# Roots and Tubers

1. Cassava
2. Dasheen
3. Sweet Potato
4. Tannia
5. Yam

# TECHNOLOGY PACKS

TANNIA

November 2015

# Background

Production decisions concerning how much effort and resources to invest and which farming practices to follow, have consequences and create opportunities for the farm affecting production levels, input costs, time constraints, and the potentially size of the operation.  They also may have implications for resource use and environmental quality.

Numerous information exist on the various aspects of production and handling/ marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and climate change that impact on the environment and rural livelihoods. These issues are also closely related to the importance of the role of primary producers in increasing the earnings of all actors along the value chain in supporting the development of a commercially viable and sustainable agricultural industry.

The production of high quality and easily understood information packages is critical as this forms a basis for farmers to obtain financing from lending institutions and to efficiently increase their production through the availability of modern technology. This will also result in a reduction of rural unemployment and will greatly help in alleviating poverty and other associated social ills.

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# Introduction

This Technological Package (Tech Pack) deals with the production and postharvest aspects of tannia.

Also included in the Tech Pack are appendices:

- Template for cost of production
- List of recommended pesticides and application rates
- Good Agricultural Practices data record sheet.

Notwithstanding the identification of any specific pesticide for the control of pests and diseases, this decision is for the discretion of the Ministry of Agriculture Area Extension Officer and the farmer.However, the mention of any pesticides and other products used in the Tech Pack should strictly comply with local regulations and all instructions provided by the manufacturer. Also, the use of trade names in the Tech Pack is for the purpose of citing examples and is not meant to either endorse or discredit any particular product.

# Description

**Botanical name:** *Xanthosoma sagittifolium*(L.) Schott
**Family:** Araceae
**Common names:** Tannia, tania; yautia; tanier; new cocoyam

# Ecology and Environmental Requirements

The *Xanthosoma* species are plants that originate from the tropical rain forest and although in their natural habitat they grow under the forest canopy, in commercial production they are usually grown with full exposure to sunlight. They require well-drained soils and do not tolerate water logging. Waterlogged soil conditions favour the development of the fungus that causes Leaf Burning Disease. The site selected, should receive moderate rains throughout the year; i.e. 55 - 80 inches(1400- 2000 mm) of rainfall during the growing season.The crop prefers cool temperatures of around 70°F (21°C).

Do not plant tannia in fields which produced a previous crop of diseased tannia. The best fields are those which were under bush or grass fallow for a year or more.

# Varieties

In St. Lucia, two types of tannia are grown commercially; those with the purple leaf petioles and purple flesh cormels and the other with green petioles and white flesh cormels (Plate 1).

**Plate 1Purple Tannia and White Tannia**

# Planting Material Preparation

There must be a "mother" source of clean planting material, certified by the Plant Protection Unit in the Ministry of Agriculture.

Planting material should be taken from only healthy and the most vigorous plants of the previous crop. This is essential, since diseased planting material will not produce a healthy crop. During the harvest of the preceding tannia crop, the healthy and most vigorous plants should be selected and the head-setts, main corms and suckers put aside to be used as planting material for the next crop. These should be stored away from the soil and other diseased plants in a moist, shaded part of the field. Three traditional kinds of planting material can be used: tops (head-setts), sprouted bits of the corm and suckers. All planting material must be cleaned thoroughly by removing all roots and soil. Damaged corms or planting material with any signs of decay should be discarded.

The next step is to dip the planting material in a mixture of Ridomil and Benlate. Mix 4 tablespoons Ridomil MZ 72 + 1 tablespoon Benlate WP 50 per gallon of water (5g of Ridomil MZ 72 + 1g Benlate WP 50 per litre of water), and soak the planting material tor 15–20 minutes. Use Ridomil MZ 72 and Benlate WP 50 only and not any other formulations of these chemicals.

