



# **BREADNUT AND BREADFRUIT PROPAGATION**

**A manual for commercial propagation**





---

*This manual was developed under the FAO-funded Technical Cooperation Project, "Promoting Breadfruit and Breadnut Development in St. Kitts and Nevis TCP/STK/3301" and implemented in collaboration with the Department of Agriculture, Ministry of International Trade, Industry, Commerce, Agriculture, Marine Resources, Consumer Affairs and Constituency Empowerment, in St. Kitts.*

# **BREADNUT AND BREADFRUIT PROPAGATION**

---

**A manual for commercial propagation**

Prepared by

**Laura B. Roberts-Nkrumah**

DEPARTMENT OF AGRICULTURE

ST. KITTS AND NEVIS/

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

ISBN 978-92-5-107374-2

All rights reserved. FAO encourages reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all other queries concerning rights and licences, should be addressed by e-mail to [copyright@fao.org](mailto:copyright@fao.org) or to the Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

© FAO 2012

# TABLE OF CONTENTS

FOREWORD	iv
ACKNOWLEDGEMENTS	v
INTRODUCTION	1
FOOD USES	1
CULTIVARS	1
BOTANY	2
ENVIRONMENTAL REQUIREMENTS	2
<b><u>BREADNUT PROPAGATION</u></b>	<b>3</b>
Procedures for propagating breadnut	3
<b><u>BREADFRUIT PROPAGATION</u></b>	<b>6</b>
Methods of breadfruit propagation	6
<b>1. Root cuttings</b>	<b>7</b>
Required facilities	7
Materials	7
Tools	7
Procedures	7
<b>2. Root Suckers</b>	<b>10</b>
Procedures	11
<b>3. Air Layers</b>	<b>11</b>
Procedures	11
<b>4. Other vegetative propagation methods</b>	<b>14</b>
Stem cuttings	14
Grafting	14
Approach Grafting	14
Micropropagation	16
CONCLUSION	16
GLOSSARY	17

## **FOREWORD**

Food and nutrition security is a major concern for St. Kitts and Nevis as it is for many countries in the Caribbean, both because of the recent steep increases in food prices and the persistent heavy reliance on imported food. The Ministries of Agriculture of the federation identified breadfruit and breadnut as two crops that have the potential to contribute to domestic carbohydrate and protein supply because of their proven ability to thrive well in the local environment and the long-standing familiarity and acceptance of them as food crops by the local population. Additionally, the versatility in their preparation and use is being increasingly recognised elsewhere in the region and they have become export crops, while locally they are seriously underutilised and consumption has declined over the years. Consequently, an FAO funded project to support the development of the breadfruit and breadnut industries in St. Kitts and Nevis has been developed.

In order to support this initiative, one major constraint which must be addressed is the absence of adequate quantities of planting material to support increased production of both crops. Trees are needed for new farms, orchards, homeowners, schools and other relevant public institutions but only limited quantities of planting material is available. This is largely due to improper and inefficient techniques which do not lead to the production of sufficient quantities of high quality plants.

A training workshop was mounted to provide propagation practitioners at the government nurseries and farmers with up-to date and efficient methods of breadnut and breadfruit propagation as a key activity under the project. This manual was prepared to provide long-term support for that training and to facilitate the extension of the training beyond the small group that was exposed to the workshop.

---

## **ACKNOWLEDGEMENTS**

The author wishes to acknowledge the Department of Food Production, Faculty of Food and Agriculture for technical assistance for development of some of the propagation materials and photographs which appear in this manual.





---

## INTRODUCTION

---

Breadfruit (*Artocarpus altilis*) was introduced to the Caribbean, from Tahiti in the South Pacific, as a source of food in 1793. Since then it has been recognised as an important crop for food security and still plays an important role in the diets of many households in this region. Breadnut (*A. camansi*), its closest relative, was introduced earlier; it is seeded and has always been less important for food. Breadfruit and breadnut have several features that have enabled them to contribute to food and nutrition security, including:

- the fruits are an excellent source of nutritious, energy or protein-rich food,
- mature breadfruit trees are very productive and normally bear much more fruit than most households can consume; breadnut trees also have relatively high nut yields,
- the trees grow easily, even with little care,
- many trees are long-lived and are generally not affected by serious pests and disease problems,
- the trees help to protect the environment because their canopies and leaf litter conserve soil moisture, reduce soil erosion and recycle nutrients.

