Overview of Yam

Yams are carbohydrate rich, staple tuber vegetables of West African origin. Botanically it belongs to the family **Dioscoreaceae**, in the genus, **Dioscorea**. Yams, whose name comes from the Senegalese 'nyami' meaning to eat, were another important crop because they provided the crucial vitamin C that enabled sailors to battle the dreaded scurvy. It is said that yams came to Jamaica from Africa in a Portuguese slave ship. There are up to 18 different varieties of yam are cultivated in Jamaica, and they all have a unique taste, flavour and texture. Some are dry, some waxy, and some soft.

Yam provides the body with fibre (soluble and insoluble), starch and sugar, potassium, protein, vitamins B1 (thiamin), B2 (riboflavin), B3 (niacin), B6 (pyridoxine), folic acid, and pantothenic acid. These vitamins help us to get energy from carbohydrates and fat.

Health benefits

The soluble fibre present in yam makes it easy to digest and is a suitable food for young children. The fibre in yam provides many benefits including:

- Slows the release of sugar or glucose from the blood into the cells. For this reason, persons with diabetes should consume yam to achieve better blood sugar control.
- Increases satiety or makes the person feel full for a longer period of time. Yam is a recommended food for persons who are trying to lose or maintain weight because they will feel hungry less often.
- Reduces the risk of being constipated (hard bound), because fibre increases bulk in the stool and with adequate amounts of fluid in diet, waste products and toxins will be removed from intestines.

- Lowers low-density lipoproteins (LDL), or the bad cholesterol, by holding on to LDL cholesterol and removing it in the faeces.
- Reduces the risk of colon cancer by not allowing harmful substances that are eaten to stick to the lining of the colon (large intestines).

Yam is rich in potassium which is needed to:

- Control heart rate
- Control blood pressure
- Maintain sodium and potassium levels in the cells

Of all the roots and tubers, yam has the highest amount of protein but should be consumed with peas or beans or fish or any food from animals to improve the protein quality. Yam has no fat, no gluten and is a poor source of iron.

Cost of Production

NAME : Yam	Local
Hectares:	0.4
HARVEST: months	9-10
Expt. Yield : kg/ 0.4 ha	5374
C.O.P. / kg : $	53
Projected Selling :	88.00
Expected Earnings	$472912
ROI	63%

Cultural practices

1. Land must be cleared of all grass, brush and trees.
2. Maximum tillage operations must be used along with the incorporation of organic matter to improve drainage, aeration, nutrition and provide room for tuber growth.
3. The soil must be ploughed and properly rotovated.
4. Limestone may be added at 2-4 t/ha before rotovating

Planting methods

There are four main methods by which yams may be planted:

1. RIDGES: Ridges must be made 1m apart and 25-40 cm high. The furrows must be filled with rotted organic matter prior to the yam setts being planted.
2. MOUNDS: Heap soil into a small mound and add organic matter evenly before planting. This method is most popular in Jamaica. Mounds are referred to as “hills.” Mounds are made
3. HOLES: Dig hole 45cm x 45cm x 45 cm. and fill with rotted organic and sharp sand in the following ratio- 1:2. Plant one yam sett in hole.
4. FLATS: Minimum tillage is done and vines are allowed to grow flat on the ground without a framework.

Yams are mainly grown in the traditional method using hills and sticks but Mini-sett technology was introduced which use smaller heads grown on mounds and a trellis system. The yam mini-sett technology constitutes the most effective method for the rapid multiplication of seed yam needed for increased and sustained production of the crop. If a small quantity of a very good yam variety is available, the first thing is to produce lots of plant materials (seeds) for farmers. The best way to rapidly multiply plant material is to use mini-setting as it allows you to make new plantlets 10 times faster than through traditional methods. In addition, mini-setts of yams tend to eliminate viral infestation than hamper yams plants under normal conditions.

Methods of propagating yams

There are four ways of propagating yams:

1. Tubers: This is the most important method of propagation in the field. The planting material is called a "sett" and the size of each sett should be between 400 grams to 500 grams. There are three types of setts (4oz. pieces) that can be obtained from a whole tuber:

- Head setts: Commonly called “yam heads”. These are the best yam setts to plant because of the presence of the primary nodal complex (eye) which gives rise to the new plants.

