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**ORCHARD PRACTICE FOR THE AFRICAN
BREADFRUIT (*Treculia africana*)
IN NIGERIA**

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Table of Contents

Acknowledgment.....	2
Introduction.....	4
Cultivation practices.....	5
Land preparation and planting.....	7
Fertilizer Recommendation	7
Control.....	9
Harvesting and utilization.....	10
Economic Analysis.....	11
Bibliography.....	15

INTRODUCTION

The African breadfruit tree (*Treculia africana*) belongs to the family Moraceae which attains a height of over 40 meters and 3 metres in girth when fully developed. Three varieties are commonly recognized, namely - *T. africana*, *T. africana* var *inversa* and *T. africana* var *mollis*. The *africana* variety produces very large fruits with seeds (achenes) which are used for food. The other two varieties produce small fruits and more branches with more wood and less pith and are thus used for pulp for paper industry. There are however other members of the Moraceae family of plants that are used for food. These are *Artocarpus communis* and *Artocarpus heterophylla*. The sterile variety of the *A. communis* is the breadfruit, while the fertile variety with achene (usually called “seeds”) is the breadnut. The *A. heterophylla* is the Jackfruit. Both species of the *Artocarpus* were introduced from the Tropical Pacific area. These should not be confused with the African breadfruit tree (*T. africana*) which occurs throughout tropical Africa.

The African breadfruit is essentially a high forest tree. It grows well in a variety of soil types ranging from sandy clay loams to heavy clay soils with adequate rainfall of about 1000mm per annum and abundant sunshine. In Nigeria, it is found growing between latitudes 4°15'N and 8°00'N of the equator, especially along streams, river banks and in village homesteads. It can also grow well even in the comparatively drier ecological zones of the southern fringe of the derived savanna. It bears fruits in 10 - 20 years under natural conditions. Under improved management, its vegetative phase is considerably reduced and fruit production starts from 4 years while economic yield is attained after 7 - 8 years of planting. The fruits (“heads”) are about 45cm in diameter and weigh sometimes up to 15kg.

Each “head” is a multiple fruit, containing about 3.6kg numerous edible seeds (achenes) embedded in a spongy mesocarp (pulp). When ripe, the “head” falls to the ground, and the mesocarp undergoes natural tissue breakdown for 7 - 10 days. The seeds are extracted, washed, stored or used for food immediately. This bulletin is written with particular emphasis on *Treculia africana* var. *africana*.

Cultivation Practices

Propagation

The African breadfruit is commonly propagated by seeds. Due to the increasing awareness of the economic importance of this indigenous fruit tree, attempts were made to propagate them by other methods other than by seeds. Thus, it can be vegetatively propagated by stem cuttings and coppicing.

Propagation by Seeds:-

Planning for nursery operations should start in January. Viable seeds are planted in well prepared seed boxes/beds between February and March. Under optimal conditions, the seeds germinate within four days. Germinated seeds are transplanted into nursery pots or polythene bags (12cm diameter x 25cm high) filled with a mixture of forest top soil, compost or well rotted animal dung and river sand in the ratio of 1:2:1. Cowdung, goat droppings, farm yard manure and compost are recommended. Poultry wastes are harmful to tender seedlings and should not be used.

The seedlings are nursed for one year before being transplanted into the field. Otherwise they are budded and left to grow for another one year. Budded seedlings are recommended because budding reduces the vegetative phase of the plant and encourages early fruiting.

If only forest top soil and river sand are used as nutrient media in the nursery, fertilizer should be applied once to the seedlings two weeks after transplanting into polythene bags. A match box of either Ammonium sulphate, Calcium Ammonium Nitrate (CAN) or compound fertilizer containing Nitrogen, Phosphorus and Potassium (NPK); 40 gm dissolved in 10 litres of water is recommended for 50 seedlings.

Stem Cuttings:

Stem cuttings are taken from tender and healthy branches of trees. These are set in sterilized river sand plant packs and placed under high humidity propagator where they are encouraged to develop roots and new shoots before they are transplanted to the field. The use of stem cutting is not however recommended to farmers unless big-time or large-scale farmers who can handle rooting hormones. Attempting to root stem cuttings without rooting hormones yields less than 10% rooting. Low concentrations (0-50ppm) of growth regulators - Indole - 3 - butyric Acid (IBA); Naphthalene - 1 - acetic acid (NAA); Gibberellic acid (GA_3); and their combinations do not enhance rooting and shoot development as do higher concentrations (100 - 200 ppm). It is recommended to propagate the African breadfruit using sub-apical stem cuttings with application of varying levels of growth regulators like NAA IBA and NAA, GA_3 at concentrations ranging between 50 - 200 ppm.

