



Sweet Potato Production

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Production Requirements

Sweet potato is a root crop native to the tropics and requires warm days and nights for optimum growth and root development. It can be one of the most profitable vegetable crops grown in Oklahoma. It is not, however, a "get rich quick" crop. Sweet potatoes can only be produced with a great deal of effort. Even with the use of mechanical harvesters and other modern production technology, labor requirements are about 60 man-hours per acre. Sweet potato production is not recommended for a grower that does not plan to grow the crop for several years. Profitable production demands that good practices be followed, which result in high yields and quality. Such practices include using good seed stock or purchasing certified slips, selecting suitable soil, careful harvesting, and proper handling, curing, and storing of potatoes.

Expected Yield

A good sweet potato yield under irrigation in Oklahoma is 300 bushels per acre of U.S. No. 1's.

Sites and Soils

Sweet potatoes yield more and better quality roots on a well-drained, light, sandy loam, or silt loam soil. Rich, heavy soils produce high yields of low quality roots; and extremely poor, light sandy soils generally produce low yields of high quality roots.

Both surface and internal drainage are important in selecting a field. Poor surface drainage may cause wet spots that reduce yields and poor internal drainage will also reduce yields. Soils with poor internal drainage are characterized by a high moisture content and poor aeration. These conditions cause sweet potato roots to be large, misshapen, cracked, and rough skinned. A three-to-five year rotation program will reduce the chance of soil-borne disease problems.

Varieties

Market preference must be considered in choosing the variety of sweet potato to grow. Since Oklahoma potatoes go to both fresh markets and to processors, it may be advisable to plant a variety that is acceptable to both types of market outlets. Where a special market has been developed, the

grower should continue with his present variety if it has proven satisfactory. Varieties most commonly grown in Oklahoma are Jewel, Redgold, Earligold, Allgold, and Centennial. Newer varieties that should be evaluated in small commercial plantings are Pope, Travis, Georgia Jet, and Jasper.

Jewel - This variety was released by the North Carolina Experiment Station. It is the variety most commonly grown in Oklahoma. It has copper-orange skin color and orange flesh. Flesh type is moist, market and canning quality is good, storage life is good, and slip production fair. Disease resistance includes stem rot, internal cork, and root knot nematode. It is susceptible to black rot, scurf, and soil rot. Red Jewel is a red-skinned mutant of the Jewel variety and is comparable with respect to yield and other quality and disease factors.

Redgold - This is the second most popular variety grown in Oklahoma and is a high yielding fresh market type developed by Oklahoma State University. It has reddish-purple skin color and salmon-orange flesh color. Flesh is moist, canning quality poor, storage life fairly good, and slip production fair. It has intermediate disease resistance to stem rot, black rot, and internal cork. It is susceptible to scurf, soil rot, and root knot nematodes.

Earligold - This is an early maturing variety developed by Oklahoma State University. It was grower tested as "Oklahoma 55-195" before being released and still is commonly, but incorrectly, called "Hybrid 195" by some producers. A major feature of Earligold is the early development of market-sized roots. It has copper skin color and bright salmon colored flesh. Flesh is moist, fresh market quality is good, storage life is good, and slip production is fairly good. It is resistant to stem rot, of intermediate resistance to root knot nematode and soil rot, but susceptible to black rot, scurf, and internal cork disease.

Allgold - This is a high yielding variety developed by Oklahoma State University. It has orange skin color, moist salmon-orange flesh, fairly good canning quality, good storage life, and fairly good slip production. Disease resistance includes internal cork and intermediate resistance to soil rot. It is susceptible to stem rot, black rot, scurf, and root knot nematode.

Centennial - This variety was released by the Louisiana Experiment Station. It generally produces a high yield of smooth roots with orange skin and flesh color. Flesh type is moist, canning quality is fair, storage life good, and slip production

only fair. It has intermediate disease resistance to stem rot and internal cork, but is susceptible to black rot, scurf, soil rot, and root knot nematode. Rose Centennial is a rose-skinned mutant of the Centennial variety and is comparable with respect to yield and other quality and disease factors.

