FACTORS AFFECTING THE CAROTENE CONTENT, YIELD, SMOOTHNESS AND SHAPE OF VARIETIES AND SELECTIONS OF SWEET POTATOES FOR SEED STOCK.

BY

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A Thesis Submitted to the Graduate Committee as Partial Fulfillment of the Requirement for the Degree of

MASTER OF SCIENCE

in

HORTICULTURE

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I
INTRODUCTION

The sweet potato is the most widely grown and most important vegetable crop in the south; and is the second most important vegetable crop in Virginia. Its popularity is due largely to its flavor, versatility for culinary purposes, and the relative ease of growing.

If the sweet potato grower is to realize a profit on his crop he must produce high yields of sweet potatoes which are relatively smooth, uniform, disease free, and well colored. In order to produce sweet potatoes with these qualities the grower must have, or have access to, good seed stock. From preliminary tests and observations we know that certain varieties of sweet potatoes vary widely in color among strains when grown under different environmental conditions. The Porto Rico variety seems to be particularily affected by the environment in which it is grown. According to Miley (11) the lack of uniformity in color, size and shape of sweet potatoes constitutes one of the greatest handicaps in successful marketing of this vegetable. Disease is known to be another important factor.

Considering the results of previous experiments on the various factors influencing the color, yield, uniformity, smoothness, and general marketable quality of sweet potatoes, several unanswered questions arise:

1. Do varieties and strains of sweet potato differ in stability or uniformity of carotene content, yield, smoothness and general appearance, when grown under different environmental conditions?

2. What affect would the regulation or control of soil moisture and temperature by use of aluminum foil mulch, and black paper mulch have on variation of carotene content of different varieties of sweet potato?

3. Are either of the strains and varieties selected more desirable as a source of seed stock with respect to the factors studied?

There exists a critical need for desirable sweet potato seed stock which is disease free, uniform, well colored, and productive. Growers in Virginia and other states are looking to Virginia as a possible source of this seed stock.

II
LITERATURE REVIEW

The importance of carotene as a biological vitamin A active constituent has been shown by Euler and his associates (15), and Moore (15). Steenbock and Sell (17) were the first to report the relationship between the yellow coloring pigments in sweet potatoes and Vitamin A in 1922. Since these discoveries Villere and Heinzelman (20), Kemmer, et. al. (8) and Ezell and Wilcox (5) have shown that the yellow coloring of sweet potato is largely carotene.

The results of experiments on the factors influencing the carotene content of sweet potatoes indicate that heredity, and the environment in which the sweet potatoes are grown

and stored are important factors.

Ezell and Wilcox (6) and Miller and Covington (13) have reported a wide difference between varieties in carotene content. Miller and Covington reported that carotene varied from a trace in U. S. 291 to 151.5 mcg. per gm. in a highly colored F. generation seedling. The unit No. 1 selection of the Porto Rico variety contained 76.3 mcg. per gm. Miller (12) has found that sweet potato strains, and even individual roots may differ in their carotene content.

Ezell and Wilcox (6) state that the carotene content of sweet potatoes increased for several months after proper curing and storage. In an effort to show whether the increase after curing and storage was real or only apparent, Ezell and Wilcox used the weight of the sweet potatoes at harvest in calculating the carotene content after curing and storage. Miller and Covington (13) stated that the carotene content of the Porto Rico sweet potato variety increased 50 percent after one month of storage. A slight rise also occured the second month after which the carotene content remained unchanged through the third month. Kimbrough (7) stated that in the area in which the University of Louisiana is located, sweet potatoes planted later than the last of June showed a decrease in carotene content. Anderson (1) reported the same results with plantings later than June 4th, at Laurel, Mississippi. Anderson also stated that a significant

reduction in yield resulted from late plantings of sweet potatoes in South Carolina, Georgia, Texas, and Mississippi. Delay in time of planting reduced the yield regardless of place, variety, yield, or spacing in the row. Anderson (1) states that Porto Rico sweet potatoes set wider than eight inches at Laurel, Mississippi, contained less carotene than those set at eight inches. No explanation was given for the results obtained. Kimbrough (7) reported that sweet potatoes dug three to four months after planting, in the Louisana area, contained the maximum amount of carotene. After this period there was little change.

Research on the affect of a soil mulch, soil moisture, soil and air temperatures and soil type on the carotene content of sweet potatoes seems to be limited. However, some research has been done on carrots, and the color of this crop is influenced by the environment in which it is grown. Therefore, some information which may be pertinent is given here.

Barnes (2) working with carrots, states that the air temperature at which carrots are grown affects the amount of carotene in the roots. Carrots grown at 60° to 70°F. had a higher carotene content than the ones grown at 50° to 60°F. or at 70° to 80°F.

Miller, Cockran, and Garrison (14) have reported that soil type influences the carotene content of carrots. These workers mixed silt loam soil and organic matter in proportions

of 70% silt loam and 30% organic matter. They also mixed silt loam and sand in proportions of 70% silt loam and 30% sand. Carrots grown in Lintonia silt loam soil contained more carotene than carrots grown in the two soils prepared as mentioned above.

Research workers have reported several factors which significantly affect the yield and shape of sweet potatoes. The average yield of marketable sweet potatoes grown at Perkins Farm, and Bixby Research Station in Oklahoma, varied from 279 bushels of Oklahoma 24, to 122 bushels of unit No. 1 Porto Rico. Whitten (23) states that cutting vines from sweet potato plants will reduce the yield. He reports that a reduction in yield varied from 32 bushels where 3/4 of the vines were removed, to 11 bushels when 1/2 of the vines were removed. Boswell (3) working with Big Stem Jersey, Porto Rico, and Nancy Hall varieties found that in South Carolina 500 pounds of 3-8-12 fertilizer gave a significantly higher total yield than the same amount of 3-8-3, 3-8-6, or 3-8-15 fertilizers. There was no significant difference between fertilizer treatments in yields of No. 1's. This author also reported that the application of 500 pounds of 3-8-15 fertilizer per acre produced chunkier sweet potatoes than the same amount of 3-8-3, 3-8-6, or 3-8-12 fertilizers. Schermerhorn (16) found that in New Jersey applying 1400 pounds of 3-8-6 fertilizer per acre produced more chunky sweet potatoes

than the same amount of 3-8-0, 3-8-4, or 3-8-8 fertilizers. The actual amount of potash applied, which resulted in chunkier sweet potatoes was a little greater in New Jersey than in South Carolina. However, the difference is not as great as it may appear to be at first. Stockdyk (18) working in Kansas reports that after the second year sweet potatoes grown from chunky seed stock produced in New Jersey had become relatively long and small in diameter. In this case hill selecting did not retain the chunky characteristic. Erwin and Haber (4) studying the irrigation of sweet potatoes in Iowa report that irrigation is absolutely necessary if sweet potatoes are to be dug in early August in that state. Non-irrigated sweet potatoes may give a good yield if dug later, as rains in September and early October supply water. However, heavy damage may result due to freezes in early October.

Since one of the experiments conducted included the use of mulches, a review of some of the literature dealing with this subject would be useful.

In an experiment conducted at Cornell University Thompson and Platenium (19) found that vegetable plots, including cabbage, carrots, and tomatoes, mulched with black unperforated paper had a higher moisture content than clean shallow cultivated plots. These workers also reported higher soil temperatures most of the time, and a more rapid nitri-

fication where the paper mulch was used. Magruder (10) reporting work done in Ohio found no difference in nitrate nitrogen on the cultivated and paper mulch plots of vegetables including cabbage, beans, and carrots. Magruder reported a higher temperature under mulch on 67 days out of 78 on which recordings were made. He also states that the mulched plots had higher moisture content than cultivated plots most of the time. Wall (21) found that aluminum foil mulch reduces variation in soil moisture and soil temperature, and increased the yield of certain vegetables including sweet potatoes.

III
PURPOSE OF THE EXPERIMENTAL INVESTIGATION

Much research has been done on certain phases of sweet potato production, while other phases seem to have been practically ignored. The affect of mulch, soil moisture, soil temperature, and soil type, on the carotene content; and the affect of mulch, soil moisture, and soil temperature on the yield of sweet potatoes have apparently received very little attention. No articles on these relationships were encountered in the survey of literature. Also, there has been no experimental study in Virginia, on the influence of the source of seed stock on the qualities named. In this research problem the author has attempted to determine whether either of the strains and varieties tested are more

desirable as a source of seed stock, with respect to adaptability and the qualities studied. An attempt has also been made to evaluate the influence of the environmental factors studied on the carotene content, yield, shape, smoothness, and freedom from disease.

IV
EXPERIMENTAL METHODS

This experimental investigation consisted essentially of two experiments. One experiment was conducted at Williamsburg, Virginia, to estimate the influence of aluminum foil mulch and black paper mulch on the carotene content, color, yield, shape, smoothness, amount of cracking and disease susceptibility of three varieties of sweet potatoes. The second experiment consisted of sweet potato plantings at Keano, Virginia; Walkerton, Virginia; and Warsaw, Virginia, to determine any difference in varieties and selected strains of sweet potatoes in regard to the factors named above, and to show the influence of soil type on these characteristics.

Source of Seed Stock

A lot of Nancy Hall and of four selected strains of the Porto Rico sweet potato variety were obtained from growers in Virginia. A lot of the Virginian, a new variety bred and developed at the Virginia Truck Experiment Station, Norfolk, Virginia, was

obtained from that station. The sweet potatoes were sorted, and treated for 10 minutes in a solution of 6 pounds of borax in 30 gallons of water to control black rot, stem rot, and scurf diseases. All of the varieties and selections were then bedded in different portions of the same electric hot bed. The hot bed was thermostatically controlled, and held at a temperature of 85°F.