  Whole tubers can also be planted. To do this, all planting setts must be dusted, especially those with an exposed cut surface, with a fungicide and anhydrous lime at storage and before planting. This encourages wounds to heal and prevents the entry of pathogens that potentially could cause spoilage to the stored planting material.

2. **Seeds:** True seeds found on vines.

3. **Cuttings:** Basal vine cuttings are best. Use 6cm - 8cm pieces, dip in a rooting hormone and place in a propagating bin.

4. **Tissue culture:** Used to produce "clean" plantlets i.e. free from diseases.

Preparation of Sets

In yams, sets are whole tubers or tuber pieces used for planting. Setts should be taken from healthy tubers of healthy plants. Tubers of appropriate sett size are not sliced while larger tubers are sliced into the desired sett size so that each sett has sufficient skin surface area. Cut sides of the sets are treated with ash or with fungicide and air dried. After air drying, sets are either pre-sprouted or planted directly.

Planting density

The density is kept constant regardless of the type of Yam being planted. This is approximately 10,000 plants/ ha or 4,050 plants/ acre. Plant yam heads are planted on continuous ridges of mounds spaced 1.4 m apart on the ridges. One “head” is planted every 0.66 m – 0.67 m and 10 cm deep in the holes.

Stalking (referred to as “sticking”)

Yams must be staked to expose the massive canopy to full sunlight throughout its growth.

1. Individual staking: One stake per plant e.g. bamboo stakes.

2. Pyramidal staking: The top of the stakes is slanted to form a peak.

3. Trellising: String wire between two strong posts and each stem is trailed along a string towards the wire support.

Training the Vines

When vines start crawling on the ground, they are trained to climb their respective stakes. They are trained again when long branches start crossing the rows or when weeding and hilling-up operations are about to be done.

Covering Exposed Tubers

As tubers elongate rapidly towards the end of the growing period of the plants, some tubers tend to heave, thereby causing them to be exposed to the sun. Heavy rains also expose the tubers. Exposed tubers should be covered with soil to prevent them from greening.

Weed control

It is of utmost importance to control weeds for the first 6-8 weeks after planting the crops. Weeds can be removed both manually and with the use of chemicals. A contact herbicide should be used in the furrows during growth. Selective herbicides can be used to control grass weeds. The broad-leaved weeds should be remove manually from around the plant.

Fertilizer application

Prior to applying fertilizers, a soil test should be done to determine which types of fertilizer is most suitable and how much is required. Best yields are achieved using high levels of organic manures and high levels of potash. Fertilizing should be done twice:

1. Two months after sprout emergence apply 85 gm–114 gm of 16:8:24 NPK fertilizer placed 15 cm - 20 cm away from the base of the plant.
2. Six months after planting, a similar amount of potash fertilizer.

PEST AND DISEASE MANAGEMENT

The major disease problem is anthracnose (Colletotrichum gloeosporioides Penz.). Anthracnose is normally seen as small, black spots between the leaf veins. Some infections can coalesce to form massive blighted lesions. This disease can be significantly managed using a number of cultural practices with a combination of timely chemical controls; these include:

1. Soaking the planting material with recommended copper fungicides prior to planting and drench the planting holes with the fungicide after planting.
2. Spraying the vines upon shoot emergence.
3. Alternating fungicides to prevent the build up to chemical resistance.
4. Encouraging healthy plants by ensuring adequate levels of nutrients.
5. Sanitizing the field by removing debris prior to cultivation to reduce the source of spores of the fungus.
6. Practicing crop rotation.
7. Inter-cropping with corn. The corn crop helps to move the spores up and away from the yam leaves reducing the infection rate.
8. Using windbreaks on the windward side of the crop.
9. Inspecting the field continuously and rogueing out infected plants.

Nematodes, especially Pratylenchus spp., Meloidogyne spp. and Scutellonema spp. are common, affecting not only the growing tuber but being associated with dry rot in the stored tuber. It has been stated that seed pieces can be treated with hot water at 50- 60°C for 30-60 minutes. In the Caribbean, the white grub, Lachnosterna sp., and the sugar cane root

borer, Diaprepes abbreviatus, often damage tubers. Field sanitation and avoidance of infected planting material are important aspects of control.

