Chairman . . . . .	POPE F. BROCK
Vice-Chairman . . . . .	SANDY BEAVER
Chancellor . . . . .	RAYMOND R. PATY
Vice-Chancellor . . . . .	HARRY L. BROWN
Vice-Chancellor . . . . .	A. HOLLIS EDENS
Executive Secretary . . . . .	L. R. SIEBERT
Treasurer . . . . .	W. WILSON NOYES
Director of Budgets . . . . .	HARRY T. HEALY

## EXPERIMENT STATION STAFF

### Administration

Geo. H. King, Director  
Richard L. Dyer, Comptroller  
Stella C. Sutton, Librarian  
Fred Bell, Supt. of Buildings and Farm  
Elna W. Thornhill, Secretary  
Doris B. Mixon, Secretary

Ell Jean Jordan, Secretary  
Billie Jean Pearman, Secretary  
Christine T. Bridges, Secretary  
Nelda Barfield, Secretary  
Madison R. White, Secretary  
Joyce Towson, Secretary

### Agricultural Economics

L. M. Awtrey, Jr., Economist

### Agricultural Engineering

James L. Shepherd, Agricultural Engineer  
\*\*\* William D. Kenney, Agricultural Engineer

### Agronomy

— S. A. Parham, Agronomist  
J. H. Turner, Jr., Agronomist  
(Cotton Breeding)  
\* Wayne H. Freeman, Agronomist  
(Corn Breeding)  
S. B. Parkman, Agronomist  
(Seed Stocks)  
\* J. G. Jenkins, Sea Island Cotton Specialist  
\* J. M. Carr, Agronomist (Tobacco)  
\* J. G. Gaines, Pathologist (Tobacco)  
\* J. L. Stephens, Agronomist  
(Forage Crops and Pastures)  
\* J. C. Walters, Assistant Agronomist  
(Forage Crops and Pastures)  
\* G. W. Burton, Geneticist  
(Grass Breeding)  
\* H. J. Hodgson, Assistant Agronomist  
(Grass Breeding)  
\* W. A. Carnes, Agricultural Aide

### Animal Husbandry

\* B. L. Southwell, Animal Husbandman  
W. C. McCormick, Asst. Animal Husbandman  
Geo. K. Dillard, Asst. Animal Husbandman  
J. G. Whigham, Farm Superintendent  
\* J. W. Stevenson, Animal Husbandman  
(Range Grazing)  
\* H. H. Biswell, Forest Ecologist  
(Range Grazing) (Resigned March, 1947)  
\* Paul C. Lemon, Forest Ecologist  
(Range Grazing)  
\* A. C. Mathews, Forest Ecologist  
(Range Grazing)  
\* F. E. Knox, Chemist

### Animal Diseases

W. L. Sippel, Animal Pathologist

### Entomology

\* P. M. Gilmer, Entomologist

### Horticulture

Otis Woodard, Horticulturist  
W. T. Brightwell, Assoc. Horticulturist  
S. A. Harman, Asst. Horticulturist  
\* Naomi C. Woodroof, Pathologist  
(Peanut Breeding)  
\* E. K. Vaughn, Pathologist  
(Vegetable Plants)  
\* LeRoy Wheeler, Agricultural Aide

### Nematology

\* J. H. Machmer, Nematologist

### Parasitology

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

### Soils

Robert L. Carter, Soil Scientist

### Shade Tobacco Branch Station Attapulgis

J. L. LaPrade, Agronomist  
E. J. Gibson, Pathologist

---

\* 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.



# CONTENTS

	Page
Introduction . . . . .	7
Weather Data . . . . .	11
AGRICULTURAL ENGINEERING	
Peanut harvesting . . . . .	13
Farm fish pond . . . . .	14
AGRONOMY	
Cotton:	
Varieties . . . . .	14
Fertilizers . . . . .	14
Breeding . . . . .	16
Corn:	
Varieties . . . . .	17
Fertilizers . . . . .	17
Breeding . . . . .	17
Peanuts:	
Varieties . . . . .	19
Fertilizers . . . . .	19
Breeding . . . . .	20
Leaf-spot control . . . . .	20
Small Grains:	
Oat varieties . . . . .	21
Oat grazing . . . . .	21
Wheat varieties . . . . .	21
Tobacco:	
Flue-cured tobacco (agronomy) . . . . .	21
Fertilizers . . . . .	21
Varieties . . . . .	22
Weed control in seedbeds . . . . .	22
Flue-cured tobacco (diseases) . . . . .	22
Survey 1946 . . . . .	22
Blue-mold control . . . . .	23
Root-knot control . . . . .	23
Shade tobacco (agronomy) . . . . .	24
Shade tobacco (diseases) . . . . .	25
Forage Crops and Pasture Experiments:	
Soybeans . . . . .	26
Lespedeza . . . . .	26
Velvet beans . . . . .	26
Kudzu . . . . .	26
Crotalaria . . . . .	26
Rotations . . . . .	27
Cover crops . . . . .	27
Grass breeding . . . . .	27
Permanent and temporary pastures . . . . .	29



# CONTENTS — (continued)

Page

## ANIMAL HUSBANDRY

### Beef cattle:

Dehydrated sweet potato feeding . . . . .	31
Creep-feeding calves . . . . .	31
Sire testing studies . . . . .	31
Wintering brood cows . . . . .	32
Mineral feeding practices . . . . .	32

### Forest Range Grazing Studies:

Herd management on range . . . . .	32
Wintering range calves . . . . .	33
Wintering cows on sugar cane . . . . .	33
Nutrient values of native forage . . . . .	34
Prescribed burning studies . . . . .	34
Improved forage plants tested . . . . .	35

### Dairy cattle:

Use of dehydrated sweet potatoes . . . . .	36
Annual pastures . . . . .	36

### Swine Investigations:

Hogging-off small grain . . . . .	36
Hogging-off runner peanuts . . . . .	36

## SWINE PARASITE INVESTIGATIONS . . . . . 37

## ANIMAL DISEASES . . . . . 39

## ENTOMOLOGY . . . . . 42

## HORTICULTURE

Sweet potatoes . . . . .	46
Soil type studies . . . . .	47
Miscellaneous vegetables . . . . .	47

### Vegetable plant seedbed investigations:

Tomato plant transportation . . . . .	48
---------------------------------------	----

### Fruit crops:

Peaches . . . . .	48
Pecans . . . . .	48
Pears . . . . .	48
Grapes . . . . .	48
Figs . . . . .	49
Blueberries . . . . .	49
Dewberries . . . . .	49
Blackberries . . . . .	49
Citrus fruits . . . . .	49
Tung . . . . .	49
Chestnuts . . . . .	49

## SOILS . . . . . 50

# TWENTY-SEVENTH ANNUAL REPORT

## 1946-1947

### INTRODUCTION

In a world beset by problems, the field of agriculture is no exception. In spite of the progress made through the years because of research, agriculture, today, has many complex problems to solve, problems appearing within the past several years.

New attacks from insects such as the green peach aphis, which during the past two years has learned to chew tobacco; a strain of nematodes flourishing in some sections on the once regarded resistant peanut; the internal cork in sweet potatoes; *Helminthosporium* on oats; the mortality in the increased livestock enterprise; the current necessity of increased production, calling for more work in plant and animal nutrients and in improving varieties and breeds and in finding more productive hybrids, in order to feed a hungry world and to avoid excessive inflation of prices; and what enterprises to substitute on acreage formerly allotted to peanuts and tobacco, are but random examples of new problems confronting the research worker in the Coastal Plain of Georgia. These new problems, together with continued research on old problems, constitute the basis of work of the scientists at the Georgia Coastal Plain Experiment Station.

The work of the Station is divided into several major fields. A brief resume of research being done in each field is given below:

**Agricultural Economics:** This department is finishing its first year. For the year, our Agricultural Economist was loaned to the Georgia Better Farms Corporation. At the Station his work has consisted for the most part in working out costs and returns from various farm practices.

**Agricultural Engineering:** One of the major problems of the peanut belt is harvesting and curing. During the harvesting season, which, under ordinary practices is extended over a period of several weeks, unfavorable weather can mean the loss of millions of dollars to the peanut producer. Methods of harvesting based on the combine principle, together with mechanical curing, can reduce the hazards to a minimum by reducing the time required. The Department of Engineering at the Station, in cooperation with other agricultural units of the University System of Georgia, the United States Department of Agriculture, and various machinery companies, is working out methods to achieve the goal of shortening the season by the use of improved harvesting machinery and mechanical curing. This department also is doing work in irrigation and tobacco curing.

**Agronomy:** The research work being carried on by our agronomists is listed by enterprises.

**CORN:** High nitrogen applications continue to show excellent results in the fertility tests. An expanded program of corn breeding is being carried on in cooperation with the United States Department of Agriculture and the Greenwood Plantation at Thomasville, Georgia. Placed on trials for the first time was the new yellow hybrid, Georgia Coastal Plain 6001, now known as Dixie 18. This is the most satisfactory hybrid corn yet developed for the Coastal Plain area. Tests conducted in various parts of the area showed an average increase in yield of approximately 15 per cent above the next best yielder.



Weevil resistance is fair and the stalk is especially resistant to lodging.

The corn project as carried on by the Station and Greenwood Plantation is declared by specialists of the United States Department of Agriculture to be the outstanding corn breeding project of the Southeast. The Plantation gives the Station unstinted support in its breeding program and then through its own increase program is assuring the farmer an ample supply of certified seedstock.

**COTTON:** Fertilizer and variety tests are conducted on cotton. A breeding program with both upland and Sea Island cotton is being conducted.

Pandora, a new wilt resistant cotton for the Coastal Plain, was planted on a large enough area to furnish three communities with seed for the next planting season.

Sealand, a new long stapled upland, developed by the United States Department of Agriculture in South Carolina, was grown on 40 acres in Berrien County. It is hoped that this cotton will be profitable enough to become a new enterprise in this area. It certainly has possibilities of being a new enterprise to take up some of the acreage relieved from peanuts and tobacco.

It is possible that the entire fertilizer tests of this Station and other experiment stations will have to be revamped to meet the increased efficiency of some of the new insecticides. With insecticides developed which control both lice and boll-weevil more efficiently than any insecticides of the past, the upper limits of profitable fertilization may be raised and yields achieved not thought possible since the advent of the boll-weevil. The Station is working with these new insecticides.

**FORAGE CROPS AND PASTURES:** Breeding and testing of various forage crops and grasses continue. Cheap feed continues to be the limiting factor in profitable livestock production. Through the development of high producing pastures and the use of forage crops of high yielding capacity, the livestock enterprise can be profitable even with reduced prices for livestock. If the livestock enterprise is to remain in a healthy condition, pastures must be improved and high production of forage crops secured. Our agronomists are working with the animal husbandmen to achieve these results.

**PEANUTS:** This number one cash crop of South Georgia presents many problems. Disease control, soil conservation, insect control, variety improvement, proper fertilizing, seed treatment, cultural practices, and harvesting are some of these. Much progress is being made at the Station in solving these problems.

**SMALL GRAINS:** Tests are conducted on oats, wheat, rye, and barley. During the season oats were attacked by *Helminthosporium*. It was observed that the standard Rustproof varieties overcame this disease more readily than other varieties. The Station-selected oat, Rustproof 14, as a result of this, is gaining in popularity.

**TOBACCO:** Research is conducted with both flue-cured and shade tobacco. Fertilizers, varieties, and rotations are tested. The control of insects and diseases is studied. Significant is the more efficient control of blue-mold in tobacco beds. Present fungicides make it possible for every tobacco grower to produce his own plants. This is most important since during the present year



mosaics formerly not found in Georgia were introduced by farmers purchasing plants from Florida. The presence of the green peach aphid on tobacco during the past season intensifies the danger from diseases. Also during the year, "outlaw" varieties of tobacco were prevalent over the belt, emphasizing the need of care in selecting the variety and choosing a reliable source of seed.

**CROP IMPROVEMENT:** During the year one worker was added to cooperate with the Georgia Crop Improvement Association. This worker conducts tests with the different varieties of various crops in several localities in South Georgia. He also assists in certifying seed of the various crops. No work is more important than the promotion of certified seed of better varieties, and this work will be expanded as rapidly as possible.

**Animal Husbandry:** South Georgia, with approximately four-fifths of the hogs and three-fourths of the beef cattle of the State, has become a leading livestock section. The Animal Husbandry Department has grown with the industry and endeavors to meet the problems of the farmer through its research work. Feeding, breeding, and management studies are conducted with beef cattle, hogs, and dairy cattle.

**Animal Diseases:** Diagnostic service is rendered the veterinarians of the State, and research work is carried on by this Department. During the year, epidemics of serious proportions have been prevented by early diagnosis. Research work is being conducted with various diseases for which there is, thus far, no specific remedy.

**Entomology:** This department is working with many of the new insecticides being developed. Splendid results in the control of the velvetbean caterpillar by the use of DDT have been secured. Comprehensive tests are also being conducted on the various organic insecticides on cotton insects.

**Horticulture:** This department conducts research work with fruits, nuts, and vegetables grown in South Georgia. An extensive breeding program is being carried on with sweet potatoes in an effort to secure varieties resistant to internal cork. Breeding work is being done with blueberries. The Station has the largest collection of known varieties of blueberries in the Southeast. Some of the blueberry hybrids developed, such as 11-182, show great promise.

**Nematology:** Research is conducted on the control of the root-knot nematodes. New nematocides show splendid results on enterprises of high acre value. Rotations have been developed which keep nematode damage to a minimum.

**Parasitology:** Parasitic hogs are responsible each year for large losses, both during feeding and at marketing. This department is working with various chemicals and management practices in order to reduce these losses to a minimum.

**Soils:** The Department of Soils, a relatively new department at this Station, works closely with other departments in an effort to determine soil changes taking place as a result of different practices and rotations.

