HORTICULTURE
SWEET POTATOES

The work in progress with sweet potatoes consists of:
1. Variety and Seedling Tests
2. Sources of Phosphoric Acid
3. Sources of Nitrogen
4. Sources of Potash
5. Top Dressing Test with Nitrogen
6. Top Dressing Test with Potash
7. Ratios of Mineral and Organic Nitrogen
8. Controlled Plant Nutrients
9. Seed-Piece Method of Planting
10. Production of Seed Potatoes for Seed-Piece Planting

**Sweet Potato—Variety Test:** This test, which formerly included 49 varieties, is being divided into two groups of 25 varieties each, the first to include those having desirable characteristics for table use and the second, those better suited for starch production. A seedling test also is in progress through which new varieties are being introduced. This work is being conducted jointly with the Office of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture.

**Sweet Potato—Sources of Phosphoric Acid:** There is only a slight difference in yields obtained from the various sources of phosphoric acid. Therefore, it appears that the cost of the material and the convenience of handling should be the determining factors in selecting the carrier to be used in a mixed goods for this crop. The amount of each carrier used in this test, together with corresponding yields, are shown in Table 35. The nitrogen and potash used in preparing the different combinations were the same in all instances so that the phosphate carrier was the only plant nutrient variable. In some phosphate carriers, the phosphoric acid content is so low that it is necessary to compute the plant food requirements in pounds per acre, rather than on a ton basis.

**Sweet Potato—Sources of Nitrogen:** The comparatively high yields obtained from mineral sources of nitrogen during the relatively dry growing season of 1943 have reduced the difference in yield of No. 1 potatoes between these sources and the more generally used organic carriers to the extent that there is now no significant yield differences. Particularly is this true when nitrogen is derived from a single source and considered on a cost basis. (Note yield records in Table 36.) There are, however, indications, as shown in Table 40, that a combination of the two sources is preferable. The best mineral carriers seem to be nitrate of soda and sulphate of ammonia while the best organics are peanut meal, cottonseed meal, and tankage.

**Sweet Potato—Sources of Potash:** Of the sources of potash now commercially available, muriate seems to be the most desirable carrier for this crop.

**Sweet Potato—Top Dressing Test with Nitrogen:** Data resulting from this work indicate that the yield increase obtained from nitrogen used as a top dresser is largely in the form of jumbo or large potatoes. Under the con-
ditions of this test, the addition of nitrogen in this manner does not seem to be desirable in the production of table stock but may have a place in bulk production. The top dressings supplemented a preplanting application of 300 pounds of 4-8-6 fertilizer per acre.

**Sweet Potato—Top Dressing Test with Potash:** Yield responses from the various rates of top dressings used here indicate that 50 pounds of muriate is the most economical amount of potash that can be used in supplementing the 300 pounds of 4-8-6 fertilizer that was applied before planting.

**Sweet Potato—Ratios of Mineral and Organic Nitrogen:** In this test, slightly higher yields result from the use of a combination of mineral and organic carriers than from either source used singly.

**Sweet Potato—Controlled Plant Nutrient Study:** Of the secondary plant food elements—calcium, magnesium, sulphur, and chlorine—only sulphur has caused a decrease in yield, when omitted from the complete formula used in this test. Neither calcium nor magnesium, when omitted, made any appreciable difference in yield. Chlorine, however, when omitted, gave an increase which indicates that under the conditions of this test its presence is objectionable.

**Sweet Potato—Seed-Piece Method of Planting:** The seed-piece method of planting consists of planting pieces of potatoes directly to the field rather than using draws or vines as is the customary practice. The value of this method seems to be two fold: First, it reduces labor cost in the planting operation, and second, it makes earlier planting of the entire crop possible, thereby giving a longer growing period and a resulting increase in production. The present indications are that the tip and stem ends of small potatoes are the most desirable seed-pieces and that the weight should not exceed one-half ounce each. The size of the seed-piece directly influences the resulting crop. A large portion of the crop produced from small pieces consists of strings and small and medium size potatoes while large pieces have the opposite effect and produce an excessive amount of oversize (mother) potatoes.

Data and observation thus far indicate that this method is not suitable for growing potatoes for table use. It does, however, seem well adapted where potatoes are to be hogg'd off and appears to have possibilities where bulk production is desired.

**Sweet Potato—Production of Seed Potatoes for Seed-Piece Planting:** This consists of planting vine cuttings about the middle of July. They should be planted on new land or on land that is thought to be free of sweet potato diseases. Plants should be spaced 4 inches in the drill and should receive only about 400 pounds of fertilizer per acre. Plant on ridge of medium height and harvest before frost. For two reasons it seems advisable to use the above cultural practices in growing seed-pieces for this method of planting: First, the resulting crop consists almost entirely of strings and small potatoes, which is the best source of seed-pieces, and second, by using seed stock grown from vines, there is a possibility of holding diseases in check.

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1The complete formula referred to above contains: 32 pounds of nitrogen, 64 pounds of phosphoric acid, 48 pounds of potash, 60 pounds of calcium, 20 pounds of magnesium, 48 pounds of sulphur, and 20 pounds of chlorine per acre.
### TABLE 35.

