

Analysis of Factors Constraining an Increase in Breadfruit Planting in Rural Communities of Southeast Nigeria

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ABSTRACT

Breadfruit (*Treculia africana*) is a member of the taxonomic family *Moraceae*, genus *Treculia* and a multipurpose tree crop of Southeast Nigeria. It is an underutilized nutritive and medicinal crop with important socio-economic and cultural significance in Nigeria and West Africa more generally. Its fruit head contains multivitamin and mineral leguminous seeds with unique oil, protein and carbohydrate composition. Breadfruit is therefore a component in sustainable food and nutrient securities, rural livelihoods enhancement, agroforestry development and innovative agricultural business. This study of the factors constraining increased planting of breadfruit in rural communities of Southeast Nigeria seeks to advance our knowledge of the value of underutilized plant species, of the generation and spread of innovative ideas and practices, and of how best to tackle food security challenges. Data were collected via a survey questionnaire, four focus group discussions and four in-depth interviews. A total of 260 farmers were randomly selected from 13 communities in two states of Southeast Nigeria for the study. Data collected were analysed using descriptive statistics and Z statistics. The study found that breadfruit is grown for reasons which include income generation (96%) and household food security (93%) and that its utilization is associated with the socio-cultural activities of the rural dwellers such as catering or entertainment in ceremonies (54%). The study also found that planting more breadfruit trees in farm fields is constrained by fear of increased risk of bush

fires (59%), drudgeries relating to breadfruit depulping (45%) and cultural norms that allow the free collection of breadfruit in farm fields (31%). Breadfruit's nutritional constitution, its potentials in new product development, its use by millions of people for food security and cultural activities in the study area, all justify greater attention being given to understanding constraints to its production and to means of facilitating planting and production in Nigeria and countries with similar climatic and edaphic conditions.

Keywords: Breadfruit, planting, food security, entertainment, potentials, innovation.

1. Introduction

The global challenges of food insecurity, rural poverty and climate change effects are concerning. It is estimated that about 842 million people are in the world experiencing acute hunger or food insecure (FAO, 2013). The undernourishment of people is more severe in developing countries with its highest prevalence in sub-Saharan Africa (FAO, 2013; Abu, 2012). In Nigeria for example, 65% of the households had difficulties meeting their food requirements mainly because of low income, abject poverty and high prices of nutritious food crops (Chukwuone and Okeke, 2012; Okeke et al, 2008). Some nutritious crops which are rich in protein are neglected in cultivation thereby culminating to their low output (Chukwuone and Okeke, 2012) and protein deficient diets of people (Idrisa, Ogunbameru, and Amaza, 2010). For addressing the challenges, identification and promotion of widespread planting and consumption of those crops is expedient. This is because some of the crop species have great potentials for integrated contribution to solving the aforesaid multiple challenges. One of such crop species is breadfruit (*Treculia african*). In support and in consideration of the enormous potentials of this crop Nzekwe and Amujiri (2013:16) declared "Of all the food crops of economic and nutritional importance needed to be conserved, African breadfruit, *Treculia Africana*, quickly strikes the mind".

Breadfruit is a member of the taxonomic family *Moraceae*, genus *Treculia* (Okafor, 1981; Baiyeri and Mbah, 2006 a; Enibe, 2001) and a multipurpose tree crop of Southeast Nigeria. It can be found as forest trees in some tropical rain forests of west and central Africa (Okafor, 1981; Nzekwe and Amujiri, 2011). It is a neglected and underutilized nutritive and medicinal crop with important socio-economic and cultural significance in some rural communities of Southeast Nigeria. Its fruit head contains multivitamin and mineral leguminous seeds with unique oil, protein and carbohydrate composition. According to Omobuwajo et al, (1999b) breadfruit seed contains 12% oil, 18% protein and 50% carbohydrate.

