

**POTENTIALS OF *Treculia africana* DECNE – AN ENDANGERED SPECIES OF SOUTHERN NIGERIA**

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**ABSTRACT**

*Treculia africana* Decne is an important multipurpose indigenous tree species in Nigeria and Africa as a whole. The species is best known for the edible seeds and oil it produces. In addition, it has numerous environmental, socio-economic, traditional and industrial uses. However, the species is declining at an alarming rate and thus, needs priority conservation. This decline is due to a number of factors of which are high rate of deforestation, increased population pressure, non-improvement and non-cultivation of the species. Urgent conservation measures are required to save the species. The conservation strategies could include; mass propagation and plantation establishment of the species, development of early-maturing and dwarf varieties as well as introduction of 'Ukwa' trade fair.

**Keywords:** Forest Fruit Tree, *Treculia africana*, Endangered, Southern Nigeria

**INTRODUCTION**

*Treculia africana* is a multipurpose tree species commonly known as African breadfruit. It belongs to the family Moraceae and it grows in the forest zone, particularly the coastal swamp zone (Agbogidi and Onomerebor, 2008). It is widely grown in Southern Nigeria for its seeds and it is known by various tribal names in the country. Such names include "afon" (Yoruba), "barafuta" (Hausa), "ize" (Bini), "eyo" (Igala), "ediang" (Efik) and "ukwa" (Igbo) [Irvine (1981) Onweluzo and Odume (2008)]. The most popular of these tribal names is the Igbo tribal name which is "ukwa". The species is a large tree which grows up to 30m high and it flowers between October and February (Salami, 2002).

African breadfruit is a traditionally important edible fruit tree in Nigeria (Okafor, 1985) whose importance is due to the potential use of its seeds, leaves, timber, roots and bark. It is increasingly becoming commercially important in Southern Nigeria hence, Baiyeri and Mbah (2006) described it as an important natural resource which contributes significantly to the income and dietary intake of the poor. The seeds are used for cooking and are highly nutritious as pointed out by various authors including; Okafor and Okolo (1974), Okafor (1990) and Onyekwelu and Fayose (2007). The seeds have an excellent polyvalent dietetic value whose biological value exceeds even that of soybeans (WAC, 2004). The species provides fodder for animals and the wood is put into various uses including furniture making, pulp and paper production as well as fibre-board production. It also has various medicinal uses including its use as cure for malaria, cough and rheumatism (Irvine, 1981).

Despite the dietary and economic importance of African breadfruit, it has remained an under-utilized species till now and its potentials remain under-exploited. Coupled with this problem is the serious threat of erosion of its genetic resources as well as extinction threat. *Treculia africana* is currently included in the list of endangered species of Southern Nigeria (Meregini, 2005) and this is quite worrisome. As a matter of fact, the species is urgently in need of priority conservation measures.

This paper therefore, introduces, describes and highlights the potentials of *Treculia africana*. The history and contemporary uses of the species are reviewed. Also, issues and

concerns related to its population decline are highlighted while suggestions are made for the enhancement of its potentials for economic development in the country.

### **Description of *Treculia africana* Decne**

*T. africana* is a large tree growing up to 30m high (Fig. 1) with a girth of 4-6m. It has a dense spreading crown and fluted trunk (Fig. 2). The bark is grey, smooth and thick exuding copious cream latex which later turns rusty red when cut (Agbogidi and Onomerebor, 2008). The leaves are simple, alternate, very large, dark green, smooth above, tough and paler below with some hairs on the 10<sup>th</sup> – 18<sup>th</sup> pairs of clear veins with pointed tips and a short stalk (WAC, 2004). African breadfruit is a monoecious dicotyledonous plant with flowers crowded into compact heads. The flowers of both sexes are surrounded by specialized bracts between which stamen or stigmas project above the surface of the flower head (Ugwoke *et al*, 2003). These bracts sometimes terminate in a flat disc or they may develop into bristles. They are persistent and surrounding the developing ovaries and producing a compound fruit often of considerable size and usually found on the trunk or older branches. The fruit (Fig. 3) is round in shape, big, greenish yellow in colour and spongy in texture when ripe and contains numerous seeds (Fig. 4) which are embedded at various depths in the fleshy pulp (Enibe, 2007). The seeds are brown in colour with fibrous coating (Okafor, 1990).