## FOOD USES

---

The most important use of breadfruit is as a starchy food for human consumption. It is cooked in several ways, including boiling, steaming, roasting, baking and frying. It is also quite versatile because the fruits can be used from the immature to ripe stage to prepare a variety of dishes that will be enjoyed by persons of all ages. In addition to traditional dishes such as boiled or roasted breadfruit with salted fish or mackerel, there are many more contemporary sweet and savoury ones such as salad, pies, pizza, chips, soups, cakes and muffins. Ripe to over-ripe fruits can also be used for fritters, pone and even alcoholic and non-alcoholic drinks. Such fruit have also been used to feed poultry and pigs.

The breadnut is a well-known relative of breadfruit that is known in Trinidad and Tobago and some other Caribbean countries as 'Chataigne'. It is consumed most commonly as the boiled mature seeds and the immature fruit is also curried or the young seeds cooked in rice or soups in St. Kitts and Nevis. This food crop is a rich protein source.

## CULTIVARS

---

In the Caribbean, the 'Yellow' and 'White' cultivars are most common. These cultivars are named according to their flesh colour. Both are used as food but consumers prefer the 'Yellow' which they consider to have a better eating quality. In St. Kitts and Nevis, there are round and long fruited types, and others that may differ in flesh colour and eating quality. No selections of breadnut have been made therefore, no distinct cultivars exist in the region.



## **BOTANY**

Breadfruit and breadnut trees grow quickly and under favourable conditions can reach up to 20 m (66'). The trees usually have a single trunk and breadfruit trees are highly branched, a feature that distinguishes them from those of breadnut that produce fewer branches. Dark green, lobed leaves are borne at the ends of the branches and in breadnut the leaves may be more erect and the lobes more shallow. The leaves vary in size depending on the age of the tree and the environmental conditions.

Under good growing conditions, the trees can commence bearing within two years. Both male and female inflorescences are borne in the axils of the leaves, but since the little or no pollen is produced in the breadfruit cultivars in the Caribbean, the female flowers are not fertilised. The entire female inflorescence develops into a seedless, round or oblong fruit. The average weight of mature fruits is 1.5 to 2 kg (3 to 5lb) and they are usually harvested and consumed at the green mature stage. The male inflorescences of breadnut produce pollen and through cross pollination, the female flowers are fertilised and develop into seeded fruit. As in breadfruit, the breadnut fruit is a syncarp that consists of many fused smaller, individual fruits.

Owing to the absence of seeds, breadfruit has an adventitious root system which is well branched. The roots can extend a considerable distance away from the trees but they do not grow deeply in the soil. The breadnut tree, by contrast, has a tap root system because it develops from a seed.

Both species have latex in all parts of the tree and the wood is quite brittle.

## **ENVIRONMENTAL REQUIREMENTS**

Breadnut and breadfruit grow best under hot, (210 and 320 C), wet conditions. The trees thrive where annual rainfall receipt is between 1500 mm (60") to more than 3000 mm (120") and is well-distributed throughout the year. Light is very important for good growth. Young trees benefit from shade which reduces wilting, stunting and possible death due to the large leaves that lose water faster than the root system can absorb it. Older trees should be grown in full sunlight so that they do not become too tall quickly with few low branches. Trees should also be planted in sheltered areas away from strong winds and hurricanes which can damage them.

Breadnut and breadfruit grow well on a wide range of soil types, provided that the soils are well-drained and moisture retentive. Locations with seriously eroded, shallow soil should be avoided. Soils should also have fairly good nutrient and organic matter content with a pH of 6 to 6.5.

## BREADNUT PROPAGATION

Breadnut is naturally propagated by seed and for commercial purposes, seed propagation is also recommended.