The following publications have been released during the year:

## BULLETINS

No. 43—Twenty-sixth Annual Report, 1945-1946.

## MIMEOGRAPH MATERIAL

No. 48—Centipede Grass for Lawns.

No. 49—Tomato Spray Schedule.

No. 50—Curing Flue-Cured Tobacco.

No. 51—Infectious Dystrophic Rhinitis of Swine Appears in Georgia.

TABLE 1.  
RAINFALL IN INCHES BY MONTHS AND YEARS FROM 1923 TO 1946 INCLUSIVE

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1923	7.04	1.97	5.24	1.38	4.67	8.87	4.51	4.14	1.05	.58	2.01	2.17	43.63
1924	5.77	4.43	4.82	5.41	1.52	6.50	5.43	3.21	12.01	1.01	.26	6.63	57.00
1925	8.76	2.37	.69	1.28	2.88	6.00	3.34	1.94	2.91	6.63	2.93	4.65	44.38
1926	11.02	4.66	8.30	3.55	3.35	2.88	7.56	4.20	2.86	1.13	4.02	2.39	55.92
1927	.38	2.93	2.93	2.58	.66	8.40	6.70	9.66	.74	.55	.92	7.70	44.15
1928	1.36	7.39	5.55	11.57	3.41	4.27	7.93	18.36	6.72	.40	1.11	2.48	70.55
1929	5.11	4.45	6.19	3.69	2.34	7.04	4.87	3.29	6.41	3.31	4.16	4.36	55.22
1930	5.41	2.56	5.70	5.95	1.20	7.22	5.62	3.82	3.78	.23	2.84	3.72	48.05
1931	2.54	2.75	2.84	2.92	3.24	2.48	7.11	4.77	1.56	1.47	.00	2.73	34.41
1932	6.06	2.24	3.50	1.82	3.68	3.63	4.79	7.51	5.47	5.00	2.81	1.83	48.34
1933	4.47	6.14	5.20	4.44	2.08	4.33	9.32	2.74	3.98	.14	.78	1.32	44.94
1934	2.09	3.38	6.17	1.71	12.42	3.43	3.23	6.21	1.51	2.39	.80	1.92	45.26
1935	2.41	5.15	2.61	2.33	2.78	.13	11.58	4.69	6.01	.04	2.36	2.02	42.11
1936	5.27	5.18	3.17	7.87	1.40	2.84	2.35	8.93	.80	4.03	.20	4.42	46.46
1937	5.55	4.80	4.83	6.52	.65	3.88	7.76	8.41	4.13	2.92	3.26	1.19	53.90
1938	2.42	1.24	1.95	2.43	2.39	4.22	2.92	2.17	2.46	1.01	.58	2.41	26.20
1939	3.18	10.86	1.73	7.44	2.54	5.94	2.87	10.05	4.22	.00	.81	2.94	52.58
1940	2.77	4.26	2.85	4.03	1.37	5.46	11.02	5.25	1.63	.79	3.76	1.83	45.02
1941	1.74	2.26	4.92	1.56	1.15	8.01	5.99	2.35	3.24	.99	.58	5.96	38.75
1942	5.02	4.15	5.64	2.07	5.06	6.59	3.18	4.75	4.78	.79	.84	4.19	47.06
1943	3.98	1.50	3.94	2.81	7.58	6.67	2.93	6.42	2.22	.00	1.36	3.03	42.44
1944	4.90	5.19	14.33	8.40	3.01	2.19	6.91	5.46	3.98	2.81	1.96	.98	60.12
1945	3.94	3.24	2.33	7.32	1.52	1.99	14.66	4.16	3.18	1.65	.96	7.78	52.73
1946	4.84	2.01	5.00	2.64	3.82	6.29	8.94	3.83	1.66	2.05	.81	.36	42.25
Average 24 Years	4.42	3.97	4.61	4.24	3.11	4.97	6.30	5.68	3.63	1.67	1.67	3.29	47.56



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 1946, INCLUSIVE.**

<i>YEAR</i>	<i>Last Killing Frost in Spring</i>	<i>First Killing Frost in Fall</i>	<i>Number of Growing Days</i>
1923.....	March 20	November 10	235
1924.....	March 17	November 26	254
1925.....	March 3	November 23	265
1926.....	March 16	November 11	240
1927.....	March 5	November 18	258
1928.....	February 21	November 21	273
1929.....	February 23	November 30	280
1930.....	March 4	November 1	242
1931.....	March 5	*	301
1932.....	March 15	November 13	243
1933.....	March 5	November 9	249
1934.....	March 12	November 13	246
1935.....	March 2	November 25	268
1936.....	February 20	November 26	279
1937.....	March 17	October 24	221
1938.....	February 26	November 25	272
1939.....	February 24	November 28	277
1940.....	April 13	November 15	216
1941.....	March 18	November 26	253
1942.....	February 28	November 12	257
1943.....	April 15	November 10	209
1944.....	March 21	November 22	246
1945.....	February 10	November 5	268
1946.....	February 10	December 3	296
Averages.....	March 9	November 20	256

\* No killing frost in the fall of 1931.

TABLE 3.

**TEMPERATURE BY MONTHS FOR THE YEAR 1946**

<i>MONTH</i>	<i>Average</i>	<i>Average Maximum</i>	<i>Absolute Maximum</i>	<i>Average Minimum</i>	<i>Absolute Minimum</i>
January.....	50.5	60.5	79	40.4	26
February.....	53.6	66.9	76	40.2	32
March.....	62.4	74.4	84	50.4	37
April.....	68.0	80.9	89	55.0	42
May.....	73.2	83.9	90	62.5	51
June.....	78.4	89.8	95	66.9	54
July.....	80.2	89.5	95	70.8	65
August.....	80.0	89.9	95	70.0	62
September.....	75.6	85.7	92	65.4	60
October.....	67.6	80.2	89	54.9	44
November.....	62.7	72.8	87	52.6	35
December.....	53.9	69.5	81	38.2	28

## AGRICULTURAL ENGINEERING

**Peanut Harvesting:** As a prelude to intensive studies toward complete mechanization of peanut harvesting, limited studies were conducted for the purpose of establishing some preliminary conclusions of fundamental significance.

Of particular significance were tests involving the removal of peanut vine tops as a high-quality livestock feed prior to harvesting the peanuts. The variety of peanuts used in the tests is known to this Station as Improved Spanish No. 205. Using a tractor with a regular cutter bar mowing attachment, approximately one-half the mass of tops were mowed by cutting level with row beds. The tops were windrowed with a side-delivery rake and, after curing, were loaded from the windrow onto a wagon with a rake bar hay loader and treated as conventional hay. The operations of harvesting the tops caused no apparent damage to the peanuts.

After the tops had been removed for six days the peanuts in stubble form were dug with conventional tractor-mounted digger blades. Immediately after digging they were windrowed with a regular 3-bar side-delivery rake which was only about 90 per cent efficient in gathering the stubble vines and nuts into the windrow.

The rake bar hay loader was used in an attempt to load the green peanuts and stubble vines on a wagon for hauling. This was not successful as the loader would choke under the weight and density of the material. The loader was abandoned and the loading was done manually with forks. From the wagon the green mass was stored in sheds for curing under normal atmospheric conditions. The sheds were of special portable types; of light open frame construction; mounted on timber skids; provided with hog wire flooring and center vents; employing metal roofing on one and canvas tarpaulins on others. Sheds ranged in size from 12' x 14' x 9' (height) to 10' x 12' x 9' (height). The storage capacity of the largest shed was two acres. After the normal curing period, the peanuts were picked with regular pickers employing both types of fundamentally different principles. Satisfactory results were obtained in picking and in quality of the finished peanuts.

Checks were made against conventionally stacked peanuts and only mill grading obtained. Field germination was satisfactory.

**PRELIMINARY CONCLUSIONS:** 1. Under similar moisture conditions, Spanish peanuts as dug cure as well stored in covered sheds of certain size and design as in conventional stacks, producing a product of higher mill grade due to absence of direct weathering.

2. Peanut vine tops, harvested prior to digging peanuts, produce a clean, high quality hay.

3. Removal of peanut vine tops greatly reduces the storage requirements for the peanuts to be cured in stubble form.

4. Removal of Spanish peanut vine tops as much as one week in advance of digging causes no appreciable damage to quality and quantity of gatherable nuts.

5. Removal of Spanish peanut tops does not lower the efficiency of at least



two of the most common conventional pickers.

6. The three-bar, side-delivery rake with 4-inch tooth spacings will not satisfactorily windrow stubble peanuts from conditions left behind regular digger blades.

7. Promise of substantial strides toward complete mechanization of peanut harvesting through continued research along the principles of these tests.

**Farm Fish Pond:** A farm fish pond study was begun with the construction of a pond containing 4.3 acres of water with a maximum depth of eight feet. The pond was constructed and stocked in approximate accordance with current recommendations of the United States Department of Agriculture. Proper fertilization and management of the pond is practiced from which records will tend to serve as verification of the merits of recommendations based on scientific research.

The availability of the model pond on the premises of this Station has already drawn considerable owners and prospective owners of farm ponds to view the application of good practice.

## AGRONOMY

### COTTON

**Cotton Variety Test:** During recent years the number of cotton varieties grown in Georgia has been greatly reduced. This is considered desirable as it lessens the chance of crossing of varieties in adjacent fields, mixing of seed at the gin and should give a more uniform quality of staple. Table 4 gives results of variety trials conducted between 1942 and 1946. This test includes varieties that are being most widely grown in the Coastal Plain area at the present time. As will be noted there are no great differences in average yields obtained from these varieties. Neither was there a wide variation in staple length although per cent lint and boll size did vary between varieties. W. W. Wannamaker's Stonewilt, Coker's 100 Wilt, and the wilt resistant strain of Empire are highly resistant to wilt and for this reason are considered more widely adapted to the Georgia Coastal Plain area. Deltapine 14 and Stoneville 2B are not wilt resistant and should not be used unless the land is known to be free of this disease. Pandora shows promise of being well suited to South Georgia conditions but seed will not be available for general distribution before 1949.

**Cotton Fertilizer Test:** Nutrition studies with cotton include tests with nitrogen materials, residual effect of potash, and nitrogen-potash ratio experiments. The extensive production of peanuts during the past five years has resulted in a serious drain on the plant food resources of many farms. Where peanuts are harvested for market, large quantities of plant food elements are taken from the soil, the removal of potash being particularly severe. There is also a reduction in organic content of the land as there is no crop residue to be turned under. This soon becomes evident where cotton is planted on land that has been heavily cropped to peanuts. Experiments have shown that in order to produce good cotton crops on such land it is necessary to make heavy



TABLE 4.  
COTTON VARIETY TEST

VARIETY	Yield in pounds of lint per acre						Per cent lint	Avg. number bolls per pound	Staple length 32d Inch
	1942	1943	1944	1945	1946	Avg.			
W. W. Wannamaker's Stonewilt .....	517	403	609	443	551	505	37.6	76.3	32.9
Deltapine 14 .....	550	389	670	477	403	498	42.1	80.8	33.0
Coker's 100 Wilt .....	521	386	568	421	500	479	37.4	77.2	33.5
Stoneville 2B .....	534	369	611	393	486	479	36.6	71.3	33.3
Marett's White Gold .....	488	386	616	414	488	478	36.3	70.4	33.6
Rhyne's Stoneville .....	485	354	623	403	449	463	36.0	71.2	33.2
<i>Varieties in test 4 years (1943-1946)</i>									
Coker's 100 Wilt .....	---	386	568	421	500	469	37.8	76.5	33.5
Empire .....	---	379	580	435	525	480	38.8	64.5	33.1
<i>Varieties in test 2 years (1945-1946)</i>									
Coker's 100 Wilt .....	---	---	---	421	500	461	38.6	72.4	33.6
Pandora .....	---	---	---	482	574	528	38.7	65.7	33.4

applications of potash and to build up the organic content of the soil by the use of cover crops.

FORMULAS AND RATES: Cotton responds well to all of the major plant food elements, and a well balanced fertilizer is required for good production. For average South Georgia conditions, cotton should receive 500 to 600 pounds of a 3-9-9 or 4-8-8 fertilizer at the time of planting. This should be supplemented with a side dressing of 15 to 25 pounds of nitrogen from some quickly available nitrogen material. On land where cotton has a tendency to "rust," 8 or 9 per cent potash is not sufficient to correct this condition. On such land, 50 to 100 pounds of muriate of potash side dressing will give profitable returns.

Where every effort is to be made to control boll weevils, it is also desirable to increase the rate of fertilizer application in order to obtain maximum yields. On land that is well adapted to cotton and where the best known weevil control measures are taken, it is advisable to apply 700 to 800 pounds of fertilizer per acre. Where heavy rates of application are used, precautions must be taken to prevent injury to young cotton seedlings. Fertilizer should either be stirred with the soil or placed in bands  $2\frac{1}{2}$  inches to side of seed row and slightly below seed level.

37.6  
40.0  
37.1

### SEA ISLAND COTTON BREEDING

A new Sea Island strain developed at this Station has outyielded six other strains which were in the test. This strain was developed from a cross between Puerto Rican and Gaddis Sea Island. It has a staple of about  $1\frac{5}{8}$  inches and fiber of relatively high tensile strength. Another newer strain which appears promising is also being tested. All of the newer strains which have been developed at this Station and in South Carolina are much more productive than the Seabrook variety which was in commercial production from 1936 to 1942 in Georgia and other States.

While progress has been made in developing new Sea Island strains, much emphasis is being placed in hybrids between Egyptian and Sea Island which appear at this stage of development more promising than pure Sea Island.

