

POTENTIAL OF *THAUMATOCOCCUS DANIELLII* (BENN) FOR POVERTY REDUCTION IN OSUN STATE, NIGERIA

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ABSTRACT

This study examined the economic value of market margins of *Thaumatococcus danielli* and its potentials for poverty reduction in Osun State. Five Local Government Areas (LGAs): Odo-Otin, Boripe, Iwo, Irewole and Atakumosa, were randomly sampled from the 30 LGAs in the state. A total of 150 structured questionnaires were administered to randomly selected farmers/harvesters, marketers and users of the plant. Descriptive statistics and economic analysis were used to analyze the data. The results show that virtually all the farmers were collectors rather than cultivators, harvesting the wild *Thaumatococcus danielli* either from the forest or cocoa plantations. However 66% of the farmers were willing to plant *Thaumatococcus*. Analysis of gender distribution of harvesters and marketers show that 86% of the harvesters were males while all the marketers were females. The average rate of returns on investment of 55.88 ± 2.58% far exceeds the maximum commercial bank lending rate of 19.4%. In order to harness the potential contribution of *Thaumatococcus* to poverty reduction, farmers should be educated about its economic potentials and be provided with agronomic information and advice.

INTRODUCTION

Thaumatococcus danielli, also known as “miracle berry, miracle-fruit or sweet prayer plant,” because of its use-versatility, is a member of *Maranthaceae* family. It is a rhizomatous, perennial and monocotyledonous herb, propagating itself by rhizomes (Onwueme *et al.*, 1979). It has long petioles about 1 or 1.5 metres long, arising from the rhizomes depending on the age and the environment of the plant. At the end of these long petioles are large, broad and oval papery, tough, versatile leaves that are about 45 cm long and 30 cm broad. The leaves are ovate-elliptic rounded, truncate at the base, and shortly acuminate at the apex. The plant flowers most of the year but more prolific from July until late October, followed by fruit formation, maturing and ripening from January until mid-April (Onwueme *et al.*, Op-cit). The flower of *T. danielli* develops into an edible fruit (berry) which contains high sugar concentrate and hard endocarp. The fruit, which is usually green initially but turns red when ripe is mainly used as food sweetener because of the presence of a chemical called

Thaumatococcus. According to Yeboah *et al.* (2003), *Thaumatococcus* crystals are about 2,000-3,000 times sweeter than sucrose and are neither allergic; mutagenic nor teratogenic.

The sweet prayer plant grows throughout the hot, humid tropical rain forest and coastal zone of West Africa. Its natural habitat is the undergrowth of forest trees in the southern parts of Ghana, Cote d'Ivoire and Nigeria. It is also known to exist in the Princes Islands, Angola, the Central African Republic, Uganda and Indonesia (Yeboah *et al.* 2003). The leaf of *T. danielli* is used extensively in cooking and wrapping food for both domestic use and commercial enterprise. As a matter of fact the use of leaves of *Thaumatococcus* transcends the confines of the rural dwellers, as evidenced by its use for special packaging of rice by a prominent and well spread urban-based fast food restaurant. The leaves are also used for preserving kolanuts and as food supplement to some ruminants including goat. The fibrous nature of the leaves enhances their use in combination with some other materials for roof thatching in hamlet and as resorts, while the root features in traditional medicine (Arowosoge and Popoola; in press). The stalk is used for local roofing and construction of fish traps and can also be beaten into fibre which can then be used in weaving ornamental bags, mats and hats among other things. Research efforts are in progress to investigate the potentials of *T. danielli* for pulping (Ogunsanwo *et al.* 2004, Oluwadare and Sotannde; 2002) as well as how to increase the sugar extract of its fruit and package its concentrate for use as food and drug sweeteners. For instance, the Faculty of Pharmacy of Obafemi Awolowo University, Ile-Ife, has established plantations of *Thaumatococcus* with the sole interest in the sugar extract of its fruit for food and drug sweeteners. The local use of *Thaumatococcus* fruit for sweetening is not yet very popular in Nigeria, but Yeboah *et al.* (2003) report that large quantities of the fruit are consumed by the local people to sweeten over-fermented palm wine and sour foods in Ghana.