Studies had been conducted on various aspects of breadfruit. For example, Okafor (1981) distinguished three varieties from the sub species. Breadfruit nutritional values have been determined (Lawal and Baser, 1986). Breadfruit acceptability studies show that the crop is highly accepted and that consumption of its porridge is preferred to rice, yam or other meals of its substitutes in the study area (Enibe, 2007 a, b,). Studies on breadfruit seed germination methods had been done with recommendations on its most appropriate germination system (Baiyeri and Mbah, 2006 a, b; Nzekwe and Amujiri, 2011). Prototype technologies had been designed and tested on the fruits' depulping (Enibe, 2001) and on its seed dehulling (Omobuwajo et al, 1999 a, b). There are evidence that breadfruit yields high income and plays useful roles in the livelihoods of rural dwellers (Chukwuone and Okeke 2012; Nzekwe and Amujiri, 2011; Nzekwe, Ojeife, and Nworie, 2010a; Nuga and Ofodile, 2010; Baiyeri and Mbah, 2006a; Enibe, 2007b). Studies reveal that breadfruit can be used for production of many by-products in different industries as pointed out in Table 1. Furthermore Breadfruit is in high demand in rural and urban populations, widely used in catering at official events and ceremonies (Enibe, 2007a; Okeke et al, 2008). Prices for Breadfruit have increased in recent years (Enibe, 2007b; Nzekwe, Ojeife, and Nworie, 2010a). However, there are indications and reports that breadfruit trees appear to be declining or endangered despite its economic

importance (Okeke et al, 2008; Nuga and Ofodile, 2010; Nzekwe, Ojeife, and Nworie, 2010a; Nzekwe and Amujiri, 2013). An important question is: Why does planting of Breadfruit trees not appear to be increasing? Currently there is lack of understanding or agreement on factors constraining planting of Breadfruit trees.

Table 1: Breadfruit potential by-products and uses

Breadfruit Potential by-products	Information Source: Literature Review, 2014
Food and feed Industries	
weaning foods	Nwabueze, 2006; Runsewe-Abiodun, 2001; Okeke et al, 2008; Enibe, 2001
Extruded foods and snacks	Nwabueze, 2006; Nwabueze and Maduebibisi, 2007; Nwabueze et al; 2008
Industrial and vegetable oil	Nwabueze and Okocha, 2008
Ruminant animal feeds	Okoli et al, 2003; Nuga and Ofodile, 2010
Breweries	
Beverage drinks	Enibe, 2007 b
Pharmaceutical Industries	
blood tonic production	Jimoh, 2011
Skin diseases and dental allergies treatment	Jiofack et al, 2003; Metuno et al, 2007
hearth diseases treatment	Ogbonnia et al, 2008; Aiyeloja and Bello, 2006
diabetes management	Ogbonnia et al, 2008; Lawal et al, 2010; Oimage et al, 2011
Material Industries	
Pulp, Paper and abrasives	Enibe, 2001; Okafor, 1991

Objectives of the study

The broad objective of this study is to analyse the factors constraining an increase in breadfruit planting in rural communities of Southeast Nigeria. The specific objectives are to:

1. Examine farmers' perception on breadfruit planting trends
2. Compare the numbers of planted and felled breadfruit trees in the last 10 years
3. Identify farmers' aims for growing breadfruit trees (BFTs)
4. Evaluate farmers' socio-cultural uses of breadfruit (BF)
5. Identify and examine the reasons why farmers do not plant more traditional breadfruit trees

2. Methodology

Participants

Southeast Nigeria is the study area. The zone is made up of five states named as follows: Anambra, Imo, Enugu, Abia and Ebonyi States. The area is mainly inhabited by the Igbo race Umeh (2012). The study uses qualitative and quantitative research methods. Data for the study were collected using 60 participant farmers in four focus group discussions (FGDs), 260 survey questionnaires and four in-depth interviews. FGD participants, survey questionnaire enumerators and respondents were recruited through the assistance of extension staff of the regions' Agricultural Development Programme (ADP).