Plot Arrangement

At Williamsburg, Virginia, the plot arrangement consisted of 3 treatments using 3 varieties in each, replicated 4 times. The plot arrangement at Walkerton, and Toano, Virginia, consisted of 2 treatments using 5 varieties and selections in each, replicated 4 times. At Warsaw, Virginia, there were 5 varieties and selections replicated 4 times.

Plot Size

In all tests each plot consisted of one row fifty feet long.

Soil Preparation

At each location the soil was plowed, disced thoroughly, and the rows ridged about 1 foot high.

Fertilization

At Williamsburg, Walkerton, and Warsaw, Virginia, 600 pounds of 2-12-12 per acre was applied broadcast a week before

planting, and 600 pounds per acre applied in a single band in the row, and the soil listed prior to planting. The Kempsville fine sandy loam soil at Toano received 500 pounds of 2-12-12 fertilizer applied broadcast about ten days before planting time. At the last cultivation a mixture of 150 pounds of 2-12-12 and 150 pounds of muriate of potash was applied as a side dressing. The Sassafras very fine sandy loam, also at Toano, received 500 pounds of 2-12-12 fertilizer per acre side dressed at the first cultivation, and a mixture of 150 pounds of 2-12-12 and 150 pounds of muriate of potash per acre side dressed at the last cultivation.

Mulched Treatments

Three treatments were used in the experiment at Williamsburg, Virginia.

1. Aluminum foil mulch
2. Aluminum foil mulch followed by black paper mulch
3. Cultivated (check)

The aluminum foil was laid so as to cover the entire soil on two plots of each variety on the four replicates. On July 5, 1950, 40 days after the aluminum foil had been laid, the aluminum foil was removed from one plot of each of the varieties in each replicate, and replaced with black paper. No special provisions were made to allow water to reach the soil under the mulches as it was assumed that sufficient water would go between the layers of mulch. This

proved to be correct with the aluminum foil, but holes had to be punched in the black paper to prevent wilting of the sweet potato. Figure 1 shows one replicate of aluminum foil treatment a few weeks after the foil was laid and the plants set.

Figure 1. Aluminum Foil Mulched Sweet Potato Plots at Williamsburg, Virginia, 1950.

In an attempt to prevent the movement of water from one treatment to another, a strip of aluminum 50 feet long and 10 inches wide was pushed into the soil to a depth of 9 inches between each treatment. To facilitate pushing the sheets of aluminum into the soil a subsoiler was drawn through the soil

between each treatment.

Most of the fibrous roots of sweet potatoes were found in the first 6 to 10 inches of soil on Ruston sandy loam and in the first 12 inches on Ochlocknee by Anderson and Leonard (9). Weaver and Bruner (22) working in Nebraska found that sweet potatoes were usually found in the surface 6 to 9 inches of soil. Due to the facts just named, and the equipment, and material available, it was felt that 9 inches was the best depth to push the sheets of aluminum.

Planting

At Williamsburg, Virginia, the Virginian variety, and a selection of the Porto Rico variety of sweet potatoes were planted May 12, 1950. On June 2, 1950, the Nancy Hall variety was planted on the same soil. The rows were four feet wide, and the plants set 15 inches in the row. Where the rows were mulched with aluminum foil, holes were punched through the foil and the plants set through these holes. The black paper was put down after the vines had begun to run, and the vines were pulled through holes made in the paper as it was laid on the rows.

Plants of the Virginian, and four selections of the Porto Rico were planted at Walkerton, Virginia, on May 17, 1950, and Warsaw, Virginia, on May 26, 1950. At both locations the rows were 4 feet apart, and the plants spaced 15 inches in the row.

At Toano, Virginia, the Virginian and four selections of the Porto Rico were planted on Kempsville fine sandy loam on May 26, 1950. On May 31, 1950, the same varieties and selections were planted on Sassafras very fine sandy loam soil. A poor stand resulted on the Kempsville soil, and the planting was completely reset June 13, 1950. The stand was better on the Sassafras soil, but some replanting was necessary. Also, some further replanting was done on the Kempsville soil after the second planting. On both soil types the rows were 38 inches apart, and the plants spaced 18 inches in the row. The wide spacing in the row was made so that the hills at all locations would have an equal area. It was necessary to space the rows 38 inches apart at this location to facilitate cultivation.

Cultivation

Shallow cultivation was done as often as was necessary to control weeds. No cultivation was done on the mulched plots.

Harvesting

Two replicates of the experimental plantings at Williamsburg, were harvested October 12, 1950, and the remaining two replicates on October 17, 1950. There were two harvests because of the large number of samples to be taken. At Toano, Virginia, plantings were made on Sassafras very fine sandy loam soil on May 31, 1950, and on Kempsville fine sandy loam,

deep phase, on June 13, 1950. Therefore, the planting on the Sassafras soil was harvested on October 5, and that on the Kempsville soil October 18, 1950. This gave both plantings a growing season of 128 days. The sweet potato plantings on both soil types at Walkerton were harvested October 24, 1950, and the planting at Warsaw, November 2, 1950. The sweet potatoes were graded as U. S. No. 1's, or culls, as they were picked up from the row.

Immediately as the harvesting was done, the yield was taken in pounds per plot, and the uniformity of shape, smoothness, skin color, and amount and kinds of disease present were estimated by observation and recorded. The variety or selection, and treatment were ranked from 1 to 10 in respect to disease and uniformity of shape. Comparative terms were used to describe the difference between selections and treatments, in respect to smoothness and skin color.

Soil Samples for Determining Soil Moisture Content

Soil samples for determining the moisture content were taken from the experiment at Williamsburg approximately every two weeks. Two composite samples of three borings each were taken to a depth of 9 inches from each of the four replicates of each treatment. The soil samples were taken to a depth of 9 inches for the same reasons given for putting the aluminum sheets 9 inches deep under "mulched treatments".

After the samples were taken they were put in cellophane bags, weighed, and taken to Blacksburg, Virginia, for drying. At Blacksburg the samples were dried in the oven for 36 hours at a temperature of 95°C. After drying the samples were re-weighed and the percent moisture calculated.

Soil Temperature Readings

At Williamsburg maximum and minimum soil temperature readings were taken daily at approximately 2 - 4 p.m. from July 21, 1950, until harvest. From June 2, 1950, until July 21, 1950, the temperature was taken once every two weeks. In the statistical analysis the average temperatures for each weekly, or semi-weekly period were used.

Carotene Analysis

After each plot had been harvested and weighed, a sample of ten sweet potatoes was selected at random from the U. S. No. 1 grade. The samples were then taken to Blacksburg, Virginia, within 24 hours, where they were analysed for the carotene content.

The chemical analysis for carotene was done according to the procedure used by Mr. James F. Eheart, Associate Chemist at the Virginia Polytechnic Institute. As the carotene analyses were run the uniformity in flesh color of the sweet potatoes was determined from their variation in carotene content.

Soil Types Used

A Sassafras fine sandy loam soil was used for the experimental planting at Williamsburg, Virginia. This soil usually has a top soil of about 8 inches and a clay subsoil. It is a well drained soil, and is excellent for truck crops. Two soil types, Kempsville fine sandy loam, deep phase, and Sassafras very fine sandy loam were planted at Toano, Virginia. The Kempsville soil has about 18 inches of sandy top soil, and has a clay subsoil. It is well drained, and tends to be a little dry during prolonged periods of dry weather. The Sassafras soil used at Toano is similar to that used at Williamsburg, except that the particles of sand are a little smaller. At Walkerton, Virginia, the soil types used were Eavesboro loamy fine sand, and Elkton fine sandy loam. The Eavesboro soil has a light sandy top soil, and a sandy subsoil. Elkton is a poorly drained soil. It has about 8 inches of sandy top soil, and a heavy clay subsoil. Only one soil, Sassafras sandy loam was used for the experimental planting at Warsaw, Virginia. This soil has larger soil particles than the Sassafras fine sandy loam, or Sassafras very fine sandy loam.

Determination of Soil Fertility Level

A composite sample of twenty borings was taken to a depth of 9 inches on each soil type at Toano and Walkerton,

Virginia. At Williamsburg, a composite sample of sixteen borings was taken to a depth of 9 inches. The soil samples were analysed by the V. P. I. Soils Laboratory for the pH, and the relative amounts of P_2O_5, K_2O, Ca., mg., and organic matter. Table 1 shows the fertility level of the soils used.

Method of Statistical Analysis

Split plot designs (24) were used at each location. The procedure employed in testing the differences between varieties, and between treatments was the Multiple Comparisons Test. This test was developed by Dr. D. B. Duncan of Virginia Polytechnic Institute and will be published in the July issue of the Journal of the Virginia Academy of Science.

Since a new test of statistical analysis was used, an explanation, using Table 9 as an example, is given. The values for the average yield of the five varieties and selections are arranged from the highest value to the least. At the bottom of the table the statement L.S.D. Between Varieties within treatments: at 5% - $\frac{4}{45.9}\ \frac{3}{43.2}\ \frac{2}{40.1}\ \frac{1}{36.5}$, is found. This means that the least significant difference between values with four degrees of freedom is 45.9 bushels, for three degrees of freedom 43.2 bushels, etc. When a value is being compared with other values to test the difference, it must be significantly different at the larger number of degrees of freedom before it can be compared at a smaller number of degrees of

Table 1. Fertility Level of Soils at Williamsburg, Toano, and Walkerton, Virginia, used for Experimental Sweet Potato Plantings - 1950.