**Fig. 1: *Treculia africana* tree**



**Fig. 2: Fluted nature of Treculia tree**





**Fig. 3: Fruits of *Treculia africana***



**Fig. 4:**  
**(a) Freshly Extracted *Treculia* Seeds**



**(b) Fully Processed (dehulled) *Treculia* Seeds**

### **Geographical distribution and ecology**

*T. africana* is found in Senegal, Southern Sudan, Angola, Nigeria, the Islands of Principe and Sao-Tome and throughout the tropics including West Africa and Central Africa sub-region (Okafor, 1985). It is a fruit tree of riverine forest in tropical Africa and it is usually found near streams or swampy areas in forests. It is shade tolerant and grows in a wide variety of soils and climatic conditions.

### **Main uses of *Treculia africana***

#### **Provision of Food**

The seeds provides an important food item which is very popular and consumed as main dish especially in South-Eastern Nigeria (Okafor, 1990; Baiyeri and Mbah, 2006). In these areas, the seeds are variously cooked as pottage or roasted and eaten with palm kernel as roadside snack. The seeds are highly nutritious and constitute a cheap source of vitamins, minerals, proteins, carbohydrates and fats (Okafor and Okolo, 1974). The result of the proximate analysis of the species by Fayose and Onyekwelu (2007) revealed that fresh seeds of the species has 38.3% carbohydrate 17.7% crude-protein, 3.8% moisture, 15.9% crude fibre, 4.0% ash and 15.9% ether extract (fat). It is recommended for diabetic patients because of its low carbohydrate content as pointed out by Irvine (1981). It can thus be used as substitute for rice, yam and other starchy foods (Enibe, 2007).

Apart from being consumed as main dish, the seeds are also processed into flour which has high potential usage for pastries (Keay, 1989). The seeds are also used as flavouring in alcoholic drinks and edible oil can be processed from the seeds [Irvine (1981), Ugwoke *et al* (2003)]. Ejiofor *et al* (1988) prepared a non-alcoholic beverage from seeds of the species which was found acceptable when taken without milk and sugar therefore, giving the beverage obtained from the species an obvious advantage over cocoa-derived beverage in view of the scarcity and expensiveness of milk and sugar in rural areas of developing countries.

#### **Wood Products**

The wood of the species is put into various uses. It is suitable for roofing, carving, furniture making, pulp and paper as well as fibre-board production as pointed out by Agbogidi and Onomerogor (2008) and WAC (2004). The wood is also suitable for firewood and charcoal production (Field Survey, 2008).

#### **Traditional Medicine**

Various parts and products of the species are used in traditional and modern medicine. In Nigeria for instance, the roots are used as a malaria tonic and worm expeller for children while the bark is used as treatment for cough, neck swelling and rheumatism (Irvine, 1981). It is also used as treatment for mouth-yaw, rashes and stomach disorders in the southern part of the country. Liquid extract of the boiled leaves is taken as cure for rashes in this part of the country. Also, the sap from the trunk is used for the treating of fire burns (Field Survey, 2008). It was also gathered that the water extracted from the boiled seeds helps to cleanse or purify the stomach when taken.

In Ghana, a root decoction of the species is used as an anthelmintic and febrifuge, and the caustic sap (from the male species) is applied on carious teeth. Also, a bark decoction is used as cure for cough and whooping cough while the ground bark mixed with oil and other plant parts is used as cure for swellings (WAC, 2004).

#### **Livestock Fodder**

The fruit-head pulp and bran of the species contains 9.4% and 5.7% protein respectively (WAC, 2004). These have been used in countries like Malawi and Tanzania to feed blue monkeys and farm-animals respectively. Blue monkeys are fond of the fruit and seeds of the species. Tanzanians use the leaves as fodder for farm-animals. Irvine (1981)

pointed out that the species provides fodder for both domesticated (e.g. goats) and un-domesticated animals (e.g. antelope) in different parts of Africa.

**Environmental Functions**

African breadfruit grows on a wide range of sites and is found at altitudes ranging between 0 to 1500m. The species make good use of marginal areas where other species may not be able to grow. The species therefore, helps to control erosion and also helps in soil conservation as the tree is a good source of mulch.

**Employment and income generation**

The collection and sales of seeds of *T. africana* provides seasonal and off-season income. Many rural women in South-eastern Nigeria are engaged in the collection and sales of the species and its trade is one hundred per cent women affair in these areas as pointed out by Ijeomah (2006).

Under favourable climatic conditions and in good soil, 120-200kg dried grains can be harvested from one tree of the species in a year as noted by WAC (2004). In the Niger-Delta region of Southern Nigeria, a cup of processed “ukwa’ seeds sells at an average of ₦80 during the off-season and sells at an average of ₦40 when in season. A medium-sized basin measure sells at an average of one thousand and six hundred (₦1,600) naira (i.e. USD 11) when in season and same goes for an average of three thousand (₦3,000) naira (i.e. USD 20) when not in season.

