SOCIOECONOMIC CONTRIBUTIONS OF NEGLECTED AND UNDERUTILIZED SPECIES TO LIVELIHOOD SECURITY IN RURAL SOUTHWEST NIGERIA: *Thaumatococcus danielli* as a Test Case

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Introduction

- There is no gainsaying the fact that Nigeria is blessed with vast human and material resources and as one of the most populous countries in Africa, the country has a population growth rate of 3.2 percent annually (NBS, 2007).

- Nigeria is also known to have diverse ecological regions hence the division of the country into five agro-ecological zones.

- Associated with the varied ecological zones is an array of plant and animal species. There are about 7,895 plant species from 338 families and 2,215 genera that have been identified in Nigeria (FGN, 2006; USAID, 2008).

- It is also known that about 70 percent of Nigerians reside in the rural areas with agriculture providing livelihood opportunities for over three-quarter of them (NBS, 2006; Oluwatayo, 2008).

Introduction cont'd

- In spite of the contributions of agriculture, some of the constraints to Nigerian agricultural development are age-long neglect, adverse climate change impacts, traditional mode of farming and low level of technology among others (Oluwatayo, 2009; Obayelu, 2010).

- Arising from these constraints are poor agricultural output and soaring poverty rates which has posed food security challenges on Nigeria such that almost 70% of Nigerians are food insecure today (Walkenhost, 2007; Obayelu, 2010; Oluwatayo, 2010).

- However, Neglected and Underutilized Species (NUS) can be an important source of livelihood/food security to a number of unemployed people living in rural areas through provision of cash income and one of such plant specie in Nigeria is *Thaumatococcus danielli.*

Introduction cont'd

- Thaumatococcus *danielli* belongs to the family Maranthacae and is found in hot humid, humid tropical rainforests and coastal area of West Africa. It is found in commercial quantities in the southern parts of Ghana, Cote d'voire and Nigeria

- *Thaumatococcus danielli* is thus a non-timber forest species (Borokini et al, 2010) that can contribute to the rural economy of Nigeria but whose potentials has not been fully exploited. It is a multi-purpose perennial herb that offers a wide assortment of uses for its leaves, fruits, stalks and roots (Arowosoge and Popoola, 2002).

- *Thaumatococcus danielli* also called 'ewe eran' is a tropical plant found in southwestern, Nigeria. When matured, the stalk is used for mat weaving, which used to be the major economic activity of communities where it is found.

- It grows freely in Ogotun Ekiti (Ekiti State), Ikeji Ile and Ipetu Ijesa (both in Osun State) and some parts of Oyo State but there is evidence from literature that it can be cultivated on the farm.

Problem statement cont'd

- Considering the rising rate of unemployment, increasing poverty level and the dwindling food security status of Nigerians, exploitation and use of *Thaumatococcus danielli* will not only stem this tide but can help in providing livelihood security because of its versatility.

- Locally, *Thaumatococcus danielli* fruits are used for sweetening palm wine and sour foods. The aril of this plant is said to contain thaumatin; a non-toxic substance 1600times sweeter than sucrose which is used to sweeten beverages, desserts, bubble gums among others (Yeboah *et al*., 2002; NAGRAB, 2008; Eniayeju, 2010).

- All parts of *Thaumatococcus danielli* are useful, a feature which qualifies it as an economic plant. The by-product of mat weaving is used for producing local sponge for bathing.

- The leaves are noted for wrapping of different kinds of food (Ojekale *et al*., 2007; Adebisi-Adelani *et al*., 2010; Eniayeju, 2010).

Problem statement cont'd

- In the past, cultivation and processing of this plant into mats was the predominant occupation of women in the study area and these were integrated into their culture as they are referred to as 'eleni' meaning mat weavers.

- However, due to civilization and demand from other agribusinesses, *Thaumatococcus danielli* production and consequently mat weaving became threatened.

- Over the years, there has being a consistent decline in the production of this NUS, consequently leading to reduction in the amount of products generated from it. Today, for instance, the producers are ageing with the youths becoming indifferent about the enterprise (Boyinde, 2012).

Problem statement cont'd

- Meanwhile, the cultivation of this plant and consequent processing into mats is capable of reducing poverty if developed.

- According to Eniayeju (2010) and Oluwatayo (2010), the bulk of agricultural production, processing and marketing is usually done by women.

- The processing of this plant is carried out by women in rural areas with men cultivating and harvesting *Thaumatococcus danielli* leaves as a means of sustaining and supplementing their family income.