### ADVANTAGES AND DISADVANTAGES OF PROPAGATION BY SEED

The major **advantages** of seed or sexual propagation of breadnut are:

1. A large number of plants can be produced in a short time
2. Minimal physical facilities are required
3. The plants are genetically diverse which is an advantage for tolerance or resistance to adverse environmental conditions and pest and disease attack.

The major **disadvantages** of seed propagation of breadnut are

1. The plants produced are not genetically identical to the parent plant, therefore, they are not true to type plants.
2. The plants are genetically heterogeneous and may not perform uniformly.

### PROCEDURES FOR PROPAGATING BREADNUT

- 1 Select full ripe fruit which have turned brown. The best fruit are those which fall off the tree for themselves or are ready to do so. If the peduncle of the fruit is becoming yellow, it is an indication that the fruit will fall soon. Avoid seeds from prematurely falling fruit.
- 2 Remove seeds from the pulp of the fruit. The seeds selected for planting should be at full size, usually at least 2.5 cm long, well-formed and germinating. Avoid small or misshapen seeds and seeds that have not begun to germinate. When germination begins the endocarp or hard brown shell splits and a white "pouch-like" structure which contains the young seedling emerges (Plate 1).



**Plate 1**  
Germinating breadnut seeds



- 3** Plant the seeds immediately if possible because they do not have a dormant period and remain viable only for a short time. If it is not possible to plant them immediately, leave them in the fruit for a day or two. If the seed must be held for a longer period (up to 1 week), dip them in a fungicide such as Kocide at the recommended rate and store them in moist sand or Promix. Wet sand or Promix will cause rotting. Avoid dry conditions and refrigeration since cold temperatures will kill the seeds.
- 4** Prepare a well-drained, but moisture-retentive growing medium using soil mixed with sand and/or organic in a ratio that is appropriate for the soil type that is available.
- 5** Fill a black, plastic propagation bag with soil mixture to within 2 to 3 cm from the top. The bag selected should have adequate root room to accommodate the root system of the breadnut seedling which grows very rapidly. The bag should be at least 30 cm and preferably 35 cm in depth, while the diameter should not exceed 15 cm (Plate 2). Wet the soil mixture thoroughly until water drains from the bag.



**Plate 2**

Suitable bag for breadnut seedling

L. Roberts-Nkrumah, DFP, UWI

- 6** Make a hole, the depth of which should be equal to twice the length of the seed. The hole should be at the centre of the bag.

**7** Position the seed in an upright position with the slit on the pouch towards the centre of the hole (Plate 3). First, the radicle and then the shoot, emerges from the pouch through the slit, and the orientation is important to ensure that the roots grow downward and the shoot grow upward at the centre of the bag. Poor seed positioning can result in distorted shoots which do not grow erect early. Cover the seed.

**8** Place the bags under light shade and avoid very close spacing. Heavy shade and crowding will cause the seedlings to be thin and lacking in vigour. Water as necessary taking care to avoid both over watering and drying out. The seeds will germinate in 7 to 10 days. Fertiliser with moderate N and high P maybe added at 3 to 4 weeks.



**Plate 3-A**

Breadnut seed showing pouch with slit through which seedling emerges

L. Roberts-Nkrumah, DFP, UWI



**Plate 3-B**

Proper alignment and depth of breadnut seed in the hole

L. Roberts-Nkrumah, DFP, UWI

**9** At about 5 to 6 weeks, when the seedlings are at least 40 to 45 cm tall, hardening may begin with exposure to full sunlight. The plants are ready to be established in the field after 8 weeks or at a height of 50 to 60 cm. They should not be allowed to become root-bound in the bags since this will negatively affect their performance in the field.



## BREADFRUIT PROPAGATION

Most breadfruit cultivars grown for food, including the 'Yellow' and the 'White' are seedless, therefore, they have to be propagated using vegetative methods, which do not require seeds. Instead, vegetative methods of propagation use the vegetative organs of the plant such as shoots and roots.

### ADVANTAGES AND DISADVANTAGES

Major **advantages** of vegetative propagation of breadfruit:

1. The plants that are propagated by these methods are genetically identical to the mother plants from which the original planting material was taken.
2. Trees from the same source that are planted at the same time in an orchard will tend to be more uniform in growth and development which will make orchard management easier.