# Sprouting Cormels

A simple field nursery can be set up to sprout the corms. The humid area consists of raised beds covered with plastic mulch, on top of which is placed a layer of sawdust or wood shavings 3 - 4 inches (7 - 10 cm) thick. Place layers of the cleaned and treated corms on top of the sawdust or wood shavings and then cover with a further thin layer of sawdust, straw material or wood shavings. The covering material should be kept moist until lateral buds begin to emerge. Each corm after sprouting can be cut into 5 - 10 pieces, (depending on the number of bud-eyes). Each piece, weighing 3½ - 5½ ounces (100 - 150 g), must have a growing bud-eye. Sprouted bits are then transplanted on to the ridges. After treatment with the fungicide mixture described above, un-sprouted bits (bearing bud-eyes), lateral suckers and head-sets can be planted directly into the ridges.

# Tissue Culture

Weaned and hardenedtissue culture plantlets are another type of planting material, which can be used for tannia cultivation. These plantlets will be produced by the Ministry of Agriculture Propagation Unit and when planted, should not be treated with any chemicals during the first 6 weeks after planting.

# Land Preparation

The key to good land preparation for growing tannia is to ensure effective drainage; quick run-off of surface water and free water movement through the soil. After clearing the land of bush, weeds and other obstacles like stones and stumps, fork or plough the soil to a depth of at least 8 inches(20 cm). Form ridges along the contour about 1½ feet (45 cm) high and 3 feet (90 cm) at the base. Main drains must be dug below the level of the furrows, and laid out in such a way as to collect all run-off water quickly. A good look at the field after it has rained heavily will normally show where to dig the drains for the best drainage. In situations where drainage is difficult, seek guidance from an Extension Officer. CARDI does not recommend planting tannia in mounds; as mounds do not provide the necessary aeration and free drainage and they do not allow efficient production of cormels.

# Spacing and Panting

Tannia can be planted at any time if irrigation is available or rainfall is adequate throughout the year. Otherwise, under rain fed conditions, planting should coincide with the beginning of the rains during June/ July. Tannia cannot tolerate water loggingconditions like dasheen.

Planting can be done on either mounds or ridges. On ridges, planting setts are placed at a depth of 2½ - 3 inches(6 - 7 cm). The planting distance in commercial cultivation is 4½ feet (1.3 m) between rows and 2 – 2½ feet (60 - 75 cm) between plants. On small plantations, with no mechanization, mounds spaced at 3 x 3 feet(1 x 1 m) or 4½ x 4½ feet (1.3 x 1.3 m) are sometimes used.Place the plantingmaterial in the hole and press the soil firmly around it.Sprouted and un-sprouted bits should be covered withabout ½ inch (2 cm) of soil.

# Fertilization

The use of chemical and organic fertilizers is widespread both in small and commercial plantations. Place 2 ounces (60 g) of triple super phosphate in the hole before planting, then use compound "banana" fertilizer NPK (16:8:24) and apply as follows: 2 weeks after planting 2 ounces (60 g) per plant and again at 8 weeks after planting 2 ounces (60 g) per plant. Immediately after applying the fertilizer, drench the soil with the Ridomil and Benlate mixture recommended for treating planting material to disinfect the soil; use 2 cups (500 ml) per plant. When the crop is about 7 months old, apply 2 ounces (60 g) potassium magnesium sulphate. The fertilizer, should be placed in a ring around each individual tannia hole, about 5 - 8 inches (12–20 cm) away from the plant and carefully worked into the soil.

# Tissue Culture Material

Tissue culture material has been shown to be easily affected by chemicals, fertilizers and pesticides. Therefore no chemicals should be applied until 6 weeks after planting. Good manual weed control during the first 6 weeks after transplanting is essential since weeds severely affect growth of tissue culture plants.

Apply triple superphosphate at the rate of 2 ounces (60 g) per plant at 6 weeks after planting. Fertilize again at 8 weeks with compound "banana" fertilizer NPK (16:8:24) at the rate of 2 ounces (60 g) per plant.

# Weed Control

The first 6 months is a critical period for weed control. Therefore, after the land is prepared and cleared, pre-emergence herbicides, then shielded sprays of Paraquat in the early stages of the crop, followed by hand weeding in the later stages of the crop cycle, are used to control weeds.

# Diseases

Effective disease control for tannia is based on prevention. Most of the important diseases are caused by root pathogens and are capable of spreading systemically through the plant. It is generally not possible to restore the health of an affected plant once the disease is detected. Since tannia is mainly vegetatively propagated, virus and other systemic diseases can be carried from one planting to another in the propagules. A crop rotation of at least 3 years is an important means of controlling disease.