- Therefore, this paper examines the livelihood generating potentials of *Thaumatococcus danielli* among households in rural Southwest Nigeria especially now that there is rising level of unemployment and over-utilization of conventional and well known species of plants in Nigeria.

Methodology

- Study Area: The study was conducted in Southwest Nigeria. Primary data were collected from rural households in the region using structured questionnaire.

- Information contained in the questionnaire included socioeconomic characteristics of these households, socio-cultural and environmental background, different activities and enterprises engaged in, other livelihood activities, uses of *Thaumatococcus danielli* and its importance in the study area.

- Three States were randomly selected in the region and one community/village from each state with known availability of the plant was covered and a total of 320 respondents were administered questionnaire in the survey.

Methodology cont'd

- Analytical techniques employed include descriptive statistics, poverty index and logit regression model.

- While descriptive statistics was used to analyse respondents' socioeconomic variables, the poverty index was employed to ascertain the poverty status of the respondents in the study area. However, a logit regression model was used to ascertain the determinants of harnessing *Thaumatococcus danielli* as a source of livelihood.

- In using the poverty index, the two-third mean per capita expenditure was employed as the benchmark to categorise the respondents into the poor and non-poor class.

This is expressed as:

Total consumption expenditure (TCE) = Total expenditure on food and non-food items

Mean TCE = TCE/Number of respondents under study

Poverty benchmark (PB) = 2/3 x Mean TCE = Poverty line

Thus, any respondent whose PE is equal to or greater than poverty line is regarded as being non-poor (1). However, those with poverty benchmark lower than the poverty line are regarded as being poor (0).

Methodology cont'd

- The logit model was employed to find the probability that a given respondent has harnessed *Thaumatococcus danielli*, knowing that the probability of harnessing it will either be 1 or 0. Thus:

$$P(x) = (y) = \frac{1}{1+\exp(-\beta_0 - \beta_1 x)}$$

Logit (y) = log (y/ (1-y),

Logit (P(x)) = log (P(x)/ 1-P(x)) = β0 +β1x

The logistic regression model describes the relationship between dichotomous response variable for instance Y, coded to take the value of 1 or 0 and *k* explanatory variables x1, x2,….xk. Y is a binary variable with Bernoulli distribution with parameter p= P(Y-1), that is, p is the probability of success for the explanatory variables.

Where: $\quad P \quad = \quad \dfrac{1}{1 + \exp(-\beta_0 - \sum_{j=1}^{k} \beta_{jxi}, j)}$

- Pi = log of odd ratios
- *Pi* = 1 if a respondent harnesses *Thaumatococcus danielli* as a livelihood source) and zero otherwise.

Methodology cont'd

- The dependent variable (y) which is:
- $P_i = 1/0 = P_i$ ln (if a respondent harnesses *Thaumatococcus danielli* as a livelihood source)
- $P_i = 0/1 = P_i$ ln (if a household does not harness *Thaumatococcus danielli* as a livelihood source)
- Explanatory variables included in the model are:
- X_1 = Age (years)
- X_2 = Gender (female =1, male =0)
- X_3 = Marital status (married=1, others=0)
- X_4 = Household size
- X_5 = Years of formal education
- X_6 = Poverty status (poor=1, non-poor=0)
- X_7 = Participation in off-farm activities (yes=1, no =0)
- X_8 = Access to market (yes=1, no=0)
- X_9 = Extension contact (number of visit)
- X_{10} = Distance to farm (km)
- b = Coefficient
- e = Error term

Results and Discussion

Table 1a: Distribution of respondents by socioeconomic characteristics

Variable	Frequency	Percentage (%)
Age		
> 30	26	8.1
31-40	49	15.3
41-50	83	25.9
51-60	127	39.8
< 61	35	10.9
Gender		
Male	123	38.4
Female	197	61.6
Marital status		
Single	21	6.5
Married	183	57.2
Divorced	69	21.6
Widowed	47	14.7

Results and Discussion cont'd

Table 1b: Distribution of respondents by socioeconomic characteristics

Variable	Frequency	Percentage (%)
Educational level		
No formal education	113	35.3
Primary	74	23.1
Secondary	52	16.3
Tertiary	81	25.3
Household size		
1-3	52	16.3
4-6	83	25.9
7-9	101	31.5
10-12	48	15.0
➢13	36	11.3
Primary occupation		
Farming	219	68.4
Trading	43	13.4
Artisan	36	11.3
Civil service	17	5.3
Others	05	1.6
Total	320	100

Results and Discussion cont'd

- About two-third (68.4 percent) of the respondents are engaged in production, processing and marketing of the NUS, hence the importance to other income generating activities.

