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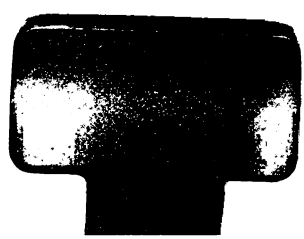
NATIONAL YAM EXPORT
DEVELOPMENT PROJECT



# IMPROVED TECHNOLOGY FOR YAM PRODUCTION

HYACINTH CHIN SUE

IICA OFFICE IN JAMAICA

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# IMPROVED TECHNOLOGY FOR YAM PRODUCTION

by
Hyacinth Chin Sue

**RADA / USAID / IICA**

## INTRODUCTION

Food yams are members of the genus Dioscorea and are grown mainly for the carbohydrate they provide. It is an important root crop throughout the tropics and subtropics. Yam is a preferred food of people from Caribbean, African and Pacific origins residing in the United States of America and the United Kingdom. This has resulted in export trading of great potential to the Jamaican economy.

The cultivation of yam is labour intensive and returns are generally low. The system of production used by Jamaican farmers is often inefficient and proves hazardous to the environment. This is because large quantities of planting material is required to cultivate one hectare usually on slopes over 15 degrees that are very prone to erosion.

Yam remains an important part of the farmers cropping system in the areas that it can be grown. Example:- A typical land use operation of a farm 1.2 hectares in upper Trelawny would be as follows:

| | |
|---|---|
| Yam | 0.6 hectares |
| Banana | 0.2 hectares |
| Other root crops | 0.2 hectares |
| Ruinate | 0.2 hectares |

## APPLICATION OF IMPROVED TECHNOLOGY FOR YAM PRODUCTION

The International Institute for Tropical Agriculture (IITA) in Nigeria has worked on yam improvement for several years and

introduced to Jamaica the "Mini-Sett technology" in 1985. The technique was tested on farmers field through IICA/ Ministry of Agriculture Cropping Systems Project in 1985. Research is underway to improve the technology through Jamaica Agriculture Research Program (JARP) in collaboration with the Faculty of Agriculture of the University of the West Indies. This program supports the National Yam Export Development Project managed jointly by RADA/IICA/USAID.

This publication is to highlight the application of the technology and describes the different stages of mini - sett production.

The recommendations are obtained from on farm research using the yellow yam variety within the traditional yam growing areas of Jamaica.

Research work towards the application of the technology to include other varieties and systems of production is being undertaken concurrently by the Jamaica Agricultural Research Program.

## THE NATIONAL YAM EXPORT DEVELOPMENT PROJECT

The National Yam Export Development Project is a sub project of the Agriculture Export Services Project funded by the United States Agency for International Development (USAID). The Rural Agricultural Development Authority (RADA) is the implementing agency and the Inter-American Institute for Cooperation on Agriculture (IICA) provides administration support.

The project aims at increasing the export of yams by promoting an improved system based on the mini-sett techniques and to improve traditional practices. The focus is on yam varieties for export in the parishes of Clarendon, Manchester, Trelawny, St. Ann, Hanover, St. Catherine and St. Andrew.

Training by means of on-farm demonstration, field days and the development and use of other communication methods are the means by which the mini-sett innovation will be spear-headed. The duration of the project is three (3) years and is targeted that 1000 farms will adopt the technology.

# JUSTIFICATION

Traditional labour represents 30–60% of total cost of production and is distributed throughout the crop season. Stakes account for 30% of total cost. Planting material is the third major input.

The mini-sett method of production has the potential to mechanize operation, eliminate the need for stakes and reduce the amount of planting material required to plant one hectare.
Additional it offers the following advantages:

(a) **Improve packaging and grading for export**
Tubers from a mini-sett harvest are within a defined size range based on the size of the sett. This facilitates grading on the basis of size. Smaller tubers are more convenient for packaging.

(b) **Reduction in the need for post harvest chemical application**
As for most ethnic produce there is no chemical registered to be used on yams in the countries to which yams are exported. The Government of the importing countries reserve the right to exclude entry of yams found to have any pesticide residues regardless of the quantity found.

(c) **Improved efficiency of use of planting materials**
As for other root crops smaller setts yield more yams per unit of planting material. It is possible to achieve higher yields per hectare by reducing the sett size and increasing the plant population per hectare.

(d) **Controlled erosion on hillsides**
Yams are often planted on free draining soils on slopes that are prone to erosion. The use of grass and plastic mulches will reduce erosion and leaching of soil nutrients.

# THE TECHNOLOGY

## 1. PREPARATION OF NURSERY

### (a) Planting Material

Select small mature tubers. Tubers that are too big will give less mini-sett per kilogram of yam. The tubers must be free from nematode damage or "burning". Nematode damage is observed as black lines on the skin or periderm of the tuber. If the skin is removed the underlying tissue is also black. This means that the

cells in the blackened area are damaged so that no sprout will develop from this region.