Soil pH and Fertilizer

Sweet potatoes are fairly tolerant of variations in soil pH between 5.2 and 6.7. However, the optimum soil pH for high yields of quality sweet potatoes is 5.8 to 6.0. Apply lime if soil pH is too low. On a lbs./A basis sweet potato plants absorb about 110 N, 15 P, and 150 K from the soil. Based on OSU soil test results the following amounts of P₂O₅ and K₂O are recommended.

Phosphorus per acre

When test shows	0-19	20-39	40-69	70+
Add lbs. P ₂ O ₅ /A	60	40	20	none

Potassium per acre

When test shows	0-99	100-149	150-199	200-249	250+
Add lbs. K ₂ O/A	200	150	100	50	none

Nitrogen- Apply 30 to 40 lbs./A N along with P₂O₅ and K₂O using a complete fertilizer. On very sandy soils where leaching of nitrogen may occur, it is best to use a split application of N. In this case, 20 pounds would be applied pre-plant and incorporated into the soil with the second application coming four to five weeks after transplanting into the field.

When transplanting, a starter solution high in phosphorus should be applied at a rate of one-half pint of solution per plant. Three pounds of soluble 15-30-15 in 50 gallons of water can be used in making starter solution.

Seed Selection

Selection and care of sweet potato roots for production of slips and vine cuttings are probably the most important practices in profitable sweet potato production. To maintain high quality seed stocks:

1. Maintain a good supply of foundation stock. These are roots from which seed stock will be grown next year.
2. "Hill-select" foundation stock by selecting hills that produce at least four U.S. No. 1 potatoes. Choose well shaped roots that are free from insects and diseases and true to variety.
3. Check the flesh color by cutting off about 1/2 inch of root nearest the stem end. Discard off types (mutants) if they are found. Four to six bushels of foundation stock will grow vine cuttings to plant one acre of sweet potatoes for seed stock production.
4. Produce seed stock from vine cuttings taken from foundation stock and planted on disease-free soil.
5. Handle seed stock potatoes very carefully - with cotton gloves. Harvest before frost and cure and store separately from other sweet potatoes.
6. Never let seed stock remain in the field unprotected from the sun after digging.

Producing Plants

Varieties differ in their plant production ability, but generally a bushel of sweet potatoes will produce 2,000 to 2,500 slips in two or three pullings. Bed four to six bushels for each acre to be transplanted in the field. Do not bed small stringy roots. Use seed roots that are between one and one-half to three inches in diameter. Slips can be grown in cold frames or heated beds. It is difficult to produce slips in open field beds in Oklahoma due to the shortness of the growing season compared to more southern states. Allow five to six weeks for slip production in hot beds and seven to eight weeks in cold frames.

Preheating of seed roots is useful for more rapid slip production. Preheating is accomplished by raising the seed storage temperature for two weeks to 85° F with 85 to 95% relative humidity. One to two inch sprouts will be formed by the time of bedding. Place fungicide-treated roots in the plant bed with the sprouts upright. A few sprouts will be broken during handling, but this causes no noticeable reduction in slip production.

Permanent plant production beds are a potential source of disease. If permanent buds are used, remove the old soil to a depth of twelve inches and discard. Disinfect the bed, frames, and covering material with a recommended disinfectant. Haul in clean top soil from an area where sweet potatoes and nematode-susceptible crops have not been grown to refill the beds. Sterilize the new soil with an approved fumigant prior to bedding roots.

Bedding Seed Roots

Before bedding sweet potatoes for plant production, examine roots carefully and discard diseased, mutated, and bruised roots. Treat seed potatoes with a recommended fungicide dip immediately before bedding. Dipping will help control surface infestations of black rot, scurf, and root rot organisms. Washing seed potatoes before fungicide treatment allows for more efficient removal of all diseased potatoes and removes dirt that reduces effectiveness of the chemicals. Seed potatoes should not be washed unless they are treated in a fungicide dip before bedding.