Materials and procedure

Information collected through FGDs was stored with notes taken by the researcher. The FGDs were used to access farmers' perception on BF planting trends. This was done to verify literature information which indicated that the crop's planting appears to be declining. The FGDs were held in four deliberately selected communities, but spread in the two study states. The communities are: Obinofia Ndiuno, Edem Ani, Oko, and Abagana.

A questionnaire was developed, pre-tested and used for the study within the available time and financial resources. In this, thirteen communities spread in six of the ten agricultural zones of Enugu and Anambra states were used for the study. Through a simple random sampling, Udi, Obinofia Ndiuno, Nguru, Edem Ani, Umuozzi and Orba communities were respectively sampled from Udi, Nsukka, and Enugu Ezeke zones of Enugu State. Using the same process, Amawbia, Umunachi, Oko and Ukpor communities were respectively sampled from Awka and Aguata zones of Anambra State. In addition, Igbariam, Aguleri and Nando were purposively selected from Otuocha zone of Anambra State.

This was because Igbariam was one of the two communities where new breadfruit was seen to be adopted in an initial research scoping exercise while Nando and Aguleri are neighbours or

nearby communities. From each of those communities, 20 farmers were selected and interviewed using the survey questionnaire and trained enumerators. This gave a total of 260 respondents.

The survey questionnaire was used to collect information on the numbers of BFTs planted and felled in the last 10 years, farmers' objectives for growing BF, socio-cultural uses of BF, BF socio-cultural use systems and reasons why BF farmers do not plant more of the crop. For wider perspectives on the effect of system norms, bush fire, drudgeries involved in BF depulping and socio-cultural utilization of BF, in-depth interviews were conducted with selected farmers.

Data analysis

The qualitative data collected were transcribed, summarized and presented in Tables. Objectives 1, 3, 4 and 5 were analysed using basic descriptive statistics such as percentages and Likert scales while objective 2 was realised using Z statistics.

3. Results and Discussion

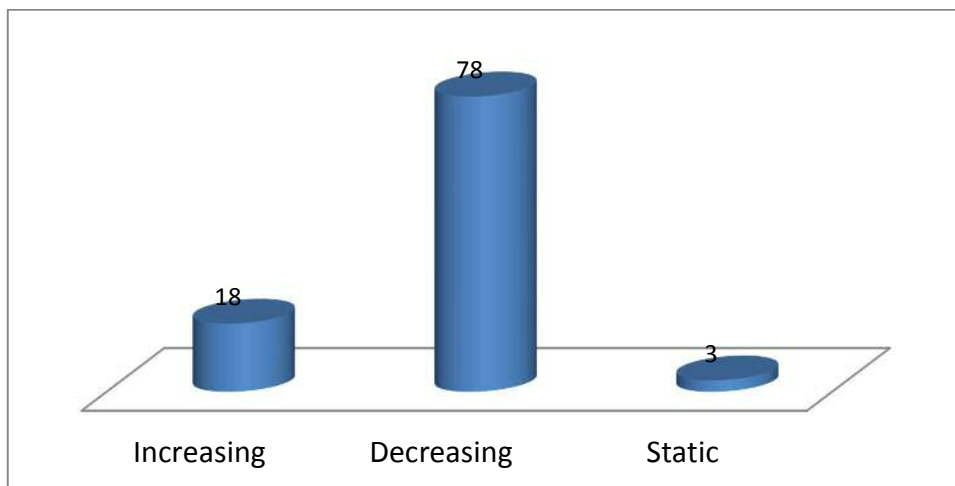
3.1. Farmers' perception on breadfruit planting trend

For verification of the literature information on BF declining, this section in FGDs accesses farmers' perceptions on breadfruit trends. Farmers were requested to indicate whether the number of breadfruit trees in the study area is increasing, decreasing or has remained static in the sense that number of its planted trees might have replaced the felled ones within the last ten years. The results are summarized and presented in figure 1. The results suggest that majority (78%) of participants in the FGDs were of the perception that the number of BFTs in the study area is declining. The implication is that farmers in the study area were aware that breadfruit is under cultivated. The result is in agreement with Nzekwe and Amujiri (2011) who reported that it is currently an endangered species. Also, the result is consistent with Nzekwe

and Amujiri (2013) who found the species' density to be less than 3 trees/ha. Farmers' objectives for growing BF are in the next section identified.

