Sweet Potato Culture

IN THE
Coastal Plain of Georgia

BY
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IMPORTANT OF THE CROP

For many years the sweet potato has been the most important vegetable crop in the South. 83 per cent of the entire crop is produced in what might be termed the cotton belt, although this section ships only about 30 per cent of the total car-lot shipments, and markets in car-lots less than 4 per cent of its total production. This would indicate that the bulk of the southern crop is grown for local consumption rather than for shipment. It is not so much the fact, however, that it is grown for home consumption as that there has not been created a demand for the southern sweet potato in the large consuming centers. Indifference toward proper marketing has created a general reputation for poor grading, loose packing, unattractive containers and improper car loading. This condition is responsible for the slow progress that has been made in creating a general demand for our product. Growers of South Georgia should give careful thought to the proper marketing of the sweet potato crop.

ADAPTATION

The sweet potato thrives best in the warmer portions of the United States and is especially adapted to the coastal plain section of Georgia where the seasons are mild, the growing period long, the rainfall liberal and the soils of a light sandy nature.

SOIL TYPES

The sandy loams underlaid with a firm subsoil are ideal soils for sweet potato production; the farther away from this type, the poorer the soil will be. Clay soils and deep sands are the poorest.

CROP ROTATION

Crop rotation in growing sweet potatoes is important from the standpoint of soil improvement, increased production and control of diseases.

A rotation in which sweet potatoes are grown on the land only once in three or four years, combined with seed selection and proper plant-bed sanitation, is effective in preventing loss from diseases. By following a rotation in which green manures are turned under, the heavy feeding habit of the potato is in a measure counteracted and larger yields are realized from all the crops.

PREPARATION OF THE LAND

The type of soil on which sweet potatoes are usually grown is not difficult to prepare. It should be turned to a
depth of 6 or 7 inches when the soil is sufficiently dry to
pulverize well, and then harrowed thoroughly. The num-
ber of harrowings required to put the land in good con-
dition will depend on the nature of the soil and the a-
mount of litter turned under. When the work of harrow-
ing the land has been completed, the rows should be laid
off 3 to 3 1/2 feet apart, the fertilizer applied and listed on
with a turn plow or some implement that will throw the
bed up to the desired height, and a light pole, long enough
to extend over several rows, should then be dragged over
the tops of the ridges. The pole should only be heavy e-
nough to level the beds slightly so that the plants will not
roll off when dropped. This should be completed several
days previous to the time of planting to permit the soil to
settle or become firm in the bed. In a comparison of
plantings made on high beds with those made on a level,
the highest yields have resulted from the former.

FERTILIZER REQUIREMENTS

The yield of sweet potatoes is increased by the use of
commercial fertilizer. Data secured from tests under
way at this station indicate that the best sweet potato
fertilizer for the predominating soil types of South Geor-
gia is one carrying 8 to 10 per cent of phosphoric acid, 3
to 5 per cent ammonia and 3 to 5 per cent potash. The
fertilizer tests are incomplete and will be continued, al-
though the results obtained over a four-year period lead
to the belief that a fertilizer carrying a high per cent of
ammonia, such as an 8-6-2 (8% phosphoric acid, 6% am-
monia and 2% potash) is preferable where quantity
production is desired, especially where the crop is to be
hogg'd off, while an 8-4-4 formula, (8% phosphoric
acid, 4% ammonia and 4% potash) seems to be a better
fertilizer where quality must be considered. The 8-6-2
formula is leading in total yield while the 8-4-4 formula
is leading in the production of No. 1 potatoes. Tests with
different sources of ammonia suggest that half should be
derived from an inorganic source such as nitrate of soda
or sulphate of ammonia, and half from an organic source
such as cotton seed meal or tankage. In tests with differ-
ent rates of applying fertilizer, the highest net returns
have resulted from applications of 600 to 800 pounds
per acre. All the fertilizer should be applied previous to
planting, as late applications tend to cause excessive vine
growth which is accompanied by poor root development.
The fertilizer should be applied in the row and thorough-
ly mixed with the soil by the use of a small plow.