Location	Soil Type	pH	Ca.	Mg.	o.m.	P_2O_5	K_2O
Williamsburg, Va.	Sassafras Fine Sandy Loam	7.1	Good	Very good	1.8%	Fair+	Good+
Toano, Va.	Kempsville Fine Sandy Loam, deep phase	6.3	Good	Very good	1.2%	Fair+	Good
" "	Sassafras Very Fine Sandy Loam	6.6	Good	Very good	1.1%	Fair	Fair
Walkerton, Va.	Eavesboro Loamy Fine Sand	6.7	Fair+	Very good	2.0%	Good	Fair+
" "	Kirton Fine Sandy Loam	5.7	Fair	Fair	2.3%	Fair+	Very good

freedom. The largest possible number of degrees of freedom is one less than the total number of values in the column considered. For example there are five values in each column to be considered in Table 9, therefore, the higher number of degrees of freedom is four. To test whether the largest value, 143.4 bushels in the first column is significantly different from the least value 63.1, look at $\frac{4}{45.9}$. Since the difference between these two values is greater than 45.9, they are significantly different. When the largest value 143.4 is compared with 84.3 at three degrees of freedom, there is still a significant difference. However, when the value 143.4 is compared with 124.9 at two degrees of freedom there is no significant difference. Since there is no difference here, there can be no comparison at one degree of freedom. The value 142.5 can now be compared with the least value 63.1 at three degrees of freedom, etc.

V
RESULTS

Mulched Treatments

Soil Moisture

The aluminum foil mulched plots had a higher moisture content than the cultivated plots in all but two cases, but on only two dates was there a significant difference. Both the cultivated plots and the aluminum foil mulched

plots had a higher moisture content than the black paper mulch excepting once in the case of cultivated plots. However, the aluminum foil mulched plots had a significantly higher moisture content in only three cases and the cultivated two. The statistical analysis for the variation between treatments during the growing season is shown in Table 2.

Soil Temperature

The aluminum foil mulched plots had a significantly lower temperature than the cultivated plots in two cases, and a significantly lower temperature than the black paper mulch in six cases. The aluminum foil mulched plots had a significantly higher average temperature than the cultivated plots for the week of September 22, to 28. This was no doubt due to the fact the aluminum foil mulched plots were not affected to as great an extent as the cultivated plots by the cool period which occured at this time. (See Table 4)

It may be observed from the table of daily readings of soil temperatures shown in Table 5 that the aluminum foil and black paper mulched plots varied less in their daily maximum and minimum temperatures than the cultivated plots.

Yield

Tables 6 and 7 show the yields of U. S. No. 1's of the Virginian and Porto Rico varieties, and the total yield of

the Nancy Hall variety at Williamsburg, Virginia. The Nancy Hall variety was analysed separately as it was planted later than the other two varieties.

The yield of Virginian U. S. No. 1's was significantly higher under aluminum foil mulched plots than cultivated plots. The total yield of both the Virginian and Nancy Hall were significantly higher under the aluminum foil mulch than on cultivated plots, and the total yield of the Virginian was significantly higher under the black paper mulch than on the cultivated plots. There was no significant difference between treatments in the yield of U. S. No. 1's or total yield of the Porto Rico; although, a higher yield was obtained under the aluminum foil and black paper mulches.

Figure 2. Yield of U.S. No. 1 Sweet Potatoes of One Plot of the Virginian Variety at Williamsburg, Virginia, 1950. (Left, cultivation 40.5 lbs.; Center, black paper, 102.0 lbs.; Right, aluminum foil, 151 lbs.)

Figure 3. Yield of U.S. No. 1 Sweet Potatoes of One Plot of the Porto Rico Variety at Williamsburg, Virginia, 1950. (Left, cultivation, 47.0 lbs.; Center, black paper, 100 lbs.; Right, aluminum foil, 80 lbs.)

Figure 4. Yield of U.S. No. 1 Sweet Potatoes of One Plot of the Nancy Hall Variety at Williamsburg, Virginia, 1950. (Left, cultivation, 20.5 lbs.; Center, black paper, 20.5 lbs.; Right, aluminum foil, 20.5 lbs.)

Table 2. Percent Moisture of Sweet Potato Plots Under Aluminum Foil Mulch, Black Paper Mulch, and Cultivation - Williamsburg, Virginia, 1950.

Date	Treatment	Percent Soil Moisture	L.S.D. Between Al. Foil and Black Paper 5%	L.S.D. Between Al. Foil and Black Paper 1%	L.S.D. Between Al. Foil and Cultivation 5%	L.S.D. Between Al. Foil and Cultivation 1%	L.S.D. Between Cultivation & Black Paper 5%	L.S.D. Between Cultivation & Black Paper 1%
June 2	Al. Foil	11.3			2.2	4.1		
	Cultivation	9.1						
June 13	Al. Foil	9.1			1.1	2.0		
	Cultivation	7.4						
June 28	Al. Foil	8.8			2.7	5.0		
	Cultivation	7.4						
July 14	Al. Foil	12.3						
	Cultivation	11.1	3.6	5.5	3.4	5.1	3.4	5.1
	Black Paper	6.2						
July 20	Al. Foil	7.9						
	Cultivation	8.0	1.8	2.8	1.8	2.8	2.0	3.0
	Black Paper	5.8						
Aug. 9	Al. Foil	6.8						
	Cultivation	6.3	1.6	2.5	1.5	2.3	1.5	2.3
	Black Paper	5.0						
Aug. 23	Al. Foil	10.5						
	Cultivation	10.0	1.6	2.4	1.5	2.2	1.5	2.2
	Black Paper	9.5						
Sept. 13	Al. Foil	11.0						
	Cultivation	11.0	2.3	3.5	2.3	3.5	2.3	3.5
	Black Paper	10.5						
Sept. 21	Al. Foil	11.5						
	Cultivation	10.5	2.6	4.0	2.6	4.0	2.6	4.0
	Black Paper	10.5						
Oct. 6	Al. Foil	10.3						
	Cultivation	9.5	2.3	3.4	2.1	3.2	2.1	3.2
	Black Paper	9.0						

Table 3. Average Soil Temperature (degrees F.) of Sweet Potato Plots Under Aluminum Foil Mulch, Black Paper Mulch, and Cultivation - Williamsburg, Virginia, 1950.

Date	Treatment	Ave. Soil Temperature	L.S.D. Between Al. Foil and Black Paper 5%	L.S.D. Between Al. Foil and Black Paper 1%	L.S.D. Between Al. Foil and Cultivation 5%	L.S.D. Between Al. Foil and Cultivation 1%	L.S.D. Between Cultivation and Black Paper 5%	L.S.D. Between Cultivation and Black Paper 1%
June 2	Al. Foil	76.3			3.7	6.9		
	Cultivation	82.0						
June 13	Al. Foil	80.4			9.0	16.6		
	Cultivation	81.1						
July 3	Al. Foil	80.3						
	Cultivation	82.5	1.0	1.5	.9	1.4	.9	1.4
	Black Paper	83.3						
July 14	Al. Foil	76.1						
	Cultivation	77.0	1.8	2.7	1.7	2.5	1.7	2.5
	Black Paper	77.6						
July 21-27	Al. Foil	72.5						
	Cultivation	73.1	2.2	3.3	2.0	3.1	2.0	3.1
	Black Paper	74.5						
July 28-Aug. 3	Al. Foil	75.7						
	Cultivation	76.6	1.3	2.0	1.2	1.9	1.2	1.9
	Black Paper	77.4						
Aug. 4-10	Al. Foil	70.5						
	Cultivation	69.6	1.7	2.6	1.7	2.6	1.9	2.8
	Black Paper	72.3						
Aug. 11-17	Al. Foil	71.6						
	Cultivation	70.9	1.6	2.4	1.6	2.4	1.7	2.6
	Black Paper	74.4						
Aug. 18-24	Al. Foil	72.0						
	Cultivation	72.3	3.1	4.7	2.8	4.3	2.8	4.3
	Black Paper	73.5						
Aug. 25-31	Al. Foil	73.5						
	Cultivation	73.5	1.3	2.0	1.3	2.0	1.3	2.0
	Black Paper	75.2						

continued

Table 4. Air Temperature and Rainfall at the Site of the Experiment - Williamsburg, Virginia, 1950.

Date		Temperature Maximum	Temperature Minimum	Rainfall (inches)
May	12	72	55	.09
	13	65	57	.18
	14	73	50	
	15	78	59	.43
	16	68	57	.01
	17	75	44	
	18	73	50	.20
	19	71	57	1.05
	20	63	50	
	21	71	35	
	22	75	40	
	23	80	60	
	24	81	62	.18
	25	78	52	
	26	71	50	.09
	27	79	54	
	28	77	52	
	29	77	60	.19
	30	75	60	.04
	31	79	63	
June	1	80	63	
	2	83	52	
	3	83	66	
	4	79	58	.16
	5	77	48	
	6	84	50	
	7	85	55	
	8	83	51	
	9	88	61	
	10	89	69	
	11	82	62	
	12	76	51	
	13	79	47	
	14	84	62	
	15	79	63	.03
	16	83	57	.19
	17	90	67	
	18	80	51	
	19	90	63	
	20	94	70	
	21	91	70	1.33

continued

Table 3, concluded

Date	Treatment	Ave. Soil Temperature	L.S.D. Between Al. Foil and Black Paper 5%	L.S.D. Between Al. Foil and Black Paper 1%	L.S.D. Between Al. Foil and Cultivation 5%	L.S.D. Between Al. Foil and Cultivation 1%	L.S.D. Between Cultivation and Black Paper 5%	L.S.D. Between Cultivation and Black Paper 1%
Sept. 1-7	Al. Foil	73.5						
	Cultivation	73.0	1.7	2.6	1.7	2.6	1.9	2.8
	Black Paper	74.7						
Sept. 8-14	Al. Foil	71.3						
	Cultivation	71.3	2.3	3.5	2.3	3.5	2.3	3.5
	Black Paper	72.5						
Sept.15-21	Al. Foil	67.0						
	Cultivation	66.7	.8	1.1	.8	1.1	.9	1.2
	Black Paper	68.0						
Sept.22-28	Al. Foil	63.4						
	Cultivation	60.1	1.6	2.4	1.7	2.6	1.6	2.4
	Black Paper	62.9						
Sept. 29-Oct. 5	Al. Foil	62.3						
	Cultivation	61.8	2.3	3.5	2.3	3.5	2.5	3.8
	Black Paper	63.4						