Figure 1: Percentage distribution of farmers' perceptions on breadfruit planting trend

(n = 60)



Source: FGDs, 2014

3.2 Number of breadfruit trees planted and felled within the last ten years.

Section 3.1 examined farmers' perception on BF trends and it reveals that farmers were aware that BFTs appears to be declining. This section examined the numbers of BFTs planted and felled in the last 10 years. Farmers in survey questionnaire were requested to indicate the numbers of breadfruit trees they planted and the numbers they felled within the last ten years. Table 2 shows that there is no significant increase in the numbers of BFTs in the study area within the last 10 years. The hypothesis that there is no significant difference between the numbers of BFTs planted and felled in the last 10 years was thus accepted as shown in Table 2. The implication of the result is that there appears to be neither a significant increase nor a decline of the crop in the last ten years.

Table 2 Comparison of planted and felled breadfruit trees within the last 10 years.

Planted and felled BFTs	Frequency (Farmers)	Number of BFTs	Mean	Variance	Z statistics	Z-Tab.	Decision on Hypothesis
Planted BFTs	246	290	1.18	5.3148	-0.5108	0.2912	Accepted
Felled BFTs	235	233	0.99	2.1538			

Source: Field Survey, 2014

3.3 Farmers' objectives for growing breadfruit Trees

The previous sections examined breadfruit planting trend the results reveal that there appears to be neither a significant increase nor a decline of the crop in the last ten years. This section seeks to investigate whether the farmers differ in their aims of growing BF. The respondents indicated their aims of growing breadfruit trees and ranked them on a five point Likert scale. The result is presented in Table 3 and shows that the farmers grow BF for many reasons, but ranked income generation (96%) and household food security (93%) highest. The implication is that household food security and income generation are the most important reasons why most farmers grow BF and that livelihood programmes which targets food security and enhanced income of the rural dwellers in the region need to consider the BF crop sector. The result is in agreement with established literature on BF which reported that BF is an important food item and income source to the rural dwellers (Enibe, 2001; Baiyeri and Mbah, 2006 a; Enibe, 2007a, b; Nzekwe, Ojeife, and Nworie, 2010a; Nzekwe and Amujiri, 2011; Chukwuone and Okeke, 2012; Nzekwe and Amujiri, 2013).

Table 3: Farmers' aims of growing breadfruit

Aims of growing BFTs	Total responses	5 point Likert Scale in percentage: Key: 1= Not important, 2=of some important, 3= important, 4 = very important, 5 extremely important.					Total % of important levels (2-5)
		1	2	3	4	5	
Household food security	212	7	11	8	18	57	93
Income generation	215	4	1	9	54	32	96
Source of fodder	205	53	24	18	5	0	47
Source of firewood	212	21	33	39	6	1	79
Source of traditional medicine	207	73	12	9	3	2	27
Sending away evil forces	200	95	4	1	0	0	5