Currently, in Osun state, the leaves are the most prominent and economic component of *Thaumatococcus*. Like in many other parts of south western Nigeria, most of the market supplies of these leaves come from extraction from the forest floor; its natural habitat, with very few farmers cultivating it. Meanwhile integrating *T. daniellii* in the agroforestry systems could be a way to increase both the income generation and diversification of crop production by small scale farmers. Furthermore Oluwadare and Sotannde (in press) identified the potential of *Thaumatococcus* to include the suppression of weeds in tree crop plantations. This will eventually reduce the cost of labour for weeding and consequently lead to improved economic empowerment of the farmers. For production to be stimulated, the economic value of the market margins has to be assessed. The objectives of this work therefore are to determine the economic value of market margins of *Thaumatococcus danielli* and assess its viability for poverty reduction in the study area, so that feasible strategies for its commercial production and improvement in the market margins could be recommended.

METHODOLOGY

Study Area

Osun State was created on 27 August 1991 from the Old Oyo State by the Federal Military Government of Nigeria. At inception, there were twenty-two 22 Local Government Areas in the state; these have increased to thirty 30 with Osogbo as the capital. Osun State covers a total land area of 9,396km² and is bounded in the South by Ogun State, in the East by Ondo State, in the North by Kwara State and in the West by Oyo State. The ethnic group and language are Yoruba with some variations in dialects, accents and tonations.

The estimated population is 4,203,016 as projected from the 1991 Census figures, consisting of 1,079,424 males (49 percent) and 1,123,592 females (51 percent). The state lies between Latitude 6° and 9° North and Longitudes 2° and 6°E. The vegetation consists of rain forest in the south and derived savanna towards the north.

Data Collection and Analysis

The primary data were collected through the use of structured questionnaires and field observations, while secondary sources of information included maps, journals and books. A total of 150 respondents comprising 50 each of farmers/harvesters, marketers and users of the plant were randomly sampled for primary information. Five Local Government Areas (LGAs) namely: Atakumosa, Boripe, Irewole, Iwo and Odo-Otin were randomly selected for questionnaire administration. Thirty questionnaires comprising 10 each for farmers/harvesters, marketers and users of the plant were administered in each of the selected LGAs. Table 1 shows the summary of questionnaire administration by LGAs and category of respondents.

Table 1: Questionnaire Administration by LGAs and Category of Respondents

LGAs	LGA Headquarters	Category of Respondents			
		Farmers/ Harvesters	Marketers	Users	Total
Atakumosa	Osu	10	10	10	30
Boripe	Iragbiji	10	10	10	30
Irewole	Ikire	10	10	10	30
Iwo	Iwo	10	10	10	30
Odo-Otin	Okuku	10	10	10	30
Total		50	50	50	150

Sampled marketers and users of *Thaumatococcus* leaves were selected from one major market in the headquarters of each selected local government area. Since the headquarters of the selected LGAs are themselves largely farming communities, farmers/harvesters of the plants were also contacted through the sampled marketers in the markets and were eventually

interviewed. Data obtained were analyzed using descriptive statistics as well as economic rate of returns on investment to ascertain the profitability of the enterprise.

The rate of returns on investment (RORI) is given by:

$$\text{RORI} = \frac{\text{TR} - \text{TC}}{\text{TC}} \times \frac{100}{1}$$

Where TR = Total Revenue
TC = Total Cost.

RESULTS AND DISCUSSION

Cultivation of *Thaumatococcus danielli*

Thaumatococcus danielli could be propagated either by sowing seeds or by planting the rhizomes. However, the major natural regeneration method is by the rhizome since the seeds take between 1 to 1½ years to germinate naturally, whereas it may take as short as one month or less for the re-growth of the rhizomes under very conducive environment. Yeboa *et al.*, (2003) observed the re-growth of the rhizomes one month after field clearing in a cocoa farm in Ghana. Investigations from the present study revealed that none of the respondents has been planting *Thaumatococcus*; they had only been harvesting the ones that were found in or around their farms. However, 74% of the farmers agreed that *T. danielli* could be cultivated along side other crops without much interference, although 26% of the farmers argued that *Thaumatococcus* might prevent other crops from receiving adequate sunlight if planted too close. The farmers further argued that the plant was capable of affecting cocoa production at the base when present in cocoa plantations. The arguments of the farmers would need to be investigated since their claims contradict the findings of Yeboa *et al.*, (2003) who recorded successful integration of *Thaumatococcus* with cocoa in Ghana. Such investigation might have to look at the effects of *Thaumatococcus* on the early growth of cocoa as well as its effects on the fruiting of cocoa at the base at maturity. Despite the farmers' seeming fear on the possible adverse effects of *Thaumatococcus*, 66% of them would still love to have a plantation of *Thaumatococcus* if given appropriate support.