Fertilize beds with two pounds per 100 square feet using a complete fertilizer such as 10-10-10 or 12-12-12. The fertilizer should be mixed with the bedding material. Warm beds to 80°F prior to bedding, then lower the temperature to 70 to 75° once sprouting begins. Place treated roots in the bed so they are not in contact with each other. About 12 square feet of bed is needed per bushel of seed potatoes. Cover with two inch mesh chicken wire and then with two inches of clean sand or sandy soil. Mesh wire prevents roots from being pulled along with slips. Separate and bed roots according to size to get an even depth of covering and uniform sprouting.

After bedding roots sprinkle water over the bed to slightly moisten the soil, but not soggy wet. Tar paper or plastic can be placed directly over the plant bed surface. When the slips push the covering up about two inches remove the covering material. Water the beds as needed to keep the soil moist. Keep the beds covered with sash or film plastic until the plants begin to emerge. Ventilate during the day to control

air temperature in the beds after plants emerge. Air temperature in the beds should be kept under 90° F to produce good quality plants. Pull plants when they are about eight inches tall. They should have at least five leaves, stocky stems, and a healthy root system. This type plant is best for mechanical transplanting.

If transplants are to be grown for sale, contact the State Department of Agriculture, 122 State Capitol, Oklahoma City, 73105, well in advance of production. They will provide regulations and requirements for certified sweet potato plant production and sale.

Preparing Soil and Transplanting

Sweet potato storage root development depends on good soil aeration. Good aeration is achieved by good field selection and by bedding the field prior to transplanting. Incorporating preplant fertilizer and “bedding-up” two weeks prior to planting allows the bed to settle before planting. The bed should be designed to provide for eight to ten inches in height after settling and transplanting.

Early planting is an important factor responsible for high total yields. Field transplanting should be accomplished as soon as possible after slip pulling. Cull weak and spindly slips for increased yield. Set slips deep, with at least three nodes (joints where leaves attach) below ground level. Optimum planting dates in Oklahoma are:

Southern and Central areas - from April 20 to May 15
Northern areas - from May 10 to May 20

One or two-row transplanters are commonly used. Irrigation water application immediately following transplanting and preemergence herbicide application reduces transplant shock and prevents wilting. Having starter fertilizer solution on the transplanter is less critical if irrigation water is available at transplanting.

Plant Spacing

A common spacing is 12” between plants and 36 to 42” between rows (12,500 to 14,500 slips per acre). Plant spacing depends on soil fertility and availability of irrigation water. Wide spacing on fertile soils results in excessive jumbo roots and rougher potatoes. Close spacing on very sandy soils may result in undersized roots.

Weed Control

Consult the most recent revision of OSU Extension Fact Sheet HLA-6008 and the latest edition of the Extension Agents’ Handbook.

Insects

If the ground has been in sod the preceding season, soil insects such as wireworms and grubs can be a problem. Insecticides are generally applied either preplant or at planting for soil insect control. Otherwise, leaf feeding insects such as the tortoise beetle and salt-marsh caterpillar are the predominant pests. Flea beetles and yellow-striped and beet armyworms may be occasional pests. For specific insect control measures, see the latest edition of the Extension Agents’ Handbook.

Diseases

The most common sweet potato diseases are scurf, stem rot (wilt), nematodes, black rot, and soft rots. These diseases and others can cause heavy losses in the field and in storage. They can be prevented or controlled by following recommended practices in selecting resistant varieties, selecting seed stock, producing transplants, selecting fields, and growing practices. Scurf, black rot, and stem rot usually come from disease infested seed stock and can be controlled by a fungicide dip before bedding seed roots. Nematodes can come from infested plant growing beds or infested soil. Fields known to be infested with nematodes or other sweet potato diseases should be avoided. A three to five year rotation should be practiced. Soft rots and other storage disease problems can be reduced by sanitation and disinfection of the storage house, proper curing, and careful handling of the sweet potatoes during harvesting, curing, and storage. For specific disease control measures, see the latest edition of the Extension Agents’ Handbook.