An inter-specific hybrid which was developed by the United States Department of Agriculture in cooperation with the Pee Dee Experiment Station, Florence, S. C., known as Sealand 542, is being tried in Berrien County by seven farmers. This cotton is a cross between a very long Sea Island and Coker Wilds and produces a staple of  $1\frac{3}{8}$  to  $1\frac{1}{2}$  inches. It is an upland type plant with bolls and picking quality similar to some upland varieties. Should this cotton prove profitable for growth in Georgia it is thought advisable to confine the acreage to Berrien County until this county is well established. Then other areas of growth may be established. The lint from this cotton must be sold in a specialized market where high quality and uniform staple is demanded by the mills. It is hoped that the growth of this cotton can be confined to well supervised areas where practically no upland cotton is being grown so that the seed will not become mixed with short staple cotton.

### UPLAND COTTON BREEDING

**Pandora:** This is a new wilt resistant variety of cotton developed at this Station. Tests have shown it worthy of increase. It is an early, rapid fruiting cotton with a close fruiting habit. The fiber data have shown that it is definitely superior to most of our commercial varieties. Seed of this cotton was used for planting increase fields in 1947. Further information regarding Pandora will be given when seed are available to the farmers in South Georgia.

**Additional Material:** Approximately a thousand progenies other than Pandora were grown in 1946. Many of these selected lines originated from crosses made between the years of 1942 and 1945. Even though such stocks need several years of further selection before improvements can be captured in a stable line, several of these stocks show a definitely superior yielding ability and possess good fiber properties. Many of these will be used to cross on Pandora, expecting to secure a Pandora strain with an exceptionally high spinning value.

**Hybrid Vigor:** Sixty pure varieties or inbred lines of cotton were assembled from breeders over the cotton belt in 1946. Something over five thousand individual crosses were made. There were 496 different combinations obtained which will be grown as hybrids in 1947. These hybrids will be checked by the best of the present varieties for increase in yield and quality which may be possible from the use of hybrid cotton. Studies will also be conducted to find out the amount of natural crossing that can be counted on in this area.



## CORN

**Corn Variety Test:** Data on yield and weevil resistance obtained from variety trials conducted between 1940 and 1946 are given in Table 5. In choosing a variety for South Georgia conditions, both yield and resistance to weevil attack are important considerations. Varieties that have been produced in Florida and South Georgia show a much higher degree of weevil resistance than varieties that have been bred farther north. Florida W-1, a hybrid produced by the Florida Experiment Station, has given highest average yields for the past seven years. Whatley's Prolific and Good's Golden Prolific have produced good yields in combination with fair weevil resistance. Coker's Garrick and Hastings' Prolific have given good comparative yields but weevil resistance of these varieties has been poor.

**Corn Fertilizer Test:** One of the most common causes of low yields of corn is due to the failure to obtain good stands, and the efficiency of fertilizers applied to corn is often determined by the number of plants per acre. Good fertilization will not give profitable returns unless every effort is made to obtain good stands. Tests indicate that Coastal Plain soils of a medium fertility level should support at least 6000 plants per acre if a minimum of 40 pounds of actual nitrogen is applied. On soils that have a good water-holding capacity, closer spacing and heavier nitrogen rates should be used for maximum production.

For good production, corn should receive 300 to 400 pounds of a 4-8-6 or 4-8-8 fertilizer at the time of planting. Additional nitrogen equivalent to 150 to 200 pounds of nitrate of soda should be applied either at planting or as a side dressing, depending upon the form of nitrogen used. Experiments indicate that nitrate nitrogen is most efficient when used as a top dressing 40 to 45 days after planting. Ammonia nitrogen and nitrogen from Uramon and Cyanamid should be applied at the time of planting.

**RATES OF NITROGEN TEST:** An experiment with heavy rates of nitrogen and close spacing of corn was begun in 1946. While this test must be conducted several years before definite conclusions can be drawn, there are indications that heavy rates of nitrogen will not give satisfactory increases in yield at normal hill spacings. On the other hand a close spacing of hills with a normal nitrogen application resulted in serious "firing" of corn and a very small increase in yield. On plots that had 6600 and 8800 plants per acre, applications as high as 95 pounds of actual nitrogen per acre gave satisfactory increases in yield.

**Corn Breeding:**<sup>1</sup> Tests of 40 new hybrids this year were made at four different locations in the Coastal Plain. From these tests Dixie 18 (F44xF6) (GT112xL578) appeared very promising. The performance of this hybrid, Florida W-1, and Whatley are presented in Table 6.

A new white hybrid, GCP 7112, will be tested next season which should have a good performance. Results obtained this season in single cross tests, indicate that it will be a higher yielding hybrid than Florida W-1, with a strong stalk, and almost as much weevil resistance.

<sup>1</sup> 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.



TABLE 5.  
CORN VARIETY TEST

Variety	Yields in bushels of shelled corn per acre						
	1940	1941	1942	1943	1944	1945	1946 <sup>1947</sup> Average
Florida W-1	46.4	49.3	36.8	30.1	43.2	50.8	52.1 45.5 42.2
Coker's Garrick	38.6	50.4	39.0	34.7	46.4	48.2	50.9 45.0 44.1
Whatley's Prolific	42.3	44.8	34.7	27.1	44.1	51.3	52.1 44.6 42.3
Hastings' Prolific	37.0	47.2	36.7	24.7	47.3	47.9	46.9 44.6 41.1
Good's Golden Prolific	43.8	46.4	44.0	26.7	41.8	41.1	43.4 41.0 41.5
Coker's Ellis	36.4	42.0	34.8	30.8	44.2	43.9	48.1 43.0 40.4
Hastings' Yellow Prolific	37.9	40.1	39.1	23.7	44.8	42.7	37.3 40.4 38.3
Florident Yellow	42.3	39.5	33.6	20.2	34.3	42.1	48.1 41.4 37.7
Whatley's Yellow Prolific	32.9	44.0	36.9	21.2	40.8	39.1	41.6 38.3 36.8
Hastings' Early White Dent	33.9	40.6	27.8	22.7	47.8	36.1	41.6 38.3 34.8 *
Variety	Per cent ears damaged by weevils — October 15						
	1940	1941	1942	1943	1944	1945	1946 <sup>1947</sup> Average
Florida W-1	2.7	11.3	9.8	18.7	14.6	12.7	22.1 10.0
Coker's Garrick	14.6	33.6	26.6	32.0	38.9	40.6	63.6 33.0
Whatley's Prolific	1.9	22.4	11.4	19.8	15.7	24.2	15.2 17.0
Hastings' Prolific	21.4	41.6	37.0	32.7	26.1	45.3	31.9 46.0
Good's Golden Prolific	5.0	3.2	9.5	15.7	12.7	5.6	11.7 15.0
Coker's Ellis	18.5	15.9	17.1	30.5	35.1	18.2	38.0 38.0
Hastings' Yellow Prolific	31.8	39.7	67.2	33.7	45.8	41.8	49.0 49.0
Florident Yellow	5.8	8.7	19.1	17.9	6.3	11.1	11.0 11.0
Whatley's Yellow Prolific	10.7	16.9	10.1	18.0	14.2	16.4	17.3 13.0
Hastings' Early White Dent	21.7	35.5	42.0	60.0	44.3	39.6	17.3 13.0

\* Six-year average.

The foundation hybrid program this year was mainly under contract with Greenwood Plantation, Thomasville, Georgia. Several isolation blocks were used in the production of foundation hybrids. One block was also located on the Station at Tifton. Thirty-five hundred pounds of seed of foundation lines and hybrids were produced. Enough foundation hybrid seed of Florida W-1 was available from the 1945 crop to allow 4 growers to plant 124 acres in production of this hybrid. A drier with 30 bushels capacity was constructed for use in drying foundation seed corn.

TABLE 6.  
PERFORMANCE OF DIXIE 18, FLORIDA W-1, AND WHATLEY,  
1945 AND 1946

Variety or hybrid	Acre yield				Lodging		Ears per 100 plants	Weevily Ears
	1945 <sup>1</sup>	1946 <sup>2</sup>	Average	Pct. of Whatley	Root	Stalk		
	Bu.	Bu.	Bu.		%	%	No.	%
Dixie 18 .....	52.9	63.1	58.0	121	6.7	7.5	148	13.6
Florida W-1 .....	44.2	55.2	49.7	104	14.5	16.2	157	6.1
Whatley .....	44.2	51.8	48.0	100	19.7	28.4	154	5.5

<sup>1</sup> Two locations. Yield for Dixie 18 was predicted from the four non-parental single crosses.

<sup>2</sup> Acre yields based on 8 tests, root lodging on 3 tests, and remainder of the averages on 7 tests at 4 different locations.

## PEANUTS

**Peanut Variety Test:** Several new strains of peanuts are being included in the variety trials. Two strains listed as "146" and "205" are similar to Spanish and are giving excellent yields under South Georgia conditions. These strains are being increased and should be available in quantities large enough for general distribution within a few years.

**Peanut Fertilizer Test:** While peanuts do not respond to fertilizers as other crops, they take from the soil large quantities of plant food elements. It should be noted that peanuts remove unusually large quantities of potash. A good crop of peanuts, when harvested for market, takes from the land 50 to 100 pounds per acre of actual potash, or the amount contained in 100 to 200 pounds of 50 per cent muriate. In order to maintain plant food resources of soil, it is necessary to replace these plant food elements by fertilizer applications. Where peanuts are being grown frequently in the rotation, this crop should receive at least 400 pounds per acre of a 4-8-8 or 3-9-9 fertilizer. It will also be necessary to increase the amounts of potash applied to other crops of the rotation in order to maintain a reasonable fertility level.

In applying fertilizer to peanuts, some care must be taken to avoid injury to young seedlings. Fertilizer should either be stirred with the soil or should be placed in bands  $2\frac{1}{2}$  inches to the sides of seed rows and slightly below seed level.



**Peanut Breeding:**<sup>1</sup> The breeding work consisted of line selection in 850 hybrid strains,  $F_4$  to  $F_9$ , and in 75 strains of standard varieties. Also 128 selected hybrid strains and 59 selected strains from standard varieties (Spanish, North Carolina Runner, and North Carolina Bunch) were grown in the preliminary variety tests. More than 20,000 single plant selections were tagged and records obtained as to type of plant, susceptibility to diseases, characteristics of pods and seed, yield of shelled seed, and shelling percentage.

In the preliminary yield tests at Tifton 329 hybrid strains and selections from standard varieties were compared in randomized 50-foot rows with four replications, in order to select distinctly superior strains for placing in the more complicated regional tests.

In the regional variety tests a modified Latin square design was used for all comparisons. In Bulloch County 16 varieties and hybrid strains of Virginia type were compared in one test and in another 9 selected strains from a commercial Virginia Bunch variety were compared. In Candler County 10 small-seeded runner hybrid selections and 6 strains of North Carolina Runner were compared in one test while in another test 9 selected strains of hybrid 207-3 were compared. In Tift County three tests were conducted: 16 early maturing strains, including Small Spanish; 16 late maturing strains, including North Carolina Bunch; and 16 white-seeded strains, including Pearl as check.

Analysis of data from variety tests at three or more locations over a period of five years shows hybrid 207-3 to be outstanding for yield and for oil production. It produced an average of 25 per cent more shelled seed than Small Spanish, with an oil content about 3 per cent higher. Two introduced strains of Spanish gave yields significantly higher than Small Spanish: Spanish 146 about 15 per cent higher, and Spanish 205 about 10 per cent higher than Small Spanish. Both of these have pods and seed slightly larger than Small Spanish.

A sufficient tonnage of each of these three was made available for processing tests. Each was shelled by a commercial sheller and small lots, 200 to 400 pounds, of No. 1 shelled seed sent to several end-use processors. Reports and samples received from the processors indicate desirable characteristics for all three. Seedstocks are being increased as rapidly as possible.

**Peanut Leaf-Spot Control:**<sup>1</sup> In one test in Tift County two new fungicides, Fermate-sulphur (20-80) and Zerlate-sulphur (20-80), were compared with sulphur and with two grades of copper-sulphur (10-90), one containing 3.4 per cent metallic copper as tribasic copper sulphate and the other 4.5 per cent metallic copper as tetra-copper-calcium-oxychloride. Leaf-spot counts indicate that copper, Fermate, and Zerlate, all increased slightly the effectiveness of sulphur, and this is reflected in the acre yield increases over the undusted checks as follows: sulphur, 336 pounds; Fermate-sulphur, 554 pounds; Zerlate-sulphur, 506 pounds; copper-sulphur (3.4 per cent copper), 511 pounds; and copper-sulphur (4.5 per cent copper), 483 pounds.

In a test to determine the effect of dusting, for leaf-spot control, on harvesting date of North Carolina Runner, both dusted and undusted plats were harvested at weekly intervals from 141 to 170 days after planting. Both dusted and undusted reached a yield maximum at 148 days after which both

<sup>1</sup> In cooperation with the United States Department of Agriculture and the Georgia Experiment Station.

began losing pods, though the undusted lost more rapidly than the dusted. The increase from dusting indicated at 148 days was 316 pounds. The dust used was copper-sulphur, 10-90.

### SMALL GRAINS

**Oat Variety Test:** Over a long period of years, oat varieties belonging to the Red Rustproof type have been most reliable for South Georgia conditions. These varieties are Rustproof 14, Hundred Bushel, Appler, Bancroft, and Texas Rustproof. During recent years, Coker's Stanton has been giving good yields and is considered best adapted of the newer varieties. (See Table 7). During the 1946-47 season, two strains of *Helminthosporium* caused severe damage to oats in the Coastal Plain area. Red Rustproof varieties appeared to be resistant to *H. victoriae* but all varieties suffered to some extent from *H. avenae*.

TABLE 7.  
OAT VARIETY TEST

VARIETY	Yield in bushels per acre							Average
	1941	1942	1943	1944	1945	1946	1947	
Coker's Stanton.....	78.8	47.3	35.5	52.0	46.0	47.3	40.1	49.6
Rustproof 14.....	73.6	44.9	28.2	51.9	41.5	46.7	38.1	46.4
Coker's Victorgrain.....	71.2	35.0	29.4	38.2	31.0	39.1	26.2	38.6
Coker's Fulgrain.....	67.7	30.1	26.2	29.8	37.5	37.5	21.9	35.8
Lega .....	-----	51.0	22.7	40.5	38.0	34.4	26.2	35.5

**Oat Grazing Test:** Tests are being conducted on the combination forage and grain production value of three commercial oat varieties. These tests also include a study of the effect of nitrate of soda on grazing value and grain yield.

