

SWEET POTATO

Sweet potato (*Ipomea batatas*), locally known as “kamote”, is commonly planted in flat to slightly rolling open areas. The crop is also known to be a cheap but excellent source of carbohydrates, vitamin

A, carotene, calcium, and phosphorus. It is also a fair source of thiamine and iron but a poor source of riboflavin, niacin, and vitamin C.

A versatile crop, sweet potato has multifarious uses. It is not only grown as a food substitute for rice and corn but also as a potential source of raw materials for industrial uses and food delicacies. Sweet potato is being processed into feeds, flour, starch, and pectin for local and export markets. The flour is further processed into fermented products such as, soy sauce and alcohol. When freshly cooked it can be sac-

charified to produce wine, vinegar, and nata.

SOIL AND CLIMATE REQUIREMENTS

NUTRITIONAL CONTENTS PER 100 GRAMS OF EDIBLE PORTION			
Yellow fleshed tubers	Tubers	Leaves	Part of Plant
70	70	87	water (ml)
121	114	42	calories
1.6	1.5	3.2	protein (g)
0.2	0.3	0.7	fat
28	26	8	carbohydrate (g)
1.0	1.0	1.6	fibre (g)
1255	60	2700	Vit. A (µg)
37	30	21	Vit. C (mg)
2.7	1.0	4.5	Iron (mg)
33	25	86	calcium (mg)

Sweet potato can be grown in a wide range of soils, from heavy to sandy. It thrives best in sandy loam soils rich in organic matter with pH ranging from 5.0-7.0 and in areas with uniform rainfall and good drainage.

The crop can be planted throughout the year but the ideal planting time for best varieties is at the onset of the rainy season or immediately after the rainy season when soil is

still moist.

Variety	Description	Maturity (DAP)
UPL SP 1 (Kinabakad)	Spreading with green/purple foliage, reddish pink tuber skin, and orange tuber flesh; average yield is 16.70t/ha; dry matter content is 37%, starch content 21.36%, and protein content is 1.50%; resistant to scab and susceptible to weevil.	100-150
UPL SP 3 (Tinipay)	Spreading with light green foliage, beige or cream skin, white tuber flesh; average yield is 17.70t/ha; dry matter content is 39%, starch content is 11.93%, and 1.60% protein content; resistant to scab and susceptible to weevil.	100-150
UPL SP 5 (G113-2B)	Semi-spreading with moderate leaf lobing; foliage is green, tuber skin is beige or cream with purple tinge, and white tuber flesh; average yield is 13.70t/ha; dry matter content is 30%, starch content is 7.56% and 1.50% protein content; moderately resistant to weevil and scab.	100-150
BPI SP 1 (Lo-323)	Spreading with green/purple foliage, copper tuber skin, and orange tuber flesh; average yield is 18.50t/ha, 26% dry matter content, 5.02% starch content, and 2.32% protein content; slightly susceptible to both weevil and scab.	100-150
BPI SP 2 (CI 893-9)	Spreading with green foliage, beige or cream tuber skin and cream tuber flesh; average yield is 17t/ha; dry matter content is 31%; 6.79% starch content and 2.01% protein content; susceptible to weevil and scab.	90-100
PSB SP 13 (OPS-88)	Spreading with slight leaf lobing; green foliage, red tuber skin, and light yellow tuber flesh; average yield is 12.86t/ha; dry content is 32.60%; starch content is 20.53% and 2.86% protein content; moderately resistant to weevil and resistant to scab.	110-120
PSB SP 14 (G648-15A)	Spreading with green foliage, red tuber skin, and yellow tuber flesh; average yield is 12.42t/ha; dry matter content is 33%; starch content is 20.38% and protein content is 3.40%; moderately resistant to weevil and resistant to scab.	100-120