Table 4, continued

Date	Temperature Maximum	Temperature Minimum	Rainfall (inches)
June 22	81	66	
23	80	65	
24	94	66	
25	92	72	
26	90	63	.03
27	96	62	
28	90	61	
29	79	56	.10
30	84	62	
July 1	82	69	
2	89	63	
3	91	71	
4	91	68	
5	87	67	.54
6	85	66	.51
7	82	63	.08
8	78	61	
9	77	66	.47
10	84	70	.22
11	86	70	.03
12	87	72	
13	87	70	.50
14	84	70	.33
15	83	69	.05
16	84	70	.37
17	89	70	.66
18	89	79	
19	86	67	.05
20	92	74	
21	95	67	.80
22	81	61	
23	80	56	
24	82	59	
25	88	71	
26	86	65	.44
27	88	65	.06
28	85	62	.10
29	86	73	
30	89	64	
31	91	65	
Aug. 1	91	75	
2	91	70	
3	86	69	.37
4	80	66	
5	78	56	.02

continued

Table 4, continued

Date		Temperature Maximum	Minimum	Rainfall (inches)
Aug.	6	80	58	.15
	7	78	57	
	8	81	56	
	9	89	65	
	10	88	66	
	11	88	67	
	12	78	67	
	13	78	56	
	14	82	50	
	15	82	52	
	16	78	65	1.51
	17	83	69	
	18	84	63	
	19	87	69	
	20	86	69	1.16
	21	76	62	
	22	79	62	.02
	23	80	66	.08
	24	81	64	1.41
	25	82	62	
	26	83	60	
	27	84	79	
	28	87	64	
	29	89	72	.36
	30	90	70	
	31	88	72	
Sept.	1	88	72	.12
	2	89	74	.76
	3	89	69	.17
	4	89	71	
	5	81	62	
	6	71	50	
	7	74	50	
	8	78	60	
	9	79	70	.27
	10	83	79	
	11	79	68	.42
	12	79	66	
	13	79	69	.03
	14	76	64	
	15	77	60	.03
	16	76	52	
	17	73	55	
	18	73	50	

continued

Table 4, concluded

Date	Temperature		Rainfall (inches)
	Maximum	Minimum	
Sept. 19	82	60	
20	80	60	.35
21	80	69	.05
22	76	66	1.03
23	79	59	
24	68	48	
25	54	37	
26	61	38	
27	65	45	
28	68	49	
29	67	59	
30	74	61	.04
Oct. 1	73	55	
2	79	52	
3	80	53	
4	77	54	
5	62	48	.47
6	68	46	

Table 5. Soil Temperature of Sweet Potato Plots Under Aluminum Foil, Black Paper, and Cultivation at Williamsburg Virginia, 1950.

Date	Replicate	Black Paper		Aluminum Foil		Cultivation	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
July 21	R1	74	70	74	74	74	70
22	R2	76	68	76	70	74	70
23	R3	80	69	76	69	75	70
24	R4	78	71	74	70	76	70
25	R1	80	71	76	74	81	75
26	R2	73	72	72	72	72	72
27	R3	76	68	74	65	74	70
29	R1	79	71	75	71	77	70
30	R2	79	74	78	70	80	72
Aug. 1	R3	82	76	79	74	80	75
2	R4	86	77	80	76	84	77
3	R1	80	76	78	75	80	76
5	R2	75	71	73	70	72	67
66	R3	75	71	72	69	73	66
7	R4	74	69	71	67	71	65
8	R1	74	67	71	67	73	67
9	R2	73	70	71	70	70	66
10	R3	80	74	80	72	80	70
11	R4	80	75	78	74	77	72
12	R1	79	75	76	74	77	74
13	R2	74	70	73	70	72	67
14	R3	75	70	72	66	72	64
15	R4	76	66	74	67	77	67
16	R1	72	72	70	70	70	70
18	R2	77	69	73	71	75	69
20	R3	78	74	76	72	76	73
21	R4	76	72	74	70	74	71
22	R1	75	69	72	71	73	69
23	R2	74	72	73	71	73	70
24	R3	77	70	73	69	76	70
25	R4	77	70	74	70	76	70
26	R1	77	70	74	70	75	70
27	R2	75	69	74	68	74	68
28	R3	80	73	75	71	75	70
29	R4	78	74	77	72	75	72
30	R1	80	74	77	72	78	73
31	R2	78	75	77	75	77	74
Sept. 1	R3	80	76	78	75	79	75
2	R4	79	77	78	75	76	74
3	R1	80	75	80	73	80	74
4	R2	78	75	76	74	76	74

continued

Table 5, concluded

Date	Replicate	Black Paper		Aluminum Foil		Cultivation	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Sept. 5	R3	73	71	71	71	70	70
6	R4	70	69	70	68	68	67
7	R1	72	67	70	66	69	65
8	R2	72	68	71	67	71	65
9	R3	74	72	72	70	72	70
10	R4	76	73	74	72	75	72
11	R1	74	72	74	71	73	72
12	R2	73	72	72	70	72	70
13	R3	74	72	73	70	73	70
14	R4	72	70	72	68	72	69
15	R1	73	69	71	68	72	68
16	R2	70	66	70	66	70	64
17	R3	70	65	68	66	66	64
18	R4	70	63	68	61	67	62
21	R1	72	65	70	65	72	62
22	R2	70	70	70	69	70	69
23	R3	71	67	70	67	70	66
24	R4	66	63	72	72	61	60
25	R1	62	54	60	55	58	54
26	R2	60	53	60	56	59	51
27	R3	72	57	70	56	58	54
28	R4	67	60	62	60	62	58
29	R1	62	61	62	60	61	60
30	R2	66	62	65	61	65	62
Oct. 1	R3	67	60	65	60	65	58
2	R4	68	60	65	60	66	58
6	R1	62	56	60	56	61	54

Table 6. Yield (Bushels Per Acre) of U.S. No. 1 Sweet Potatoes of Two Varieties Grown Under Aluminum Foil Mulch, Black Paper Mulch, and Cultivation. Williamsburg, Virginia. 1950.

Variety	Treatment	R1	R2	R3	R4	Ave.
Virginian	Aluminum Foil	550.4	439.5	597.9	597.9	546.4
Porto Rico	" "	287.1	249.7	316.9	369.0	305.7
Virginia	Black Paper	415.8	524.7	404.0	219.8	391.1
Porto Rico	" "	291.0	255.5	396.0	304.9	311.9
Virginian	Cultivation	241.5	338.7	160.3	217.8	239.6
Porto Rico	"	265.3	334.5	186.2	213.9	250.0

L.S.D. Between varieties within treatments: at 5% - 103.4 bushels
at 1% - 149.3 bushels

L.S.D. Between largest and smallest averages for treatment within varieties: at 5% - 203.1 bushels
at 1% - No. sig. dif.

L.S.D. Between two consecutive averages for treatment within varieties; at 5% - 187.4 bushels
at 1% - No. sig. dif.

Table 7. Total Yield (Bushels Per Acre) of Sweet Potatoes Grown Under Aluminum Foil Mulch, Black Paper Mulch, and Cultivation, Williamsburg, Virginia, 1950.

Variety	Treatment	R1	R2	R3	R4	Ave.
Nancy Hall	Aluminum Foil	174.2	122.8	163.4	196.0	164.1
" "	Black Paper	79.3	122.8	134.6	116.7	113.4
" "	Cultivation	128.7	57.5	110.9	77.3	93.6

L.S.D. Between largest and smallest treatment average: at 5% - 56.6
at 1% - 85.7

L.S.D. Between any two consecutive treatment averages: at 5% - 52.2
at 1% - 79.1

Smoothness, Shape, and Disease

The Virginian was smoother than the Porto Rico, or the Nancy Hall, and treatments did not seem to make any difference with either of the varieties. There was very little difference between treatments or varieties in uniformity of shape. No evidence of disease was observed on the Porto Rico or Nancy Hall. The Virginian had a slight trace of scurf, and some rodent damage under the aluminum foil and black paper mulches.

Carotene Content

The Virginian variety is very high in carotene content, and it was several times higher in this constituent than the Porto Rico or Nancy Hall, regardless of treatment. The Virginian sweet potato under the aluminum foil mulch had a significantly higher carotene content than those under black paper or cultivation. There was a slight difference in favor of cultivation with the Porto Rico variety, but this was not significant. Under black paper the carotene content of the Virginian and Porto Rico fell between the aluminum foil mulch plots and the cultivated ones, but it was not significantly different from either. Table 8 shows the results of the statistical analysis of the carotene content of the Virginian, and Porto Rico varieties. There was no significant difference between treatments in the carotene content of the Nancy Hall variety which was planted later.

Table 8. Carotene Content (mg./100gm.) of Two Varieties of Sweet Potatoes Grown Under Aluminum Foil Mulch, Black Paper Mulch, and Cultivation - Williamsburg, Virginia, 1950.