Table 1 describes the main fungal disease of tannia, its symptoms and control.

Good Agricultural Practice (GAP) related to the use of pesticides, requires farmers to maintain up to date records on the application of pesticides to the crop. These records should include trade names, application rates and dates of application. During the harvesting period use pesticides with a very short harvest interval.

| Pest & Diseases | Symptoms | Control/ Management |
|---|---|---|
| Fungal disease, 'Tannia<br>Rapid Yellowing Disease (TRYD) commonly called "Burning Disease" by farmers. This disease is caused by the fungal pathogen (*Pythhium myriotylum*) | The above ground symptoms of the disease are associated with rotting roots hence the descriptions for this disease indicate that the outer leaves of the plant gradually go yellow from margin to mid rib<br>  <br>  <br>and finally the leaf dies.<br>  <br>The roots of the plant also die. Plant growth is stunted. The diseased plant reportedly has no healthy roots. Production of marketable cormels is severely affected. | **Cultural control:**<br>A very important element of the control strategy is the use of clean, (disease free) healthy planting material with good plant vigor.<br><br>An approach has also been adopted to combine in vitro and in vivo techniques for the rapid multiplication of tannia.<br><br>Management of the disease also includes the following:<br>• Clean planting material- disease free<br>• High soil fertility<br>• Use fungicide (Acrobate) as soil drench |

# Harvesting

The smooth white varieties mature 8 - 11 months after planting. However, the smooth purple varieties are later maturing and can be left in the ground for up to 13 months. In small plantations and back-yard systems, harvesting of the cormels can begin at 6 months after planting and is done without uprooting the plant.

Harvesting is done manually; use either a fork or a cutlass to loosen the soil around the main corm and cormels, then gently lift the plant, by holding and pulling the petioles upward. Care should be taken to avoid damaging cormels during harvest. The undamaged cormels are graded according to size and shape. Cleaning is usually done by rinsing cormels in clean water. The cormels are then dried, treated and placed in boxes in cold-storage rooms (Plate 3).

**Plate3** Harvested tubers of white tannia

# APPENDICES

## APPENDIX I: TEMPLATE FOR COST OF PRODUCTION ANALYSIS: CASSAVA

| | Input | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **1.** | **Planting material** | | | | |
| | Cassava sticks (if purchased) | | | | |
| | Fungicide, nutrient, insecticide, fertilizer (specify names used) | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | Shade netting | | | | |
| | Polythene bags | | | | |
| | **Total cost for planting material** | | | | |
| | | | | | |
| **2.** | **Land preparation** | | | | |
| | Pre planting herbicide, fertilizer (specify names used) | | | | |
| | | | | | |
| | | | | | |
| | Other land preparation costs (e.g. equipment rental) | | | | |
| | **Total cost for land preparation** | | | | |
| | | | | | |
| **3.** | **Crop maintenance** | | | | |
| | Water/irrigation | | | | |
| | Fertilizer (specify types used) | | | | |
| | | | | | |
| | | | | | |
| | Weed control (specify chemicals etc. used) | | | | |
| | | | | | |
| | | | | | |
| | Pest and disease control (specify chemicals etc. used) | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | **Total cost for crop maintenance** | | | | |
| | | | | | |
| **4.** | **Harvest/storage** | | | | |
| | Materials (e.g. storage containers etc.) | | | | |
| | Estimate any utility costs | | | | |
| | Transport to market | | | | |
| | **Total cost for harvest/storage** | | | | |
| | | | | | |
| **5.** | **Labour** | | | | |
| | Planting material | | | | |
| | Land preparation | | | | |
| | Crop maintenance | | | | |

Notes

- It is recommended that the above data be completed on a per crop basis.
- The cost of any fixed structures should be considered. For example if an irrigation system is solely used for tannia in the year and is expected to last for 10 years, then one tenth of the cost of the equipment should be added at item 7. If, however, irrigation for other crops is also provided then this also needs to be considered. If tannia accounts for half the irrigation in a year, then the annual cost calculated as above needs to be divided by 2. Similar considerations should be given to the cost of any refrigerator if the crop is stored at a low temperature.
- The revenue obtained from sale of the crop should be compared with the cost of production to determine the profit/loss on the operation.