**Wheat Variety Test:** Coker's Hardired and Sanford continue to be the most reliable varieties for the South Georgia area. Wheat yields have not been consistent in the middle and lower Coastal Plain areas because of the frequency of severe rust attacks.

### FLUE-CURED TOBACCO

The flue-cured tobacco research program is a cooperative project of the Georgia Coastal Plain Experiment Station, the Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration of the United States Department of Agriculture, and the University of Georgia College of Agriculture. This program includes studies of varieties, fertilizers, rotations, disease control in the field and seedbed, seedbed management, and the improvement of varieties by breeding and selection. The entire program is a concerted effort to improve the production of flue-cured tobacco in Georgia.

**Fertilizers:** Potash applications of less than 90 pounds  $K_2O$  per acre (1000 pounds of a 3-9-9 or 1500 pounds of a 3-9-6) produce lower yields and a higher percentage of nondescript tobacco than applications of 90 to 150



pounds per acre. Applications of  $K_2O$  in excess of 180 pounds per acre produce such a healthy, vigorous growth that the percentages of lugs and cutters are reduced and the percentage of leaf grades increased.

Fertilizer mixtures containing no sulphur produce low yields and a high percentage of nondescript tobacco. Practically all commercial mixtures contain sufficient sulphur for normal growth of the tobacco crop.

On a Tifton sandy loam, applications of fertilizer in excess of 1400 pounds of a 3-10-10 increased yields but reduced quality.

**Varieties and Quality:** Varieties of the 400 group produce about 200 pounds per acre greater yields than the best standard varieties but the quality is low with a considerable proportion of the crop grading green or greenish tinge. In 1946 the highest quality was produced by the Virginia Bright Leaf variety followed closely by Gold Dollar and Yellow Mammoth in the order named. The Oxford 26, a Granville wilt resistant variety from North Carolina, produced the lowest quality of the thirteen varieties tested.

**Off-Type Varieties:** The number of tobacco growers planting off-type varieties in the Georgia belt increased to an alarming degree in 1947. Buyers of Georgia tobacco are fully aware of this trend and will become more and more critical of grades as the demand for tobacco eases. Georgia now enjoys the reputation of growing one of the world's finest cigarette tobaccos. However, if the use of off-type varieties is continued there is danger of serious damage to the reputation of Georgia as a tobacco-growing state. At present in disease-free areas, most disease resistant varieties do not measure up to the standard varieties in quality. This will not always be true. Unless the presence of diseases makes it necessary to use a resistant variety, it is recommended that one of the standard varieties such as Virginia Bright Leaf, Gold Dollar, and Yellow Mammoth be planted.

**Weed Control in Seedbeds:** For the ninth consecutive year on the same area, one pound of cyanamid per square yard gave effective control of weeds and produced an excellent growth of tobacco plants. More than 96 per cent of the weeds were killed and 321 plants per square yard of transplantable size were produced. However, the beds were sown too thick for the plants to be of the best quality. Cyanamid will not control root knot in seedbeds.

## FLUE-CURED TOBACCO DISEASES

**Disease Survey:** Blue mold was more destructive in 1946 than in any year since 1937. First mold symptoms were not observed until February 15 in both old and new beds in Cook County. The disease appeared to be ten days further advanced in the affected old beds than in new ones. The weather remained mild during the remaining six weeks and no freezes occurred. Mold spread and developed rapidly until a peak of activity was reached March 15-20. Cloudy periods of from one to three days occurred each week in March and these periods were timed with fungus development so as to cause the maximum damage in most beds. No more than 5 per cent of the tobacco growers attempted to spray their beds according to recommendations. Many tried to use paradichlorobenzene by broadcasting the crystals on the plants and without the use of a heavy cloth. These growers, as well as those who used no

control method, lost over 85 per cent of their plants. At least 80 per cent of the flue-cured plants were killed by mold in 1946. The crop set from the remaining plants was three weeks late and produced a lower grade leaf than tobacco set on time. The 5 cent per pound reduction due to the late crop resulted in a \$5,000,000 crop loss. Nevertheless, production in pounds was the highest on record.

Damping-off (*Rhizoctonia solani*) was observed in only a limited number of plant beds, and caused maximum losses of 30 per cent in a few beds after the plants reached the size of a silver dollar. No mosaic (virus) or other disease was observed in plantbeds.

The crop made excellent growth in the field until May 20 when a general heavy rain partially drowned many fields, halted growth, and resulted in production of only average leaf quality. Root-knot loss in most fields was less severe than usual, less than 5 per cent total damage being estimated. Angular leafspot (*Pseudomonas angulatum*) was the second most important field disease in some sections, this disease being more prevalent than in any year since 1930. General infections were observed in many fields during May, and in each case such infections were present only in fields set with plants grown from North Carolina seed. Damage as high as 30 per cent occurred in a few fields, although total loss was less than one per cent. Southern root rot and stem rot (*Sclerotium rolfsii*) and sore shin (*Rhizoctonia solani*), both very similar stalk diseases, caused slight damage in the majority of fields observed during July. Meadow nematode (*Pratylenchus pratensis*) was of minor importance, as was frog-eye leafspot (*Cercospora nicotianae*), and common tobacco mosaic.

**Blue-Mold Control Tests:** Twice weekly applications of Fermate spray (4 pounds to 100 gallons), and 15 per cent Fermate dust, gave commercially perfect blue-mold control in experimental and grower test beds in 1946. A new dithiocarbamate spray and dust material sold as Dithane Z-78 was found to be fully as effective against mold as Fermate, and in some tests it proved superior to Fermate. Many grower beds showed spotted and insufficient spray or dust coverage, and this resulted in poor disease control. It is very important that every leaf be covered with the fungicide, even if twice the usual amount of material is required. Normally a spray application of 5 gallons per 100 square yards, and 2 or 3 pounds of a 15 per cent Fermate dust per 100 square yards, are sufficient for complete coverage, but more should be used if necessary to cover all leaves.

The paradichlorobenzene gas treatment is no longer recommended for blue-mold control. Suitable cloth covers for holding in the vapors are very expensive and difficult to obtain. Moreover, most growers have insisted on broadcasting the PDB crystals directly on the plants without the heavy cover. Hundreds of growers lost their tobacco beds in 1946 due to improper use of this treatment.

**Field Control of Root Knot:** A three-year crop rotation experiment for root-knot control in tobacco was concluded in 1946. Detailed results from this and similar tests will be reported elsewhere. Most successful root-knot control was obtained where tobacco followed two successive years of bare fallow, Spanish peanuts (harvested), cotton, or oats and weeds. Runner peanuts and crotalaria also were highly effective but these crops resulted in an



excessively green and low quality leaf, except where grown two years in advance of the tobacco crop. Velvet beans, corn, root-knot resistant cowpeas, and soybeans were not reliable in preventing root knot in tobacco. Brabham peas, sweet potatoes and various truck crops greatly increased disease damage.

Root knot has been very successfully controlled in tobacco fields by fumigating the soil 30 to 60 days before transplanting with such liquid fumigants as D-D mixture or Dowfume-N (dichloropropane-dichloropropene), and Dowfume W-10 (10% ethylene dibromide). Applications of 15 and 20 gallons per acre of D-D mixture or Dowfume-N, and 30 and 40 gallons of Dowfume W-10 have proved highly effective when applied either in the drill in 4-foot rows or in parallel furrows 12 inches apart. An eight-inch depth of application is considered preferable to six inches. A slightly inferior grade of tobacco leaf usually follows these treatments, the lower grade being associated with greener leaves on the top half of the stalk. This is similar to the lower quality associated with excessive nitrogen in the fertilizer or following leguminous crops. In addition, the effects of the chlorine and bromine applied have not been conclusively determined. Preliminary observations indicate the need for a reduced nitrogen supply where these fumigants are used.

### SHADE TOBACCO

The 1946 season was successful for most growers in the Georgia area. Rainfall was somewhat below normal during the plant setting period but proved adequate for normal yields and quality. There was no unusual outbreak of insects or diseases and little loss from storms, drought or flood. Prices were good.

The following is a brief progress report showing results of nutrition work for the 1946 season.

**Nitrogen:** Nitrogen (N) applied at the rate of 200 pounds per acre was superior to other rates used.

**Phosphorus:** Phosphorus ( $P_2O_5$ ) made its best showing in 1946 when applied at the rate of 100 pounds per acre.

**Potash:** The 300-pound  $K_2O$  rate per acre was best for this nutrient.

**Calcium:** Calcium (CaO) applied at the rate of 500 pounds per acre gave better results than higher or lower rates.

**Magnesium:** The 150-pound rate for magnesium (MgO) proved best in 1946.

**Sulphur:** Benefits obtained from treatments carrying more than 125 pounds  $SO_3$  per acre were questionable.

**Boron:** The use of boron in 1946 reduced yields, grading quality and fire-holding capacity.

**Chlorine:** Chlorine reduced yields, grading quality, 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.

**Single Nitrogen Sources:** Stable manure was slightly superior to cottonseed meal and considerably better than tung meal and castor pomace as single nitrogen sources in 1946.

**Seedbed Fertilizer Tests:** Seedbed fertilizer work was shifted to new ground in 1946. Results indicate that one pound per square yard of 6-6-6 formula was better than other grades of mixed goods tested.

## SHADE TOBACCO DISEASES

The shade tobacco plantbed season of 1946 was very favorable for the production of plants. Blue mold (*Peronospora tabacina*) caused no appreciable damage to the tobacco beds in this area. The disease did not appear until a substantial part of the crop was set or until the plants were large enough to withstand the slight attack.

**Control of Weeds and Root Knot in Plant Beds:** The control of weeds and root-knot (*Heterodera marioni*) is the most serious problem in shade tobacco plant beds. Several different materials and combinations of materials have been used for this purpose. The most effective treatment for control of both weeds and root knot on tobacco beds has been a combination treatment of one pound urea (Uramon) plus one-half pound calcium cyanamid (Cyanamid) per square yard, worked uniformly into the soil to a depth of six inches. This treatment should be applied at least 60 to 90 days prior to seeding time. To obtain best results with this treatment it should be applied on well drained soil. If applied on wet locations or where drainage is poor, an excessive amount of soluble nitrogen may be present to prevent germination of seed or kill many of the small plants.

**Root-Knot Control in Shade Fields by Soil Fumigation:** Effective root-knot control has been secured by fumigating tobacco fields with 10 per cent ethylene dibromide (Dowfume W-10) and with a mixture of dichloropropane-dichloropropene (D-D). It has been found that 30 gallons per acre of W-10 and 15 gallons per acre of D-D mixture are required to insure control of root knot in the field. Higher rates of these materials gave even better control in some instances. Tests have shown that these materials should be applied at least 30 days before transplanting and preferably 60 days. These materials applied in early fall (September) did not give sufficient control of root knot on tobacco grown the following summer. Tests have also shown that the soil must be treated before each crop of tobacco. Fall vegetables, such as pole beans, carrots and cabbage planted after harvest of tobacco have suffered serious damage from root knot, although the soil was treated just prior to the tobacco crop.

**Methods of Application:** Both of these soil fumigants are liquids. They were applied by pouring them into the soil at a controlled rate. There are two ways of applying these materials. One is the broadcast method and the other is the drill method. In the broadcast method the stream of material is applied to a turnplow furrow every 12 inches apart with a plow following, so that the material is covered immediately. The soil is not turned again for at least 30 to 40 days. In the drill method the material is poured in a furrow under each tobacco row. This was done by laying off the rows with a middle-burster and



then pouring the materials at proper rate in the furrow, followed by a turnplow covering the material. The list thus prepared was not disturbed afterward. Fertilizer was applied on either side of this list and two additional turnplow furrows were made to cover the fertilizer and freshen the list before transplanting. Where the drill method was used, reduced applications per acre did not give consistent root-knot control.

Several commercial fields were treated with both materials in the shade tobacco area for the 1946 crop. The broadcast method was used and the materials applied with a tractor-drawn applicator which was regulated to apply the proper amounts. Reports are that the results obtained were very satisfactory.

Burn tests have been made of cured tobacco grown on treated soil for the years 1945 and 1946. These tests have not shown that the burn or aroma of the tobacco has been affected by treating the soil. These tests are being continued to see if continuous use of these materials in the same soil will affect the burn of tobacco in the future.

### 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 and forage and soil-building crops. The pasture and grazing experiments include cooperation with the Bureau of Animal Industry.

Most of the tests on soil building, fertilizers, lime, crop rotation, and grazing are based on cumulative data so that they are necessarily conducted over a period of several years before average results can be translated to recommendations.

**Soybeans:** This Station cooperates with the United States Regional Soybean Laboratories in growing soybeans adapted to the South. Many varieties, selections, and crosses are being grown for yield and adaptation studies.

The Ootootan soybean is a good hay yielder but produces few seed. The Palmetto variety is a good dual-purpose bean, producing both hay and seed.

**Lespedeza:** *Lespedeza sericea* is being fertilized with varying rates of fertilizer to determine if fertilization influences the palatability in regard to grazing.

**Velvet Beans:** About 50 varieties and selections of velvet beans are being tested for yield and hardiness. This is preliminary to a breeding program with the purpose of increasing the value of this bean as a cover and feed crop.

**Kudzu:** Selections of kudzu plants show a wide variation in type. Some plants tend to produce an abundance of flowers while others are vegetative. There are many other variations including size and texture of leaves. Studies are being made to determine the types most desirable for the various uses of soil building, grazing, and hay production. Management and fertilizer tests are being started. Breeding work will follow as soon as suitable selections are isolated.