- Income generated from *T. danielli* range between 57 and 73 percent (with an average of N104, 994.00). Therefore this NUS remains one of the most important sources of livelihood especially for the women.

- Total consumption expenditure (TCE) = Total expenditure on food and non-food items
        =N153,500.00

- Mean TCE = TCE/Number of respondents under study   = N153,500.00/320
  =   N479.6875

- Poverty benchmark (PB) = 2/3 x Mean TCE = Poverty line = 2/3 x479.6875 =
                N319.7917

- Thus, any respondent with consumption expenditure below N319.7917 is regarded as being poor but those with consumption expenditure equal to or above N319.7917 are regarded as being non-poor.

Results and Discussion cont'd

Table 2: Share of income from *Thaumatococcus danielli* to other income sources

Variable	Number of respondent	% share of respondent	Share of income (N) from Thaumatococcus danielli
Farming	219	68.4	104,994.00
Trading	43	13.4	20,569.00
Artisan	36	11.3	17,345.50
Civil service	17	5.3	8,135.50
Others	05	1.6	2,456.00
Total	320	100	153,500.00

Results and Discussion cont'd

- **Determinants of harnessing _Thaumatococcus danielli_ as livelihood security source**

- The result of the logistic model employed to ascertain the determinants of harnessing this NUS as a source of livelihood sources showed that the coefficients of age, gender, household size and access to market were positive and significant at $p<0.05$, $p<0.00$, $p<0.10$ and $p<0.10$ respectively.

- Thus in the case of age and access to market, the higher the age of respondents and the more the accessibility of those harnessing this NUS to market, the more their likelihood of harnessing. _Thaumatococcus danielli_ as a livelihood source.

- On the other hand, the coefficients of educational status, poverty status, extension contact and participation in off-farm activities were negative and significant at $p<0.01$, $p<0.05$, $p<0.00$ and $p<0.05$ respectively. Therefore, an increase in the value of these variables has the likelihood to reduce harnessing this NUS as a livelihood source.

Results and Discussions cont'd

Table 3: Result of logistic regression on the determinants of harnessing *Thaumatococcus danielli* as livelihood security source

Variable	Coefficient	Standard error	Marginal effect
Age	0.0980**	0.0431	0.0310
Gender	0.1572***	0.0403	0.1500
Marital status	-2.3996	1.8815	-0.1167
Household size	0.1493*	0.0821	1.0030
Education status	-0.9044***	0.3501	-1.3556
Poverty status	-0.0148**	0.0065	-0.1702
Participation in off-farm	-0.2107**	0.0924	-0.578
Access to market	0.2247*	0.1202	0.6001
Access to extension serv.	0.8905***	0.3301	0.0773
Distance to farm	1.0153	0.0132	0.5619
Constant	3.2011***	1.2206	

Log likelihood = -189.11,   Chi square= 53.84,   Number of observations = 320, Pseudo R^2 =0.213,

*** Coefficient significant at 1% , ** Coefficient significant at 5% , *Coefficient significant at 10%

Summary of findings and conclusion

- This study examined the contributions of *Thaumatococcus danielli* to livelihood security in rural Southwest Nigeria.

- Findings from the study showed that the bulk of the income realised by the respondents were generated from this particular NUS either from its production, processing or marketing of *Thaumatococcus danielli* products.

- Again, while poverty status, educational status and participation in off-farm activities were important correlates of harnessing this crop, a gender analysis of those harnessing it showed that there were more females than males.

Policy Recommendations

Going by the findings from this study, it is therefore recommended that:

- Efforts should be geared towards building the capacity of respondents through education so as to enhance their earning potentials and adoption of new skills that will be used in improving the production, processing and marketing of *Thaumatococcus danielli's* products.

- Also, awareness should be created on the untapped livelihood-enhancing opportunities (other NUS species) available in the study area so as to enhance the income of residents and reduce the rising poverty in the study area.

- Increase in extension contact to the farmers will not only enhance improvement in its productive but could also assist in showcasing the income-generating and poverty-reducing potential of *Thaumatococcus danielli* and other useful NUS in the study area for better profit and utilization.

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- **Thanks for your kind attention**