Economically, the species has been rated as a very high income earner (Table 1) alongside with some other forest species by women in some Southeastern communities as revealed by Ijeomah (2006).

**Table 1: Rating of some edible forest products by women based on their economic contributions in some southeastern communities**

| Forest Products                  | Level of Contribution |           |            |           |             |
|----------------------------------|-----------------------|-----------|------------|-----------|-------------|
|                                  | Very High             | High      | Moderate   | Low       | Very Low    |
| <i>Treculia africana</i>         | 150 (100.0)           | -         | -          | -         |             |
| <i>Pentaclethra africana</i>     | 150 (100.0)           | -         | -          | -         |             |
| <i>Irvingia gabonensis</i>       | -                     | 9 (6.0)   | 81 (54.0)  | 60 (40.0) |             |
| <i>Tetracarpidium conophorum</i> | -                     | -         | 51 (34.0)  | 88 (66.0) |             |
| <i>Bushment</i>                  | -                     | -         | -          | 138 (920) |             |
| <i>Chrysophyllum albida</i>      | 6 (4.0)               | 18 (12.0) | 126 (84.0) | -         |             |
| <i>Pterocarpus sayauxi</i>       | 72 (48.0)             | 48 (32.0) | 28 (18.6)  | 2 (1.4)   |             |
| <i>Archatina spp</i>             | -                     | -         | 42 (28.0)  | 87 (58.0) |             |
| <i>Gongronema latifolia</i>      | -                     | -         | -          | 45 (30.0) |             |
| <i>Tetrapleura tetrapleura</i>   | -                     | -         | -          | -         |             |
| <i>Xylopia aethiopicus</i>       | -                     | -         | 18 (12.0)  | 60 (40.0) |             |
| <i>Vernonia amygdalina</i>       | -                     | -         | -          | 48 (32.0) |             |
| <i>Dialium guineense</i>         | -                     | -         | -          | 24 (16.0) | 12.6 (84.0) |
| <i>Garcinia kola</i>             | -                     | 58 (38.7) | 24 (16.0)  | 68 (14.5) | -           |
| <i>Dacryodes edulis</i>          | 150 (100.0)           | -         | -          | -         |             |
| <i>Dennattia tripetala</i>       | 92 (61.4)             | 27 (18.0) | 11 (7.3)   | 20 (13.4) | -           |

Source: Ijeomah (2006)

N.B: Numbers in parenthesis are percentage values.

### **Other Uses**

Other uses of the species gathered from a field survey (2008) in South-eastern Nigeria includes: The use of the decayed trunk as medium for raising mushrooms and use of stands of the species as boundary landmark due to the hardiness or resilience of the species.

### **Decline in population of *Treculia Africana* Decne – An Ecological Concern**

The decline in populations of African breadfruit and other valuable indigenous fruit trees in Nigeria is disturbing and has currently, become an ecological concern. There are several reasons for this decline including the following:

#### **Deforestation**

Although the challenge of forest resources depletion is global as pointed out by Ijeomah (2006), the Nigerian case is even more worrisome. FAO (2005) reported that Nigeria has the world's highest deforestation rate of primary forests and a further report, FAO (2006) revealed that the country has lost a staggering 79% of its old-growth forests between 1990 and 2005. The main cause of this massive deforestation in the country have been highlighted and these include: the growing population and subsequent higher demand for agriculture, livestock production and fuelwood (Ekanade *et al*; 1995, 1996 and 1998). Other reasons include illiteracy and ignorance of the people who believe that forests are free gift of nature that cannot be exhausted, the non-enforcement of forest laws and corruption (Adekunle and Akinelmibola, 2008). These stated reasons are serious threats to forest conservation and utilization of different indigenous fruit trees such as *T. africana*. The higher the deforestation rate, the more endangered forest species become and the more the need for priority conservation of these species.