Variety	Description	Maturity (DAP)
PSB SP 15 (V37-151)	Semi-spreading with green foliage, light red tuber skin and light yellow tuber flesh; average yield is 14.37t/ha; dry matter content is 14.37%; starch content is 65.06% and protein content is 4.44%; moderately resistant to weevil and resistant to scab.	110-120
PSB SP 16 (V30-595)	Spreading with green foliage, white tuber skin and flesh; average yield is 13.88t/ha; dry matter content is 37.07%; starch content is 70.72% and protein content is 26.22%; moderately resistant to weevil and resistant to scab.	110-120
PSB SP 17 (88WS 630)	Spreading, with leaf lobing slightly; foliage is green, purple tuber skin, and yellow tuber flesh; average yield is 17.84t/ha; protein content is 31.24%, starch content is 69.97% and 4.45% protein content; moderately resistant to weevil and resistant to scab.	110-120
2PL SP (Kinabka)	Spreading with green foliage, purple tuber skin and white tuber flesh; average yield is 16.70t/ha; dry matter content is 37% 21.36% starch content and 1.50% protein content; susceptible to weevil and resistant to scab.	110-120
VSP 5 (V10-595)	Spreading, with leaf lobing slightly; green foliage, tan tuber skin and yellow/purple tuber flesh; average yield is 17.10t/ha; dry matter content is 34.70%; starch content is 16.79 and protein content is 1.40%; moderately resistant to weevil and resistant to scab.	110-120
VSP 6 (V20-209)	Semi-spreading with moderate leaf lobing; green/purple foliage, purple tuber skin, and white tuber flesh; average yield is 19.40t/ha; dry matter content is 37.90%; starch content is 35.92% and protein content is 1.70%; moderately resistant to weevil and resistant to scab.	110-120
VSP 7 (V20-209)	Spreading with green foliage, white tuber skin, and orange tuber flesh; average yield is 16.46t/ha; susceptible to weevil and resistant to scab.	110-120

VARIETIES

Choosing the kind of variety to plant is dependent on the purpose

for which it is grown. Following are 14 varieties recommended by the Philippine Seed Board. These varieties have inherent character-

istics such as, high yield, resistant to pest and diseases, improved nutritional quality, short maturing, and many other desirable characteristics.

Moreover, the varieties recommended for starch processing are those relatively high in starch content.

CULTURAL REQUIREMENTS

LAND PREPARATION

To have good root yield of the crop, plow and harrow the soil twice or until soil is loose and friable. Form ridges or furrows of about 30-40 centimeters high by using a carabao-drawn mold-board plow or tractor-drawn disc plow with a distance of about 75-100 cms between ridges.

PLANTING MATERIALS

Use sprouts from roots of previous crop or vine tip cuttings from healthy plants 25 cm long. However, for economic reasons, tip or terminal vine cuttings immediately or you can store them in shaded place but they should be planted within 2 days from the time they are cut.

PLANTING

Plant vine cuttings diagonally on top of ridges during the rainy season to prevent the crop from being soaked under water, or in the furrows during dry season so that moisture reserve in the soil can be utilized by the crop. Expose 2-3 leaves at the tip at a distance of 25 cms between hills. One cutting per hill is equivalent to 33,000 hills per hectare.

FERTILIZATION

Follow the fertilizer recommendation based on the results of the soil analysis. If not available, follow the following general recommendations:

1. For poor soil, use 4-6 bags complete fertilizer per hectare;
2. For moderately fertile soil, use 4 bags complete fertilizer per hectare;
3. for fertile soil, fertilization is not advisable.

Apply fertilizer at planting time at 8-10 cms from the base of the plant or broadcast in the furrows and cover subsequently with soil. *The use of compost or organic fertilizers at 3 tons per hectare is highly recommended.*

PEST	DESCRIPTION	CONTROL MEASURE
Scab	Occurs during rainy days infecting the leaves and vines	Spray with copper Oxychloride or Maned (2.008g ai/l) every 10-14 days.
Weevil	Most serious anthropoid pest infecting the roots; infected roots cannot be eaten by man.	Burn all infected plants. If needed, apply Furadan 3G granules with fertilizer or use healthy plant materials.