**SWEET POTATO—SOURCES OF PHOSPHORIC ACID**

Average Yield for Years 1935 to 1943, Inclusive

Fertilizer: 800 Pounds per Acre, 3.29% Nitrogen, 8% Phosphoric Acid from Sources as Indicated, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash)

Variety: Porto Rico

Average Date Planted: April 14
Average Number of Growing Days: 193

<table>
<thead>
<tr>
<th>Source of Phosphate</th>
<th>Amt. Used per Acre (Libs.)</th>
<th>Phosphoric Acid Content (%</th>
<th>Yield in bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. 1's</td>
<td>No. 2's</td>
</tr>
<tr>
<td>Soft phosphate**</td>
<td>1066</td>
<td>6</td>
<td>184.8</td>
</tr>
<tr>
<td>Ammoniated superphosphate</td>
<td>427</td>
<td>15</td>
<td>182.86</td>
</tr>
<tr>
<td>Triple superphosphate</td>
<td>137</td>
<td>46.8</td>
<td>179.64</td>
</tr>
<tr>
<td>Basic slag</td>
<td>800</td>
<td>8</td>
<td>176.55</td>
</tr>
<tr>
<td>Superphosphate</td>
<td>400</td>
<td>16</td>
<td>176.31</td>
</tr>
<tr>
<td>Dicalcium phosphate</td>
<td>160</td>
<td>40</td>
<td>170.92</td>
</tr>
</tbody>
</table>

* Since the analysis of different batches of materials may vary from time to time, the percentages of “available” phosphoric acid used in this table are approximate for all sources except soft phosphate and basic slag. In these last named materials the figures representing the phosphate content are arbitrary, because manufacturers or distributors furnished only data on the total phosphoric acid contained.

** So far as these tests are concerned, the terms soft phosphate and colloidal phosphate may be used interchangeably.

### TABLE 36.

**SWEET POTATO—SOURCES OF NITROGEN**

Average Yield for Years 1933 to 1943, Inclusive

Fertilizer: 800 Pounds per Acre, 3.29% Nitrogen from Sources as Indicated, 8% Phosphoric Acid, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash)

Variety: Porto Rico

Average Date Planted: April 17
Average Number of Growing Days: 195

<table>
<thead>
<tr>
<th>Source of Nitrogen</th>
<th>No. 1's</th>
<th>No. 2's</th>
<th>Strings</th>
<th>Jumbos</th>
<th>Rot</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cottonseed meal</td>
<td>155.84</td>
<td>29.97</td>
<td>25.87</td>
<td>4.06</td>
<td>.32</td>
<td>216.06</td>
</tr>
<tr>
<td>Tankage</td>
<td>154.27</td>
<td>30.91</td>
<td>26.44</td>
<td>4.82</td>
<td>.41</td>
<td>216.85</td>
</tr>
<tr>
<td>Sulphate of ammonia</td>
<td>149.45</td>
<td>30.86</td>
<td>21.42</td>
<td>4.23</td>
<td>.37</td>
<td>206.33</td>
</tr>
<tr>
<td>Nitrate of soda</td>
<td>151.33</td>
<td>36.32</td>
<td>24.43</td>
<td>6.11</td>
<td>.78</td>
<td>218.97</td>
</tr>
<tr>
<td>Calnitro</td>
<td>144.26</td>
<td>28.24</td>
<td>21.61</td>
<td>7.64</td>
<td>.21</td>
<td>201.96</td>
</tr>
<tr>
<td>Cyanamid</td>
<td>132.61</td>
<td>30.07</td>
<td>23.65</td>
<td>3.26</td>
<td>.21</td>
<td>189.80</td>
</tr>
</tbody>
</table>
TABLE 37.
SWEET POTATO—SOURCES OF POTASH
Average Yields over a Thirteen-Year Period
Fertilizer: 800 Pounds per Acre, 3.29% Nitrogen, 8% Phosphoric Acid, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash). The potash is derived from sources as indicated.

Variety: Porto Rico
Average Date Planted: April 14
Average Number of Growing Days: 183

<table>
<thead>
<tr>
<th>Source of Potash</th>
<th>Yield in bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. 1's</td>
</tr>
<tr>
<td>Kainit</td>
<td>165.25</td>
</tr>
<tr>
<td>Muriate of potash</td>
<td>160.77</td>
</tr>
<tr>
<td>Manure salts*</td>
<td>155.52</td>
</tr>
<tr>
<td>Sulphate of potash</td>
<td>150.64</td>
</tr>
<tr>
<td>Sulphate of potash</td>
<td>148.48</td>
</tr>
<tr>
<td>magnesia</td>
<td></td>
</tr>
</tbody>
</table>

* Eleven-year average.

TABLE 38.
SWEET POTATO—TOP DRESSING TEST WITH NITROGEN
Average Yield for Years 1936 to 1943, Inclusive
Fertilizer: 800 Pounds per Acre, 3.29% Nitrogen, 8% Phosphoric Acid, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash). Applied before planting.

