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FRUITS AND SEEDS PRODUCTION OF *Irvingia gabonensis* (O' Rorke) AND ITS ECONOMIC IMPORTANCE IN EDO CENTRAL, NIGERIA

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ABSTRACT
Irvingia gabonensis is one of the most important indigenous fruit trees cultivated and commercialized in Edo Central, Nigeria. In this study, the yields of fruits and seeds of I. gabonensis were evaluated in traditional agro forestry and compound farming systems. The results showed that the mean fruit yield of the species are 620 and 850 fruits/tree while the projected mean fruit productions/hectare are 76,880 and 105,400 fruits in the two systems respectively. Mean seed yield of 18.24kg and 25kg of dry cotyledon per tree was recorded with a projected cotyledon yields/hectare of 2,262 kg/ha and 3,100 kg/ha respectively. In the open market, 50g of dry cotyledons of the species sells for ₦ 170.00, while average farmers income from fruits production of the species per household is about ₦ 3,675.00 annually. The study has helped to raise awareness of the contributions of I. gabonensis to household economies, food security and wealth creation.

Key Words: Fruit, Production, Marketing, Economy.. Livelihood.

INTRODUCTION
Irvingia gabonensis (0' Rorke) belongs to the family *lrvingiaceae*. It is a tropical forest fruit tree in Nigeria and can attain a height of 25m and 2m in girth when fully mature. The fruit has sweet edible fibrous pulp which is rich in vitamin C. The species is commonly referred to as Dika nut or wild mango. It can be recognized by its dense dark evergreen foliage and characteristic stipules (Keay, 1989). The most important part of *I. gabonensis* to the rural people of Edo central and Nigeria in general is its nutritious seeds which have also been found useful in the reduction of cholesterol and body weight in obese patients (Ngondi et al. 2005). The seeds are primarily used for soup making in many parts of Nigeria and also in Cameroon (Ayuk, et al. 1999), where another variety (Irvingia wombulu) is also sourced and processed.(Nkwatoh, 2010) Generally, it has a large market value and fast becoming an export forest produce in Nigeria to Europe and the United State of America (Ladipo, 2003).

Despite the nutritional importance of *I. gabonensis*, there are no large scale plantations of the species for seed and fruit yield data collection. Existing stands are mainly found in traditional agro forestry system and compound farm or homestead. This creates the need for awareness in both yield potential and economic roles, so as to encourage more people to embark on large scale plantation development and probably set up small scale industries for seed export to many countries. This study will maximize the potentials of the species to become a much more widely grown and utilized crop throughout Nigeria.

The objective of the study therefore to determine the effects of farming system on the fruit and seed yields of *I, gabonensis* and the species role in the economy of rural people of Edo central, Nigeria.

Irvingia Seeds (Ogbono)

MATERIALS AND METHODS

Study Area

The study was conducted in two different farming system locations within Ekpoma Edo State. (Latitude 6^0 45^1 N and Longitude $7^0 03^1$E). These are the traditional agro forestry system and compound farms. Mean annual rainfall in the area is about 1,500mm. Similarly, mean temperature range is 27^0 to 35^0 C .The mean relative humidity is about 75%.

Data Collection and Analysis

Ten sample trees each of *I. gabonensis* were randomly selected in traditional agroforestry and compound farms system at Ekpoma in 2008 fruiting season. All the sample trees were fairly uniform in height and girth, and over 20 years in age.

Both primary and secondary data were collected in this study. Primary data were collected on mean fruit and seed yields per tree and per hectare between April and July, 2008. The mean numbers of fruits per tree was used to calculate a projected fruit production data in tones per hectare, using a spacing of 9m x 9m with 124 trees. Mean seed yield per tree was calculated after collecting all the fruits over time as they were dropping. These fruits were then depulped, dried and processed to cotyledons

Data on mean yields of the species per farming system were subjected to t-test analysis for comparison between the two farming systems using the t-test analysis formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{S_2 P\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Where, t = test

$\bar{x}_1$ = mean number of fruit or seed per tree per hectare in traditional agroforestry