Coppicing: - Established stands of the African breadfruit tree are cut back to stumps. Stump diameter of about 8.2cm is recommended. The stumps are covered with soil to encourage both shoot development and rooting of the shoots. The coppiced shoots are detached and transplanted.

This method of propagation although not very popular, holds good promise. A stump of 8.2cm mean diameter could produce about 10 coppiced shoots. Coppiced shoots exhibit vigorous up right growth and can give up to 80 - 90% survival rate on planting out in the field.

Land Preparation and Planting:

This operation is done between November and March. It includes: clearing, felling of unwanted trees, cross-cutting, packing and burning. Marking out of planting sites follows. The spacing of 7m x 7m is recommended. After marking out, holes of 60cm x 60cm x 45cm are dug and filled with well decomposed organic matter and top soil two weeks before transplanting. Inorganic fertilizer should not be put into planting holes at transplanting of seedlings, because this may be harmful to the young seedlings. Field planting (transplanting) should be done between May and June or anytime the rainfall becomes fairly established.

Fertilizer Recommendation:

Fertilizer application should be done during the rainy season. If the planting holes are well prepared, no chemical fertilizer is required in the first year. However, in subsequent years (1-4 years after planting), there can be application of 0.25 kg/stand of NPK (15:15:15; 10:10:20) or NPK Mg (12:12:17:2) or any other compound fertilizer having NPK. If the nutrient level of the soil is however low, the dosage could be increased to 0.5 kg per stand. Ringweed the plants before broadcasting the fertilizer around each stand once a year.

Interplanting

Trees are transplanted in the field between May and June at a spacing of 7m x 7m. To allow for interplanting with food crops, a spacing of 10m x 10m is better because of the ultimate size of the trees. Interplanting of the species with yams, cassava, cocoyams and vegetables especially pepper and fluted pumpkin is recommended. Spreading crops like melon (egusi) and sweet potato are highly recommended as interplants because apart from the importance of roots from sweet potato and seeds from egusi, as food, the sweet potato and egusi also serve as soil covers to check erosion and control weed growth.

Irrigation:

Trees transplanted in May/June may be adversely affected by the following dry season (November-March). During this time, a supply of 20 - 25 litres of water per tree per week is recommended. This will enhance survival rate and early productivity.

Replacement of Dead Plants(beating up)

In cases of failures of some stands to survive, they should be replanted the next season and this practice should continue until all the missing stands are filled up. Before replanting, the dead plants and the planting holes should be checked for the cause of the death. If death is caused by disease or pest, adequate measure should be taken to clean up the planting site and planting material before and after replanting.

PLANT PROTECTION

Pests and Diseases

a) African breadfruit is susceptible to damping off disease caused by two fungi, *Pythium* spp. and *Phytophthora* spp.

Control

Stands of the trees should not be waterlogged. Spray plants with Bordeaux mixture (Copper Sulphate mixed with lime) at the rate of 2 kg/ha at 0.4g of powder per litre of water. Efficient treatment requires complete wetting of affected parts.

b) Young seedlings are attacked by termites, grasshoppers, caterpillars, scale insects, etc. These pests can be controlled by spraying monthly with any broad spectrum insecticide like Ultracide, Diazinon, Rhonalin 20 EC, Mocap 10G, etc. Rodents can attack newly transplanted stands and destroy them. Baiting with rodenticides (e.g. Chlorophacinone) is advised; otherwise, setting of traps could keep off rodents from newly established fields.

c) **Weed Control:**- Ring-weed a metre from the base of the plants in the first two years of establishment. If, however, the trees are interplanted with food crops, the field should be clean weeded twice in a year. If not interplanted with food crops, slash the inter row as the need arises to keep down weed and pest attack.

d) **Fire Tracing:-** Bush fire can destroy a newly established field during the dry season. Create a fire corridor round the plantation each dry season, by cutting a fire trace six metres wide round the plantation during the dry season.

HARVESTING AND UTILIZATION

Harvesting:- Budded trees come into fruiting in about 4 - 5 years while unbudded trees take 10 - 20 years. The fruits mature in 106 days, fall to the ground when ripe, and are collected for processing. An average yield of 3.6kg edible seeds/head/year is common in the African breadfruit. This gives seeds/fruit yield of about 17.2%.

Processing:-

After harvesting, allow fermentation of the pulp for about 7-10 days thereby allowing easy removal of the seeds. Very often, the extraction is done traditionally by marching in a “dancing pattern” and washing the pulp in a large basket. During this process water and sand are liberally added to help remove the soft pulp debris of the fruit. Finally, the seeds are clean- washed and air dried. The seeds may be sundried and stored in calabashes, pots or sacs at room temperature for up to three to four months.