Variety: Porto Rico
Average Date Planted: April 15
Average Number of Growing Days: 197

<table>
<thead>
<tr>
<th>Top Dressing*</th>
<th>Yield in bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. 1's</td>
</tr>
<tr>
<td>Check (no top dressing)</td>
<td>180.93</td>
</tr>
<tr>
<td>100 Lbs. Nitrate of soda</td>
<td>181.65</td>
</tr>
<tr>
<td>200 Lbs. Nitrate of soda</td>
<td>190.42</td>
</tr>
<tr>
<td>100 Lbs. Nitrate of soda and 50 Lbs. Muriate of potash</td>
<td>197.54</td>
</tr>
</tbody>
</table>

* Top dressing applied at first cultivation.
Sweet Potato—Effect of Ridge Heights, Nitrogen, and Dates of Harvesting on Yield: This work is conducted jointly with the Office of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture. Comparative yields were obtained from ridge heights of 4, 9, and 14 inches, from formulas carrying 2 and 8 per cent nitrogen, and from harvestings made September 1, September 26, October 20, and November 20.

Data from ridge heights showed the highest yield was produced by the 14-inch ridge and the lowest by the 4-inch ridge. This coincides with results obtained in a previous study of this nature, conducted by this Station during the years 1925 to 1931 and reported on page 40 in Bulletin No. 17 of this Station, under the sub-heading “Cultural Methods”.

In comparing yields from fertilizers of high and low nitrogen content, the data again corresponded with results obtained from a study of nitrogen requirements of sweet potatoes at this Station, conducted during the years 1928 to 1931 and reported on page 24 in Bulletin No. 17 under the subheading “Fertilizer Formula Test”. Thus from this study it seems evident that fertilizers high in nitrogen will give profitable returns. However, other plant nutrient studies with this crop indicate that more economical returns may be obtained from similar increases of the potash content of fertilizer.

The effect of different harvesting dates on yield shows that there is a definite correlation between high production and a long growing season. These data, likewise, correspond with a similar test conducted during the years 1922 to 1927 and reported on page 44 of Bulletin No. 17 of this Station, under the subheading “Harvesting Dates (Late Maturity)”.

### TABLE 39.

**SWEET POTATO—TOP DRESSING TEST WITH POTASH**

Average Yield for Years 1936 to 1943, Inclusive

**Fertilizer:** 800 Pounds per Acre, 3.29% Nitrogen, 8% Phosphoric Acid, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash). Applied before planting.

**Variety:** Porto Rico  
**Average Date Planted:** April 5  
**Average Number of Growing Days:** 197

<table>
<thead>
<tr>
<th>Top Dressing*</th>
<th>Yield in bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. 1's</td>
</tr>
<tr>
<td>Check (no top dressing)</td>
<td>190.80</td>
</tr>
<tr>
<td>50 Lbs. Muriate of potash</td>
<td>205.87</td>
</tr>
<tr>
<td>100 Lbs. Muriate of potash</td>
<td>195.48</td>
</tr>
<tr>
<td>200 Lbs. Muriate of potash</td>
<td>198.95</td>
</tr>
</tbody>
</table>

* Top dressing applied at first cultivation.
TABLE 40.

SWEET POTATO—RATIOS OF MINERAL AND ORGANIC NITROGEN

Average Yield for Years 1933 to 1943, Inclusive
Fertilizer: 300 Pounds per Acre, 3.29% Nitrogen from Sources as Indicated, 8% Phosphoric Acid, and 6% Potash (equivalent to the old formula of 8% Phosphoric Acid, 4% Ammonia, and 6% Potash).
Variety: Porto Rico  
Average Date Planted: April 10  
Average Number of Growing Days: 203

<table>
<thead>
<tr>
<th>Ratio of Nitrogen</th>
<th>Yield in bushels per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. 1's</td>
</tr>
<tr>
<td>1/3 Nitrate of soda and 2/3 cottonseed meal</td>
<td>196.71</td>
</tr>
<tr>
<td>Cottonseed meal</td>
<td>192.46</td>
</tr>
<tr>
<td>2/3 Nitrate of soda and 1/3 cottonseed meal</td>
<td>187.58</td>
</tr>
<tr>
<td>1/4 Nitrate of soda, 1/4 tankage, 1/4 cottonseed meal, and 1/4 sulphate of ammonia</td>
<td>186.89</td>
</tr>
<tr>
<td>Nitrate of soda</td>
<td>186.52</td>
</tr>
</tbody>
</table>

TOMATOES

A summary of results of data obtained from a study of plant food and cultural requirements of tomatoes at this Station follows:

Marglobe seems to be the best commercial variety with Rutgers as a close second.

In order to have tomatoes ready for market when there is least competition with other commercial-producing areas, seed must be planted in hotheads about the middle of January and plants transplanted to the field March 10 to 20 in the Tifton area. Likewise, heaviest yields result from such plantings.

For average upland soils of this area, tomatoes should be spaced so that each plant will occupy 10 to 12 square feet. The most desirable distances seem to be 3 x 3½ feet, 3 x 4 feet, or 2½ x 4½ feet.

Data obtained from a study of plant food requirements of tomatoes indicate that fertilizer for this crop should contain 6 per cent nitrogen, 8 to 10 per cent phosphoric acid, and 8 per cent potash and that this formula should be applied at the rate of about 1500 pounds per acre. About one-third to one-half of the amount should precede planting and the remaining part should be applied early in the growing season, preferably about the time the first blooms appear, or at the first or second cultivation. In the event a 6-10-8 formula is not available, approximately the same results may be obtained from 2000 pounds per acre of a 4-8-6 formula and 100 pounds of nitrate of soda.