**Crotalaria and Other Summer Legumes:** *Crotalaria lanceolata* promises to be well adapted for use in the Southeast. It has the advantage of

being non-poisonous and can be grazed by cattle. It re-seeds well and volunteers readily without the necessity of stirring the soil. Other summer legumes being tested are Indigoferas, lespedezas, and various new introductions of legumes.

**Rotations:** Crop rotation experiments were started this year whereby the land will be continuously covered with a summer or winter crop. A three-year rotation to include three money crops and three cover crops, or a money crop and a cover crop on the same land each year, is being tried and is promising. Annual and periodic fertilization is also included in this experiment.

**Winter Cover Crops:** Winter cover crops being tested include winter peas, lupines, vetches, serradella, and clovers.

The Dixie Wonder winter pea appears to be a promising variety for the lower Coastal Plain. While less winter hardy than some varieties, its earliness is advantageous to farmers desiring to turn the cover crop under early enough to avoid cut-worm injury to the following crops.

The blue lupine is a good, rapid-growing, heavy-yielding cover crop which can generally be recommended. The lupine should not be used, however, in rotation with tobacco, melons or tomatoes because of disease transmission to these susceptible crops.

Dixie Crimson clover and various Crimson clover selections have been tried for several years. All varieties have failed during some years of severe fall drought. The Dixie Crimson clover is a hard-seed variety that will re-seed when given the opportunity. Crimson clover seed should be well inoculated and planted on well drained, heavy type soils. A firm seedbed is desirable. Good success has been had by planting on short Bermuda-grass sod.

## 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:** A new phase of this work generally referred to as the Piney Woods Revegetation Project was added in 1946. It is the purpose of this project to discover means of reseeding cut-over timber lands with grasses and legumes in order to increase their productivity. Some of the preliminary results of this project appear in another section of this report. This project is being carried out in cooperation with the United States Forest Service.

**Foreign Introductions:** A number of new grass introductions from foreign countries were tested in 1946 and 1947. These appear to be of value only in supplying germ plasm for the improvement of the species being bred at Tifton.

**Breeding:** Breeding and selection within the following species were continued in 1947: Bermuda grass, Dallis grass, Bahia grass, Sudan grass, and Cattail millet. A brief report concerning some of the products of this research follows:

**COASTAL BERMUDA:** Coastal Bermuda, an unusually vigorous and highly



productive hybrid, continued to demonstrate its superiority in 1947. Grazing tests with this hybrid during the past three years indicate that it may be expected to produce nearly twice as much beef as common Bermuda.

The Georgia Crop Improvement Association began certifying sprigs of Coastal Bermuda grass in 1946 and several million sprigs were sold in 1947. An effort is being made to establish nurseries in each county for the purpose of supplying farmers within the county with planting material.

**DALLIS:** Hybrids between a Dallis grass introduction from Uruguay and the D-1 selection developed at Tifton, gave rise to interesting progenies in 1947. While most of the plants were of no economic value, it was believed that some of them might be useful in the further genetic improvement of this important grass.

**BAHIA:** Progress was made in the development of cold resistant Bahia grass hybrids. These hybrids are being developed to combine the desirable characteristics of some of the existing varieties and to increase their productivity. Grazing studies with existing Bahia grass varieties indicate that they are superior to carpet grass but inferior to Coastal Bermuda as pasture plants.

**SUDAN:** More than sixty thousand plants, the progenies of crosses between some of the best disease resistant Sudan selections developed at Tifton and Sweet Sudan, were grown for selection purposes in 1947. A number of promising plants that seemed to combine the desired characteristics of both parents were selected for further testing in 1948.

**CATTAIL MILLET:** Cattail millet, perhaps the best temporary grazing crop for the Coastal Plain, has been receiving much attention from the grass breeding department. Much fundamental ground work has been laid which should result in the development of highly superior hybrids. A leafy variety, short enough to permit combining of the seed, is being developed for early release.

**Small-grain Varieties for Winter Grazing:** Studies on the use of small grain for winter grazing begun in 1943 were continued. Heavy attacks of the *Helminthosporium* diseases, probably associated with an unusually warm fall, greatly reduced the production of many varieties of oats. As a result the Abruzzi and Balbo rye out-yielded the oat varieties in forage production materially. Leaf rust which attacked the wheat varieties no doubt contributed to the low yields of forage obtained from them.

**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. It is hoped that this program will furnish solutions to many of the problems that have plagued all who have tried to grow grass on golf courses, lawns, airports, etc., in this area.

## COOPERATIVE PASTURE INVESTIGATIONS

The pasture investigations being carried on are in cooperation with the Bureau of plant industry and the Bureau of Animal Industry, United States Department of Agriculture. Most of the studies have regional, as well as State, applications.

**Limed Lowland Pasture Shows Better Gains:** In the first year of the grazing experiments, heifers when grazed at the rate of 2 animals per acre made liveweight gains of 119 pounds per head during the 224-day grazing period on lowland permanent pastures of carpet grass, Dallis grass, and white clover that had been limed, as compared to a gain of 84 pounds per head on similar pasture that had not been limed. Due perhaps to unfavorable weather conditions, gains were low for both groups.

**Coastal Bermuda Grass Produces More Liveweight Gains Than Pensacola and Paraguay Bahia Grasses:** Three pastures growing Coastal Bermuda, Pensacola-Bahia, and Paraguay-Bahia grasses, respectively, were grazed for 210 days during 1946 with medium to good grade yearling steers at the rate of 1 1/3 head to an acre. Each pasture received 200 pounds of a 6-12-6 commercial fertilizer. The pastures produced liveweight gains of 148, 88, and 31 pounds per acre in the order named. The steers on the Bahia grasses lost weight during late September and October.

**Cattail Millet is a Good Summer Grazing Crop:** Cattail millet planted in rows and cultivated one time produced 205 pounds of liveweight gain per acre when grazed for approximately 80 days during the summer, as compared to liveweight gains of 189 pounds on cattail millet sown broadcast. Kudzu during the same period produced 176 pounds of liveweight gain per acre when grazed from June 26 to October 16.

**Abruzzi Rye Produces More Beef Than Oats:** In a test to determine the earliest date practicable for grazing certain varieties of small grains and to determine the amount of green grazing these varieties would furnish during the winter months, Abruzzi rye furnished 89 grazing days per acre and produced an average liveweight gain per acre of 150 pounds when grazed with Grade Hereford steers, as compared with 64 grazing days and 118 pounds of liveweight gain per acre produced by Vicland oats. Grazing was begun on both crops December 6. Rustproof oats and Sanford wheat were not large enough to graze until January 9. These two crops furnished 70 grazing days per acre, with the Rustproof oats producing 106 pounds of liveweight gain per acre and the Sanford wheat showing a loss of 19 pounds of liveweight per acre. Results were less favorable for these crops during the winter 1946-47 than for the previous winter, owing to extremely unfavorable weather for growth of small grain crops.

**Liberal Nitrate Applications at Planting Give Earlier and More Winter Grazing:** In a test to determine the amount of nitrates that can profitably be applied to small grain-vetch mixtures for grazing, the results during the winter 1946-47 indicated that 200 pounds of nitrates may be profitably applied per acre. Results during the winter 1946-47 were not as favorable for any of the different rates of nitrate application as during the previous winter, due to extremely unfavorable weather for growth of small grain crops. When grazed at intervals with medium to good grade steers, Vicland oats and



common vetch having no nitrate applied gave 47 grazing days per acre as compared with 79 grazing days per acre from areas treated with 200 pounds of nitrate per acre at planting. Due to unfavorable weather, growth on the areas that were fertilized at the rate of 400 pounds of nitrate per acre (200 pounds at planting and 200 pounds either December 1 or January 1) did very little better. The previous year's results indicate that heavy nitrate applications will produce more than enough extra growth to pay for the product.

## ANIMAL HUSBANDRY

The beef-cattle and swine investigations are in cooperation with the Bureau of Animal Industry, United States Department of Agriculture. Only a few of the projects being studied are discussed in this report. More detailed information can be had by writing to this Station.

### BEEF CATTLE

**Dehydrated Sweet Potatoes and Cracked Shelled Corn are Good Fattening Feeds for Steers:** In steer feeding tests conducted during the fall and winter 1946-47, dehydrated sweet potatoes proved less satisfactory than cracked shelled corn as a source of carbohydrates in a fattening ration. The dehydrated sweet potatoes were not as palatable and proved to be much more laxative than cracked shelled corn. A mixture of equal parts dehydrated sweet potatoes and cracked shelled corn gave a higher average daily gain than the cracked shelled corn or ground snapped corn. In each case, the steers were fed protein concentrate and peanut hay. The average daily gains made by the steers were 2.84, 2.46, 2.23, and 2.13 pounds, respectively, for the dehydrated sweet potato-cracked corn mixture, cracked shelled corn, ground snapped corn, and dehydrated sweet potato groups. The steers fed the mixture of dehydrated sweet potatoes and corn ate some more feed and showed a little higher finish and sold at a little higher price than the others. The return per dollar expense was \$1.24 for the potato-corn mixture and the cracked corn groups, and \$1.10 for the dehydrated sweet potato and ground snapped corn groups.

**Creep-Fed Calves Make Good Gains:** Twenty purebred Hereford calves creep-fed during the summer of 1946 made an average daily gain of 1.55 pounds. The calves were dropped in February and March with an average birth weight of 75 pounds, and were weaned October 9 at an average weight of 409 pounds. The calves consumed 3.20 pounds of feed per head per day during the suckling period.

Forty-eight grade Hereford calves were dropped in February and March at an average birth weight of 72.83 pounds, and were weaned October 10 at an average weight of 365 pounds. The calves made an average daily gain during the suckling period of 1.31 pounds and consumed 1.90 pounds of grain per head per day. The grain mixture fed to both the purebred Hereford and grade Hereford groups was composed of 6 parts cracked shelled corn and 1 part cottonseed meal.

**Rate of Gain a Good Basis for Selecting Breeding Cattle:** Three sire groups of Grade Hereford calves were fattened for a period of 154 days during the fall and winter 1946-47. The feeding period began two weeks after the calves were weaned in the fall, and the steer calves sired by each bull were fed. The calves in Group 1 made an average daily gain of 2.49 pounds and produced 20.64 pounds gain for each 100 pounds of digestible nutrients consumed. This is compared to an average daily gain of 2.34 pounds and a gain of 18.86 pounds for 100 pounds of digestible nutrients consumed by calves in Group 2, and 2.41 pounds daily gain and 19.16 pounds gain per 100 pounds of digestible nutrients consumed by steers in Group 3. These data show that the efficiency of gain or pounds of liveweight gain per 100 pounds



of digestible nutrients consumed is in direct proportion to the rate of gain. Rate and efficiency of gain made by offspring are two of the most important characteristics used in determining the breeding value of beef bulls. It will seem that the cattle breeders could very well evaluate the breeding ability of bulls by feeding calves of approximately the same age for a definite period and determining the rate of gain. The calves making the highest rate of gain should serve as a useful basis for selecting a herd bull.

**Wintering—An Important Phase of Beef Cattle Production:** During the winter 1946-47, 28 brood cows were wintered for a 21-day period on frosted Hegari sorghum. The cows made an average daily gain of 1.17 pounds during the 21-day period they were on the Hegari. The crop furnished 77 grazing days per acre. One of the difficulties encountered in using Hegari as a winter grazing crop for the cattle is that an estimated 50 to 75 per cent of the seed eaten by the cows go through them undigested. The grain is damaged somewhat by mold and weevils during the late fall before frost. After frost, the stalks and leaves of the sorghum have a tendency to deteriorate rather rapidly in food value.

Cows carried on a wintering test comparing peanut hay and silage as wintering feeds showed that approximately 23 pounds of hay or 60 pounds of silage plus 1½ pounds of peanut meal fed daily is necessary to maintain cattle satisfactorily, especially if some of the cows are calving during the period. The silage-fed group outranked the peanut-hay-fed group somewhat in general appearance. The calves dropped during the period in the silage group made slightly higher daily gains than the calves in the peanut hay group. In this test, the feed cost was 23 cents per day for the peanut hay-peanut meal group, as compared to 26 cents for the peanut meal-silage-fed group.

**Mineral Feeding to Cattle Important:** During the 1946 grazing period, a mineral mixture composed of equal parts salt and fine ground steamed bonemeal was kept before all steers on pasture at all times. The steers consumed daily .104 pound of the mineral mixture. Brood cows suckling calves consumed an average of .15 pound per head daily.

### 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, all of the United States Department of Agriculture. Problems in cattle management, forest range management, and reseeding practices on the range are being studied.

**Supplemental Feeding on the Forest Range Prevents Cattle Losses:** Range forage is very deficient in nutrients during fall and winter. Feeding one or two pounds of concentrated protein supplement per head daily on native forest range prevents death losses from starvation and keeps the cows in strong, thrifty condition. A group of 20 native and grade Polled Hereford cows fed at the rate of 2 pounds of peanut meal per head daily from October 15, 1946 to January 31, 1947 lost 18.05 pounds per animal for the period compared with a loss of 34.55 pounds per cow for a similar group supplemented at the rate of one pound per head daily and 97.74 pounds loss per animal for a comparable group without supplement. In addition to the heavy

loss in body weight, one cow in the unsupplemented group starved to death and a second animal required special feed and care at the close of the period. This group was uniformly weak and emaciated. While the cows which were fed at the rate of 2 pounds of protein supplement were somewhat stronger and in better flesh, results as measured in terms of calf crops for the past four years show little or no advantage over the 1-pound rate of supplement feeding.