**PLANTING MATERIAL**

Each set weighs 25g with a piece of skin or periderm

The tuber is cut into cylindrical pieces. Each piece is cut longitudinally so that it has a skin or periderm. The size of the piece will depend on the desired tuber size at harvest. A 25gm sett can yield a tuber weighing 1 kg. Approximately 2 tonnes are needed to make enough setts for 1 hectare.

(b) **Treating the Setts**

Prepare a mixture of Benlate and two handfuls of woodash to 2 liters of water. An insecticide/nematicide can be added when available. Dip the setts wearing protective clothing such as gloves to avoid contact with the mixture.

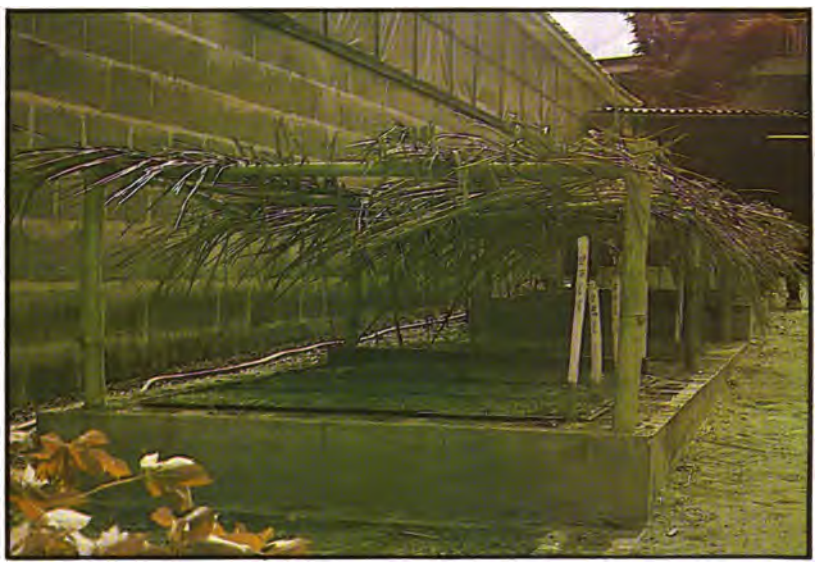
Spread the setts for two or more hours to dry in light shade. The chemicals will form a protective layer against rotting. The setts are "cured" and ready to be planted in a nursery.

(c) **Nursery Bed**

Prepare nursery bed in an area that is not prone to flooding. The bed should be raised about 30cm high to improve drainage.

Yams cannot withstand water logged conditions. Spread, setts on a layer of moist sawdust about 10cm and cover with additional sawdust.

The nursery bed must be covered to protect the setts during heavy rainfall periods. Small quantities of water is to be applied to maintain a moist sawdust. Setts will start sprouting at 6–8 weeks and 90% germination is expected at or before 12 weeks depending on the age of the tuber, the frequency of water application and the size of the sett.



**NURSERY BED**

(d) **Choice of Medium**

Coarse sawdust and old pine bark work well as mediums for sprouting. Fine sawdust tend to become compacted when wet resulting in reduction in aeration and requires more care in watering. While weathered sawdust may have less toxic substances called resins, one must be careful of the amount of micro organisms present in this sawdust if it was unprotected.

## 2 FIELD OPERATIONS

(a) **Planting**

Setts are to be transplanted soon after sprouting. Once sprouted, they grow rapidly and the planting materials is depleted.

Mini-setts prefer loose red oxisol soils found mainly in the bauxitic areas. These soils have low clay content and are free draining. Unlike with the traditional system clay soils are not very suitable for mini-sett production. Under the plastic mulch clay becomes compacted which resist tuber development. The clay is not exposed to the usual weathering conditions typical to hill plantings.

Ridges should be made 1m apart and fertilized with a mixed fertilizer such as 7–14–14:, 12–24–12:, or 6–18–27. Cover with plastic mulch only after a heavy rain shower. Cut holes 30cm apart, large enough to allow transplanting. Weed growth will be confined to the areas around the planting hole and between rows depending on the size of the hole and overlapping of the plastic.

Grass mulch can be used instead of plastic mulch.

**PLANTING 1**
Cover with plastic mulch only after heavy rainfall

**PLANTING 2**
Cut holes 30cm. apart large enough to allow transplanting

(b) **Harvesting**

The field is ready to be harvested 9 months after transplanting. Remove the yam vines that may still be green and lift the plastic mulch from the ridges. Carefully dig each tuber with the help of a stick or cutlass. Damage to the tubers will reduce the shelf life of the yam. Grade the tubers according to sizes. Heads from damaged tubers and small tubers are valuable planting material for the next planting season. Small tubers of 100 – 150 grams can produce tubers of 1 kg. or more that are suitable for export.