A study of plant food carriers indicates that preferable sources of the principal plant nutrients are: for phosphoric acid, ammoniated superphosphate; for nitrogen, 2/3 from nitrate of soda and 1/3 from peanut meal or cottonseed meal; and for potash, muriate of potash.
Of the secondary plant nutrients, only calcium seems to be required in quantities greater than that contained in standard fertilizers and in the average upland soils of this area. Apparently tomatoes can use efficiently as much as 100 pounds of calcium oxide per acre.

The advisability of side dressing tomatoes depends on the composition and amount of plant food applied as a complete fertilizer. It seems that the top levels at which the three principal plant nutrients can be used efficiently in the average soils of this area are: Nitrogen, 80 to 90 pounds per acre; phosphorus, 120 to 150 pounds per acre; and potash, 120 pounds per acre, and that side dressing is advisable only when (1) the original application does not provide an adequate amount of plant food, (2) when it does not have the desired combination of plant nutrients, and (3) when needed to replace fertilizer lost by leaching. It has been further observed that yields may be boosted by supplementing commercial fertilizer with animal manures although they should be used with caution as they often are carriers of objectionable diseases.

TOMATO PLANT DISEASE INVESTIGATIONS

Due to increased demands for information on all phases of seedling handling and shipping, most of the investigations on tomato plants during the current period were confined to problems of handling and shipping rather than to plant diseases in the field as in former years. As conditions permit, the regular program of disease experiments will be continued.

Loss of Green Weight During Storage and Subsequent Plant Growth

Quite often tomato plants are packed with insufficient moss, are poorly wrapped, and are subjected to conditions during shipping which result in appreciable wilting and loss of green weight. Such plants do not survive transplanting as well and seldom grow as rapidly as those receiving better treatment. In order to study the influence of this wilting, some preliminary tests were made in which lots of plants were weighed, wrapped, and then subjected to storage conditions which produced different losses of green weight. Following a period of 48 hours, the lots were removed, weighed, and transplanted to benches in the greenhouse where they were allowed to grow for 14 days. Following this growth period, the plants were dug up, washed, and weighed again.

The data from these tests indicate that plant growth after transplanting decreased as the loss of green weight during storage increased. While the data are too limited to justify definite conclusions, it is apparent that every effort should be exerted to prevent tomato plant wilting as far as possible.

Root Development During Storage and Subsequent Plant Growth

Since the beginning of the plant industry in this area, many tomato plant growers and buyers have felt that the development of new roots during handling and storage is essential to good survival and rapid growth following transplanting. Since root growth may be influenced by one or more of the many factors involved in packing and shipping plants, the need for specific information with regard to this subject is apparent. Accordingly, three tests were conducted with both temperature and nutritional conditions that pro-
duced different degrees of new root growth during a 48-hour storage period, equivalent to the average time plants are in transit. Following storage, the different lots were weighed, transplanted to benches in the greenhouse, and allowed to grow for periods of 14 to 20 days. They were then removed from the soil, washed, and weighed again in order to determine the gain in green weight.

All lots of plants survived equally well and there were no consistent differences in increases of green weights. While these results are preliminary, they indicate that tomato plants need not show new root growth at time of transplanting in order to insure good growth. Plants without new root growth may survive and grow equally as well as those showing new growth.

Length of Storage Periods in Relation to Tomato Plant Recovery After Transplanting

This is a continuation of the work started in 1942-43 in which equal lots of tomato plants were packed as for shipment and held at temperatures of 40-50° F. and 60-70° F. for periods of 2, 4, and 6 days. Following storage, the plants were transplanted to benches in the greenhouse and allowed to grow for periods of approximately two weeks. They were then removed, washed, and weighed in order to determine increases in green weight.

There were no differences in weights between the storage temperatures used in these tests but the green weights showed a steady decline as the storage periods were lengthened. As previously reported, these results suggest the necessity of allowing the least possible loss of time between pulling, packing, and resetting tomato plants.

The Influence of Storage Temperatures Upon the Rate of Growth of Tomato Plants After Transplanting

Due to wide fluctuations in temperatures during harvesting, packing, shipping, and resetting tomato plants, a definite need has arisen for accurate information on the optimum temperatures for this over-all handling problem. This is particularly true at the present time when several different types of rail and motorized equipment are being used for plant transportation.

During the current season three storage tests were conducted in which different lots of tomato plants were stored at temperatures of approximately 40, 50, 60, 70, and 80 degrees F. Following storage periods of 48, 72, and 96 hours, equal lots of plants were removed from each storage temperature, weighed, then set in randomized blocks in the field. After growth periods of 14 to 18 days, they were dug up, washed, and weighed again to determine the rate of growth.

The combined data for these three tests show that rate of growth was retarded following storage temperatures of 40° F. and below, also those above 70° F. Maximum growth in all cases occurred after storage at temperatures from 50° F. to 70° F. inclusive.