#### **Increased Population Pressure**

The decline in the population of African breadfruit is also as a result of increased population pressure in the country at large and in the areas of abundance (Southern Nigeria) of the species. The increased population is resulting in the conversion of more forests to agricultural lands as well as industrial estates in order to satisfy the basic needs (food, clothing and shelter) of the teeming population. Currently, erstwhile village fruit tree forests which served as sanctuaries for in situ and some degree of ex situ conservation of choice plants in several communities are now being shared out to community members for the purpose of agricultural production and even being sold or leased out to companies. The thinking of the village heads is that the establishment of such companies in their domain will provide jobs for their subjects as well as bestow development on their communities. This is however to the contrary often-times as rather than assisting to actualize the development dream, most of these companies end up exploring and over-exploiting the natural resources (oil and gas deposits, extensive forests, good agricultural land, abundant fish resources, etc) in these areas and degrade the land through unsustainable exploitation (resulting in grave consequences) which leave the people highly vulnerable to environmental shocks. The Niger Delta region of Southern Nigeria is currently having this experience. Rather than an improvement in the standard of living of the people in the region, there is abject poverty, serious tension and conflicts borne out of the inability of youths in the region to be gainfully employed and engaged in activities into which they can channel their energies.

#### **Lack of Species Improvement**

The decline of the species is further heightened by the non-improvement of the species which has birth a wrong belief particularly in Southeastern Nigeria. Southeasterners believe that the fruit of the species have some mystical powers which causes the death of persons the fruit falls on accidentally. It is viewed as a 'taboo' for the fruit to fall on a person. The resultant effect of this belief is the felling of African breadfruit trees found in home

gardens inspite of the increasing demand for its products. This belief definitely shows ignorance on the part of the people concerned as the height of the tree, the heaviness of the fruit and the harvesting nature (fruit fall) of the species bestows an “hazardous tendency” on the fruit. This indeed is a problem with the species but it could have been remedied with the improvement of the species. However, little or nothing has been done in developing dwarf varieties of the species.

### **Non-Cultivation of Species**

The non-cultivation of African breadfruit in the country and in its area of abundance (Southern Nigeria) particularly has also contributed to the population decline of the species. Currently, little or no effort is made to propagate the species as the case is with other indigenous species despite their importance. The few stands of the species found in their natural habitat (the forest) are being lost to deforestation, the few found in home-gardens are also being lost to infrastructural development and nothing is being done about propagating the species. The long gestation period of ten (10) or more years of the species has not helped matters either. There is really a great deal of reluctance in planting the species and this apathy appears to persist.

### **CONCLUSION AND RECOMMENDATIONS**

*T. africana* is an important forest tree species from both economical and ecological perspectives. The collection of its products has great potentials of enhancing rural livelihoods and national food security, therefore there is an urgent need to concentrate efforts on developing appropriate conservation measures for this highly valuable species. Measures that promote natural regeneration should be adopted and techniques for successful natural regeneration developed. Also, silvicultural studies on alternative methods of propagation, seed collection, nursery practices, choice of appropriate planting sites and post planting care should be encouraged. It is important also to conduct marketing studies in order to enhance and sustain the sales of products of the species as well as the income being generated from it. A yearly trade fair, “ukwa fair” should be organized to further create awareness about the potentials of the species. The various products derivable from the tree shall be displayed at the fair with the intent of endearing the hearts of the people to cultivating the species.

Lastly, there is an urgent need to develop early maturing, dwarf varieties of the species. The development of this improved variety will solve the problem of accidental death caused by the fruit-fall which has given rise to negative traditional beliefs about the species.

### **REFERENCES**

- Adekunle, V.A.J. and Akinlemibola, O. (2008). Effect of Deforestation on Climate Change. In: Climate Change and Sustainable Renewable Natural Resources Management (ed) Popoola L. Proceeding of 32<sup>nd</sup> Annual Conference of the Forestry Association of Nigeria, held in Umuahia, Abia-State, Nigeria. 20<sup>th</sup> – 24<sup>th</sup> Oct; 2008, pp.170-182.
- Agbogidi, O.M. and Onomerebor, V.A. (2008). Morphological Changes in the Seedlings of *Treculia africana* Grown in Crude Oil Impacted Soils. In: Climate Change and Sustainable Renewable Natural Resources Management (ed) Popoola L. Proceeding of 32<sup>nd</sup> Annual Conference of the Forestry Association of Nigeria, held in Umuahia, Abia-State, Nigeria. 20<sup>th</sup> – 24<sup>th</sup> Oct; 2008, pp.170-182.
- Baiyeri, K.P. and Mbah, B.N. (2006). Effect of Soiless and Soil-based Nursery Media on Seedling Emergency, Growth and Response to Water Stress of African Breadfruit (*Treculia africana* Decne). African Journal of Biotechnology 5(15): 1400-1405.
- Ejiofor, M.A.N. (1988). Diversifying Utilities of African Bread-fruit as Food and Feed Inter. Tree Crop J. 5:125-135.