**VARIETIES**

Of the 16 varieties of sweet potatoes included in our present variety trials only four or five can be considered of commercial importance. Among these Porto Rico, Golden Beauty (a strain of Porto Rico), Nancy Hall, Triumph and Big Stem Jersey are outstanding. The northern markets prefer a dry, mealy potato, such as the Jersey strains, while the moist-fleshed varieties such as Porto Rico and Nancy Hall are in demand on southern markets. The Jersey strains are well adapted to the demands of the early market but should not be considered as a potato for commercial storage in South Georgia. The moist-fleshed varieties should be grown for the late market and for storage.

A larger number of varieties are adapted to plantings for home consumption. Among these, Pumpkin Yam should have a place because of its excellent eating quality, and Southern Queen because of its superior keeping quality.

**SELECTION OF SWEET POTATOES FOR SEED**

For general farm purposes mass selection of sweet potatoes for seed is the most practical method of procedure in keeping varieties true to type and potatoes free from diseases. Several precautions should be observed in selecting sweet potatoes for seed purposes. Probably the most important of these is that of growing the seed stock from vine cuttings, and on newly cleared land or on land on which potatoes have not been grown for three or four years. Fields of potatoes to be used for seed should be gone over carefully before harvesting, and hills having dead vines, or those that are not true to type, dug up and removed. This is necessary in order to keep free from stem rot and to keep the varieties pure; and then, just previous to bedding the potatoes the following spring, they should be sorted carefully and all roots discarded which show the slightest indication of rot. By careful selection the grower should be able to increase the productiveness of his strain and reduce loss from diseases.

**SLIPS OR DRAWS AND VINE CUTTINGS**

Sweet potatoes are grown either from slips or draws, produced from the roots (potatoes), or from vine cuttings. In the light of data secured from tests that are being conducted at this station, it seems that the commercial grower must look to slips (except for seed purposes) for his
source of plants as they can be produced earlier than vines. Plantings made from vine cuttings must of necessity be delayed until the earlier plantings from slips have produced enough vine growth to furnish cuttings. Yields secured from late plantings are too low to give the grower a substantial margin of profit over the cost of production.

As a precaution against diseases, it is very necessary that seed potatoes be grown from vines. Such diseases as stem rot and black rot are often transmitted from the plant bed to the succeeding crop on the slips, while even in a diseased plant, it is not likely that the disease will have penetrated far enough at the time the vines are cut to infect them. It has also been observed that very little difference in yields result from plantings made from the two sources, where planting dates and other conditions are the same.

GROWING SLIPS

Quantity of Seed Potatoes

The quantity of seed potatoes required for the bed will depend on the purpose for which the slips are desired. Growers producing potatoes for the early market will need about seven bushels of seed potatoes for each acre to be planted, as only about three pullings can be used. When potatoes are grown for the late market, the planting season may be extended over a longer period, thus reducing the seed requirement to 4 or 5 bushels per acre. Good seed should produce between 2 and 4 thousand slips per bushel.

Size of Bed

The size of the plant bed required may be approximated by allowing 15 square feet per bushel for No. 1 potatoes, 20 square feet per bushel for No. 2 potatoes, and 25 square feet per bushel for strings.

Location of Bed

A location should be selected that is free from sweet potato disease organisms. Such a location may best be secured by avoiding old plant beds, fields on which potatoes have recently been grown, and drifted soils. The location should also be well drained and should be one that affords protection from the cold, north winds. The south side of a building or a southern slope bordered on the north by a heavy growth of timber offers excellent protection.
Source of Heat for Plant Bed

In order to produce slips for early plantings artificial heat must be used in the bed. In-as-much as manure-heated beds are less expensive and quite adequate for the needs of the growers of South Georgia, only that type of bed will be discussed. Manure-heated beds must be covered with some water-proof material to protect the manure from the heavy rains of late winter and early spring, as manure ceases to heat when it becomes saturated with water.