| INSECTICIDES | APPLICATION RATE |
|---|---|
| Pronto 35 SC | 3 - 5 teaspoons/gallon of water |
| Target | 1 - 2 teaspoons/gallon of water |
| Pirate | ½ - 1 teaspoons/gallon of water |
| Fastac | 1 - 2 teaspoons/gallon of water |
| Caprid | ½ - 1 teaspoon/gallon of water |
| Diazinon (Basudin) | ¾ - 1½ pints/acre |
| Admiral | ¼ teaspoon/gallon of water |
| Dipel | 1½ - 2 teaspoons/gallon of water |
| Aza-direct | 1 - 2 teaspoons/gallon of water |
| Cure | ½ - 1 teaspoon/gallon of water |
| Danitol | 1 - 2 teaspoons/gallon of water |
| Cypro | ½ tablespoon/gallon of water |
| Dimethoate (Perfecthion, Rogor 40) | 1 pint/acre |
| Phosvel | 1¼ - 2 pints/acre |
| Orthene | 3.2 ounces/acre |
| Permethrin (Ambush) | ½ teaspoon/gallon of water |
| Padan 50 WSP | 2 - 3 teaspoons/gallon of water |
| Lannate | 1 teaspoon/gallon of water |
| Decis | ½ teaspoon/gallon of water |
| Kelthane 42% | 1¼ lb/acre |
| Orthene 75S | 1 lb/acre |
| Malathion | ½ - 1 pint/acre |
| Sevin | 1½ lb/acre |
| BT(*Bacillus thruingiensis*) | Label rates |
| Rotenone | 1 - 2 teaspoons/gallon of water |
| Neem X. | 8 - 10 oz/gallon of water |
| **FUNGICIDES** | **APPLICATION RATE** |
| Bellis | 2 teaspoon/gallon of water |
| Acrobat | 2 - 4 teaspoon/gallon of water |
| Mancozeb (Dithane M45) | 1.5 lb/acre |
| Cabendazim | 2 teaspoon/gallon of water |
| Daconil | 1½ - 2 pints/acre |
| Benomyl (Benlate) | 6 oz/acre |
| Captan | 2 - 3 teaspoons/gallon of water |
| Peltar | 3 teaspoons/gallon of water |
| Manzate DF | 2 - 4 teaspoons/gallon of water |

| | |
|---|---|
| Bravo | 1½ - 2 pints/acre |
| Tri-Miltox-Forte | 3 teaspoons/gallon of water |
| Botrilex | 5 - 200 lbs/acre |
| Kocide 101 | 2 - 4 teaspoons/gallon of water |
| Cupravit | 2½ lb/acre |
| **WEEDICIDES** | **APPLICATION RATE** |
| DCPA (Dacthal W-75) | 10 lb/acre¬¬¬ |
| Diphenamide | 4 - 10 lb/acre |
| Paraquat (Gramoxone) | 1 - 2 pints/acre |
| Dymid 80W | 5 lb/acre |
| Atrazine 80 (Gesaprim). | 1¼ - 1½ lb/acre |
| Linuron (Lorox) | 1 pint/acre |
| Prometryn (Caparol) | 0.8 - 1.6 lb/acre |
| Sethoxydim (Poast) | 1¼ - 3½ lb/acre |
| Clethodim (Select) | 0.094 - 0.25 lb/acre |
| Prometryn 50WP (Geagard) | 2 - 3 lb/acre |
| Herbicidal Oil (Stoddard Solvent, Kerosene oil) | 40 - 80 gallons/acre |

**APPENDIX II: LIST OF RECOMMENDED PESTICIDES AND APPLICATION RATES**

**APPENDIX III: GOOD AGRICULTURAL PRACTICES DATA RECORD SHEET**

| Grower name: | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Name of applicator | Date | Brand and product name | Rate | Size of area/no. of plants treated | Total application (amount of the product used) | Notes/target pest | Start/finish time |
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*The applicator should be trained or, if not, supervised by a trained or certified person. Proof of training required.