The Influence of Tomato Plant Grades Upon Yields

Considerable interest has been shown by both growers and buyers in the new grades that have been established in the United States Department of
Agriculture for tomato plants. While yield data in Georgia are not comparable to those of the northern tomato-growing states, they indicate the relative yielding ability of tomato plants of different sizes when set at the same time and grown under similar conditions.

Lots of Rutgers tomato plants were pulled from a commercial field and graded as follows:

1—U. S. No. 1 grade (6 to 9 inches tall; minimum diameter 3/16 inch).
2—Large U. S. No. 1 plants.
3—Small U. S. No. 1 plants.
4—Plants larger than U. S. No. 1.
5—Plants smaller than U. S. No. 1.

These were planted in 3½-foot rows, 50 plants per row, and each group was replicated five times. Harvests were started when fruits were full ripe and were continued at 4- and 7-day intervals until the vines were dead.

The data from this test indicate that early yields were significantly greater on the large plants than on the small. This was true even in the cases of numbers 2 and 3, which were sub-divisions of U. S. No. 1, indicating that plants slightly larger than the present U. S. No. 1 may be used to an advantage. Of particular importance, however, was the consistently low yields of number 5. Apparently tomato plants smaller than the present U. S. No. 1 grade are definitely inferior to U. S. No. 1 grade in yielding ability when transplanted under the conditions of this test.

**WATERMELONS**

Work in progress with watermelons consists of studies of: Varietal adaptation; sources of phosphoric acid, nitrogen and potash; ratios of mineral and organic nitrogen; top dressing tests with nitrogen and potash; the effect of secondary plant nutrients on yield; and a breeding project, the object of which is to develop wilt resistance.

In wilt-free soils, standard varieties such as Stone Mountain, Dixie Queen, Watson, and Cannon Ball are among the most desirable for commercial production, while in wilt-infested soil, varieties such as Hawkesbury and Blacklee should be used.

In studying carriers of the three principal plant nutrients, it appears that ammoniated superphosphate is the best source of phosphoric acid, that some of the best sources of nitrogen are uramon, sulphate of ammonia, calnitro, peanut meal, and cottonseed meal, and that muriate is the best source of potash. Response from secondary plant nutrients indicates that the presence of sulphur and chlorine increases yields while calcium and magnesium slightly depress yields.

Top dressing tests indicate that increased yields of good quality melons may be expected where 100 pounds of nitrogen and 50 pounds of muriate of potash per acre are used to supplement customary applications of complete fertilizer.

**Wilt Resistance in Watermelons:** (In cooperation with the Georgia Experiment Station.) Most of the work with watermelons in 1943 was
centered on three very sweet strains. These are quite resistant to wilt, probably more resistant than Georgia Wilt Resistant, and in addition appear to have some resistance to anthracnose.

Strain S306 appears to be the best of the three strains although the rind is weak. The sugar content is high, some refractometer readings (total soluble solids) going above 14 per cent. The flesh is compact and fine-grained but the melon will not stand shipping as the rind is very thin. It is thought that this strain would be desirable for local marketing where hauling distances are short.

Strain S308 is similar to S306 but not quite as good. Strain S307 is sweet and has a tough rind but has a tendency to develop white heart. One selection from S307, free of white heart, was planted in 1944 for testing.

In an effort to breed a small, ice box size melon resistant to wilt, a selected backcross of Georgia Wilt Resistant with Colocynthis was again backcrossed with a sweet, wilt resistant strain (S308). It may be necessary to backcross again for quality, but the problem of resistance to wilt is simplified because all parents used were themselves resistant; resistance thus coming from two entirely different sources.

Brown’s Little Midget and other small melons have been used to cross with wilt resistant strains. The F2 generation of some were grown in a wilt-infested field in 1944. Some lots disappeared almost completely while in others there was a high percentage of survival.

**BEANS**

**Lima:** Data covering a ten-year study of Fordhook lima bean culture and fertilizer requirements are shown in detail in the Twenty-second Annual Report of this Station.

**Root Rot of Snap Beans:** (In cooperation with the Georgia Experiment Station.) Macrophomina phaseoli (Maulb.) Ashby, Sclerotium rolfsii Sacc., and Fusarium spp. were again the chief fungi associated with root rot of snap beans at Tifton and at Experiment. In a continuation of the program of breeding snap beans resistant to these root rot organisms, plantings of seed from 500 individual plants selected in 1943 as well as mass plantings from survivors of the original hybrids were made both at Tifton and at Experiment. Some of the plants are outstandingly vigorous and are producing good yields, but there is still little indication of the development of any real resistance to *M. phaseoli* and *S. rolfsii*.