Major **disadvantages** of vegetative propagation of breadfruit:

1. If an orchard is planted with trees of only one cultivar, then all the trees are susceptible to the same pests and diseases.
2. The cost of production of propagated plants is greater can be than those grown from seeds because more skilled manpower and special physical facilities are required.
3. The available methods do not allow very large numbers of plants to be produced within a short period.

### METHODS OF BREADFRUIT PROPAGATION

The most successful and commonly practised methods for commercial breadfruit propagation are based on macropropagation. This requires the use of relatively large pieces of planting material from the stock plant to begin the multiplication process.

The main methods are:

1 Root cuttings

2 Suckers

3 Air layers

## 1. ROOT CUTTINGS

The use of root cuttings is the most suitable method that is currently available for commercial production of young breadfruit plants (Plate 4). Root cuttings can be used to produce young breadfruit plants because they can be induced to produce adventitious shoots. Many nurseries use one root cutting to produce one plant but this is wasteful and can weaken the stock plants from which they are taken if roots cuttings are collected from the same trees annually. Instead, one cutting can be used to produce many shoots. This is the method described below.

### Required facilities

- The propagating bin should be located under 50% shade and with a clean, well-drained medium such as river sand to a depth of at least 20 cm (8").

### Materials

- Black plastic bags (15 cm X 30 or 35 cm)
- Soil mixture or growing medium – This should consist of a mixture of soil, organic matter and sharp sand in suitable proportions, for example, 3:2:1 or 2:1:1, to allow for proper drainage with good moisture retention.

### Tools

- Lopper or bow saw.
- Secateurs or sharp knife

### Procedures

- 1 Cut pieces of root, at least 1m (3') long with a diameter of 5 to 7 cm (2" to 3") wide, from roots growing close to the surface (Fig. 4). Before lifting the piece of root or root cutting, place a notch at one end to mark the upper surface of the root.



**Plate 4**  
Removing breadfruit root cutting

L. Roberts-Nkrumah, DFP, UWI



- 2** Immediately after lifting the cutting, dip both ends in a 6% potassium permanganate solution and also brush some of the solution on the cut end of the root in the soil. This treatment coagulates and stops the flow of latex and sap out of the cuttings.
- 3** Wash the root cuttings free of soil. Use a soft brush to dislodge any soil that is not easily removed by water. The cuttings should be brushed gently to avoid damage to their surface. Do not soak the cuttings in water for long periods.
- 4** Cut them into smaller pieces, 30 to 60 cm (1' to 2') long, that can be accommodated in a propagating bin (Plate 5). Remember to notch the upper surface at one end of the cutting. Additionally, 2 to 4 cuts, just about 2 to 3 mm (1/8") deep may be made with a clean, sharp knife along the length of the cutting to encourage multiple shoot development.



**Plate 5**

A breadfruit root cutting

L. Roberts-Nkrumah, DFP, UWI

- 5** Place the cuttings horizontally in the bin with the notched surface of the root uppermost as it was in the soil and cover with a 1 cm (0.5") layer of sand.
- 6** This layer of sand should be kept moist, but not wet, preferably by an overhead misting system. If a misting system is not available, the sand should be kept moist by watering using a hose or can with a fine holes in the head or spout to minimise removing the sand, and by covering the bin with plastic to maintain high humidity. However, avoid over-watering as this encourages root rot. Apply fungicides taking care to rotate them. Within 4 to 6 weeks, **adventitious shoots** should begin to appear (Plate 6).



**Plate 6**

Adventitious shoots emerging on root cutting

L. Roberts-Nkrumah, DFP, UWI



- 7** Cut the shoots after several leaves have developed and the stems are elongated and hardened in the lower portion as shown by its brown colour. Use clean secateurs or a clean, sharp knife to remove only the upper portion of the shoot. Place the cut at the semi-hard (greenish brown) portion of the stem and at least 2.5 cm (1") below a node. Be careful to leave the lower nodes intact because from these additional shoots will arise and should be harvested in a similar manner (Plate 7).