Source: Field Survey, 2014

3.4. Farmers' systems of breadfruit socio-cultural utilization

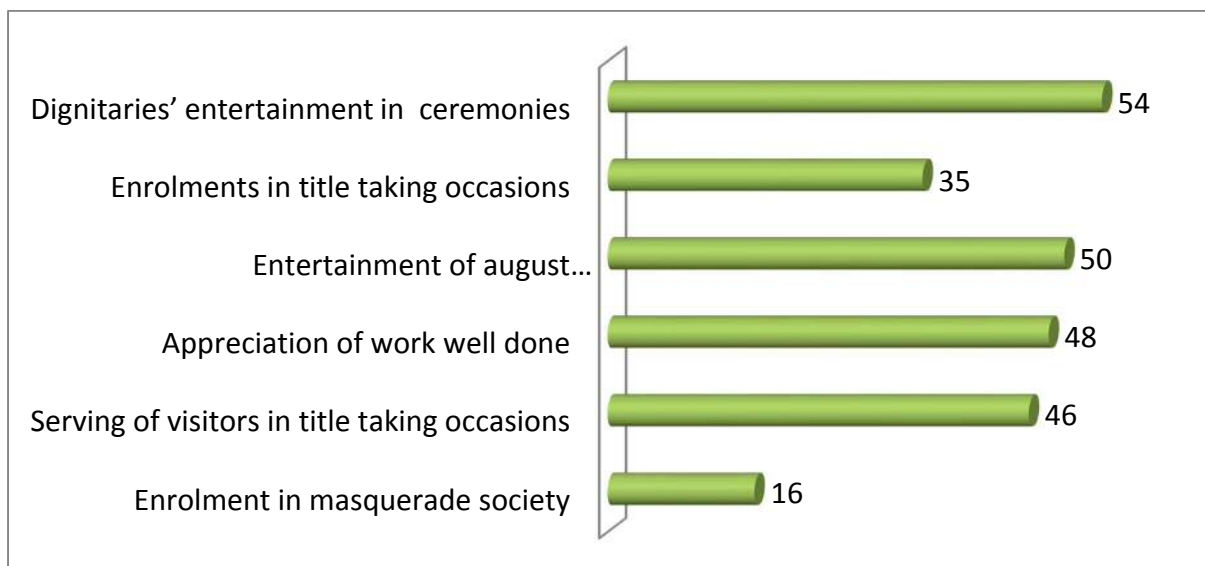
Literature sources in section 1 indicate that BF plays useful socio-cultural roles in the livelihoods of the rural dwellers. This section seeks to identify BF food socio-cultural uses and roles. The respondents indicated their breadfruit social and cultural use systems. The result is presented in figure 2.

The result shows that farmers use BF food socio-culturally in four major ways: Catering in ceremonies (54%), august visitors' entertainment and or special reception of visitors in rural homes (50%), showing of appreciation to someone for a work done excellently (48%) and serving of visitors in title taking occasions (46%).

The result confirms that BF food uses is associated with socio-culturally activities in some rural communities of the study area. The result is in agreement with earlier research (Enibe, 2007a) that reported that breadfruit meal is cherished and served to: loved ones, special visitors or entertainment of someone for a work well done. The result also agrees with Okeke et al (2008)

who reported that breadfruit is one of the important delicacies of the Igbo race served at important ceremonies. The result raises the question, why do farmers not grow more BFTs in HMGs and in FMFs for their increased income and enhanced livelihoods? The next section answers the question.

Figure 2: Percentage distribution of important breadfruit socio-cultural utilization systems identified by respondents in Southeast Nigeria (n = 231, 229, 234, 234, 232, and 230)



3.5. Reasons why farmers do not plant more traditional breadfruit trees

The previous sections reveal that BF is of socio-economic and cultural significance in the study area. Based on this, this section identifies the reasons why the farmers do not plant more BFTs. Farmers who had BFTs gave reasons why they could not plant more of the trees. The result is presented in Table 4. The result shows that the main reasons were: Lack of enough home garden (HMG) land (80%), fear of breadfruit head (BFH) killing someone by accident in HMG (61%), Largeness of traditional breadfruit trees (TDBFTs, 60%), fear of bush fire (59%) destruction of trees in farm fields, Drudgeries in BF depulping (45%) and system norms which

allow free collection of BFHs (31%) from BFTs in farmers' fields (FMFs). Concerning the effect of systems norm, an in-depth interviewee gave it as a reason why she felled an important breadfruit tree in one of her farm fields instead of leaving the tree to the advantage of non-owners (II: AB/20/03/13).