For the period February 1 to March 15 all the cows were removed from their pastures so that the pastures could be burned and permit the grass to make sufficient growth by March 15. During the 45-day period three groups of cows were held in dry lots and fed a ration of 2 pounds protein meal and 25 pounds chopped sugar cane. One group was placed on range (about 3 acres per cow) that had not been grazed during the previous summer and fed 2 pounds protein meal. Even though the cows were calving during this 45-day period, the cows in dry lot lost only 42.82 pounds per head, while the cows on range lost 70.70 pounds. All cows on the two treatments were strong and vigorous. There was little difference in per cent calf crop. Since winter range must be provided in one case, it offsets the cost of chopped sugar cane in the other.

**Calves Do Well on Range If Supplemented:** While it is generally advisable to market range calves at weaning, an economical method of wintering heifer calves for herd replacements is desirable. On October 22, 1946, 50 weaned calves were divided into two comparable groups and grazed on native forest range until January 29, 1947. One group which was fed at the rate of 2 pounds of peanut meal per head per day gained 26.36 pounds per head for the period. The second group fed at the rate of 1 pound of peanut meal per head per day lost 1.8 pounds per animal during the 99-day period.

At the close of this test the two groups of calves were combined and fed as one group in dry lot for 8 weeks. The daily ration consisted of 1.5 pounds peanut meal, 10 pounds of chopped sugar cane, and 2 pounds of peanut hay. Calves which had previously received 2.0 pounds of protein supplement gained 23.04 pounds each for the 56-day period, as compared to 9.64 pounds gain for the calves which had previously received 1.0 pounds of protein supplement. It seems probable that part of this difference may have been due to increased appetite and more thrifty condition of the calves which had been supplemented at a higher rate, and as a result consumed more than their share of the feed.

In order to save time and labor, all supplemental feed on range, except at calving time, is given three times per week rather than daily.

**Sugar Cane Valuable as a Winter Feed for Cattle in the Coastal Plain:** Sugar cane shows promise as a winter feed for range cattle in the lower Coastal Plain. It is well adapted to this area where both feed and land suitable to grow feed are scarce and the land is not generally well adapted to the construction of trench silos. C. O. 290 has been the best variety tested at the Alapaha branch station. In 1946-47 variety tests, C. O. 290 yielded 28.22 tons compared with 22.88 tons of Cayana, 19.83 tons of C. P. 29-116, and 16.78 tons of C. P. 31-511. These results were obtained from planted cane under comparable conditions. The first three produced good stubble crops; C. P. 31-511 gave very poor stubble yields. Yields of C. O. 290 have varied over the past four years from 18.45 tons per acre to 36.6 tons. All yields are based on weight of chopped cane when fed in February and March. The cost



of chopped cane placed in the trough has varied from \$6.15 to \$3.79. A daily ration of 2 pounds of high protein concentrate (peanut or cottonseed meal) and 25 pounds of chopped sugar cane will slightly more than maintain a dry cow weighing about 700 pounds.

**Nutrient Values of Native Forage:** Chemical analysis shows the protein, calcium, and phosphorus content of the native forage to be low during a large part of the year. On areas protected from fire, the forage during the first three months of the grazing season averaged about 5 per cent protein, .14 per cent calcium, and .07 per cent phosphorus. On burned range for the same period the forage contained about 8 per cent protein, .13 per cent calcium, and .11 per cent phosphorus. However, this advantage of burned range over unburned does not last through the summer. The protein and phosphorus values gradually decline until in the late fall and winter they reach the low level of 4 per cent or less for protein and about .04 per cent for phosphorus. However, calcium is higher in winter time, averaging between .20 and .30 per cent.

These forage analyses and also analyses of cattle blood samples indicate that in order to meet the calcium and phosphorus requirements of cattle on forest range a mineral mixture must be fed yearlong. At Alapaha the mixture being used is composed of two parts of steamed bonemeal and one part of granulated salt.

**Prescribed Burning Increases Gains and Reduces Fire Danger:** Cattle have real value in forest fire protection because they reduce the fire hazard by eating forage plants which comprise part of the highly inflammable ground cover. While this removal is not the only way cattle reduce fire hazard, it is one of the most important and easily seen. The difference in amount of light fuels on grazed and ungrazed areas is shown in Table 8.

TABLE 8.

**POUNDS OF COMBUSTIBLE MATERIAL\* PER ACRE ON GRAZED AND UNGRAZED AREAS (OVEN DRY WEIGHT).**

<i>Years of accumulation</i>	<i>Grazed areas</i>	<i>Ungrazed areas</i>
1 year.....	1,700	2,390
2 years.....	1,920	3,740
3 years.....	2,660	4,510
6 years.....	3,690	4,500

\* Pine needles, twigs, and brush excluded.

Chemical analysis has shown that the nutritional value of wiregrass forage is very low. Prescribed burning during the winter months will increase the protein and minerals in the forage. Cattle should be kept off the range for at least 6 weeks in February and March in order to give the new growth time to get a head start before being grazed. In addition to improving the quality, however, the new forage on burned areas is easier to graze and more abundant than that on unburned range where the old growth accumulates and tends to smother out the new forage. In the past four years, cattle having access to

a fair amount of burned range gained nearly three times as much as those on range totally protected from fire, during the summer grazing season.

**Improved Forage Plants Tested:** A project to study the artificial revegetation of Piney Woods Ranges in the South was started in the spring of 1946. The main purpose of the project is to improve the forage values and the resulting grazing capacity of areas devoted primarily to the production of forest crops. Studies begun this year were concerned chiefly with the adaptation and establishment of promising species and strains of grasses and legumes on the four major soil types in the Georgia Coastal Plain, namely (1) Tifton, (2) Norfolk, (3) Plummer, and (4) Leon soils.

An adaptation nursery containing 19 introduced grasses, four native grasses and five legumes was established on virgin soil of the four soil types. Each variety was grown with and without 600 pounds of 4-8-6 fertilizer per acre. Vegetative development and air-dry yields of the species varied widely between species and between the different soil types. Most of the grasses gave highly significant increases in yield of herbage from fertilizer application except the native species which in some instances gave a slightly negative response, though not significantly so. The four annual legumes tested produced about 6 to 8 times greater yields where fertilized, while *Lespedeza sericea* simply doubled its yield on fertilized plots. Although further study is necessary, present indications are that Pensacola Bahia grass and Common Bahia grass are among the most promising grasses for range reseeding on the well-drained Tifton and Norfolk soils. On the poorly drained Plummer and Leon soils of the Georgia flatwoods, the most promising grasses at present are Dallis grass, Common Bahia grass, Pensacola Bahia grass, and Common carpet grass, in order of importance. Common lespedeza is probably the most promising legume tested except on well-drained sandy soils where nematode infestation might limit its development.

An establishment experiment was started last year to test different methods of establishing six promising species on the four soil types. Most significant from the year's results is the fact that in order to successfully establish grasses and legumes on the piney woods ranges, it seems necessary to prepare the soil and fertilize. Probably the most important role of soil preparation is the elimination of competition for light, moisture and minerals by the native vegetation. The most effective preparation was disking with a bush and bog disk harrow on land from which the vegetation had recently been burned. Drilling the seed in at the proper time gave best stands, but good results were obtained by broadcasting the seeds on prepared land whether the seeds were covered or left to be covered by rains. Despite the fact that all establishment plots were open to grazing throughout the growing season, the ground coverage of the planted species in August was over twice as much on the fertilized plots, and the proportion was even greater by the end of the growing season.

This spring, two new experiments were begun to test single combinations of four of the most promising summer grasses, four summer and three winter legumes on native range land of the Norfolk, Plummer, and Leon soil types. The effect of lime application is also included in these establishment experiments.



## DAIRY CATTLE

**Dehydrated Sweet Potatoes is a Good Source of Carbohydrates in a Dairy Ration:** A feeding trial carried on during the summer of 1946 and repeated early in the year 1947 indicates that dehydrated sweet potatoes is equivalent to ground snapped corn as a feed for dairy cattle. In the test, two groups of cows received either ground snapped corn or dehydrated sweet potatoes in their grain mixture. The concentrate mixture was composed of either ground snapped corn or sweet potato meal, ground oats, peanut meal, and wheat bran. The cows were fed silage and hay. They were also on green grazing during the period. During the 1946 test, the ground snapped corn group produced 2.07 pounds of milk for each pound of concentrates consumed, while those on dehydrated sweet potatoes produced 2.20 pounds of milk for each pound of concentrates consumed. The corn-fed cows averaged 20 pounds of milk and 1.05 pounds of butterfat per day, while the dehydrated sweet potato group produced 20.7 pounds of milk and 1.05 pounds of butterfat. The results of the 1947 test were essentially the same.

**Temporary Grazing Crops Recommended for Economical Milk Production:** An effort is being made to keep the Station dairy herd on temporary green grazing crops the year round. When the temporary grazing is abundant, the cows are permitted to graze all they will. When temporary grazing is scarce, the cows are permitted to graze a short time daily. It has been noted that an hour's grazing during the winter months will materially stimulate milk production. Cattail millet has proved to be the best temporary summer grazing crop tested. If rotation grazing is practiced, three-tenths of an acre per cow will furnish all the cattail millet grazing a dairy cow will take, provided the millet is grown on good land that is liberally fertilized. A succession of plantings of cattail millet is desirable for continuous grazing during the summer. Oats and vetch have proved to be the best combination for temporary winter grazing. Oats, like Cattail millet, give the best results when rotation grazing is practiced. Early plantings (4 bushels of oats and 30 pounds of vetch) with liberal applications of fertilizer and nitrate have been found necessary for early winter grazing.

## SWINE INVESTIGATIONS

**Mature Oats Equal to a Mixture of Oats, Rye, and Wheat When Hogged-off:** When hogged-off, oats produced more pounds of pork per acre than a mixture of oats, Abruzzi rye, and wheat. Pigs in both groups were self-fed protein supplement. The oats yielded 1640 pounds per acre while the mixture yielded 1359 pounds. There was little difference in average daily gains made by the pigs in the two groups. Another group of pigs self-fed shelled corn while hogging-off mature oats gained faster and required less feed per 100 pounds of gain. The feed cost, however, was slightly higher for the corn-fed group.

**Runner Peanuts Hogged-off Early Produce More Pork Than Those Hogged-off Late:** Runner peanuts hogged-off during the period September 25 to December 11, 1946 resulted in more pounds of pork than those hogged-off during the period December 20, 1946 to February 24, 1947. There was no appreciable difference in the rate of gain made by the pigs in the two groups, but pigs hogging-off peanuts early consumed 408 pounds of peanuts

hogged-off and protein supplement fed, as compared to 543 pounds consumed by the pigs hogging-off runner peanuts late. Former observations indicated that runner peanuts started decaying rather badly during February.

## SWINE PARASITE INVESTIGATIONS

The swine parasite laboratory in cooperation with the Animal Husbandry Department has conducted experiments to ascertain:

1. The effect of internal parasites on the growth and nutrition of pigs.
2. The rate of acquisition of parasites by pigs occupying for the fifth consecutive summer an area which previously had not been used for swine.
3. The effect of the removal of manure from farrowing lots during the suckling period on subsequent infection of pigs with internal parasites.
4. The efficacy of sodium fluoride as an anthelmintic for the removal of large roundworms from swine.

The results of the first investigation corroborated the findings of previous years that pigs farrowed and raised on soil heavily contaminated with the infective stages of internal parasites were severely stunted by the worm infections resulting from exposure to these parasites. The pigs from the unsanitary lot reached a final market weight of 215 pounds five weeks later than pigs of the same age kept in a similar lot located on clean soil from which the manure was removed daily during the experiment. The average number of internal parasites recovered from the pigs from the unsanitary lot and clean lot was 7,321 and 114, respectively. The number of large roundworms, thorn-headed worms, red stomach worms, intestinal threadworms, and one species of nodular worm, *Oesophagostomum brevicaudum*, recovered post mortem was greater than that found in the pigs from the unsanitary lot the previous year. The number of lungworms, two species of nodular worms, whipworms, and liver lesions due to the larvæ of the kidney worm decreased as compared to that reported the previous year.

Contrary to the results previously reported, the pigs in the unsanitary lot required 4.83 pounds of feed to produce one pound of gain, whereas the pigs in the clean lot required only 4 pounds of feed to produce one pound of gain.

The finding of 24,606 red stomach worms in one pig and none in the remaining 11 pigs of the same group indicated that that animal probably was far more susceptible to infection with this parasite than the other pigs, since all were equally exposed to infection.

Continued observations on the acquisition of parasites by pigs ranging over land occupied for the fifth consecutive summer indicated an increase in the average infection from 2,169 internal parasites reported last year, to 4,187 for the current year. The number of large roundworms, one species of nodular worm, *Oesophagostomum longicaudum*, intestinal threadworms, and lesions in the liver due to the larvæ of the kidney worm increased as compared to that found in pigs occupying the area in 1945. The number of lungworms, thorn-headed worms, two species of nodular worms, three species of stomach worms, and whipworms decreased as compared to that reported the previous year.

An experiment was completed during the year in which parasite infections



in pigs raised on a farrowing lot from which all manure was removed daily during the suckling period were compared to those in pigs farrowed on lots from which manure was not removed. After six years of the application of this relatively strict sanitary procedure during the first 10 weeks of the life of the pig, nodular worm infection was reduced to 4.1 worms per pig, whipworm infection to 11.5 worms per pig, and liver lesions due to kidney worm larvæ to 1.7 lesions per pig. These figures when compared to the number of worms and lesions found in control pigs, 147.6, 21.9, and 3.6, respectively, indicate the value of early prevention of parasite infection. This procedure also delayed the maximum egg production of the large roundworm approximately 57 days as compared to control pigs.

In 1945 an experiment was performed which indicated that sodium fluoride mixed with the quantity of ground feed which pigs would clean up in one 24-hour period in the proportion of 1 to 100 would remove practically all of the large roundworms present in young pigs at the time of treatment. This experiment was repeated during the current year with relatively poor results. Additional work is being done in an effort to ascertain the true cause of the discrepancy.