L. Roberts-Nkrumah, DFP, UWI

**Plate 7**

Taking a stem cutting from an adventitious shoot

- 8** Dip the cut ends of the shoot cuttings in rooting powder for semi-hard shoots or in an **auxin** solution with an appropriate concentration to increase the root number.

- 9** Place the cut shoots to root in another shaded (50%) bin in damp sand, under mist or very high relative humidity conditions. Rooting takes place in 3 - 4 weeks (Plate 8).



L. Roberts-Nkrumah, DFP, UWI

**Plate 8**

A rooted adventitious shoot cutting



**10** The rooted cuttings are then potted in plastic bags containing a suitable rooting medium. Apply water and maintain the young plants under shade and high humidity for about 2 weeks. Do not space the plant too closely in the nursery since this increases shade and will encourage rapid vertical shoot growth which can be a disadvantage in the field. Harden them gradually by reducing shade. Note that the medium should be kept moist but not wet and during this period, a complete fertiliser with a high P ratio should be applied. Pesticides should only be used if required. The plants are ready for field planting in 5 to 6 months.

*NOTE: Timely and repeated harvesting of semi-hard shoot cuttings is the key to deriving many shoot cuttings from the same root cuttings over more than one year.*

This method is the most suitable for commercial nurseries or for producers who plan to establish medium to large orchards or even smaller producers who plan to establish all their breadfruit plants in the field at once and have appropriate nursery facilities. The physical requirements for the nursery are greater but many more plants are produced by this method which reduces the risk of damaging the mother trees by frequent root removal.

## 2. ROOT SUCKERS

This is the natural method of breadfruit propagation and is based on the natural or induced development of adventitious shoots or **suckers** on the intact root. Traditionally, adventitious shoots are induced by making a shallow cut on the surface of an exposed portion of root. Most suckers die after removal from the field and transplanting to plastic bags or directly to another field location. The procedures described below are a modified type of mound **layering** which minimises the risk of failure (Plate 9).



**Plate 9**  
Mound layered and rooted sucker

L. Roberts-Nkrumah, DFP, UWI

### Procedures

- 1** Select a sucker that is growing on an intact root in a shaded area.
- 2** When the sucker reaches a height of 30 to 45 cm (12 to 15"), cut the root on the side of the sucker that is closer to the stock plant. If the sucker is in a well-lit area, make the cut in two stages, a partial cut first, and then a final cut about 1 month later to complete the cut through the root. This gradual process reduces the shock the sucker experiences when it is severed from the stock plant. Lift the cut end of the root with the sucker above the soil while leaving the rest of the root intact and in the soil.
- 3** Mound soil, preferably with high organic content, for example leaf litter, around the base of the sucker. Water and keep the soil moist to encourage the sucker to develop its own roots. This may take 6 to 8 weeks.
- 4** Sever the stock plant root on the side of the sucker away from the stock plant. The sucker be attached to a short piece 8 to 10 cm (3 to 4") of the stock plant root but it will have its own root system.
- 5** Dig the soil around the sucker and lift it carefully to retain as many of the roots without damaging them.
- 6** Place the sucker and its root ball in a black plastic bag. The bag should contain enough soil mixture so that when the root ball is placed in, there is enough space to the top of the bag (about 2.3 cm or 1") for watering.
- 7** Place under shade and continue to water until new leaves appear. Fertilise and harden gradually as described above. The plant should be ready for field planting after 2 months.

## 3. AIR LAYERS

**Air layering** should be set or used on plants that have not yet matured, which means that they have not flowered and borne fruit.

### Procedures

- 1** Select young plants, preferably suckers arising from the roots of older trees. The suckers should be at least 90 to 120 cm (3 to 4') tall with a stem girth of 3 to 4 cm (1 to 1.5"). Air layers may also be made on the branches of larger suckers but the level of success is usually lower.



- 2 Remove a ring of bark about 5 cm (2") wide from the semi-hard, light brown portion of the stem using a clean, sharp knife. The upper part of the ring should be just below a node and only the bark must be removed; the underlying wood should not be cut (Plate 10).