- Ekanade, O. and Salami, A.T. (1995). Innovation Diffusion in Farm Management: A Case Study of the Impact of Oyo State Agricultural Development Project on peasant Farming in Nigeria. *Ife Social Sciences Review*, 12 (1&2):1-7.
- Ekanade, O., Salami, A.T. and Aborode, M. (1996). Floristic Changes in the Tropical Rainforest of Southwestern Nigeria. *Malaysian Journal of Tropical Geography*. 27(2):7-13.
- Ekanade, O., Salami, A.T. and Odekunle, T. (1998) Adoption of Modern Farming Techniques in Rural Southwestern Nigeria. *Journal of Science Research*, Vol. 4(1):63-67.
- Enibe, D.O. (2007). *Treculia africana* Consumer Acceptability and Utilization for Food Security and Industrial Development. In: Olufajo, O.O., Omokore, D.F., Akpa, G.N. and Sanni, S.A. (eds.). Proceedings of the 41<sup>st</sup> Annual Conference of the Agricultural Society of Nigeria (ASN) held at ABU, Zaria between 22<sup>nd</sup> and 26<sup>th</sup> of October, pp.455-458.
- FAO (2005) Forests (Facts and Figures) [http://www.fao.org/forestry/site/28679/en/Assessed on 17/10/2010](http://www.fao.org/forestry/site/28679/en/Assessed_on_17/10/2010).
- FAO (2006). Wood Energy. [http://www.fao.org/forestry/site/energy/en/Assessed on 17/10/2010](http://www.fao.org/forestry/site/energy/en/Assessed_on_17/10/2010).
- Ijeomah, H.M. (2006). Forest Resources Depletion and the Role of Rural Women in Selected Communities of Ideato South Local Government Area, Imo State. *PAT*; 2(2):104-117.
- Irvine, J.I. (1981). Comparative Study of the Chemical Composition and Mineral Element Content of *Treculia africana* Seeds and Seed Oils. *Journal of Food Engineering*, 40:241-244.
- Keay, R.W.J. (1989). *Trees of Nigeria: A Revised Version of Nigeria Trees*. Vols. 1 and 2. Stanfield DP, Clarendon Press, Oxford.
- Meregini, A.O.A. (2005). Some Endangered Plants Producing Edible Fruits and Seeds in Southern Nigeria. *Fruits*. Vol. 60, p.211-220.
- Okafor, J.C. and Okolo, H.C. (1974). Potentials and Some Indigenous Fruit Trees of Nigeria. Paper Presented to the 5<sup>th</sup> Annual Conference of the Forestry Association of Nigeria, Jos.
- Okafor, J.C. (1980). Edible Indigenous Woody Plants in the Rural Economy of the Nigerian Forest Zone. *Forest Ecology and Management*, 3:45-55.
- Okafor, J.C. (1985). Selection and Improvement of Indigenous Tropical Fruit Trees: Problems and Prospects. *Journ. For. Res.* Vol. 1, No. 2: 87-95.
- Okafor, J.C. (1990). Indigenous Trees of the Nigerian Rainforest. A Paper Presented in a Symposium on the Potentials for Domestication and Rebuilding of Forest Resources. Yaounde, Cameroon, pp.34-38.
- Onweluzo, L.J.C. and Odume, L. (2008). Method of Extraction and Demucilagination of *Treculia africana*: Effect on Composition. <http://www.bioline.org.br/request?nf07008>. Assessed on 9/1/2008.
- Onyekwelu, J.C. and Fayose, O.J. (2007). Effect of Storage Methods on the Germination and Proximate Composition of *Treculia africana* Seeds. Paper Presented at the Conference on International Agricultural Research for Development. Tropentas, Germany.
- Salami, K.D. (2002). Effects of Organic and Inorganic Fertilizer on Early Growth and Development of *Treculia africana*. *African Journal of Agricultural Sciences* 15:46-51.
- Ugwoke, F.N., Agbo, A.E., Ali, N.C., Attah, C.P. and Ekwueme, J.I. (2003). A Note on African Breadfruit (*Treculia africana* Decne). Unpublished Report Submitted in Partial Fulfillment of CSC 341, Dept. of Crop Science, University of Nigeria, Nsukka, Nigeria, p.18.
- World Agroforestry Centre (WAC, 2004). *Treculia africana*. In: Agroforestry Database <http://www.worldagroforestry.org/sea/products/afdbases/af/asp/speciesInfo.asp?SpID=1651>-Assessed on 2/12/2010.