Treatment	Aluminum Foil		Black Paper		Cultivation	
Variety	Virginian	Porto Rico	Virginian	Porto Rico	Virginian	Porto Rico
			DRY - WEIGHT BASIS			
Carotene Content mg./100gm. of Sweet Potato	25.53	5.40	23.18	5.83	22.40	6.08
% Dry Matter	23.10	32.30	21.90	32.50	24.20	32.20
			FRESH - WEIGHT BASIS			
Carotene Content mg./100gm. of Sweet Potato	5.88	1.75	5.65	1.88	4.88	1.98

Statistical Analysis - Dry Weight Basis

L.S.D. Between averages for varieties within treatments: at 5% - 1.57
at 1% - 2.26

L.S.D. Between largest and smallest averages for treatment within varieties: at 5% - 1.53
at 1% - 2.32

L.S.D. Between two consecutive averages for treatment within varieties: at 5%-1.41
at 1%-2.14

Statistical Analysis - Fresh Weight Basis

L.S.D. Between averages for varieties within treatments: at 5% - .34
at 1% - .48

L.S.D. Between largest and smallest averages for treatment within varieties: at 5% - .49
at 1% - .75

L.S.D. Between two consecutive averages for treatment within varieties: at 5% - .45
at 1% - .68

Treatment did not seem to affect the internal or external color of the Porto Rico or Nancy Hall varieties. There were a few Virginian sweet potatoes with a salmon pink skin color under the aluminum foil mulch. When they were harvested, it was observed that these were partially above the soil surface This was no doubt due to the relatively high soil moisture under the aluminum foil. The flesh color of the Virginian variety was a deeper orange under the aluminum foil than under the other treatments.

Affect of Varieties and Selections

Yield

There was a significant difference between selections and varieties on both soil types at Toano. When the selections of the Porto Rico variety were ranked in order of yield, they were in the same order on both soils. The Virginian, however, was third in yield on the Kempsville soil, but dropped to last place on the Sassafras very fine sandy loam. Table 9 gives the statistical analysis of the yield at Toano.

Several of the selections of the Porto Rico variety produced a significantly higher yield than the other selections and the Virginian on one or both soil types at Walkerton. As at Toano, the Virginian variety was the only one which did not rank the same in yield on both soils. On the

Elkton soil the Virginian ranked fifth, while on Mavesboro soil it ranked second. Table 10 shows the yield of U.S. No. 1's of all selections of the Porto Rico, and the Virginian varieties on both soils.

Only one soil type, Sassafras sandy loam was used for the experimental planting at Warsaw. As shown in Table 11 there was a significant difference between the yield of U.S. No. 1's of the Virginian and several of the selections of the Porto Rico variety. Also, Porto Rico selection #4 was significantly lower than selections #1, #2, or #3.

In total yield the Virginian and the same selections of the Porto Rico variety were significantly different, as in yield of U. S. No. 1's.

Smoothness, Shape, Cracking, and Disease

The Virginian was smoother on both soil types at Toano than any of the selections of Porto Rico. On Sassafras very fine sandy loam no difference in smoothness was observed between the four selections of the Porto Rico variety. On the Kempsville fine sandy loam, deep phase, there was a considerable amount of cracking in all the selections of Porto Rico except selection #4. This selection had less cracking and was smoother than any of the other selections of the Porto Rico variety on this soil.

There was no significant difference in uniformity of shape,

Table 9. Yield (bushels per acre) of U.S. No. 1 Sweet Potatoes of Five Varieties and Selections Grown on Two Soil Types at Toano, Virginia, 1950.

Variety	Soil	R1	R2	R3	R4	Ave.
Porto Rico (Sel. #2)	Kempsville Fine Sandy Loam, deep phase	162.5	195.0	115.0	101.0	143.4
" " (Sel. #4)	" " " "	200.0	165.0	100.0	105.0	142.5
Virginian	" " " "	149.8	147.4	162.5	39.9	124.9
Porto Rico (Sel. #1)	" " " "	110.0	132.5	64.9	29.9	84.3
" " (Sel. #3)	" " " "	80.0	85.0	39.9	50.0	63.7
Porto Rico (Sel. #2)	Sassafras Very Fine Sandy Loam	152.3	162.6	164.6	112.6	148.0
" " (Sel. #1)	" " " "	87.6	102.0	122.9	154.3	116.7
" " (Sel. #3)	" " " "	92.9	112.6	75.0	112.6	98.3
" " (Sel. #4)	" " " "	87.6	105.2	92.0	83.3	92.0
Virginian	" " " "	83.5	104.3	45.9	104.3	84.5

L.S.D. Between varieties within treatments: at 5% - $\frac{4}{45.9}$ $\frac{3}{43.2}$ $\frac{2}{40.1}$ $\frac{1}{36.5}$

at 1% - $\frac{4}{61.0}$ $\frac{3}{57.6}$ $\frac{2}{53.6}$ $\frac{1}{49.5}$

L.S.D. Between treatments within varieties: at 5% - 139.3

Table 10. Yield (bushels per acre) of U.S. No. 1 Sweet Potatoes of Five Varieties and Selected Strains Grown on Two Different Soils at Walkerton, Virginia, 1950.

Variety	Soil	R1	R2	R3	R4	Ave.
Porto Rico (Sel. #3)	Elkton Fine Sandy Loam	83.2	99.1	144.6	95.0	105.5
" " (Sel. #1)	" " " "	114.3	75.1	75.1	108.9	93.5
" " (Sel. #2)	" " " "	77.3	101.1	81.2	67.3	81.7
" " (Sel. #4)	" " " "	53.4	103.0	87.1	59.5	75.6
Virginian	" " " "	69.3	77.3	57.5	37.7	60.5
Porto Rico (Sel. #3)	Bayesboro Loamy Fine Sand	93.0	130.7	128.7	128.7	120.3
Virginian	" " "	81.2	93.0	118.7	182.1	118.8
Porto Rico (Sel. #1)	" " "	114.8	103.0	122.8	108.9	112.4
" " (Sel. #2)	" " "	79.3	91.0	126.8	126.8	106.0
" " (Sel. #4)	" " "	87.1	71.2	53.9	63.4	68.8

L.S.D. Between varieties within treatments: at 5% - $\frac{4}{42.1}$ $\frac{3}{39.5}$ $\frac{2}{36.7}$ $\frac{1}{33.4}$

at 1% - $\frac{4}{55.9}$ $\frac{3}{52.8}$ $\frac{2}{49.3}$ $\frac{1}{45.3}$

L.S.D. Between treatments within varieties: at 5% - 66.14

Table 11. Yield (bushels per acre) of U. S. No. 1's of Five Varieties and Selections of Sweet Potatoes Grown on Sassafras Sandy Loam - Warsaw, Virginia, 1950.

Variety	R1	R2	R3	R4	Ave.
Virginian	205.8	164.4	174.2	168.4	178.2
Porto Rico (Sel. #1)	172.3	120.9	140.5	144.6	144.6
" " (Sel. #3)	162.3	156.4	77.3	106.9	125.7
" " (Sel. #2)	106.9	103.0	124.8	142.7	119.2
" " (Sel. #4)	106.9	93.0	45.5	65.3	77.7
L.S.D. Between variety averages: at 5%			4 / 45.5	3 / 42.9	2 / 39.4	1 / 36.5
at 1%			4 / 63.1	3 / 59.6	2 / 55.7	1 / 51.2

among the varieties and selections, on either of the soil types at Toano.

No disease was observed on any of the selections of the Porto Rico variety on either of the soil types at Toano. A small amount of scurf was noted on the Virginian variety on the Sassafras soil.

At Walkerton, Virginia, there was no difference between any of the selections of the Porto Rico in smoothness on the Elkton sandy loam soil. On the Eavesboro loamy fine sand, Selection #1 was the smoothest of the selections of Porto Rico. The Virginian was smoother than any of the selections

on both soil types.

There was some cracking in all the Porto Rico selections on both soils. However, no difference was observed between selections in the amount of cracking. There was conspicuously less cracking in the Virginian than any of the selections. Some veining and rodent damage was observed on the Virginian on both soil types.

The Virginian was more uniform in shape than any of the selections of the Porto Rico variety on both soil types at Walkerton. There was a difference between selections in their uniformity of shape, as may be seen in Table 12.

Table 12. Uniformity in Shape of Sweet Potatoes Grown on Two Soil Types at Walkerton, Virginia, 1950. (1-least uniform, 10-most uniform)

Variety or Selection	Uniformity Grade	
	Elkton Sandy Loam	Kavesboro Loamy Fine Sand
Virginian	9	9
Porto Rico (Sel. #1)	8	8
" " (Sel. #2)	7	6
" " (Sel. #3)	7	7
" " (Sel. #4)	6	6

A small amount of soft rot disease was observed on the Virginian variety, and some soil rot noted on all selections of the Porto Rico, except selection #4, on the Elkton soil. There was no appreciable amount of disease on any variety

on the Eavesboro loamy fine sand. The disease found on the sweet potatoes on each soil type are shown in Table 13.

Table 13. Disease Found on Sweet Potatoes Grown on Two Soil Types at Walkerton, Virginia, 1950.

Variety or Selection	Diseases	
	Elkton Sandy Loam	Eavesboro Loamy Fine Sand
Virginian	Soft Rot	Soft Rot
Porto Rico (Sel. #1)	Soil Rot	-
" " (Sel. #2)	Soil Rot	-
" " (Sel. #3)	Soil Rot	-
" " (Sel. #4)	-	-

At Warsaw, as at all locations, the Virginian was smoother than any of the selections of the Porto Rico variety. Selection #3 of the Porto Rico was observed to be less smooth than any of the others.