Covering for Plant Bed

The cover in most general usage is unbleached sheeting treated with linseed oil, or it may be treated with a mixture composed of 10 pounds of paraffin wax, 4 pounds of rosin, and 3 gallons of cylinder oil. The latter treatment is less expensive. The sheeting may be purchased in yard widths. As many widths should be sewed together as will be required for the width of the bed. When the bed has been completed and the potatoes placed and covered, the sheeting should then be dipped in the waterproofing material, stretched tightly over the gable roof of the bed and nailed down securely. Beds with gable roofs should extend north and south in order to give an equal distribution of the sun’s light and heat.

Plant bed construction

A desirable type of bed may be constructed in the following manner: Use 12-inch boards for the sides and ends. Place them on the surface of the ground, supported by substantial stakes or stobs. Throw out about 3 or 4 inches of soil and bank it against the sides to turn the surface water away. Place the ridge pole 18 inches above the sides of the bed, supported by 2“x4” stakes, placed at about 10 foot intervals. Nail small strips from the ridge pole to the sides of the bed to serve as rafters to support the cover. This completes the frame work.

Manure for plant bed

Only fresh stable manure should be used. It should be dug from the stall two or three days before it is to be placed in the bed and turned several times to insure uniform heating. Before placing the manure in the bed it is good practice to cover the bottom with straw or litter of some kind to prevent contact with the soil. If the manure is dry it should be sprinkled as it is placed in the bed, as moisture is essential to the decomposition by which heat
is produced. Manure should be placed in the bed to a depth of 6 or 8 inches and should be well tramped. The manure should be covered to a depth of about one inch with soil or sand to prevent contact with the potatoes.

**Soil for plant bed**

Since slips draw on the mother potatoes for food in the early stage of their growth, rich soil is not necessary. Where a light sandy soil is used for covering the bed, the sprouts come through earlier, root development is more extensive and the roots are not broken off so badly in pulling the plants. The soil should be secured from a spot where contamination with sweet potato diseases is not likely. Soil from woodland is preferable.

**Seed potato treatment**

To prevent disease organisms from being carried into the plant bed on the surface of the sweet potatoes, they should be immersed for 10 minutes in a 1 to 1000 strength solution of corrosive sublimate. The material may be purchased from drug stores or wholesale drug houses. To get this to a working basis, dissolve one ounce of corrosive sublimate powder in one gallon of hot water and dilute to 8 gallons. The solution should not be placed in metal containers. It should be used only two or three times as it loses its effectiveness after repeated use. After the potatoes have been treated they may be placed immediately in the bed. Corrosive sublimate is a deadly poison when taken internally and should be handled with care.

**Bedding seed potatoes.**

The seed potatoes should be bedded about six weeks to two months before the plants are desired for field planting. The potatoes should be placed by hand over the surface of the bed as close together as possible without having them touch one another. If the potatoes are too close, disease will spread with less difficulty and the sprouts will be so crowded that long, spindling plants will be produced. After the potatoes have been placed in the bed they should be covered to a depth of about 2 inches with sand or soil.

**Plant bed management.**

The frame work of the bed should be complete and all of the materials required in the preparation of the cover should be at hand before the manure is placed. This is necessary in order that the manure may be protected
from rain. After the potatoes have been placed and covered to the desired depth with soil, the bed should be watered and the cover nailed down securely. It should then be observed at frequent intervals, and later waterings given as often as the soil becomes dry. Weeds and grass spring up readily where artificial heat is used and should be pulled off before the plants appear, in order to prevent competition. After there is a good stand of plants on the bed and the days have become warmer, the ends of the beds should be opened to permit ventilation. About a week before the plants are to be set in the field one side of the cover should be loosened and rolled up a little way, at first during the early mornings and late afternoons of bright warm days. It may gradually be left off longer each day until the plants are hardened to outdoor conditions; although it should be placed on the bed each night until the danger from frost has passed.

Care should be exercised in “drawing” the plants from the bed to prevent pulling the potatoes out of the soil. Potatoes that appear loose may be held in place with one hand while the plants are pulled with the other. Beds should be watered and the covers placed on again immediately after the plants have been pulled. This should be repeated after each pulling, as long as the weather remains cool.