Espercial emphasis is being placed upon a study of *M. phaseoli*, which is usually the most important of the root-rotting fungi. *M. phaseoli* causes charcoal rot of seedling beans and root rot and stem lesions of older plants at any stage of development. Very young seedlings affected by charcoal rot are entirely blackened and collapsed. Only the sclerotial stage of the fungus (*Sclerotium bataticola* Taub.) is found on such seedlings. If, however, sufficient woody tissue has developed to hold the plant erect subsequent to its death, pycnidia are formed on the above ground parts of the lesions. After death of older plants killed by infection of the roots, the fungus spreads over the entire plant, producing the ashy stem blight phase of the disease. Numerous pycnidia over the entire surface of the plant raise the cuticle, causing the
stems to appear pale gray. Ashy stem blight may appear independently of root rot on plants from blooming time until maturity. Reddish-brown discolorations, resulting presumably from infection by pycniospores, appear on the stems. Parts of the stem above the point of infection die and are covered by pycnidia. Leaves are similarly infected, and frequently the fungus enters the stem from diseased leaves. Pycnidia are produced on the leaves also. All isolates from snap bean, whether pycnidia were present or not, and isolates from two common bean field weeds, coffee weed and *Lactuca scariola*, have produced pycnidia in culture on sterile bean stems, demonstrating that *S. bataticola* as it occurs on snap bean in Georgia is connected with a pycnidial stage, *M. phaseoli*.

*Diarthe sojae* Lehman, originally described as the cause of pod and stem blight of soybean and recently reported on cowpea, has been found at Tifton on snap bean and at Experiment on snap bean, cowpea, soybean, and lima bean. Perithecia developed on overwintered stems of all four hosts. On snap bean *D. sojae* infects principally the pedicels of mature plants. From the pedicels the fungus spreads downward, causing a dieback of the stems. It has been isolated also from the hypocotyls of plants killed by root rot. *D. sojae* has not, however, appeared to be of much importance on snap bean.

**CABBAGE**

The study of cabbage culture and fertilizer requirements is being continued. Data in hand at the present time lead to the following suggestions:

Copenhagen Market, Marion Market, and Round Dutch are among the best round-head varieties for this area.

Plantings should be timed so that the fall crop will mature in advance of the severe cold of winter and that head formation of the spring crop will not begin until after the danger of cold has passed. These requirements may be met by planting the fall crop early in September and the spring crop from late November to early January.

Plants should be spaced 16 inches in the drill and in rows 3 feet apart.

A study of fertilizer requirements shows the widest margin of profit coming from an application of 1200 pounds per acre, that less profit is realized from 1600 pounds, and that a slight loss results from a 2000-pound application. These data are based on a sales price of $20 per ton.

The study further indicates that a well balanced formula should contain approximately 3 per cent nitrogen, 8 per cent phosphoric acid, and 8 per cent potash.

In view of the fact that seasonal adaptation and the long growing period of this crop subjects it to the heavy rains of winter, it has been found advisable not only to apply fertilizer in split applications but also that mid-winter applications should contain materials that are less subject to leaching. It now appears that about one-third of the fertilizer should be applied before planting, one-third in February, and the remaining part about one month later. If plants then appear to lack vigor, they should also receive an application of 100 to 200 pounds per acre of nitrate of soda—or the equivalent of some similar material. Data obtained from a study of plant nutrient sources indicate that ammoniated superphosphate is the most economical source of phosphoric
acid, that nitrogen carriers less susceptible to leaching are preferable, and that muriate is the best source of potash. There also is evidence that yields may be further boosted by supplementing commercial fertilizer with animal manure.

**OTHER TRUCK CROPS**

**Asparagus:** In a variety test that has been in progress 19 years, Mary Washington appears to be the best variety for this area.

**Roasting Ear Corn:** Although not as prolific as some varieties, Golden Cross Bantam is considered the best sweet corn for home use and local market in the Coastal Plain area. Fertile soil is essential in the successful culture of this variety.

**Cantaloupes:** In variety trials with cantaloupes, Mildew Resistant No. 45 appears to be one of the best melons for this area. In comparison with Hale’s Best, it is more resistant to leaf diseases, is a better shipper, is of superior quality, is as attractive in appearance, is as productive, and matures only three or four days later. It therefore is desirable not only as a commercial melon but also for home use. For home use alone, however, Honey Rock is decidedly the most desirable melon yet grown at this Station.

**English Peas:** In a variety test now in progress with English peas, Creole, a small, smooth-seeded, mid-season variety is the most prolific, with Little Marvel and Thomas Laxton also showing to good advantage. Creole, however, seems particularly desirable because of noticeable resistance to leaf diseases.

**Okra:** Clemson Spineless is comparing favorably with standard okra varieties and because of the absence of spines, is especially desirable from the standpoint of handling.

**Squash:** Early Prolific Straight Neck is a relatively new variety that is well adapted to this area. In comparison with Yellow Summer Crookneck, it appears to be equally as early, slightly more productive, more attractive, and remains edible longer.

**Mustard:** Tendergreen is the most desirable mustard that has been grown at this Station. It is a smooth-leaved, vigorous variety of excellent quality and should be grown more extensively in the Coastal Plain.

**Tampala:** This is a new green vegetable that shows marked resistance to summer heat and drought. It was introduced from the Orient where it is used extensively both in China and in India. It is cooked in about the same way as turnips or spinach and its present behavior indicates that it has possibilities of becoming the most important summer green for this area.

**FRUIT CROPS**

**Peach—Variety Test:** Fifty-two per cent of the 73 varieties originally included in this test fruited in 1943. This represents a loss of half of the varieties at the end of an eleven-year period. Of those now living, about 25 are in normal production.