## ANIMAL DISEASE INVESTIGATIONS

**Diagnostic Service:** A laboratory diagnostic service by this Department is available to owners of sick animals. The local veterinarian should be consulted to determine if this service is needed. In cases where the symptoms are clear-cut, laboratory service is unnecessary. However, in disease outbreaks where the symptoms are obscure or confusing an accurate diagnosis can sometimes be made by the help of laboratory tests. This enables the farmer and his veterinarian to take prompt steps to correct the disease condition among the sick animals and, thus, save many animals that would have been lost had a diagnosis been delayed. An example is a case where 300 feeder pigs were showing indefinite symptoms of an illness that could have been any one of four serious disease conditions. By prompt use of the laboratory facilities, the germ causing the disease was identified and proper treatment administered; thus, saving many animals that otherwise would have been lost.

**Investigation of "Summer Itch" of Mules:** "Summer itch," "humor" or "faircy" has long been a common complaint of mule owners in Georgia. Treatment of this condition has been reported as generally unsatisfactory by veterinarians. Some treated animals will apparently be cured for one season, but the condition usually recurs the next spring. As the first step in this investigation, it was decided to try to determine the cause of the condition.

The condition manifests itself as a skin disease that appears in the spring with the beginning of warm weather and disappears in the fall with the coming of cool weather. Itching is the principal symptom. When an affected animal becomes hot while working, the itching may become so intense that the animal cannot work and must be unhitched. The affection usually starts on the front legs above the fetlocks and spreads upward over the shoulder and neck. It may occasionally spread over the back, sides, and hind legs. When the animal is in pasture, it is often seen to rub the neck or shoulders on objects or to bite at its legs or sides.

The lesions start as elevations about 2 mm. in diameter which are soon denuded of hair by biting or rubbing. This often causes the skin to bleed, especially on the legs between the fetlock and carpus, or "knee." The areas denuded of hair around these elevations become confluent and leave bare patches from 5 mm. in diameter to patches that may involve almost the entire shoulder or neck. Any lesions that follow are probably due to injury from rubbing or biting by the animal. During the summer, there may be remissions of the condition during which a marked improvement is seen, only to be followed by another attack that usually progresses further. The disease tends to become worse each year until the animal approaches old age, when the symptoms and lesions often become less marked. Animals from colts to aged mules or horses are affected. Dark bays and blacks seem to be affected most frequently. Farmers say that affected animals suffer from heat more than do normal animals. The condition does not spread from one animal to another. Usually, there is one mule in a lot that is affected and remains so without any new cases developing in the other animals. A survey in Tift County revealed about 10% of the animals to be affected.



In response to a form letter to veterinarians, this condition was reported from all Southeastern states, from Arizona, Nevada, California and Oregon, and from Wisconsin, Illinois, Iowa and Kansas. It does not seem to exist in New England or the Eastern Rocky Mountain region. It has been reported in the veterinary literature from India, Greece, the Philippines, North and West Africa, Germany, and Australia. The histories and symptoms of the condition in these countries are almost identical with those of cases seen here.

The cause of the disease in these other countries has been determined to be a small, immature form of a worm parasite in the skin. Federal workers have found larval worms in the skin of horses in Maryland and Virginia suffering with a skin disease similar to "summer itch." Our investigation was directed toward examination of the skin of affected animals for parasites. After many unsuccessful attempts with various methods, a parasite was found in the skin of three affected mules. This parasite resembles a microfilaria of the genus *Onchocerca*. Thorough investigation of the tendons and ligaments of the legs and the large ligament (*Ligamentum nuchae*) of the neck, of the walls of the great blood vessels, and of the abdominal cavity of one aged mule failed to reveal adult parasites of this genus, although the microfilaria had been found in the skin.

Experimental treatment of one animal with increasing doses of tartar emetic, 0.66 gm., 0.66 gm., 0.88 gm. and 0.88 gm. in 1% solution of sterile distilled water, given intravenously every other day had no beneficial effect on one five-year old mule affected with the disease.

Search for the adult parasites will be continued. Certain mosquito-like insects have been found to transmit the disease in other countries and a search for the vector is planned. Various drugs now being used in a similar disease of humans, will also be tried next season.

**Investigation of a New Cattle Disease (X-Disease):** Since March 1946 this Department has had under observation a new disease of cattle that has the external appearance of mange. It affects animals up to two years of age, usually under one year. One case was observed in a calf four weeks of age. The disease has appeared in Randolph, Mitchell, Colquitt, Tift, Marion, Wilcox, Catoosa and Candler Counties. The same condition has been observed in many states from Texas to New York during the last two years.

In addition to the mange-like condition of the skin, the calves usually have a watering of the eyes, wart-like growths on the tongue, roof of the mouth, lips or on other parts of the intestinal tract. A diarrhea usually accompanies the disease. The animals usually get progressively thinner and die in a matter of weeks. An acute outbreak has been seen where the calf ran a high temperature and died in a week. Some animals show lesions about the top of the hoof.

This disease has been mistaken for foot and mouth disease. Due to the seriousness of foot and mouth disease which exists in Mexico at this time, any condition involving the feet and mouth should be reported to the local veterinarian or the Chief Veterinarian's office in Atlanta.

No effective treatment has been developed for this new disease. Study of this condition is continuing.

**New Infectious Diseases of Swine (Infectious Rhinitis):** Swine herds

in Colquitt, Irwin, and Turner Counties have been found to be infected with a disease not previously reported in Georgia, but that has been seen in Indiana, Minnesota, New York, and Canada. This is a chronic disease of the nasal passage of swine, usually passed by the sow to her pigs shortly after birth. The pigs begin to make a "sniffing" or "sneezing" noise which gets gradually worse. Many of the affected pigs develop a deviation of the snout to one side or the other, which makes breathing very difficult, while in others the principal symptom is the dripping of blood-tinged fluid from the nostrils. In well marked cases, fits of sneezing may be seen in the pigs. The serious thing about this disease is that it markedly retards the growth of the pigs, kills many of them and spreads slowly to a high percentage of the pigs. This condition is not to be confused with "bull nose" which is a pus-containing swelling of the tissues of the snout. The only remedy known at this time is for the owner to sell *all* his hogs *for slaughter*, (so the disease will not be spread). A Canadian authority states that the disease is spread only by direct contact between swine. Therefore, it should be possible to restock a premises with pigs safely, after removing all swine that had been exposed to an infected animal. Investigation of this condition is continuing.

**Mastitis Control Program:** The project on control of mastitis in co-operation with the Dairy Department has been continued. By use of the milking procedure and other recommendations mentioned in last year's report, the incidence of mastitis has dropped from 29% of tested quarters on the initial test in July 1945 to 9% in June 1947. Attempts to eradicate the disease have not been made as several old cows with incurable cases of mastitis have been retained in the herd due to their records and valuable blood lines. The incidence of acute flare-ups of mastitis from any cause has been reduced considerably. Five quarters in four cows have shown new infections in the past year. The incidence of new infections would, in our opinion, have been much greater had the new milking system not been used. Dairymen interested in the details of mastitis control should write for Mimeograph Paper No. 41 entitled "How to Eliminate Mastitis from the Dairy Herd."

**Treatment of Mastitis:** There is little new to be added to the information recorded in last year's report. A tendency has developed toward using a combination of penicillin and sulfa drugs for intramammary infusion, the combination being better than either alone. Best results have been obtained when the cows were treated while dry.

**Mastitis Testing Service:** In order to eliminate mastitis, it is necessary to know which cows are infected. Accordingly, this Department has continued to test milk samples for mastitis, free of charge, for dairymen and veterinarians throughout the State. Sterile tubes for the collection of milk samples, containing a preservative, can be secured by the dairyman or his veterinarian from this laboratory.

During the year, 1715 samples from 1117 cows were tested. These samples were from 55 herds varying in size from one to 92 cows, averaging over 21 cows per herd. The average incidence of infection was 19.7% of the samples tested.



## ENTOMOLOGY

During the year, research work has been confined largely to problems dealing with insects attacking cotton, tobacco, and cucumbers, and to the control of velvet bean caterpillar (*Anticarsia gemmatilis*) on peanuts.

Considerable progress has been made in investigating the newer organic insecticides on these crops, especially upon cotton and cucumbers.

**Cotton:** The cotton investigations were designed especially to test the relative effectiveness of two new organic insecticides, a 20% chlorinated camphene and the 5% DDT-3% (g) Benzene hexachloride mixtures as compared with the standard recommended calcium arsenate—1% nicotine mixture. Insects especially investigated were boll weevils, boll worms, and cotton aphids, with some investigation of green stink bug control.

All insecticides used were effective. All gave good control of both aphids and weevils, and the organics both gave good control of stink bugs where they appeared. At the percentage and dosage levels used, there appeared very little difference in degree of control and none of the materials gave indications of damage to the cotton plant. Under conditions of good fertilization, the organic materials appeared to stimulate fruiting, although no significant increases in yields were recorded.

Neither the chlorinated camphene nor the DDT-BHC mixtures controlled red spider where it appeared, unless they carried at least a 40% sulfur content. Where this was used as the diluent, adequate control of red spider was obtained.

Both of the organic materials appeared to control boll worm excellently with little choice between the two as to efficiency. The calcium-nicotine mixture was not quite as effective against this pest. However, at least one late dusting with the organics, especially to control boll worm, is necessary. If their use is discontinued too early, heavy populations of worms are likely to appear, since both seem to reduce markedly the populations of parasites and predators which ordinarily hold down the numbers of boll worms.

From present data at hand, there would appear to be little choice among the three materials in most years. Cost would undoubtedly be the major factor in selection. Somewhat better control of boll worm and stink bug infestations, however, would appear to make the organics somewhat the better choice even at slightly higher costs.

**Cucumbers:** Work in 1947 was designed to study the effects of some of the newer insecticides upon the "pickle worm" and "melon worm" infestations which appear about mid-season. The materials investigated included 20% chlorinated camphene, 5% chlordane, 4% DDT and 3% (gamma) Benzene hexachloride. These were compared with the standard-used cryolite, carrying a 90% sodium fluoaluminate content.

With the exception of the chlordane, all gave good control of pickle worm and melon worm in a mixed infestation. Of the three organic materials the BHC gave the best control of worms and the highest yield of fruits during the season. Seasonal average infested fruits was just under 6%, with a maximum infestation of 8.06% as compared with a seasonal average of 15% for

cryolite with a maximum of 18.2%.

Both DDT and chlorinated camphene gave percentages intermediate between the BHC and cryolite, with seasonal average of 12.5% for DDT, and 11.7% for the chlorinated camphene.

No burning was noted on any of the plats carrying the organic materials in spite of somewhat heavy dosages (averaging between 23 pounds and 30 pounds per acre per application). However, both DDT and BHC have been reported elsewhere as producing severe foliage damage upon cucurbits and, in spite of two seasons' use without indication of injury, they should be used, if at all, with extreme caution, since the conditions inducing injury in this area are at present unknown.

There seemed to be no indications of damage to fruits either in size or otherwise. However, there was a very definite reduction in the number of blooms produced upon the chlorinated camphene plats, so much so as to reduce actual yield to little above that of the check, or approximately one-third less than the cryolite and slightly over one-half of the BHC plats. This would appear to be a serious objection if future tests should prove it to be a characteristic of the use of this material.

Tainting of the fruit by the BHC was not noted with raw cucumbers. However, usually this is a very serious fault of this material, and it would not be advisable to use it until further tests are made. The material appears to have very great promise, however, if it is found to be safe under average conditions and does not taint fruit for use as pickles.

Chlordane used at the above percentage gave little better control of worms than the check plats.

Aphids did not appear; consequently, the effects of these materials upon aphids were not determined.

**Tobacco:** Work upon tobacco was exploratory only. It included observations upon control of horn worm, bud worm, and aphids, using the following materials: Standard lead arsenate used without lime, a plant-safened calcium arsenate, 20% chlorinated camphene, 5% chlordane, and 3% (gamma) Benzene hexachloride.

Of the materials used, the chlorinated camphene appeared especially effective against horn worm, gave good bud-worm control, and appeared to give some aphid control. It would not, however, "clean up" a heavy aphid infestation.

The BHC gave excellent aphid control, only fair horn-worm control, and poor bud-worm control. It was found, however, unusable because of permanent tainting of the tobacco, the odor being distinctly noticeable even after curing. It may have a place in cleaning up plants in the plant bed just before setting them out, if, as is suspected, much of the aphid infestation actually is begun in the plant beds.

The chlordane gave fair control of horn worm, rather poor control of bud worm, and appeared to have little effectiveness on aphids. However, the aphid infestation was light and the degree of control hard to estimate.

The plant-safened calcium arsenate gave second best control (after the



chlorinated camphene) of horn worm, only moderately good bud-worm control, and appeared to increase slightly aphid infestation. Although used in heavy dosages (as a dust), it gave no indication of serious plant burn.

The lead arsenate, used as the standard, gave third best control of horn worm, but even at that, very good commercial control. It appeared a little more effective as used against bud worm than the calcium, but less so than the chlorinated camphene. Aphid infestation appeared to be unaffected by it.

None of the materials used produced any serious plant injury even at rather high per-acre applications. The BHC when permitted to accumulate in "gobs" on the under sides of the leaves produced some burning. However, none observed appeared to be serious enough to affect quality of bright tobacco. The calcium arsenate upon occasional leaves produced a very minor edge burn, never over a fraction of an inch deep, and apparently without any significance commercially. None of the other materials appeared to damage the plants.

The plats dusted with the calcium arsenate appeared to mature off a little faster and a few plants showed a yellowing of the green tint of the foliage, but no definite damage from this cause.

Of the materials used, the chlorinated camphene appeared to have the best possibilities as a tobacco poison. It appeared quite effective against both horn and bud worms, seemed to produce no damage to the plant, and appeared not seriously to taint the tobacco. There is a little doubt as to just how late it may be used without producing some slight "taint" in the cured leaf, and the question of undesirable residues upon the leaf is still unsettled. It is definitely not recommended for use at this time until these phases of the problem can be definitely settled.