THE DISTANCE TO PLANT

Spacing tests with the Porto Rico potato have been under way for four years at this station. Data at hand indicate that the highest yields of marketable roots may be expected from spacings of 12 to 16 inches in the drill and 3 to 3½ feet in the row. A high per cent of over-sized potatoes results from wider spacing, and in years of excessive rainfall this condition is magnified. Closer spacings tend to produce strings and in dry years the percentage of small potatoes is especially high.

SETTING THE PLANTS IN THE FIELD

The setting of sweet potato plants is facilitated considerably where all preparation has been completed several days in advance of the time the slips are to be set in the field. By so doing the soil will have become firmed in the bed. This will enable the roots of the plants to form quicker contact with the soil and thus become established with less difficulty. Another point in favor of preparing the land in advance is that the plants may be set immediately after a rain and eliminate the necessity of watering
by hand. The potatoes will be more uniform in shape and there will be a higher per cent of marketable roots where they are spaced uniformly in the drill.

The most generally used method of setting plants in the field is by hand. Probably the most convenient device that can be used in this method of transplanting is a thin stick about 3 to 3 1/2 feet long, having in the lower end a slight notch. The droppers lay the slips on the top of the ridge at the proper distances and the planters place the notch on the root of the plant, forcing it into the soil. The earth is then packed about it by a second thrust of the stick or by the foot of the operator.

Where a large acreage is grown, the work of setting the plants in the field may be facilitated by the use of transplanting machines.

THE INFLUENCE OF EARLY PLANTING ON YIELD

There is probably no other factor of so great importance in the production of a high yield of sweet potatoes as early planting. Data obtained from a series of plantings made at 15-day intervals, beginning early and continuing late into the season, show that very profitable yields may be secured from plantings made in April and May while little if any profit may be expected from late plantings. Over a four year period an average total yield of 304 bushels per acre has resulted from plantings made April 1st while a total yield of only 82 bushels per acre has resulted from plantings made July 1st.

CULTIVATION

The type of soil on which sweet potatoes are usually planted and the tendency of the vines to cover the ground early in the season reduces the cultural requirements of this crop to considerably less than that of the average truck and field crops. Weather conditions and the amount of weed growth will determine, to a large extent, the number of cultivations that should be given, although as a general rule the first cultivation should be delayed until the plants have become well established. This usually requires 10 to 15 days. Other cultivations should follow at such intervals as will keep grass and weeds under control. When the vines begin to interfere with further cultivation, the crop should be "laid by." At the last working it is often necessary to turn the vines out of alternate middles until they have been plowed out. The vines should then be turned back into the freshly cultivated middles in order that those remaining may be worked. The vines
may be turned with a round stick or cane. The later cultivations should be made with some implement that will gradually build the bed to the desired height. A cultivator with turnshovels or discs is desirable for this purpose. It also may be necessary to hoe the potatoes once or twice through the early part of the growing season.

**HARVESTING FOR THE EARLY MARKET**

Where sweet potatoes are grown for the early market they may be harvested as soon as the roots reach marketable size, regardless of season or maturity, as they are to be used for immediate consumption. A profitable yield of marketable potatoes, under normal seasonal conditions, may be expected in about 120 days from the date of planting.

Sweet potatoes harvested during the hot summer months should not be exposed to the sun. Possibly 30 minutes will cause blistering which is followed by severe rotting. Carts of potatoes often arrive at their point of destination in bad condition because of exposure in the field.