The results suggest that lack of enough HMG, fear of BF accidental killing of someone around the home, fear of bush fire destruction of trees in farm fields, drudgeries in BF depulping and the behavioural pattern of free collection of the fruits in some communities are the major constraints of increasing planting of BFTs. The result implies that BF tree planting in the study area can be maximized in HMGs and in FMFs with adoption of new breadfruit trees (NBFTs) and BF depulping technologies as well as by addressing the farm field factors of bush fire.

The result on lack of enough HMG is understandable because most home compounds are not always very large. Farmers plant BFTs away from buildings and reserve space for integration of other tree crops in their home gardens' traditional agroforestry practices as livelihood strategies and resource diversifications. Hence, limited numbers of the trees are planted in HMGs. The result is in line with Okeke et al (2008) who reported that BF trees grow to be huge and are threats to nearby buildings. They were of the view that dwarf varieties developed should be planted at home gardens. In view of the largeness of TBFTs, the result on fear of accidental killing of someone in HMGs is understandable. The result on bush fire is in line with Asadu et al (2004) who lamented that it is one of the problems of land use in Nigeria. In support, an in-depth interviewee, reported that fear of bush fire is one of the reasons why they find it difficult to plant many of the trees away from the home (II: OB/12/03/14).

Concerning depulping, the result is in agreement with Enibe (2001); Onweluzo and Odume, (2007) who reported that the traditional method of depulping and cleaning BF is slow, tedious and requires considerable quantities of water. An in-depth interviewee in a community where

BF is owned by men indicated that BF depulping wastes time and that many women of their town do not like to spend time in its depulping (II: AD/21/03/13). The result on breadfruit systems norm is consistent with the findings of Rogers (1983) and Veen (2010) who revealed that norms or established behavior patterns of the members of a social system can be a barrier to change or diffusion of innovation.

Table 4: Reasons why farmers do not plant more traditional breadfruit trees in Southeast Nigeria

Variable	Total responses	5 point Likert Scale in percentage Key: 1= Not important, 2=of some important, 3= important, 4 = very important, 5 extremely important.					Total percent of important levels
		1	2	3	4	5	
Reasons for not planting more breadfruit trees							
Lack of enough HMG land	236	20	6	10	19	46	80
Largeness of TBF	234	40	7	15	25	13	60
Possibility of BFH accidental killing of someone in HMG	231	39	12	17	18	14	61
Free collection of BFHs in FMFs	229	69	9	9	12	0	31
Fear of bush fire	231	41	23	17	10	9	59
Drudgeries in BF depulping	227	56	18	14	8	5	45
Planting Prevention by husband/wife	218	90	4	3	1	1	10

Source: Field Survey, 2014.

3.6 Conclusion

This study explored breadfruit planting trends, values and the constraints of farmers regarding increasing its cultivation. The results show that the crop is an under cultivated, neglected tree crop that bears nutritive seeds with important socio-economic and cultural significance in Southeast Nigeria. This study established that the major reasons contributing to its limited planting were : low planting in farm fields due to: fear of bush fire destruction, its fruits' depulping drudgeries, and systems norms that allow free collection of the fruit heads from the

trees in farm fields of some rural communities. Breadfruit's nutritional constitution, its potentials in new product development, its use by millions of people for food security and cultural activities in the study area, all justify greater attention being given to understanding constraints to its production and to means of facilitating planting and production in Nigeria and countries with similar climatic and edaphic conditions. In view of the findings, BF planting is recommended to farmers and investors in Nigeria and in other countries but associated with other initiatives to address constraints. For its increasing planting in farm fields of Southeast Nigeria the following are suggested: Adequate policy measures or interventions against incessant bush burning are needed. This may encourage farmers to increase cultivation of this and other crops in their farm fields; increasing access to improved dwarf varieties of breadfruit; Producing commercial breadfruit depulping technologies to reduce drudgeries and water use involved in its depulping.

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