Data obtained thus far indicate that peaches are particularly well adapted for home orchard use as far south as the lower central Coastal Plain. However, to prevent severe loss from nematode injury and thus produce more vigorous, longer-lived trees, plantings should be made only on the heavier soil types;
and on these soils, cultural practices known to be effective in reducing the nematode population should be practiced at least one year in advance of the time the trees are to be set. Also to protect trees from scale and the fruit from insect and disease attack, a definite spray schedule should be followed.

Through judicious selection, a collection of varieties may be obtained that will provide fresh fruit of excellent quality from early June until late September. No other fresh fruit may be available from the home orchard over so long a period nor is of as much value in this area. The varieties mentioned in Table 41 are selected from those included in the test referred to above. They are chosen on the basis of maturity dates and quality so that ripe fruit of high quality may be available continuously throughout the season. The trees are vigorous and are well adapted to this area. The varieties selected for home use are listed in order of maturity in the following table.

### TABLE 41.

**PEACH VARIETIES FOR HOME ORCHARD USE**

*Average Yield for Years 1935 to 1943*

<table>
<thead>
<tr>
<th>Variety</th>
<th>Free or cling*</th>
<th>Date mature</th>
<th>Quality</th>
<th>Color of flesh</th>
<th>Yield per tree (crates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayflower</td>
<td>SC</td>
<td>5-24</td>
<td>Fair to good</td>
<td>Wht. with red</td>
<td>.14</td>
</tr>
<tr>
<td>Uneeda</td>
<td>SC</td>
<td>6-4</td>
<td>Fair to good</td>
<td>White</td>
<td>2.82</td>
</tr>
<tr>
<td>Arp Beauty</td>
<td>F</td>
<td>6-12</td>
<td>Good to exc.</td>
<td>Yellow</td>
<td>.90</td>
</tr>
<tr>
<td>Mamie Ross</td>
<td>F</td>
<td>6-29</td>
<td>Excellent</td>
<td>Wht. with red</td>
<td>1.37</td>
</tr>
<tr>
<td>Burbank's New July</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elberta</td>
<td>F</td>
<td>7-2</td>
<td>Good to exc.</td>
<td>Yellow</td>
<td>2.35</td>
</tr>
<tr>
<td>Georgia Belle</td>
<td>F</td>
<td>7-12</td>
<td>Excellent</td>
<td>White</td>
<td>2.04</td>
</tr>
<tr>
<td>Dixie Gold</td>
<td>F</td>
<td>7-16</td>
<td>Good to exc.</td>
<td>Yel. and red</td>
<td>1.87</td>
</tr>
<tr>
<td>Munson Free</td>
<td>F</td>
<td>7-20</td>
<td>Good to exc.</td>
<td>Yel. with red</td>
<td>1.25</td>
</tr>
<tr>
<td>Late Elberta</td>
<td>F</td>
<td>7-30</td>
<td>Fair</td>
<td>Yellow</td>
<td>1.21</td>
</tr>
<tr>
<td>Krummel's October</td>
<td>F</td>
<td>8-17</td>
<td>Good to exc.</td>
<td>Yel. and red</td>
<td>1.29</td>
</tr>
</tbody>
</table>

* SC—semi-cling.  
F—free.

**Plums:** All of the better known varieties of plums that were originally planted in the trial grounds at this Station have died as a result of susceptibility to wilt. Other varieties and seedlings are being planted, however, and at the present time an introduction from the United States Department of Agriculture, designated as S.P.I. 47935, is surviving and apparently possesses wilt resistance.

**Pecans:** Annual yield records are being kept on 29 varieties while others recently planted have not yet begun fruiting. As in previous years, extremely prolific varieties continue to show a tendency toward poor filling; and with Mahan, apparently more than with other varieties, there seems to be a progressive tendency toward heavier bearing and poorer filling, as the tree approaches maturity. Likewise, as the trees increase in size, scab injury seems to be accentuated. Since poor filling appears to be a tendency with all prolific varieties and also that scab susceptibility increases with massive top development, it therefore seems advisable to avoid using such varieties in future plantings on the average soils of this area, and particularly is this true of scab-susceptible varieties, unless a regular spray schedule can be followed. Among
those that seem best suited for home use and for commercial plantings are Stuart, Moore, Farley, Desirable, and Brooks. In the past, Schley has been the most popular pecan but because of increasing scab injury, it is no longer profitable unless a definite spray schedule for scab control is followed, and since this is not practical in small plantings, its use for such purposes should be discontinued.

**Pears:** The highly productive, blight-resistant varieties such as Pineapple and Chinese Sand are of such low quality that they are of no value for eating as fresh fruit. They are, however, desirable when canned, preserved, or otherwise processed.

Baldwin is a blight-resistant variety of excellent quality as an eating pear. It is well adapted, is propagated commercially, and should be included in all home orchards.

**Grapes (Bunch):** The well known varieties of bunch grapes such as Niagara, Concord, and Delaware are short-lived in the Coastal Plain area and for that reason are not well adapted for planting here.

An exception is Warren, which is extremely vigorous and long-lived although the fruit is of medium to poor quality and both the berries and bunches are small.

Dogride also is vigorous, long-lived, and apparently better adapted than any other bunch grape. Its fruit, however, is of little or no value but the vines may have possibilities as an under-stock.