Plate 10

Girdled breadfruit stem

L. Roberts-Nkrumah, DFP, UWI

- 3 Lightly scrape the exposed area to remove the **cambium**. This prevents re – growth of the bark.
- 4 Quickly apply, a damp, but not wet, rooting medium such as peat moss or coconut coir to cover the cut area. Wrap the medium securely with a piece of polythene, measuring roughly 20 cm x 20 cm (8" x 8") to prevent desiccation and secure the polythene above and below the cut area with polythene or rubber strips (Plate 11).
- 5 If the air layer is at risk of breaking off because it is top heavy due to the leaves, or the location is fairly windy or because of any other reason, stake the entire sucker to minimise its movement. If the layer was made on a branch, tie a splint across the cut area to increase stability.



**Plate 11**  
Air layered and staked  
breadfruit stem

L. Roberts-Nkrumah, DFP, UWI

**6**

Ensure that the plant is well-watered. After about 6 – 8 weeks, well-developed roots should be visible through the plastic.

**7**

Remove the layer by cutting the stem with a sharp, clean knife or lopper below the plastic wrapping and take it to shaded area (Plate 12).



**Plate 12**  
Rooted breadfruit layer

L. Roberts-Nkrumah, DFP, UWI



- 8** Remove the plastic wrapping and immediately plant the layer in a black plastic bag with suitable growing medium, and water thoroughly.
- 9** Maintain the plant in shade for 6 weeks during which period it should be well-watered. Fertilise lightly when new leaves appear and apply pesticides only if necessary. Harden for at least 2 weeks in lighter shade to full sunlight before field planting.

This method will produce a large plant, at least 0.6 m (2') tall which is ready for the field in 4 months. Producers, who already have access to breadfruit trees with suckers and plan to establish small orchards, on a phased basis, may prefer this method, especially since the requirement for physical facilities is much lower. The method may also be used by commercial nurseries when a few plants are required in a short period.

#### 4. OTHER VEGETATIVE PROPAGATION METHODS

##### Stem cuttings

**Stem cuttings** have potential for producing a large number of plants at relatively lower cost and their removal may be less damaging to the stock plant (Plate 13). However, when soft, semi-hard or hard cuttings are taken from young or mature trees and rooted directly in sand, under high humidity and shaded conditions, they tend to die within one to two weeks. Consequently this method is not a commonly used.

##### Grafting

**Grafting** is not used in local nurseries but has been attempted elsewhere with varying levels of success. Since most breadfruit cultivars in the Caribbean are seedless, it might not be considered advantageous to graft **scion** on **rootstocks** with adventitious roots. There should be a good reason for grafting since it requires more skill and planting materials and is, therefore, more expensive than any of the other methods described above. Since no dwarf cultivars have been identified as yet and breadfruit bears as early as two years after planting, breadfruit is not grafted. However, breadnut has useful rootstock characteristics which may be useful in some situations. For example, with its tap root system, it is hardier and tends to survive better in drier environments. It also has a lower tendency to succumb to the Tree Decline disease.

##### Approach grafting

This method is used successfully in commercial nurseries in the Pacific. It is conducted using suckers or adventitious shoots arising on shallow roots and a seedling root stock such as breadnut.

**Procedure:**

- 1** Select a sucker in the field about 45 – 60 cm tall. Take a breadnut seedling of similar height and growing in a black plastic bag. The sucker will be the scion and the seedling plant, the rootstock.
- 2** Select a long internode within the semi-hard region of the sucker and identify a similar internode at the same height on the rootstock. Remove a thin strip of bark within the internode and make a cut of similar length and width on the rootstock.
- 3** Bring the two cut surfaces together and ensure that they match. Tie the stems of the both plants from below the cut to above the cut using grafting tape or a rubber strip (Plate 13).
- 4** Keep both plants well watered. When new leaves have expanded on the seedling plant, cut back the top of the plant to just above the union of the plants. After the sucker has shown similar additional vegetative growth it can be severed from its own stem below the point of the union.



L. Roberts-Nkrumah, DFP, UWI

**Plate 13**  
Approach grafting of  
breadfruit on breadnut

- 5** The grafted plant can now be removed from the field and taken to a hardening area where it should be kept well-watered and fertilised as necessary before field-establishment.



