

## PEST CONTROL AND DISEASE CONTROL

### Insects

If the ground has been in contact with grass covered surface soil 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.

Home gardeners can use various measures to control wireworms. Trap wireworms in pieces of potato scattered around the garden, rotate crops and plow or cultivate infested soil in late summer or in autumn to kill or expose various insect stages to predators. Cultivation in the spring, well in advance of planting, can help reduce wireworm populations.

### 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 3 to 5-year rotation should be practised. 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.

### HARVESTING

Regular field inspection is needed to determine the time of harvesting. Sweet potatoes can be harvested any time after a sufficient number of roots have reached marketable size. The price for uncured sweet 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 12 °C, some damage to the quality, storage capacity and shoot production of the roots will result. Chilling damage can occur even though a frost has not occurred. In cool weather, remove all dug sweet 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 that they do not interfere with digging. In small lands the tubers can be removed with a turning plow. For larger planting, a three-point hook chain type digger is best. Complex harvesters are now available for large areas, which require little labour, and deliver sweet potatoes directly into containers. Regardless of equipment used, it should be adjusted and operated to minimise skinning and bruising. Field grading is important. Use cotton gloves to prevent skinning. Place grade 1s and grade 2s in crates together and cuts, cracks, jumbos, and rejects in separate containers. Only grade 1s and grade 2s should be placed in storage.

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# Sweet potato (*Ipomoea batatas*)

### ORIGIN AND DISTRIBUTION

Sweet potato (*Ipomoea batatas*), a member of the morning glory family, originated in South Mexico and Central America and is now the seventh most important food crop, worldwide.

Sweet potato, which originated in the Yucatan peninsula in Latin America, seems to be the most widely dispersed root crop. It is adaptable and can grow under many different ecological conditions. It has a shorter growth period than most other root crops (3 to 5 months) and shows no marked seasonality: under suitable weather conditions it can be grown all year round. Adverse weather conditions rarely cause a complete crop loss. Hence sweet potatoes are planted as an "insurance crop," combined in mixed cropping with grains like rice in Southeast Asia, and with other root crops like cocoyam and yam in Oceania. It is a popular plant in the Philippines and in Japan because of its prostrate habit, which makes it resistant to damage by high winds such as hurricanes and typhoons (Wilson, 1977). Sweet potatoes have been cultivated since about 3 000 B.C. and were an important food for the Mayans in Central America and the Peruvians in the Andes.



### 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 South Africa. 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, labour requirements are about 60 man-hours per hectare. Sweet potato produc-



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tion is not recommended for a grower who 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 shoots, selecting suitable soil, careful harvesting and proper handling, curing and storing of potatoes.

### SOIL AND CLIMATIC REQUIREMENTS

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 characterised 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 programme will reduce the chance of soil-borne disease problems.

Short days promote fleshy root development and flowering, while long days promote top growth. The optimum soil temperature range for fleshy root development is 21 to 28 °C. Optimum growing temperatures for top growth are >25 °C. Sweet potato can be grown at altitudes of up to 609 m.

### USES

Sweet potato is a dual-purpose crop, as the roots are edible and the tops may be consumed as a green vegetable. Although the leaves and shoots are also edible, the starchy, tuberous roots are by far the most important product. In some tropical areas, they are a staple foodcrop.

Apart from the utilisation of the roots, stems and leaves are readily eaten by cattle, goats, pigs, poultry and even fish when green or can be used as hay or silage.

Humans consume the vines as a green vegetable or salad green.

Human health benefits and concerns

Apart from basic starches, sweet potatoes are rich in complex carbohydrates, dietary fibre, beta carotene (a vitamin A equivalent nutrient), vitamin C, and vitamin B6. Pink, yellow and green varieties are high in carotene, the precursor of vitamin A.

Sweet potato varieties with dark orange flesh have more beta carotene than those with light-coloured flesh, and their increased cultivation is being encouraged in Africa, where

vitamin A deficiency is a serious health problem. Despite the name “sweet”, it may be a beneficial food for diabetics, as preliminary studies on animals have revealed that it helps to stabilise blood sugar levels and to lower insulin resistance.

### CULTURAL PRACTICES

#### Soil preparation

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 fertiliser and “bedding-up” two weeks prior to planting allow the bed to settle before planting. The bed should be designed to provide for 20 to 25 cm in height after settling and transplanting.

Feeder roots soon occupy the entire bed. To prevent damage to roots, weeds should be removed/slashed with equipment that does not scrape or remove soil from the bed. Disk covers or other implements which throw soil onto the bed avoid root damage and increase the height of the bed. A final bed height of 20 cm is desired by the last cultivation when vine production interferes with cultivation. Less damage to vines occurs if rows are cultivated in the same direction each time. Weeds not controlled by chemicals and cultivation will require hand hoeing.

### SEED SELECTION RECOMMENDATIONS

Selection and care of sweet potato roots for production of shoots 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. Choose well-shaped roots that are free from insects and diseases and true to variety.
3. Check the flesh colour by cutting off about 0,5 cm of root nearest to the stem end. Discard off-types (mutants) if these are found. Four to six volumes of foundation stock will grow vine cuttings to plant 1 ha 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.

### PLANTING

Early planting is an important factor responsible for high total yields. Field transplanting should be accomplished as soon as

possible after shoot pulling. Weak and long-thinned shoots should be removed for increased yield. Setting shoots deep, with at least three nodes (joints where leaves attach) below ground level allows good root development.

Irrigation water application immediately following transplanting and pre-emergence herbicide application reduce transplant shock and prevent wilting. Having a starter fertiliser solution on the transplanter is less critical if irrigation water is available at transplanting.

A common spacing is 30 cm between plants and 90 to 106 cm between rows (12 500 to 14 500 shoots per ha). 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.

### FERTILISATION

Fertiliser is usually incorporated into the soil with an additional application approximately 6 weeks after planting. Requirements depend on soil testing but are normally in the range of 60 kg N/ha and 120 kg K/ha. Phosphorus is also required but is only added in phosphorus deficient soils. Boron is usually added to prevent a surface defect known as blister.

### IRRIGATION

Maintaining a constant water supply, especially during the tuber formation stage at 7 to 9 weeks after planting, is important for large yields and quality crop. Irrigation is recommended when 40 to 50% of the field-capacity moisture has been depleted. Stop irrigation about 1 month before harvest. Inadequate soil moisture is a consistent limiting factor in sweet potato production. Rains are rarely spaced to provide uniform and adequate moisture throughout the growing season. 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 very large roots.

### WEED CONTROL

Cultivating as often as necessary when weeds are small reduces weed competition. Proper cultivation, field selection and rotations can eliminate the need for chemical weed control.