Selection #2 of the Porto Rico was the least uniform in shape, and the Virginian most uniform; but no difference in uniformity of shape was noted in the other three selections of the Porto Rico variety. Table 14 gives the grade the Virginian and each selection of Porto Rico was given as to uniformity in shape.

No disease was observed on any of the sweet potatoes grown at Warsaw.

Table 14. Uniformity in Shape of Sweet Potatoes Grown at Warsaw, Virginia, 1950. (1-least uniform, 10-most uniform)

Variety or Selection	Uniformity Grade Sassafras Sandy Loam
Virginian	9
Porto Rico (Selection #1)	8
" " (Selection #2)	7
" " (Selection #3)	8
" " (Selection #4)	8

Carotene

There was no significant difference between any of the selections of Porto Rico, grown at Toano, in carotene content. However, the Virginian was much higher in carotene than any of the selections of the Porto Rico variety, as may be seen in Table 15.

The Virginian was more uniform in skin and flesh color than any of the selections of Porto Rico. There was no noticeable difference between the selections of Porto Rico in uniformity of flesh color, but selection #4 varied most in the color of the skin.

At Walkerton, Virginia, and at all other locations, the Virginian was much higher in carotene than any of the selections. There was no significant difference between any of the selections of the Porto Rico, as shown in Table 16.

No difference was noted in the uniformity of skin or

Table 15. Carotene Content mg/100gm. of Five Varieties and Selections of Sweet Potatoes Grown on Two Soil Types - Toano, Virginia, 1950.

Soil Type	Variety	Carotene Content mg./100gm. of Sweet Potato	% Dry Matter
	DRY - WEIGHT BASIS		
Kempsville Fine Sandy Loam, deep phase	Virginian	21.45	20.1
" " " " " "	Porto Rico (Sel. #1)	6.05	27.0
" " " " " "	" " (Sel. #4)	5.83	25.8
" " " " " "	" " (Sel. #3)	5.83	25.9
" " " " " "	" " (Sel. #2)	5.48	25.8
Sassafras Very Fine Sandy Loam	Virginian	21.03	21.8
" " " " "	Porto Rico (Sel. #1)	5.20	30.3
" " " " "	" " (Sel. #4)	4.83	29.1
" " " " "	" " (Sel. #3)	4.38	32.2
" " " " "	" " (Sel. #2)	4.33	30.7
	FRESH - WEIGHT BASIS		
Kempsville Fine Sandy Loam, deep phase	Virginian	4.25	-
" " " " " "	Porto Rico (Sel. #1)	1.65	-
" " " " " "	" " (Sel. #4)	1.53	-
" " " " " "	" " (Sel. #3)	1.50	-
" " " " " "	" " (Sel. #2)	1.43	-

continued

Table 15, concluded

Soil Type	Variety	Carotene Content mg./100gm. of Sweet Potato	% Dry Matter
Sassafras Very Fine Sandy Loam	Virginian	4.58	-
" " " " "	Porto Rico (Sel. #1)	1.58	-
" " " " "	" " (Sel.#4)	1.40	-
" " " " "	" " (Sel. #3)	1.40	-
" " " " "	" " (Sel.#2)	1.33	-

Statistical Analysis - Dry Weight Basis:

L.S.D. Between varieties within treatments: at 5% - $\frac{4}{1.94}$ $\frac{3}{1.83}$ $\frac{2}{1.69}$ $\frac{1}{1.54}$

at 1% - $\frac{4}{2.58}$ $\frac{3}{2.44}$ $\frac{2}{2.28}$ $\frac{1}{2.09}$

L.S.D. Between treatments within varieties: No Significant Difference.

Statistical Analysis - Fresh Weight Basis:

L.S.D. Between varieties within treatment: at 5% - $\frac{4}{1.76}$ $\frac{3}{1.73}$ $\frac{2}{1.54}$ $\frac{1}{1.40}$

at 1% - $\frac{4}{2.34}$ $\frac{3}{2.21}$ $\frac{2}{2.06}$ $\frac{1}{1.90}$

L.S.D. Between treatments within varieties: at 5% - .71

at 1% - 1.31

Table 16. Carotene Content (mg./100gm.) of Five Varieties and Selections of Sweet Potatoes Grown on Two Soil Types-Walkerton, Virginia, 1950.

Soil Type	Variety	Carotene Content mg./100gm. of Sweet Potato	% Dry Matter
	DRY - WEIGHT BASIS		
Elkton Fine Sandy Loam	Virginian	21.10	22.0
" " " "	Porto Rico (Sel. #4)	4.88	30.8
" " " "	" " (Sel. #1)	4.70	33.9
" " " "	" " (Sel. #2)	4.65	31.8
" " " "	" " (Sel. #3)	4.28	33.2
Zavesboro Loamy Fine Sand	Virginian	18.75	23.1
" " " "	Porto Rico (Sel. #1)	5.28	32.5
" " " "	" " (Sel. #3)	4.88	33.4
" " " "	" " (Sel. #4)	4.83	31.1
" " " "	" " (Sel. #2)	4.10	32.2
	FRESH - WEIGHT BASIS		
Elkton Fine Sandy Loam	Virginian	4.65	-
" " " "	Porto Rico (Sel. #1)	1.60	-
" " " "	" " (Sel. #4)	1.50	-
" " " "	" " (Sel. #2)	1.48	-
" " " "	" " (Sel. #3)	1.43	-

continued

Table 16, concluded

Soil Type	Variety	Carotene Content mg./100gm. of Sweet Potato	% Dry Matter
Eavesboro Loamy Fine Sand	Virginian	4.30	-
" " " "	Porto Rico (Sel. #1)	1.70	-
" " " "	" " (Sel. #3)	1.65	-
" " " "	" " (Sel. #4)	1.50	-
" " " "	" " (Sel. #2)	1.33	-

Statistical Analysis - Dry Weight Basis:

L.S.D. Between varieties within treatments: at 5% - $\frac{4}{2.28}$ $\frac{3}{2.14}$ $\frac{2}{1.99}$ $\frac{1}{1.81}$

at 1% - $\frac{4}{3.03}$ $\frac{3}{2.86}$ $\frac{2}{2.67}$ $\frac{1}{2.46}$

L.S.D. Between treatments within varieties; at 5% - 2.35

at 1% - 4.31

Statistical Analysis - Fresh Weight Basis:

L.S.D. Between averages for varieties: at 5% - $\frac{4}{1.72}$ $\frac{3}{1.62}$ $\frac{2}{1.50}$ $\frac{1}{1.37}$

at 1% - $\frac{4}{2.29}$ $\frac{3}{2.16}$ $\frac{2}{2.02}$ $\frac{1}{1.86}$

L.S.D. Between averages for treatments: at 5% 2.9

at 1% 5.3

flesh color of the Virginian or selections of the Porto Rico variety on either of the soils. Although the Virginian was significantly higher in carotene on the Elkton fine sandy loam soil, this variety has such a deep orange flesh color that no difference in flesh color could be detected.

The Virginian was again higher in carotene content than any of the selections, on a dry or wet basis, at Warsaw, Virginia. Selection #1 had a higher carotene content than selection #3 or #4 on a dry basis, as shown in Table 17. It was impossible to explain why selection #1 should be higher in carotene content than selection #3 and #4 at this location.

Selections #2 and #4, were noticeably less uniform in skin and flesh color than the other selections. The Virginian varied less than any of the selections of the Porto Rico in respect to uniformity of skin and flesh color.

Affect of Soil Type

Yield

At Toano, Virginia, there was no significant difference between Kempsville fine sandy loam, deep phase, and Sassafras very fine sandy loam soils in the yield of U.S. No. 1 sweet potatoes. It was observed that at the time of harvest the leaves of the plants on the Kempsville soil had begun to

Table 17. Carotene Content mg./100 gm. of Five Varieties and Selected Strains of Sweet Potatoes Grown at Warsaw, Virginia, 1950.

Soil Type	Variety	Carotene Content mg./100 gm. of Sweet Potato	% Dry Matter
	DRY - WEIGHT BASIS		
Sassafras Sandy Loam	Virginian	27.68	24.7
" " "	Porto Rico (Sel. #1)	6.20	35.2
" " "	" " (Sel. #2)	5.35	35.0
" " "	" " (Sel. #4)	4.43	34.7
" " "	" " (Sel. #3)	4.35	37.2
	FRESH - WEIGHT BASIS		
Sassafras Sandy Loam	Virginian	6.83	-
" " "	Porto Rico (Sel. #1)	2.25	-
" " "	" " (Sel. #2)	1.85	-
" " "	" " (Sel. #3)	1.63	-
" " "	" " (Sel. #4)	1.53	-

Statistical Analysis - Dry Weight Basis:

L.S.D. Between variety averages: at 5% - $\frac{4}{1.53}$ $\frac{3}{1.44}$ $\frac{2}{1.32}$ $\frac{1}{1.23}$

at 1% - $\frac{4}{2.12}$ $\frac{3}{2.00}$ $\frac{2}{1.87}$ $\frac{1}{1.72}$

Statistical Analysis - Fresh Weight Basis:

L.S.D. Between variety averages: at 5% $\frac{4}{1.56}$ $\frac{3}{1.47}$ $\frac{2}{1.25}$ $\frac{1}{1.25}$

at 1% $\frac{4}{2.16}$ $\frac{3}{2.04}$ $\frac{2}{1.91}$ $\frac{1}{1.75}$

turn yellow, while on the Sassafras soil, vine growth was more dense, and the leaves still green. Also, there was a great number of sweet potatoes which were too long, and small in diameter on the Sassafras soil. These facts indicated a lack of maturity, and a possible reduction in yield. It was necessary to harvest the sweet potatoes at this stage in order to finish the carotene analysis in the time available.