**Grapes (Muscadine):** Twenty-seven varieties are now fruiting in the trial grounds and represent a wide range both in productivity and in quality. Among the most productive varieties are Hunt, Irene, Thomas, and Yuga. For table use Dulcet and Yuga are the most desirable. Both are exceptionally sweet and of unusually high quality, Dulcet being of early and Yuga of late maturity.

**Figs:** Fig plantings are only moderately successful in this area. The two major handicaps are susceptibility to cold injury and to nematode attack. Plants survive best in uncultivated areas, the most desirable locations being in chicken-runs, clean-swept yards, near buildings, or along hedge rows. They seem to be particularly sensitive to root disturbance and as a result do not survive long under cultivation. Celeste, Brunswick, and Brown Turkey appear to be the best varieties for this area.

**Jujubes:** This is a stone fruit of Chinese origin. It produces regular crops and is not attacked by insects or diseases. The fruit of S.P.I. 38249, which is the largest and best, is about two inches in diameter. It is mealy and sweet with no acid, which makes it insipid as a fresh fruit but it is excellent when preserved, made into fruit butter, or pickled. When dehydrated it is similar to dates and considered by many as superior.

**Blueberries:** The Southern or Rabbit-eye blueberry (Vaccinium ashei) is native to the lower Coastal Plain of Georgia and the adjacent coastal areas. It responds well to cultivation and apparently should be planted on low, moist, loamy soils commonly known as marginal or gallberry land, but will not survive in excessively wet or waterlogged areas unless given drainage. Yield records from native seedlings and from named varieties of both northern and southern types are being kept and the resulting data indicate definitely that
northern berries should not be planted as far south as the lower Coastal Plain of Georgia. Some of the named varieties of southern berries are prolific and of excellent quality and would prove a valuable addition to the home orchard. Although in view of the likelihood of better commercial varieties being developed through a breeding program that is now being conducted jointly between this Station and the United States Department of Agriculture, extensive commercial plantings of the best varieties now available are not considered advisable. The progress that is being made at the present time suggests that blueberries hold definite promise of becoming a valuable commercial crop in the area to which they are adapted.

**Dewberries:** Youngberry and Boysenberry seem to be about equally well adapted here. They are too highly perishable to ship to distant markets but are well suited for home orchard use. Maturing as they do in early spring they are available when fresh fruit is scarce.

*These three-year-old blueberry plants are from crosses of the best Rabbiteye varieties. Many of the plants are six feet tall, producing 8 to 10 quarts of fruit, and are superior in quality to any of the known Rabbiteye varieties. This indicates improved vigor, production, and quality, and is one of the many ways in which the Georgia Coastal Plain Experiment Station is pioneering in blueberry culture.*
Apples: Because of an inadequate rest period, apples are not well adapted this far south. Some varieties, however, will grow well enough in the central and upper Coastal Plain to be included in home orchards. Varieties that have fruited most consistently in the Station trial grounds are: Early Harvest, Carter, Stark’s Delicious, Horse, Hyslop, and Transcendent. The latter two are crabs.

Citrus: The satsuma is the most hardy of the citrus fruits and, when grafted on Trifoliata stock, will survive the winters as far north as the lower central portion of the Coastal Plain of Georgia. In the Tifton area it frequently is slightly injured by cold but trees in the Station trial grounds have never been injured to the extent of causing a complete crop failure. These trees are growing in open field and, with the exception of a two-foot mound of soil at the base of the tree in winter, they are given no protection. If planted on the east or south side of buildings or hedges, heavier crops will be produced. Owari is the best of the satsuma varieties and should be included in all home orchard plantings in areas where it survives. Myers Lemon, Eustis limequat, and grapefruit (when budded on Trifoliata) have sufficient cold resistance to be included in home orchards in the extreme southern portion of Georgia.

Tung: Tung trees in the trial grounds are now 20 years old. As the trees approach maturity, production is gradually increasing. As a result of fluctuating temperature in early spring, fruit buds are frequently injured by cold, resulting in occasional complete crop failures. During the 17-year period over which these trees have been fruiting, there have been eight normal and six partial crops and three complete crop failures. The average yield per tree during that period has been approximately 40 pounds of air-dried nuts, or 1200 pounds per acre. Selling at present price levels, this would give a gross return of about $50 per acre, while if sold at prewar prices, gross returns would be only about $17 per acre. It therefore seems apparent that until better adapted varieties or strains are available, commercial plantings would not be advisable in this area.

Chestnuts: Blight-resistant chestnuts continue to show marked vigor and blight resistance, and to produce annual crops of nuts. The fruit, however, is of poor quality and molds soon after harvest so that storage does not seem to be possible.

Persimmons: The Japanese type is sufficiently well adapted in this latitude to be included in home orchards. It is of particular value because of the fact that it is available when other fresh fruit is scarce.

Other Fruits: Fruits that are still surviving but that show poor adaptability are walnuts, quince, and olives.

FIELD STATION, McIntosh County

Work at the Station in McIntosh County was transferred to a more centrally-located trucking area in Decatur County, near Attapulgus. The truck station will be operated in connection with the Shade Tobacco Experiment Station where adequate facilities are available for both phases of work. A study of the plant nutrient requirements of cabbage already is under way and work with other truck crops will be initiated as soon as adequate labor and equipment are available.