Under good climatic and soil conditions yields of 32 tonnes/hectare can be expected with 60% of the tuber by weight larger than 1kg. in size.

**HARVESTING**
Straight tubers collected from harvest after nine months

(c) **Constraints**

There are constraints to the application of mini-sett technology in Jamaica:

1. **Tuber size**

There is need for more information on the different tuber size

that are marketable. At present a tuber of 1.3 kg. is the minimum acceptable size for export. It is necessary to identify a sett size and spacing that will yield tubers of the desired size range.

2. **Planting Material**

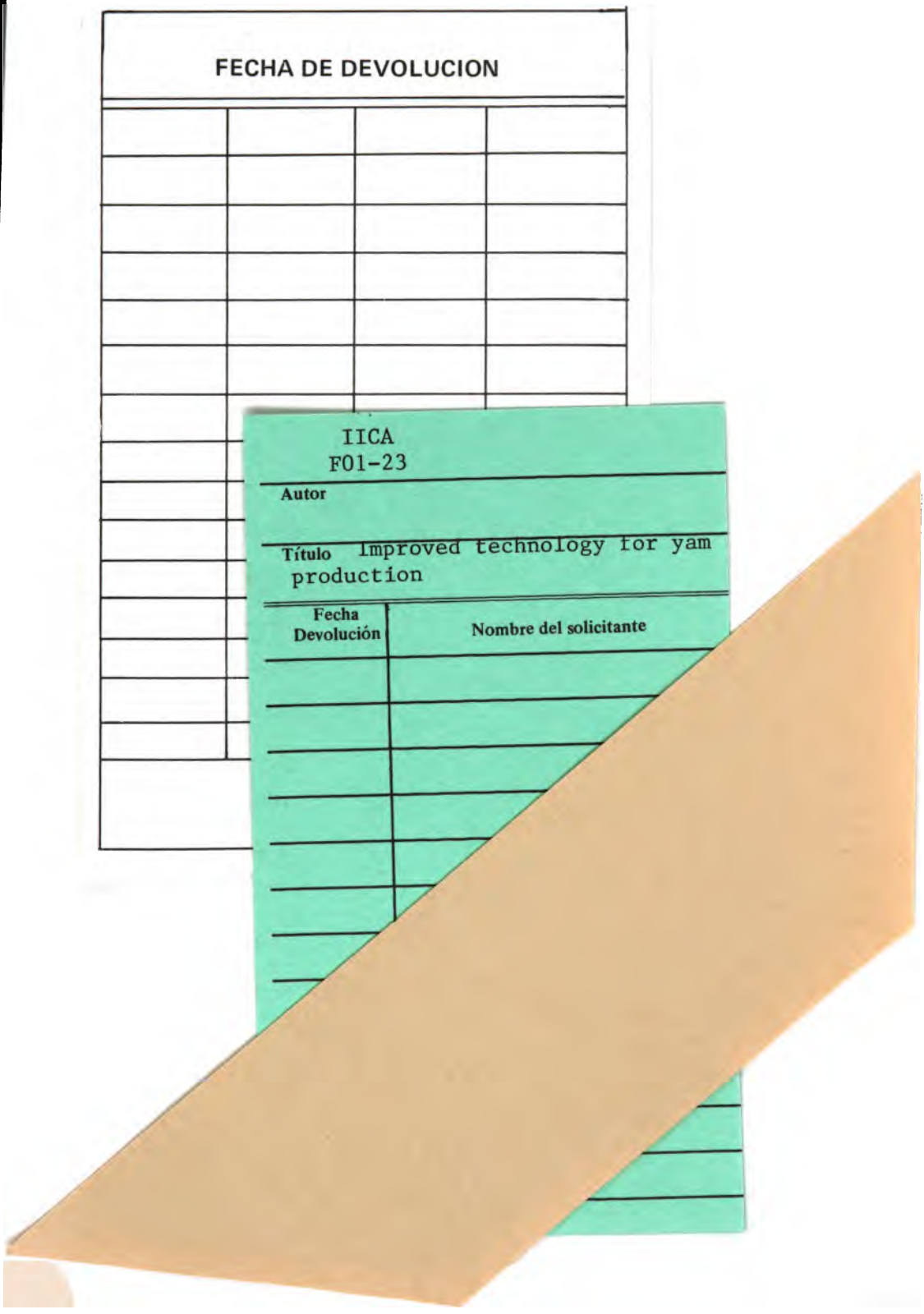
   Nematode damaged tubers are not suitable planting material. It would be beneficial to identify a source of planting material that has potential for high yields.

3. **Cultivation practices**

   Additional care is required in the use of small setts. Good husbandry unique to mini-sett must be taught to the farmers for the successful transfer of the technology.

4. **Varietal differences**

   The main variety grown is yellow yam **(Dioscorea cayenensis)** which is less responsive in all the productive attributes than most other varieties of yam.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