**HARVESTING THE LATE CROP**

The late crop which is to be placed in storage or consumed over a long period of time, should be well matured before being dug. Under favorable seasonal conditions the roots continue to grow until late in the fall; therefore, an increase in yield may be realized by leaving the potatoes in the field until just previous to the time the first frost is expected. During late falls, however, harvesting should not be delayed as there is a tendency toward excess rotting and the production of over-sized potatoes when left in the ground too long. Data from tests that are under way at this station indicate that the maximum yield of No. 1 potatoes may be expected in about 180 to 200 days from the date of planting. Growth after that time tends toward the production of Jumbos. Toward the latter part of the growing season the yellowing of the vines will indicate that the potatoes are mature and ready for digging. Another test for maturity is that of cutting or breaking a potato and leaving it exposed to the air for a few minutes. The cut or broken surface dries if it is mature, but remains moist if it is not ready to be dug. Under no condition should the potatoes be left undug until the appearance of cold weather as frost or a freeze may injure the stem end of many of the roots and cause them to decay in storage.
The type of implement most generally used in digging sweet potatoes is a turn-plow with a vine cutter attached to the beam, although a middle burster is quite satisfactory and there seems to be fewer injured potatoes where it is used. Regardless of the implement used, it should be set deep to reduce the percentage of cut and bruised potatoes. Where vine cutters are not available, a riding cultivator may be used for this purpose by attaching two discs and running them on the edges of the bed. This cuts the vines well, but at the same time cuts many of the potatoes near the surface. Every possible precaution should be observed to prevent bruising or cutting the roots, as every bruise gives an opportunity for rot fungi to enter.

The following are pointers that will be useful in harvesting the sweet potato crop:
1. Sweet potatoes that are to be placed in storage should be harvested when mature and before being injured by frost.
2. Remove vines by any means that will not injure the potatoes, and only as much as can be dug each day.
3. In case of frost, cut the vines at the main stem as soon thereafter as possible and let the potatoes remain in the ground until the weather permits digging.
4. Plow deep in order to prevent cutting and bruising the potatoes.
5. Remove the harvest of each day and place it in storage.

GRADING

Appearance is a big factor in the sale of sweet potatoes. Precaution must be observed in digging and handling to prevent them from becoming unsightly through the presence of cuts, bruises and other defects. It is not only important that the stock be of attractive appearance, but also that it be separated into well defined grades. It is essential that potatoes be carefully graded if they are to be marketed to best advantage. The work of grading the crop may be facilitated and less handling required if done before being removed from the field.

In order that the grading of sweet potatoes may be standardized the specifications adopted by the U. S. Bureau of Markets should be carefully adhered to. A general summary of these grades follows:

Grade Requirements

All grades shall consist of sound sweet potatoes of similar varietal characteristics which are practically free
from dirt or other foreign matter, frost injury, decay, bruises, cuts, scars, cracks, and damage caused by heat, diseases, insects (including weevils), or mechanical or other means.

**U. S. No. 1.** The diameter of each potato shall not be less than \(1\frac{3}{4}\) inches nor more than \(3\frac{1}{2}\) inches, and the length shall not be less than 3 inches nor more than 10 inches. Exception: the length may be less than 3 inches if the diameter is 2 inches or more.

**U. S. No. 2.** The diameter of each potato shall not be less than \(1\frac{1}{2}\) inches nor more than \(3\frac{1}{2}\) inches. The potatoes may be of any length.

**U. S. Jumbo Grade.** The diameter of each potato shall not be less than \(3\frac{1}{2}\) inches. The potatoes may be of any length.

In order to allow for variations incident to proper grading and handling, five per cent, by weight, of any of the above grades may not meet the requirements as to diameter, and, in addition, six per cent, by weight, may be below the remaining requirements of the grade.

**STORAGE**

The proper storage of sweet potatoes should be more generally practiced as it makes the product available over a larger portion of the year and often obviates the necessity of selling the crop as soon as harvested, when prices are usually low.

If sweet potatoes are to be kept in good condition in storage they must be well matured before being dug, carefully handled, the curing process begun immediately upon being placed in the curing house, and a uniform temperature maintained after being cured.

Where a large quantity of seed potatoes is to be stored it is advisable to build a substantial storage house as it will last longer and require less attention than a cheap, poorly constructed one. In sections of South Georgia where tobacco is grown, the use of the tobacco barn for curing the sweet potato crop is becoming a general practice. The only change necessary in converting the barn into a curing house is that of putting in a temporary floor above the flues. The principal objection to this type of storage house is that the temperature fluctuates more than in a specially constructed house. This condition makes it necessary to give the potatoes more careful attention during the winter months when freezing is likely to occur.
Rules for curing and storage

The following rules should be observed during the curing and storage periods, in the operation of the sweet potato curing house.