**Peanuts:** Work in control of the velvet bean caterpillar (*Anticarsia gemmatilis*) was done largely upon peanuts.

Because of the slowness of action of cryolite and the fact that it is ineffective after even light rains, it seemed desirable, if possible, to replace this insecticide by a faster acting and more permanent material.

Five per cent DDT had been tried the previous year with success, but in order to reduce the residue problem on the hay, the dosage was cut in half and used as a 2.5% DDT with dusting sulfur as the carrying agent.

The reduced dosage gave complete success. Kill amounted to practically 100% in less than 48 hours, and feeding was almost completely stopped within a half hour of applying the material. Even rather poor application gave excellent control because of the habit of the insect feeding in the tops of the plants.

Since the additional benefits in leaf-spot control, where 15 pounds of sulfur is used, were sufficient to pay approximately the full cost of the material used, dosages recommended were from 15 to 20 pounds per acre. Unquestionably, dosages as small as 10 to 12 pounds per acre will give insect control satisfactorily.

Complete protection from injury by velvet bean caterpillar was secured in the experimental plats for a period of 10 days. The plats were accidentally redusted at the end of that period. However, excellent protection without any recurrence of insect damage was seen in commercially-dusted fields for a

period of three full weeks. This was secured in spite of heavy rainfalls during the period.

Such analyses as have been secured show very low residues of DDT on hay handled in the usual manner, and hay fed to livestock at the Station showed no indications of any toxic effects upon any type of stock.



## HORTICULTURE

### SWEET POTATOES

**Sweet Potato Variety Test:** Over a four-year period Bunch Porto Rico has exceeded the yield of the standard vining Porto Rico fifty-seven bushels per acre in marketable potatoes. The Bunch Porto Rico requires a shorter growing period, has a higher percentage of No. 1 potatoes, is of equally good or perhaps better color, shape and appearance than the vining type and, because of its shorter vines, is easier to cultivate and harvest.

In a cooperative test including twenty-five of the best standard and recently introduced table varieties (Bunch Porto Rico was not included), Ranger and Unit I were outstanding. While in a collection of twenty-five varieties high in starch and dry matter, B-4004, L-125, L-5, and B-196 were among the best.

**Sweet Potato Breeding:** To meet the need for a better quality table potato that is resistant to stem rot and also to develop a potato to meet a certain need for livestock feed and commercial purposes, the Tifton Station has begun a sweet potato breeding program.

In 1945 and 1946 a number of plants were induced to bloom and several hundred seed from known crosses, and from open-pollinated flowers, were harvested. Promising seedlings from these are being grown in elimination trials. Porto Rico, Ranger, 129655, Nancy Hall, and several seedlings known to carry wilt resistance are being grown for breeding purposes. By utilizing greenhouse space, crosses are being made in both summer and winter, thereby speeding up the breeding program.

**Sweet Potato Seedling Test:** In a cooperative project with the United States Department of Agriculture and other research institutions in the South, promising seedlings developed at cooperating stations are forwarded to the Tifton Station for test, to determine their behavior under Georgia conditions. Several now under test are remarkably high in carotene, a desirable table characteristic, while others are high in dry matter, which is desirable for livestock feed.

**Foundation Seed Stock of Sweet Potatoes:** Realizing that one of the requisites in expansion of the sweet potato industry in Georgia is a better source of seed, this Station has initiated a program whereby limited supplies of high quality, disease-free seed potatoes will be released to qualified growers, who will increase them for distribution to the public the following year. Such foundation seed stocks are being maintained in both the copper skin Porto Rico and the Bunch Porto Rico but are being withheld at the present time because of internal cork contamination.

Because of frequent mutations and possibly other factors not too well known, the Porto Rico strains of sweet potato rapidly lose their desirable golden interior color. Shape, size, productivity and other desirable qualities are likewise lost unless a careful program of seed selection is followed. It is for this reason that the Tifton Station has begun developing foundation seed stock and it appears now that "trued-up" seed potatoes should be sent out to seed growers either annually, or at two-year intervals.

To produce these seed, the Station makes hill selections at harvest, on the

basis of productivity, shape, size, exterior color, interior color, varietal characteristics, and freedom from disease. Potatoes are placed in disease-free containers and cured in disease-free houses. When removed from storage they are again checked for disease, and each root bedded must conform to the high standards mentioned. Draws from these roots are set in the field early, on clean land. Plants are checked periodically for off-types and diseases. Vine cuttings from these plants are set in mid-summer to produce potatoes from which the foundation seed is selected.

The State Department of Entomology and Plant Quarantine are cooperating with the Station in producing disease-free seed stock.

### SOIL TYPES STUDY

This study is designed to ascertain the adaptability of leading truck crops to Tifton and Norfolk Sandy Loam soils, and also to determine the efficiency of different fertilizer levels.

**Sweet Potatoes:** The soil types study thus far indicates that well drained Tifton Sandy Loam is slightly preferable to Norfolk Sandy Loam and also to low-lying Tifton Sandy Loam for sweet potato production. It also indicates that where normal applications of fertilizer are used, higher returns may be expected from Tifton than from Norfolk soils.

**Watermelons:** Watermelon yields were slightly higher on Norfolk than on Tifton Sandy Loam while the response to a heavy application of fertilizer was about the same on the two soil types.

**Snap Beans:** This crop is slightly more productive on the relative low-lying Norfolk soil than on well drained Tifton Sandy Loam. Also in this study heavy applications of fertilizer were significantly more effective on Norfolk than on Tifton soils.

**Tomatoes:** Yields from tomatoes growing on Norfolk Sandy Loam likewise were greater than on Tifton Sandy Loam and, also the response from heavy applications of fertilizer on Norfolk soils was substantially greater than on Tifton soils.

### MISCELLANEOUS VEGETABLES

**Snap Bean Variety Test:** Logan, a variety recently introduced by the Vegetable Breeding Laboratory, Charleston, S. C., was the most productive bean in test in 1946 while in 1947 more recent introductions were included which were considerably more prolific.

**Lima Bean Variety Test:** US 242, a Fordhook type of lima bean, is significantly more productive than the old Fordhook variety and appears to be equally as desirable as a fresh market bean. For processing, US 243 seems definitely superior to Henderson Bush, which it closely resembles. Observations indicate that it will be an outstanding processing variety.

**English Pea Variety Test:** Wando English pea, recently introduced by the Vegetable Breeding Laboratory at Charleston, S. C., is the outstanding variety in the test and is proving to be a popular canning pea.

**Table Cow Pea Variety Test:** Of the thirty-five kinds of peas included in this test Alabunch, New Era, Brown Crowder, Alacrowder and



Conch were among the most prolific, desirable eating varieties.

**Cabbage:** A study of cabbage nutrient requirements, cultural practices and varieties, as previously reported, is being continued but is being hampered by frequent cold injury to the crop.

### VEGETABLE PLANT SEEDBED INVESTIGATIONS<sup>1</sup>

Due to change in personnel, a full report from this department is not available at this time.

**Transportation of Tomato Plants by Airplane:** Preliminary tests of air transportation of tomato plants were made in 1945. This was followed by the successful transportation of about 50 plane loads in 1946 and approximately double that number in 1947. As a result of the success already attained in transporting tomato plants by air and also of the possibility of considerably lower transportation rates in 1948, it is the general opinion of those closest to the tomato plant industry, that air shipment will become increasingly popular, particularly in transporting plants to the more distant canning areas where truck and rail shipments require several days for delivery.

### FRUIT CROPS

**Peach Variety Test:** The peach variety test was discontinued at the end of the twelfth year of production or when the original trees were 14 years old. At the termination of the test, only 28 of the original 73 varieties were surviving and practically all of those were badly devitalized, as was obvious both in tree vigor and in yield. Among the varieties that survived over the entire period and that appeared to be of greatest value in this area are Uneecle, Anna, Burbank's New July Elberta, Georgia Bell, Dixie Gold, Elberta, Valiant, Mamie Ross, Hiley, Slappy, and J. H. Hale. It is interesting to note that practically all of the standard commercial varieties are in this group.

**Pecans:** Variety trials with pecans continue to show Stuart, Farley, Bradley, and Moore to be superior varieties for the Coastal Plain of Georgia.

At the age of seventeen years, Farley is leading all varieties (in test at Tifton, for a comparable period of time) in the total production of nuts and is even more impressive from the standpoint of pounds of kernel produced. In addition to many other desirable characters, it possesses a high degree of resistance to scab and other leaf diseases.

**Pears:** Baldwin continues to be the outstanding pear in test. Present data and observations indicate that there is no variety its equal for home use and its possibilities as a commercial pear are being studied.

**Grapes:** One acre each of the Hunt and Yuga varieties of muscadine grapes was set in February 1945. Many plants produced arms as long as six feet the first summer and a yield of commercial proportions was obtained in the summer of 1947.

**Muscadine Variety Trials:** This test has been in progress twenty-two years and many of the varieties produced exceptionally well in 1946 with the

<sup>1</sup> 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.

result that, in many instances, the average annual yield is considerably higher. However, Hunt appears to be the leading commercial variety, while Dulcet and Yuga are preferable for home use.

**Figs:** Plants of twelve varieties of figs were set in the spring of 1946. Previous to setting, the soil was treated to kill nematodes, and cover crops resistant to this pest are being grown.

**Blueberries:** Propagation studies have shown that the rabbiteye blueberry may be propagated by both hardwood and dormant cuttings. Preliminary investigations indicate that a mixture of equal parts of ground acid peat, sand, and sawdust is satisfactory for rooting; however, larger plants are obtained when a mixture of two parts of acid peat, one part of sand, and one part of sawdust is used.

Cuttings which have fruit buds are very difficult to root, as compared to those which do not have fruit buds. Also cuttings from healthy, vigorous plants root better than cuttings from weak plants. Softwood or summer cuttings have not given as high percent of rooted plants as have hardwood cuttings.

Blueberries may be successfully rooted in cold frames in a lath house, without heat.

Two thousand seedlings were set in the winter of 1945-46 and 50,000 seeds of known crosses were planted. These plants will be fruited and outstanding plants selected for further tests. Twenty selections have been made from seedlings set in 1941. The best of these selections, 11-182 and 11-180 (still designated by trial numbers), are being propagated as rapidly as possible and should be ready for release to the public in limited quantity in 1948-49.

**Dewberries:** Fifteen varieties and selections of dewberries were set in the spring of 1945. These varieties vary from poor to excellent in yield and vigor with the exception of Thornless Loganberry which died after producing a light crop in 1946.

**Blackberries:** Eleven varieties of blackberries are included in the test over a two-year period and several showed promise this year of being superior to native berries.

**Citrus:** Owari is the best variety of Satsuma orange for the lower Coastal Plain of Georgia and, with the exception of Kumquats, Myers lemon is the only citrus fruit possessing sufficient cold resistance to grow successfully as a home fruit in the Tifton area. In the extreme southern portion of the State, Limequats and grapefruits also may be grown in the home orchard.

**Tung:** Trees in the Station trial grounds are showing increased production as they approach maturity. Although there have been two complete crop failures (as a result of cold injury) during the past ten years, there has been an average annual production of slightly more than one ton of air-dried nuts per acre during that time. At present price levels, that would provide a gross income of about one hundred dollars per acre or about one-third that amount when sold under pre-war prices.

**Chestnuts:** Eleven-year-old, blight-resistant chestnuts have produced average annual yields ranging from five to fifteen pounds per tree, while individual trees have produced annual yields ranging up to forty-eight pounds.



The trees are vigorous, productive, and well adapted but the nuts are of poor storage quality and, as a result, apparently cannot be marketed except when processed.

## SOILS DEPARTMENT

During the early part of 1947, sufficient laboratory equipment and supplies were secured to set up and put into operation a few of the routine chemical soil analysis procedures commonly in use. The principal objective in the beginning was to try as many of the types of procedure which are currently being used and find out which ones were adapted to the soils of the Coastal Plain in general, and the soils on the Experiment Station property at Tifton and Alapaha in particular. Samples of soils from plots on which the past treatment was known were used as the basis for evaluating the procedures.

Soil samples are being collected and analyzed from various plots on the Station property at Tifton and Alapaha as requested by the various departments. In some instances, periodic soil sampling and analysis is carried on with some departments as a soils research study in evaluating the treatments which affect the chemical and physical properties of the soils. It is planned to expand the physical testing of soils during the coming year with the aid of new equipment expected to be available.

**Soils Studies of Lime Rotation Test:** (Tifton Sandy Loam, Norfolk Sandy Loam, and Plummer Loamy Sand): Soil samples are collected periodically to determine the available N. P. K. content, the pH, the organic matter and exchangeable bases of the plots. These plots were treated with three different forms of lime, superimposed on a rotation of grain, corn and peanuts, involving the maximum use of summer and winter legumes. No conclusions on this study to date.

**Minor Element Test:** (Ruston Sandy Loam): At Greenwood Plantation in Thomas County, where cooperative corn breeding work is being conducted, it was noted during the growing season of 1946 that some of the areas showed symptoms of minor element deficiencies. In order to determine the nature of these deficiencies, a test was set up using the elements magnesium, zinc, copper, and boron. The corn plots receiving no zinc showed very definite zinc deficiency symptoms during the early part of the 1947 growing season. Further work will be carried on along this line to study the effect on yield of the zinc deficiency as well as the other minor elements.

(Tifton Sandy Loam): A test similar to the corn minor element test was set up with cotton at Tifton using magnesium, zinc, copper, and boron. No conclusions to date.

(Tifton Sandy Loam): A minor element test using copper and zinc was set up at Tifton on Spanish peanuts to determine the effect on yield of the use of these two minor elements. No conclusions to date.

**Maps:** In cooperation with the Soil Conservation Service, the Soils Department completed a detailed soils map of the 2,800-acre Alapaha Experimental Range tract located in Berrien County.