No significant difference in yield of U.S. No. 1 sweet potatoes due to soil type resulted from the plantings on Elkton fine sandy loam, and Bavesboro loamy fine sand soils at Walkerton, Virginia.

Smoothness, Shape, Cracking, and Disease

At Toano, Virginia, the sweet potatoes grown on Sassafras very fine sandy loam were smoother, and better in respect to cracking than those grown on Kempsville fine sandy loam, deep phase. There was not as much variance in smoothness between soil types in the Virginian and the Porto Rico selection #4 as there was in the other selections.

Soil type seemed to have only a slight affect on disease at Toano. No disease was observed on the Kempsville soil and only a trace of scurf on the Virginian variety on the Sassafras.

At Walkerton, Virginia, selection #1 of the Porto Rico

variety and the Virginian variety were noticeably more smooth on the Eavesboro loamy fine sand soil, than on the Elkton fine sandy loam. A trace of cracking was observed in the Virginian variety on the Eavesboro soil, but none on the Elkton soil. More veining was noted in the Virginian on Elkton fine sandy loam. A greater amount of cracking was noted on all the selections of the Porto Rico than in the Virginian, but soil type did not seem to affect the selections in respect to this factor.

Selection #2 of the Porto Rico was more uniform in shape on the Elkton sandy loam than on the Eavesboro loamy fine sand soil. The Virginian and other selections of Porto Rico were not affected by soil type, in respect to uniformity of shape.

Soil type affected the amount of disease on all the selections of Porto Rico except #4, at Walkerton. A small amount of soil rot was observed on selections #1, #2, and #3 on the Elkton soil, but all the selections on the Eavesboro soil were free from disease as shown in Table 13.

Carotene Content

Soil type did not significantly affect the carotene content of the Virginian or the selections of the Porto Rico variety at Toano, either on a wet or dry basis.

At Walkerton, Virginia, the Virginian had a significant-

ly greater carotene content on the Elkton sandy loam soil than on the Ravesboro fine sandy loam. The selections of Porto Rico, however, were not affected by soil types at this location.

VI
DISCUSSION OF RESULTS

At Williamsburg the two types of mulches did not affect the soil moisture content in the same manner. The black paper mulch did not have a higher soil moisture content than the cultivated plots on a single date. However, the cultivated plots were higher in moisture content than the black paper mulched plots on two dates. The aluminum foil mulched plots had a higher moisture content than the cultivated plots at two dates out of a total of ten readings, and the black paper mulched plots on three dates out of a total of ten readings. The entire soil was covered on the aluminum foil, and the black paper mulched plots. Evidently water was able to seep between the folds of aluminum foil better that the black paper. This probably partially accounted for the low moisture of the black paper mulched plots.

The aluminum foil mulched plots had a significantly lower average temperature than the cultivated plots twice out of a total of sixteen weekly, or semi-weekly averages. Also, the aluminum foil plots had a significantly lower aver-

age weekly, or semi-weekly, temperature than the black paper mulched plots on six occasions. The aluminum foil mulched plots had a significantly higher average temperature than the cultivated plots for the week of September 22, to 28th. This was no doubt due to the fact a cool period occured during this time, as shown in Table 4. The aluminum foil mulched plots varied less than the cultivated plots in temperature extremes, and this would indicate that the temperature under the mulched plots would not change, with a change in the air temperature conditions, as rapidly as the cultivated plots.

Only the Virginian and Nancy Hall varieties were significantly affected, in respect to yield, by the aluminum foil, black paper and cultivated treatments. The yield of No. 1's of the Virginian, and the total yield of the Nancy Hall were significantly higher under the aluminum foil mulch than on the cultivated plots. Under black paper mulch the yield of the Virginian and Nancy Hall were not significantly different from the yield of either of the other treatments. It seems that a relatively high yield was produced in spite of the dry conditions under the black paper mulch, because the plots were under aluminum foil until July 5, 1950. As shown in Table 6, there was a significant difference between varieties, in respect to yield, only under the aluminum foil mulch. Under this treatment the Virginian was significantly

higher than the Porto Rico. The increase in yield of the Virginian and Nancy Hall varieties under the aluminum foil indicate that these two varieties were influenced by the environmental conditions which the mulch brought about. These conditions, as measured in the experiment, were a higher soil moisture content, and a lower soil temperature. In a preliminary study of the root development of the Virginian and the Porto Rico varieties at Blacksburg, Virginia, observations indicated that the Virginian had the larger number of small swollen roots. It was also observed that under the aluminum foil the Virginian had a larger average number of sweet potatoes per hill than the Porto Rico. Therefore, it is possible that the higher moisture and lower temperature resulted in a larger number of the rootlets of the Virginian developing into sweet potatoes. The Virginian is a relatively new sweet potato variety, and was developed at the Virginia Truck Experiment Station, Norfolk, Virginia, from a cross of Maryland Golden and B219, a U.S.D.A. seedling. From the results obtained in this experiment its physiological makeup seems to be different from the Porto Rico variety, and further study of its possibilities would be interesting.

There was no difference between treatments in the smoothness of any variety at Williamsburg, Virginia. The Virginian variety was smoother than either the Porto Rico or Nancy Hall variety regardless of treatment. Sweet potatoes of the

Virginian variety have a skin which is exceptionally smooth and glossy. This was observed in all the plantings in this experimental investigation.

No difference in uniformity of shape was observed between any variety or treatment.

No disease was noted on the Porto Rico or Nancy Hall varieties on the aluminum foil, black paper, or cultivated treatments at Williamsburg, Virginia. A trace of scurf was found on the Virginian on all treatments at Williamsburg.

A considerable amount of damage was done by rodents, assumed to be field mice, to the Virginian sweet potatoes under the aluminum foil and black paper mulches.

From Table 8 we see that the carotene content of the Virginian variety was 3 to 4 times as high as the Porto Rico variety. This was true regardless of treatment at Williamsburg, Virginia. Under aluminum foil the carotene content of the Virginian sweet potatoes was higher than on the black paper mulch plots, or the cultivated plots. It is evident that the higher soil moisture and lower soil temperature under the aluminum foil caused an increase in the carotene content of the Virginian. These conditions did not significantly affect the carotene content of the Porto Rico or Nancy Hall varieties.

The Virginian was observed to be the only variety to have any off colored skin coloring. These roots were a lighter

red than the typical Virginian. The off colored sweet potatoes were partially out of the ground and under the aluminum foil.

From the results obtained, the following general conclusions were drawn:

1. Aluminum foil mulch tends to increase the soil moisture and lower the soil temperature.

2. When the entire plot is covered by unperforated black paper, without some provision for water to reach the soil, the soil moisture is lowered.

3. The carotene content of the Virginian is 3 to 4 times as high as the Porto Rico.

4. Under the conditions of this experiment, neither the carotene content, nor the yield of the Porto Rico was affected by the aluminum foil, or black paper mulches.

5. The total yield of the Nancy Hall was increased by aluminum foil mulch.

6. The carotene content and yield of the Virginian can be increased over cultivation by aluminum foil mulch.

7. The Virginian sweet potato variety seems to be affected by variations in its environment to a greater extent than the Porto Rico.

On Kempsville fine sandy loam, deep phase, at Toano, Virginia, the yield of selections #2 and #4 of the Porto Rico variety, were significantly higher than selections #1 and #3. On the Sassafras very fine sandy loam soil at Toano selections #2 and #4 of the Porto Rico variety had significantly higher yields than the Virginian and selection #3 of the Porto Rico, and the Virginian produced a higher yield than selection #3.

At Walkerton, Virginia, the Porto Rico selection #3 was

significantly higher than the Virginian on the Elkton fine sandy loam soil. On the Eavesboro loamy fine sand the Virginian and selections #1, #2, and #3 of the Porto Rico, were higher in yield than selection #4.

The Virginian was higher in yield than selections #3, and #4 at Warsaw, Virginia. Also, selections #1, #2, and #3 of the Porto Rico were higher than selection #4.

Soil type did not affect every selection of Porto Rico, or the Virginian variety, to the same degree. For example, Table 10 shows that the Virginian, and the selections of Porto Rico did not respond to the same degree on the two soil types at Walkerton. There was no significant difference between soil types in the yield of the Virginian variety, or of either of the selections of the Porto Rico variety at Walkerton. However, the Virginian and the selections of Porto Rico did vary in their degree of response to soil type to such an extent that the variety or selections which were significantly different on one soil type were not significantly different on the other. Similar results were obtained at Toano. Apparently there was an interaction between variety and soil type, but the results obtained are not adequate to fully interpret this interaction.

There was no variety or selection which was consistantly higher in yiedl than all the others. As shown in Tables 9, 10, and 11, however, selection #2 of the Porto Rico variety

was the only selection which was consistantly among the highest in yield at all locations.

The Virginian was smoother than any of the Porto Rico selections at all locations. Porto Rico selection #4 was the smoothest of the selections of this variety on the Kempsville soil at Toano. On the Kempsville soil all the selections of Porto Rico, except selection #4, had a considerable amount of cracking. There was no cracking in any of the selections on the Sassafras soil at Toano, and no difference was observed between selections in smoothness on this soil. Evidently there was an interaction between selections and soil type here, in respect to smoothness. At Walkerton selection #1 was smoother than any of the other selections of Porto Rico on the Eavesboro soil. All of the selections had some cracking on both soil types. No difference was observed between the selections in smoothness on the Elkton soil. Since selection #1 of the Porto Rico, and the Virginian were the only ones influenced by soil type at this location there was some interaction of variety or selection and soil type. Selection #2 of the Porto Rico was not as smooth as the other selections nor the Virginian at Warsaw, Virginia. No difference was observed between the other selections of Porto Rico.