Cultivation

Feeder roots soon occupy the entire bed. To prevent damage to roots, cultivate weeds with equipment that does not scrape or remove soil from the bed. Disc hillers or other implements which throw soil to the bed avoid root damage and increase the height of the bed. A final bed height of ten inches is desired by the last cultivation when vine production interferes with cultivation. Less damage to vines occur if rows are cultivated in the same direction each time. Weeds not controlled by chemicals and cultivation will require hand hoeing.

Soil Moisture

Inadequate soil moisture is a consistent limiting factor in Oklahoma sweet potato production. Rains are rarely spaced to provide uniform and adequate moisture throughout the growing season. Supplemental irrigation should be available to supply up to one and one-half inches of water each seven to ten days. Actual needs will vary with soil type, plant size, and temperature. Too much water is harmful and reduces yield and quality. Moisture should be withheld toward the end of the growing season to condition the soil and roots from harvesting and to discourage the development of cracks and jumbo roots.

Harvesting

Regular field inspection is needed to determine when to harvest. Sweet potatoes can be harvested any time after a sufficient number of roots have reached marketable size. The price for uncured potatoes in late August and September may be high enough to justify sacrificing some yield to begin digging and marketing early. If the crop is to be stored, harvest before frost for maximum yields. If soil temperature falls below 55°F some damage to the quality, storability, and slip production of the roots will result. Chilling injury can occur even though a frost has not occurred. In cool weather, remove all dug potatoes from the field before nightfall. Prevent sunscald by removing or protecting harvested potatoes from the sun. A 30-minute exposure to the sun can cause sunscald, which reduces potato quality.

Most harvesters require vines to be cut with a rotary mower so they do not interfere with digging. Smaller acreages can be dug with a turning plow or a middle buster. For larger planting a three-point hitch chain type digger is best. Complex harvesters are now available for large acreages, which require little labor and deliver potatoes directly into containers. Regardless of equipment used, it should be adjusted and operated to minimize skinning and bruising. Field grading is important. Use cotton gloves to prevent skinning. Place No. 1's and No. 2's in crates together and cuts, cracks, jumbos, and culls in separate containers. Only No. 1's and No. 2's should be placed in storage.

Containers

Containers are important in handling and proper curing and storage of sweet potatoes. To minimize handling and reduce root injury containers used to harvest potatoes in the field are used in curing and storage. Bushel crates are usually used; however, larger containers cause less root damage.

Curing

Sweet potatoes to be stored for later marketing or for seed stock must be cured immediately after harvest to minimize storage losses. Do not wash potatoes to be cured and stored. Curing involves controlling temperatures and relative humidity and providing ventilation for seven to ten days. Curing is a wound-healing process which occurs most rapidly at 80° to 90°F, a relative humidity of 85 to 90%, and good ventilation to remove carbon dioxide from the curing area. Wounds and bruises heal and a protective cork layer develops over the

entire root surface. In addition, suberin, a waxy material, is deposited. The cork layer and suberin act as a barrier to decay-causing organisms and to moisture loss during storage.

Storage

Store sweet potatoes between 55° and 60°F. Do not allow temperature to fall below 55°F or chilling injury will result. Relative humidity should be maintained between 75 to 80% to prevent excessive water loss from the roots. Some ventilation should be provided to prevent carbon dioxide buildup.

Grading and Marketing

Whether marketed from the field or from storage, fresh market sweet potatoes are usually washed, graded, and often waxed before marketing. Poorly shaped, diseased, and damaged roots should be graded out to make a good looking pack. Buyer requirements for grade and size must be met for repeat sales. Fresh market sweet potatoes are usually packed in 50 or 40 pound cartons.

Small acreages of sweet potatoes can be marketed by pick-your-own methods. Only potatoes that will be picked up by customers during the next hour should be dug to prevent sun scald injury. Roadside stands, farmer's markets, and local stores are other possible markets for small producers. Some processing potatoes are produced in Oklahoma. Be sure to determine processor requirements prior to production and delivery. There may be size restrictions on processing deliveries or potatoes may be delivered field run with culls removed.

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