During the curing period:

1. Maintain a temperature of 80 to 90 degrees F., during the curing period, which is usually 10 to 15 days.
2. Give thorough ventilation during the day but do not allow the temperature to fluctuate.
3. Close the floor ventilators at night if there is danger of frost.
4. During severe weather, close all ventilators in the floor and roof.
5. Examine the curing house, during the curing period, noon and night.
6. When the curing period is over (indicated by sprouting or a purplish blue spot at the bud), gradually reduce the temperature, by slowly discontinuing the fire.

After the curing period:

1. Maintain a dry atmosphere and a uniform temperature.
2. As often as weather conditions permit, open the ventilators and outside doors and windows, but close them completely early each afternoon.
3. During wet weather if the house appears damp, open the ventilators and keep a slow fire until all dampness has been driven out.
4. During severely cold weather keep a slow fire to prevent the potatoes from freezing.
5. Have a regular time, preferably the middle of the day, to remove potatoes from the house, and do not return potatoes that have once been removed.
6. Do not grade or handle potatoes until they are ready to be taken immediately from the house. Such practice causes severe rotting.
7. Let one person be responsible for and entirely in charge of the house.

DISEASES

Stem-rot

The first indications of stem-rot in the field is a slight yellowing of the leaves of diseased plants. The leaves later become somewhat puckered and the vines finally wilt and die. If the diseased stems are split or cut in two, it will be noticed that they are dark or discolored on the
inside. The discoloration is a sure sign of stem-rot. It sometimes extends several feet from the hill and may also enter the potato. Sprouts from such potatoes are likely to be diseased and thus carry the disease to the succeeding crop. The fungus also lives over in infected soil.

**Stem-rot control**

The fungus causing stem-rot attacks the interior of the potatoes and the sprouts, therefore, seed treatment or fungicides cannot be depended upon for control. The only successful control measure is the selection of healthy seed potatoes and the growing of the crop on disease-free soil. Healthy seed potatoes may be secured by selection in the fall at digging time, while the potatoes are still attached to the vines. Each hill should be examined by splitting the stem, and the seed potatoes taken only from those plants where the inside of the stems show no discoloration. Selections should be made just before frost, as frost injury produces a similar discoloring.

In the spring just before bedding the sweet potatoes they should be treated with corrosive sublimate as described under “Seed Potato Treatment”, to kill any disease spores that may be on the surface of the potatoes.

**Black-rot**

Black-rot may occur on any of the underground parts of the plant. It may be recognized on the potato by a dark, somewhat sunken spot which is rather circular in appearance and underlaid by a greenish tissue. On the plants the infection begins as a small black spot, gradually enlarging until the stem is rotted off.

**Black-rot control**

Control measures for black-rot are similar to those for stem-rot. The principal ones are seed-bed sanitation, selection of seed potatoes, crop rotation and seed potato treatment. Although, where black-rot alone is concerned the seed may be selected in the spring as the disease is easily detected on the surface of the potatoes. This does not mean, however, that the presence of spores on healthy potatoes can be detected. Therefore, seed-treatment cannot be dispensed with.

**Soft-rot**

This is the most common of the storage house rots and is a very serious menace to the sweet potato industry. Probably the most effective control measure for this dis-
ease is careful handling of the crop while being harvested and stored, as it seems to attack only bruised or injured roots.

**Dry-rot**

Dry-rot is another disease that attacks the potato in storage. Its control is the same as that for soft-rot. For detailed information and description of sweet potato diseases see Farmers Bulletin 1059, published by the U. S. Department of Agriculture, Washington, D. C.

Sweet potato growers should give careful consideration to the eradication of diseases of this crop. The distribution of diseases, particularly stem-rot and black-rot, has become so general within recent years that heavy losses are being sustained annually from these two sources. Proper methods of prevention and control should be adhered to in order that the future of the industry may not be threatened. It is imperative that growers use every method at their disposal to safeguard the sweet potato crop.