Integrated Pest Management (IPM) measures involve the use of cultural practices such as land preparation; drainage facilities; planting on mounds or on flat land, crop rotation sequence, and intercropping to affect the build-up of pests. IPM also involves the use of biological control methods, which involve the use of biological agents such as predators, parasites and pathogens. Parasites are smaller insects, which lay their eggs on the pests. The eggs hatch and the young ones go into the pests and kill them. Another method used to destroy pests is solarisation in which clear plastic is used to cover land for a period of time. The build-up of heat in this process will kill the pests in the soil. These methods eliminate the use of pesticides.

Methods of harvesting

Yams mature between 9-10 months after planting and this can be seen by the yellowing of the leaves and natural dieback of the vines. After removing the vines, lift the tubers using hand forks taking care to do as little damage to the tubers. Tubers should be dusted with anhydrous lime and a fungicide to accelerate wound healing.

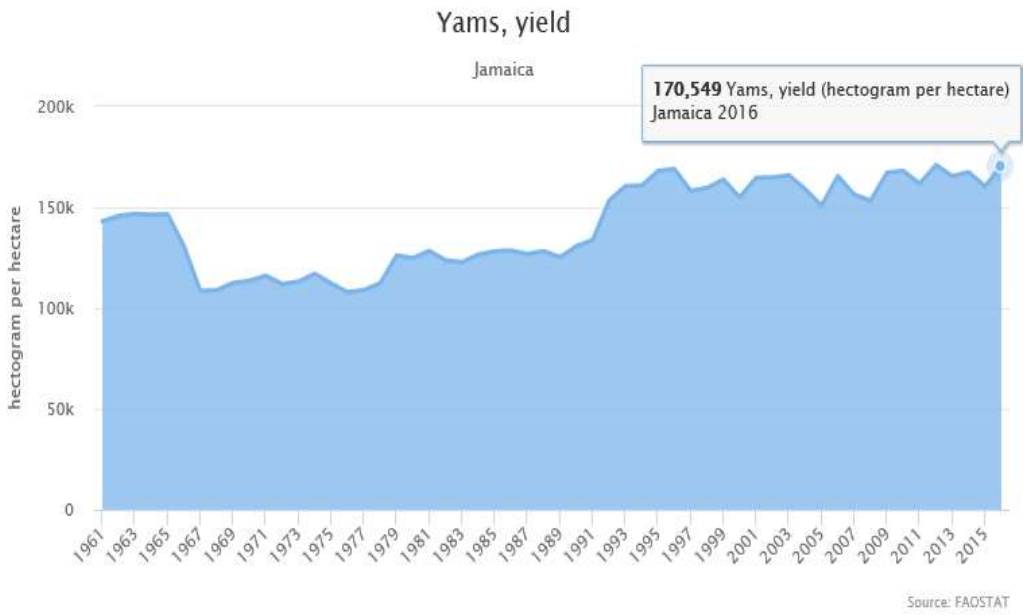
Ideal Soil Type

The best soils for growing yams are soils that are loamy to moderately clayey. The cultivation of yam requires fertile soils that are deep and well drained. It also requires soils that are not too compacted, as that may result in tuber malformation. However, yams can be cultivated on most soil types once the yam holes are properly dug. Soils which are friable and provide adequate drainage, proper aeration, and sufficient moisture (not waterlogged) are other

critical requirements for yam growth. Soils with **pH of 4.5-6.5** is ideal for growing the crop. Yams are sensitive to shade and this may lead to low crop yields. As a result yams should be grown under full sunlight. For optimum tuber growth, a temperature range of 25-32° C must be maintained.