Gender Distribution of Harvesters and Marketers of *Thaumatococcus*

Gender analysis relates to the simple comparison of the number, or proportion of males and females within a unit of population in a project, event, village, office or community. It also deals with the more complex process of examining the relations between those counted, as well as defining who has the right and access to, or control of which resources. Gender analysis as an instrument in development studies enhances deeper understanding of the activities of interest and importance to each unit of the gender component of the society, and the opportunities and challenges that each of them faces in doing those activities. Table 2 below shows the gender distribution of the respondents.

Table 2: Gender Distribution of Respondents

Gender	Local Government Areas										Total	
	Odo-Otin		Boripe		Iwo		Irewole		Atakunmosa		Freq	%
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Farmer												
Male	8	16	6	12	10	20	9	18	10	20	43	86
Female	2	4	4	8	-	-	1	2	-	-	7	14
Marketer												
Male	-	-	-	-	-	-	-	-	-	-	-	-
Female	10	20	10	20	10	20	10	20	10	20	50	100
Consumer												
Male	-	-	-	-	-	-	-	-	-	-	-	-
Female	10	20	10	20	10	20	10	20	10	20	50	100

Majority (86%) of the farmers were male while only 14% were females. On the contrary, the distribution of the marketers were females. These are to be expected, since generally in the south-western part of the country, more males are involved in farming, while the females engage in selling farm produce, especially non-cash crops or those with little economic value. More important implication of the distribution is its inherent gender structure. Thus development intervention for *Thaumatococcus* will not have the problem of “gender balance” since both sexes play complimentary roles in both the production and marketing of the produce.

MARKET MARGIN

Market margin refers to the net sales less the cost of the goods and attendant services required to make the goods available in the market. It implicitly consists of cost and profit components, and has a positive correlation with market efficiency since increase in market margin leads to increase in market efficiency. Investigations in the study revealed that an average bundle (1kg) of *Thaumatococcus danielli* comes out of the farm gate at the rate of ₦40.00 in Iwo, Boripe and Atakunmosa LGAs and ₦35.00 at Odo-Otin and Irewole LGAs respectively. Other cost component which is the cost of transportation amounted to ₦20.00 each in Irewole and Odo-Otin LGAs, and ₦15.00 each in Boripe Iwo and Atakunmosa LGAs.

In order to assess the profitability of the enterprise and its potential for poverty reduction, an extrapolation of the rate of returns on investment (RORI) on 100kg of the produce (*Thaumatococcus* leaves) was carried out (Table 3).

Table 3: Marketing Cost and Margin of *Thaumatococcus danielli* in Osun State

LGAs	Farm Gate Price; (₦)/100kg	Average cost of Transportation; (₦)/100kg	Delivery price at market (₦)/100kg	Sales price (₦)/100kg	Market Margin (₦)/100kg	% Returns
Atakumosa	4000	1500	5500	13000	7500	57.69
Irewole	3500	2000	5500	12000	6500	54.17
Iwo	4000	1500	5500	11500	6000	52.17
Boripe	4000	1500	5500	13000	7500	57.69
Odo-Otin	3500	2000	5500	13000	7500	57.69
Mean	3800	1700	5500	12500	7000	55.88

Observations from Table 3 showed that the average returns from the sales of 100kg of leaves of *Thaumatococcus* in Osun state is ₦7000:00, while the rate of returns ranges between 52.17 and 57.69%, with an average of 55.88% and a standard deviation of 2.58. Compared with the maximum lending rate of 20.47% for commercial banks (CBN 2004), marketing of *Thaumatococcus* leaves could be profitable with a good potential for poverty reduction, since the rate of returns on investment for the enterprise (55.88%) is higher than the maximum lending rate. This implies that if a bank loan was taken to invest on the enterprise, the returns on the investment would off-set the loan and still leave considerable profit margin.

CONCLUSION

The results of this study show that production and marketing of *Thaumatococcus* has great potentials to reduce poverty in the study area. Its cultivation could make an important contribution to poverty reduction by enhancing economic empowerment, sustainable development and biodiversity conservation. However, this might be achieved without educating the farmers on the economic potentials of this plant species as well as providing useful agronomic information and advice on its cultivation. This is a challenge to the States Ministries of Agriculture as well as Agricultural Development Projects. These institutions should be in the best position to organize educative programmes for the farmers as well as liaise with public agricultural micro-financing institutions like the Nigeria Agricultural and Rural Development Bank for financing the cultivation and marketing of *Thaumatococcus*. This will no doubt encourage farmers to engage in extensive cultivation of the plant and consequently improve their economic status.

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