DISEASES	DESCRIPTION	CONTROL MEASURE
Stem and foliage scab	Oblong to elongated scabby lesions on the stems and leaves.	Cut off the infected stem.
Cercospora leaf spot	Circular lesions with a diameter of 0.5-1.0 cm which are conspicuous on both surfaces of the leaf. Spots are dark brown to almost gray centers.	Practice sanitation and crop rotation, and use disease-free planting materials. Use resistant varieties.
Blight	Stem are rolled below or above the soil and the organism produces a soft brownish rot. Leaves turn yellow and plants are stunted, stem separate easily from the mother plant when pulled gently. Moldy growth appears at the base of the stems.	Observe farm sanitation, and destroy infected plants. Deep plowing and maintain good drainage facilities to minimize disease infection.
Nematode	Roots are galled with several egg masses on the surface. Lesion, necrosis and rotting appear usually in cracked, deformed roots.	Treat soil with nematicide which can reduce infection by 85%. Practice crop rotation every 5-10 years with non-host crops, or use resistant varieties.

CULTIVATION AND WEEDING

If weeds are abundant, shallow cultivation is done 10-12 days after planting. Hilling up cultivation is done at 25-30 days after planting. This is to provide enough soil to cover the developing roots

and thus, minimize the entry of weevils that may attack the growing roots.

PEST AND DISEASE MANAGEMENT

Foliar spraying of fevintrothion at 0.5% one (1) month after planting and twice, at 50 days and 70 days after planting (DAP).

HARVESTING

Most of the recommended varieties are ready for the harvest 110-130 days after planting (DAP). Harvesting can be determined by root sampling and if desired size has been attained, harvesting can be done anytime.

Before harvesting, cut and roll the vines like a mat, fork, hoe or, pass a plow below the ridges, then hand pick the roots. Handle the roots carefully to minimize injury. Sort out damaged or bruise roots from undamaged ones.

DISEASES	DESCRIPTION	CONTROL MEASURE
Soft rot or ring rot	Soft and stringy when opened. Color of the tissue turns from cinnamon to chocolate brown as the rotting advances; forms a ring or band measuring 2.5 cms wide which makes the roots to shrive and shrink.	Store roots in clean, dry and well-ventilated storage areas. Care must be taken, not to bruise or injure roots during harvest and transport.
Storage rot	Infection is limited to wound periderium which is formed when injured and infected.	Avoid root injury during harvest and transport. Store in a well-ventilated storage house.

POST-HARVEST DISEASES

POST-HARVEST OPERATION

If possible, use wooden crates for containers instead of gunny sacks to avoid skin damage during handling and transport.

Harvest roots, if properly cured, can be stored even for 3 months by keeping them under room temperature of 115°F or 32°C with a relative humidity of 92-95%.

PROCESSING OF SWEET POTATO CHIPS

Chipping or cutting sweet potato roots into thin slices should be done to facilitate efficient drying, handling and storage, and to avoid jamming the grinding machine during feed milling operations. The desired size of chips should not exceed 1.5 cm thick and 10 cm long.

THERE ARE TWO METHODS OF CHIPPING SWEET POTATO ROOTS:

1. Manual chipping or slicing by means of cutting knives or “bolo”
2. Mechanical chipping by means of chopping machines operated manually or by engine.

Manual chipping is suited for small-scale operation (less than half a hectare yield). However, for huge volume of roots (more than one hectare yield), mechanical chipping is necessary.

An example of a mechanical chipper is the one developed by the Bureau of Plant Industry. The BPI rootcrop chipper has a rated capacity of 0.3 tons per hour when pedal operated and 1.5 tons per hour when operated by a 3-horse power

gasoline engine.

It cutting blades are mounted on a vertical disk located opposite a feed hopper. These blades are adjustable, allowing roots to be chopped to desired thickness, from 5 mm to 20 mm thick, and from 100 mm to 180 mm long.

DRYING

Dry sweet potato chips to 12-13% moisture content through sun-drying or artificial heat drying.

SUN-DRYING - spread chips uniformly in mat or concrete floor. Expose directly under the sun for 2-3 sunny days. Turn chips periodically to facilitate efficient drying. Drying period depends on the availability of sunlight and size and thickness of chips.