There was no difference between any of the varieties or selections in respect to uniformity of shape at Toano.

At Walkerton, the Virginian was more uniform in shape than either of the selections of Porto Rico on both soil types. Selection #1 was the most uniform in shape of the selections of the Porto Rico variety on both soils, as shown in Table 12. On the Elkton soil, selections #2 and #3 of the Porto Rico were more uniform in shape than selection #4, while on the Eavesboro soil, selection #3 was more uniform in shape than selections #2 and #4.

As shown in Table 14, the Virginian sweet potato variety was most uniform in shape, and selection #2 of the Porto Rico was least uniform in shape at Warsaw. There was no difference between the other selections.

The Virginian sweet potato variety was more uniform in shape than the selections of Porto Rico at Walkerton and Warsaw, Virginia. However, as shown in Tables 12 and 14, no selection of the Porto Rico variety was consistantly more uniform in shape than the other selections, at these locations.

No disease was noted at Toano, except for a trace of scurf on the Virginian on Sassafras soil.

At Walkerton, Virginia, a small amount of soft rot was found on the Virginian on both soil types. Soil rot was observed on selections #1, #2, and #3 of the Porto Rico, on the Elkton soil, but none of these selections were diseased on the Eavesboro soil. Selection #4 did not have any disease

on either soil type.

No disease was observed on any of the plantings at Warsaw, Virginia.

Both soil rot and soft rot are soil borne diseases and the soils at Walkerton were evidently infested with these diseases. Apparently selection #4 was more resistant to the soil rot than the other selections, and more resistant to the soft rot disease than the Virginian.

The Virginian was 3 to 4 times as high in carotene content, and more uniform in skin and flesh color regardless of location or soil type.

At Toano, Virginia, there was no difference between any of the selections of Porto Rico in carotene content. There was no difference in uniformity of flesh color of the Porto Rico selections, but selection #4 varied most in skin color on both soils. No difference was observed in the other selections in their uniformity of skin color.

There was no difference between selections in carotene content, nor uniformity of skin and flesh color at Walkerton, Virginia.

At Warsaw, Virginia, selection #1 had a higher carotene content, on a dry weight basis, than selections #3 and #4 of the Porto Rico variety. Selections #2 and #4 were less uniform in skin and flesh color than selections #1 and #3.

No explanation can be given for selection #1 being higher

in carotene than any of the other selections of the Porto Rico variety at Warsaw only.

From the results obtained, the following general conclusions are drawn:

1. No variety or selection was consistently higher in yield than all the others.

2. Selection #2 was the only selection which was consistently among the highest in yield at all locations.

3. The rank in yield of the selections of the Porto Rico variety were not the same on every soil type; however, the results obtained are not adequate to interpret fully the apparent interaction between variety and soil type, in respect to yield.

4. The Virginian sweet potato variety was generally smoother, and more uniform in shape than any of the selections of the Porto Rico.

5. No selection of the Porto Rico variety was consistently smoother, or more uniform in shape, than the others. Selection #1 was the most consistent selection of the Porto Rico variety to rank among the most uniform in shape.

6. There was no appreciable difference between varieties and selections in their disease susceptibility.

7. No selection of the Porto Rico was consistently better in respect to cracking, than the others. However, there was less cracking in the Virginian than in any of the Porto Rico selections.

8. The Virginian variety was 3 to 4 times higher in carotene content than any of the selections of the Porto Rico, regardless of location or soil. It was also more uniform in skin and flesh color.

9. None of the selections of Porto Rico was consistently higher in carotene content. Selection #4 varied more than the other selections in the uniformity of skin color.

10. Variety or selection was a more important factor than soil type in determining the yield, and uniformity of flesh, and skin color of the sweet potatoes.

Soil type did not influence the yield of U.S. No. 1 sweet potatoes of the Virginian or selections at Toano, or at Walkerton, Virginia.

All the selections of Porto Rico, except #4, were smoother, and had less cracking on the Sassafras soil, than on the Kempsville. Selection #4 and the Virginian were not affected by soil type in respect to smoothness or cracking. The Kempsville soil has a deeper sandy top soil than the Sassafras and is inclined to be dryer during dry spells. It is possible that this accounted for the cracking on this soil.

At Walkerton, Virginia, the Virginian and selection #1 were smoother on the Eavesboro loamy fine sand soil than the Elkton sandy loam soil. There was no difference between soil type in the smoothness of the other selections. The Elkton soil has a heavy clay subsoil and is poorly drained. These facts make it less desirable as a sweet potato soil, and could have accounted for the lack of smoothness in the Virginian and selection #1 of the Porto Rico.

Selection #2 was the only selection which seemed to be affected by soil type, in respect to uniformity at Walkerton. It was more uniform on the Elkton soil.

There was practically no difference in soil type in the amount of disease at Toano.

At Walkerton, a small amount of soft rot was observed on the Virginian, and soil rot observed on all the selections of the Porto Rico, except selection #4, on the Elkton soil. The Virginian was the only one which had any disease on the Eavesboro soil.

Soil type did not affect the carotene content or the uniformity of skin and flesh color of the Virginian or the selections of Porto Rico at Toano.

There was no difference between soil types in the carotene content of any of the selections of the Porto Rico at Walkerton. However, the Virginian was significantly higher in carotene content on the Elkton soil, than on the Eavesboro. It is difficult to explain the higher carotene content of the Virginian on the Elkton soil expecially in view of the fact the higher yield was obtained on the Eavesboro soil. No difference was observed between soil type in the uniformity of skin and flesh color of the Virginian or the selections of Porto Rico.

The following general conclusions were drawn from the results obtained, in respect to the influence of soil type on the factors studied:

1. Soil type did not affect the yield of the Virginian, or selections of Porto Rico at either of the locations.

2. Soil type had only a slight and inconsistent affect on the disease, smoothness, and uniformity of shape of the sweet potatoes.

3. The influence of soil type on the carotene content was only slight, and inconclusive.

VII
SUMMARY

The Virginian variety and four selections of the Porto Rico variety were planted on two soil types at Toano, and Walkerton, Virginia, and on one soil at Warsaw, Virginia. At Williamsburg, Virginia, the Virginian, Nancy Hall, and a selection of the Porto Rico were planted under aluminum foil mulch, black paper mulch, and on cultivated plots. From these plantings an attempt was made to determine the influence of aluminum foil mulch, black paper mulch, selection or variety, and soil type, on the factors studied.

The following summary is given of the results obtained from the "Mulched Treatments" phase of the experiment:

1. Aluminum foil mulch tended to increase the soil moisture and lower the soil temperature as compared to black paper mulch and cultivation.

2. Where the entire plot was covered by unperforated black paper, without some provision for water to reach the soil, the soil moisture is lowered.

3. The carotene content of the Virginian was 3 to 4 times as high as the Porto Rico variety.

4. Neither the yield nor the carotene content of the Porto Rico variety was affected by the aluminum foil, or black paper mulches.

5. The carotene content and yield of the Virginian, and the total yield of the Nancy Hall was higher under aluminum foil mulch than on the cultivated plots.

6. There was no difference between the aluminum foil, black paper, and cultivated treatments in the smoothness and uniformity of shape of the three varieties considered.

7. The Virginian was smoother and more uniform in shape than the Porto Rico or Nancy Hall varieties. The Virginian was also more uniform in skin and flesh color than the Porto Rico variety.

The following summary is given of the results obtained from the "Affect of Variety and Selections" and "Affect of Soil Type" phases of the experiment:

1. No variety or selection was consistently higher in yield than all the others.

2. Selection #2 of the Porto Rico variety was the only selection which was consistently among the highest in yield at all locations.

3. The Virginian sweet potato variety was smoother and more uniform in shape than any of the selections of the Porto Rico.

4. No selection of the Porto Rico variety was consistently smoother than the others. Selection #1 was the most consistent selection of the Porto Rico variety to grade high in uniformity of shape.

5. There was no appreciable difference between varieties and selections in their disease susceptibility.

6. No selection or variety was significantly better, in respect to cracking, than the others.

7. The Virginian variety was 3 to 4 times as high in carotene content than any of the selections of the Porto Rico, regardless of location or soil. It was also more uniform in skin and flesh color.

8. None of the selections of Porto Rico was consistently higher in carotene content. Selection #4 varied

more than the other selections in the uniformity of skin color.

9. Variety or selection was a more important factor than soil type in determining the yield, carotene content, and uniformity of flesh, and skin color of the sweet potatoes.

10. Soil type did not affect the yield of the Virginian, or selections of Porto Rico at either of the locations.

11. Soil type had only a slight and inconsistent affect on the smoothness, and uniformity of shape of the sweet potatoes.

12. Under the conditions of this experiment there was no consistent difference in soil type in the amount and kind of disease present.

Conclusions

1. Aluminum foil mulch tends to lower soil temperature and raise soil moisture as compared to black paper mulch, or cultivation.

2. The carotene content of the Virginian variety is higher under aluminum foil than under cultivation.

3. The Virginian is 3 to 4 times as high in carotene a as the Porto Rico variety.

4. The yield of the Virginian is higher under aluminum foil than on cultivated plots.

5. Selections of the Porto Rico variety differ in respect to yield.

6. Some selections of the Porto Rico variety seem to be more uniform in skin color than others.

7. The Virginian is more uniform in shape, and skin and flesh color, than the Porto Rico variety.

8. The Virginian variety has a smoother skin than the Porto Rico variety.

9. Variety or selection seems to be a more important factor than soil type in determining the yield, carotene content, and uniformity of flesh, and skin color of sweet potatoes.

VIII
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