To ensure viability of seeds to be used as planting materials, it is advised not to use seeds that have been stored for more than three months unless the seeds have been stored under controlled temperatures.

Utilization:-

The African breadfruit seed is energy-rich and a good source of protein, minerals, vitamins, fats and oil. It contains about 17.23% protein, 10.27% fat, 72.50% carbohydrate and other nutrients. The seeds may be cooked, shelled or unshelled, mixed with rice, beans, maize and sliced oil bean seeds. The seeds may be made into soup. The flour can be baked into breadfruit loaves or biscuits.

The tree is useful for afforestation and erosion control. The wood is utilized in the pulp and paper industry. The timber is marketed as African box wood for furniture, wood carving, turnery and fire wood. The bark is used traditionally as cough medicine, laxative and curative for leprosy in Guinea. The leaves and fruit pulp provides feed for domestic animals such as cow, sheep and goat.

ECONOMIC ANALYSIS

The average yield of the budded seedling is realised at the 7th year. Therefore the 7th year is used in the following economic analysis:

- a) The basic cost of production of 1.0 ha of African breadfruit up to the 7th year (as at March 1993).

- b) The expected yields per hectare per annum of African breadfruit (at the 7th year of fruiting).

The revenue of N70,380.00 is the estimate for only the 7th year. This amount almost offsets the cost of production (1st - 7th year) which is estimated at N77,3020.00. Where the trees start production from the 4th - 5th year (if budded), the revenue from the productive 4th, 5th and 6th years have not been taken into consideration. Furthermore, by the 8th year, profits are realized and will be sustained under good management. (Table 1 and 2)

Table 1

Operation	Mandays (M.d)	Cost/ Manday (N)	Total Cost
1.Underbrushing/clearing (Secondary forest)	38	30	1,140
2. Felling, cross cutting and packing	10	30	300
3. Burning	3	30	90
4. Digging 204 holes (60cm x 60cm x 45cm) plus filling with organic mater	10	30	300
5. Cost of seedlings (204) at N10.00 per seedling	-	-	2,040
6. Planting of seedlings	20	30	600
7. Fertilizer (3 bags/ha x 7 years x N100 /bag	-	-	2,100
8. Manual weeding (2 times.yr x 7 yrs at 40 mandays/. weeding)	560	30	16,800
9. Fertilizer application (5 md. x 7 yrs)	35	30	1,050
10. Handling of fruits (gathering, depulping and washing of seeds) 70 md/yr x 3 yrs (5th, 6th & 7th yr)	210	30	6,300
11. Pest and disease control (N2,400/yr x 7 yrs)	-	-	16,800
12. Transportation (N1000./yr x 7 yrs)	-	-	7,000
13.Storage, handling and marketing costs (5th, 6th & 7th yrs)			1,800
14. Maintenance of farm sheds (N1,000/yr x 7 years)		-	7,000
15. Contingencies - (N2,000/yr x 7 yrs)		-	14,000
		Total =	N77,320.00

Table 2:

1. Plant population	204 trees/ha
2. Average fruit yield/tree/year	7 heads/tree
3. Average yield of seeds/head/year	3.64 kg (uncorticated)
4. Average yield of seed per tree per year	3.64 x 7 heads = 25.48 kg (uncorticated)
***(allow 10% shell content)	
5. Average yield of seed/tree/year	25.48 x 90% = 23kg (decorticated)
6. Value of decorticated seed (March 1993, Umuahia Township Market)	₦15.00/kg
7. Value of decorticated seed/tree/year	₦15 x 23 = N345.00
8. Value of d/ecorticated seed/ha/year	₦ 460,00 x 204
	₦70,380.00

SOURCES OF PLANTING MATERIAL

1. Forestry Commission, Enugu
2. Forestry Research Institute of Nigeria.
3. National Horticultural Research Institute.
4. Michael Okpara University, Umudike.

SUMMARY

1. Select well -drained and fairly fertile soil
2. Avoid waterlogged areas
3. Prepare planting sites before the onset of rains
4. Mark out planting sites 7m x 7m
5. Dig planting holes 60cm x 45cm
6. Fill planting holes with organic matter and top soil.
7. Avoid putting inorganic fertilizer into planting holes before or at planting
8. Plant at recommended time, May - June is ideal for the southern states, otherwise plant when the rainfall becomes regular
9. For early fruiting, use budded seedlings
10. Ringweed
11. Apply NPK fertilizer from 1 year after establishment
12. Protect plants against pests, diseases and fire
13. *Treculia* may be interplanted with food crops and vegetables
14. Process fruits 7-10 days after harvesting
15. Grow *Treculia* for more food and money

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