ARTIFICIAL HEAT DRYING

- This is utilized in the absence of sufficient sunlight. Recommended drying facilities:

1. **STATIC-BED DRYERS** - All commercial batch dryers, e.g. storage, bin, tray and through-circulation dryers, used for wheat, rice, corn and similar products may be used for drying sweet potato chips.

2. MOVING-BED DRYERS

- These are similar to static-beds except that the bed moves either continuously or intermittently from one end to another. This allows continuous feeding of wet material from one end and continuous withdrawal of dried product from the other.

3. NATURAL CONVECTION TYPE DRYER OR IMPROVED “TAPAHAN”

- This utilizes a wide variety of combustible fuel, such as wood and coconut husk. Fuel is burned inside a steel tube made of three oil barrels welded together. This tube lies at the bottom of the pit covered by a perforated metal drying platform. Air entering the bottom of the pit is warmed by heat radiating from the barrel's surface and rises up through the drying platform and layer of materials to be dried. Flue gas and other products of combustion are released above the drying platform thru a chimney coming from the end of a steel tube or combustion chamber. To increase its capacity, provide up to 10 layers of tray or drying platform above the steel tube or combustion chamber.

SWEET POTATO

Ingredients:

500g sweet potato
120g refined sugar
2g foodgrade citric acid
0.232g ascorbic acid

Procedure:

1. Dilute the sweet potato with 404.17 liters water
2. Steam to cook
3. Blend for 5 minutes
4. Filter using cacha
5. For every 1000 ml filtrate, mix refined sugar, citric acid and ascorbic acid.
6. Strain and bottle.
7. Pasteurize for 4 min. after boiling.

SWEET POTATO JAM

Ingredients:

1 cup steam sweet potato
1 1/3 cups water
2 1/4 cups + tsp refined sugar
1/8 tsp food grade fruit citric acid

Procedure:

1. Blend steamed sweet potato with water and fleshy portion of desired

fruit flavor for 5 minutes.

2. Cook the blended ingredients.
3. Add citric acid or calamansi juice.
4. Fill into sterilized jars.

SWEET POTATO CATSUP

- 1 3/4 - steamed sweet potato
- 1 1/2 cups - water
- 1/2 cup vinegar
- 1/2 cup + tsp sugar
- 1 tbsp - salt
- 1/4 tsp garlic powder
- 1/2 tsp onion powder
- 1/2 tsp white pepper
- 1/4 tsp cayenne pepper
- 1/4 tsp chili powder
- 3/8 tsp cinnamon
- 0.44g strawberry red/food colors
- 0.25g egg yolk

Procedure:

1. Blend all ingredients in 3-4 minutes.
2. Cook the blended ingredients.
3. Fill into sterilized bottles and then pasteurize for 30 minutes.

SWEET POTATO HOTCAKE

Ingredients:

- 1 pc egg (medium to large size)
- 1 1/4 cups water
- 1 tbsp oil
- 1/2 tsp vanilla
- 100g sweet potato

Procedure:

1. Pre-heat frying pan and brush the surface with oil or margarine.
2. In a bowl, beat the egg, add the liquid ingredients and mix thoroughly.
3. Add 100g Sweet potato Hotcake mix to the bowl and blend well.
4. Pour enough butter to the pan to get desired sizes of hotcake.
5. Turn once when top is bubbly and edges start to dry.
6. Serve hot with margarine and sugar, jam or jelly.

SWEET POTATO FLOUR

1. Wash and peel good quality sweet potato roots. Slice thinly.
2. Dry the chips under the sun or use an artificial dryer until chips crack.
3. Grind the dried chips using an 80 mesh sieve. Grind the dried chips using an 80 mesh sieve. Grind the coarse flour and sift again. Pack the fine flour.

*Source: Palnt Industry Production Guide on Sweet Potato,
BPI Sweet Potato Commodity Profile
DA-Eastern Visayas Integrated Agricultural research Center*