Production Data

Year	Hectograms per hectare
2016	170,549
2015	160,501
2014	167,433
2013	165,476



Countries Export Data

Description	kg	J$	US$	Country
Yams, fresh or naturally dried	2,713	1,049,538	9,085	British Virgin Island
Yams, fresh or naturally dried	1,261,092	329,308,008	2,816,612	Canada
Yams, fresh or naturally dried	127,972	47,032,584	403,512	Cayman Islands
Yams, fresh or naturally dried	50	5,400	47	Netherlands Antilles
Yams, fresh or naturally dried	6,579	2,259,180	19,606	Saint Martins, French
Yams, fresh or naturally dried	12,342	3,000,071	25,157	St. Maarten (Dutch part)
Yams, fresh or naturally dried	605,250	150,798,000	1,287,081	United Kingdom
Yams, fresh or naturally dried	6,980,321	1,692,804,883	14,459,364	United States of America
Yams, fresh or naturally dried	25,740	7,376,882	61,456	United States Virgin Islands

Description	kg	J$	US$	Country
Yams artificially dried	671	199,676	1,737	Canada
Yams artificially dried	1,273	260,190	2,246	United Kingdom

Description	kg	J$	US$	Country
Yams, nesoi, chilled or frozen	20,470	6,635,593	55,569	Canada
Yams, nesoi, chilled or frozen	83,796	30,935,417	259,597	United States of America
Yams, nesoi, chilled or frozen.	1,053	211,620	1,842	Cayman Islands
Yams, nesoi, chilled or frozen.	4,947	990,964	8,555	United Kingdom

	2011	2012	2013	2014	2015	2016
Yam Annual exports (USD)	19,931	19,610	22,221	22,141	19,406	25,759

Price on International Market

Country	JMD$ /Kg
Canada	$324
United Kingdom	$200
United States of America	$369
Cayman Islands	$200

How are Yams Exported

Currently, yams are exported fresh or naturally dried, artificially dried, nesoi, chilled or frozen.

Export Requirements

Export requirements vary depending on the market into which the yams are to be exported. Generally, for any export market, the tubers should be free from cracks and bruises, without many toes, mature, free from any pests and chemical residue. Size of tubers varies with the market as larger tubers are preferred by the UK market and smaller ones by the US market. The size designated by weight varies between 0.5 - 3.0 kg. These yams are packaged in coir dust in 13.6 - 20 kg carton boxes. If travelling by sea freight, the shipment is refrigerated at a temperature of 12 - 13 degrees C as lower temperatures result in chilling injury and higher temperatures cause sprouting.

Major Players in the Trade

Yams are grown in many tropical regions throughout the world, but the main production centre is the savannah region of West Africa. White yam (*Discorea rotundata*) is believed to be indigenous to the area stretching from Côte d'Ivoire to Cameroon and is generally considered to be the best edible yam in that region. The yellow yam (*Dioscorea cayenensis*) is also indigenous in West Africa. The variety of yams being exported from Jamaica in large quantities are Yellow, Negro and Sweet yam. The major export markets in order of size are USA, UK, and Canada.

The Top 5 Yam Producing Countries

	Country	Yam Production	% of World Total
1	Nigeria	40,500,000 m/t	64.2%
2	Ghana	7,074,574 m/t	11.2%
3	CÃ´te d'Ivoire	5,731,719 m/t	9.09%
4	Benin	3,177,265 m/t	5.03%
5	Ethiopia	1,191,809 m/t	1.89%

Sources: FAOSTAT data 2015.

S.W.O.T

Strengths	Weaknesses
• Ready market • The demand by both the export and local markets is excellent. • Close proximity to main markets, United States and Canada, resulting in reduced cost of shipping. • Marketing and production information are readily available.	• Susceptible to being affected by Nematodes • Pesticide Residue • Poor post-harvest practices • Only grown in some parishes on a large scale. • Initial investment can be high and is dependent on the time of year that the procurement of planting material is done. • Planting material are generally sold at the same price as the tuber for consumption and so, during the period when yam prices are highest, the price for the planting material is also at its highest.
Opportunities	**Threats**
• Great potential for growth in international markets • Product can be diversified into other product lines such as yam flour, yam chips and canned yams etc. • Disseminate technological innovations for raising productivity, reducing pre- and post-harvest losses and minimizing production costs.	• High uncompetitive prices • Fluctuation in supply. • Decline in supply if various inspections conducted by regulatory bodies (e.g. FDA) are not passed. • Pests and Diseases resulting in poor plant development and reduced tuber weight.