This method can be used on plants that are 3 to 4 months old and even up to 12 months old. The plants must be well-watered and preferably grown in light shade. The grafting process may take 2 to 3 months.

One advantage of this method is that the requirements for physical facilities are minimal.

### Micropropagation

This is a vegetative propagation method that has the potential to produce large numbers of plants. Unlike all the methods described previously, **micropropagation** makes use of very small pieces of plant material or tissues for plant propagation and is also referred to as tissue culture. Shoots must first be multiplied and rooted under sterile, laboratory conditions, before the plantlets are acclimatised and hardened in propagating facilities as described above for other materials. Research on the micropropagation of breadnut and breadfruit was undertaken since the early 1990. Micropropagated plants of 'Yellow' breadfruit have been produced (Plate 14) and studies on acclimatisation protocols and field performance have begun.



**Plate 14**

Micropropagated breadfruit plants

F. Solomon Jr., DFP, UWI

## CONCLUSION

Successful commercial production of breadfruit and breadnut begins with the availability of adequate quantities of high quality planting material. Previously, suitable propagation techniques were not available for the production of large numbers of uniform materials in a relatively short time. This is now possible through the improved use of root cuttings and through micropropagation. However, more traditional methods which can be used by farmers or home owners for production of small quantities of materials are still available and useful. Research work is being conducted at the University of the West Indies to improve and to evaluate alternative methods of breadfruit and breadnut propagation to enhance the commercial production and the contribution of these crops to food and nutrition security through improving the availability of high quality planting material for commercial orchards.



It is hoped that this manual will encourage all persons who were trained in the propagation of breadnut and breadfruit as a part of this project, to practice and to become more proficient. As propagators, you have been provided with the information that should also help you to adjust to various situations because you know the requirements that must be met. Extension officers are also encouraged to use the information as a resource for reference and should find it useful for preparing guidelines and training in one or several methods of propagation for these crops and for other tree crops where the information is relevant.



## GLOSSARY

- Adventitious shoot** A shoot that arises on an unusual part of the plant such as on the roots in breadfruit plants
- Auxin** A plant growth regulator that stimulates root growth and development.
- Cambium** An area of actively dividing cells that causes growth of plant tissues.
- Grafting** A method of plant propagation in which pieces of two different plants are joined to form one plant. The *scion* is the piece that forms the shoot system is and the *rootstock* is the piece that forms the lower stem and root system.
- Layering** A method of plant propagation in which roots are encouraged to develop on a stem cutting while it is still attached to the stock plant.  
*Air layering* – the technique is used on stems attached to the stock plant above soil level so that the roots of the stem cutting develop above the soil.  
*Mound layering* – the technique is used when a portion of the stem is below soil level or is covered with soil, and the roots of the stem cutting develop in the soil.
- Micropropagation** A method of plant propagation in which very small pieces of a plant are used to develop large numbers of new plant under controlled, sterile laboratory conditions.
- Stem cutting** A method of plant propagation in which a piece of stem is removed from the stock plant and placed under suitable environmental conditions to develop a root system.
- Sucker** This is a special name that is given to an adventitious shoot arising on a breadfruit root.



**B**readfruit and breadnut have excellent potential for contributing to food and nutrition security, viable livelihoods, sustainable environments and adaptation to climate change which are all key elements of the Agricultural Development Strategy of the Ministry of Agriculture of the Federation St. Kitts and Nevis. A workshop was held in St. Kitts over 1.5 days in July 2011 to provide training in propagation of breadfruit and breadnut.

The theoretical aspects of propagation of these crops were detailed and addressed the knowledge that was necessary for all aspects of the propagation process. The objective was to provide an understanding of good propagation practices in general and the peculiarities of breadfruit and breadnut that would have made it necessary to alter propagation techniques from those commonly used for other crops, especially suckers, grafting and air layering.

This manual was prepared to provide long-term support for that training and to facilitate the extension of the training beyond the small group that was exposed to the workshop. While the Manual was produced for St. Kitts/Nevis, it is hoped all countries of the Caribbean and beyond will benefit from the information being shared.

ISBN 978-92-5-107374-2



9 789251 073742

I3085E/1/10.12