$\overline{x_2}$ = mean number of fruit or seed per tree per hectare in compound farm

n_1 = sample size in traditional agroforestry (10)

n_2 =sample size in compound farm (10)

S_2P = pooled variance

The secondary data were collected using two sets of semi-structured questionnaires. The first sets of questionnaires were administered on twenty stand owners of the species using purposive sampling method to determine their production constraints. The second sets of questionnaires were fifty bulk and were administered on retail dealers of *Irvingia* products, using purposive sampling method to determine the uses, market profile and socio-economic importance of the species. Descriptive statistics involving means and percentage were used to analyze the secondary data.

RESULTS AND DISCUSSION

Fruit and seed production

Table 1 shows the mean fruit production of *Irvingia* trees in the two farming systems. The results showed that the mean fruit yields of *I. gabonensis* were 620 and 850 fruits per tree in the traditional agroforestry and compound farms respectively. There was significant difference between the two means at 5% level of significance using t-test . . Similarly, the projected mean fruit production of the species per hectare (ha) were 76,880 and 105,400 fruits for the traditional agro forestry and compound farms respectively. The t-test analysis for comparison of means showed significant difference between the two farming systems at 5% level of significance.

Table 1 Mean Fruit yield of *I. gabonensis* per Farming system

Farming System	Mean Number of Fruit per Tree	Mean Fruit Yield per Hectare
Traditional Agroforestry	620[a]	76,880[a]
Compound Farm	850[b]	105,400[b]

Means with same alphabets along the column are significantly different from each other at P>0.05

The annual mean seed yields of *I. gabonensis* per tree and per hectare are shown in Table 2. The result indicates a mean of 18.24kg and 25kg of dry cotyledon yield per tree for the traditional agroforestry system and compound farm respectively, which were significantly different from each other using the t-test analysis.. In the same vein the projected cotyledon yield per hectare were 2,262 kg/ha and 3,100 kg/ha for the traditional agroforestry and compound farms respectively. The t-test analysis for means comparison revealed that the yield from the traditional agro forestry system was significantly different from that of compound farm. The reasons for higher yield from compound farms include: less competition for space, light and nutrients, unlike the traditional agroforestry system with strong competition from cola species, cocoa species, *Dacryodes edulis, Chrysophyllum albidum, Dennettia tripetala, Musa* species, *Garcinia* species and so on.

Table 2 Mean Seed yield of *I.gabonensis* per Farming system

Farming System	Mean Cotyledon Yield per Tree (kg)	Mean Cotyledon Yield per Hectare (kg/ha)
Traditional Agroforestry	18.25	2,262
Compound Farm	25	3,100

Although productivity is higher in *I.gabonensis* present in compound farms compared to the traditional agroforestry system, farming activities that are compatible with the species and augment ecological stability should be encouraged in agroforestry development. Several scientists have reported on fruit and seed production in some tropical forest tree species (Aiyelaagbe *et al* 1996, 1998; Blumenfield *et al* 1983; Ejiofor and Okafor 1997; Okafor, 1990; Whiley *et al*, 1988; Whiley, 1990)

The species is a fast growing and early fruiting tropical forest tree. This is an advantage over some species such as *Garcinia kola* which is a slow growing and late maturing forest fruit tree. Other factors that should encourage farmers and would be investors to establish large scale plantations of the species include: relative ease of raising the seedlings unlike *Garcinia kola,* short maturing period of 4-5 years and higher productivity of the species as shown in Tables 1 and 2.

Production Constraints, Uses, Market Profile and Socio-economic characteristic

All the production constraints identified in this study must be circumvented in order to realize the projected yields of *I. gabonensis.* The needs of these small scale holders cannot be ignored. In other word, for proper expansion of *I. gabonensis* business in Edo central, small holders are the key stones for any result oriented strategic development. Unavailability of land, lack of improved planting materials, inadequate supply of hired labour and absence of credit facilities are major limiting factors of production for *I. gabonensis* (Table 3)

Table 3: Production Constraint of *I. gabonensis* in Edo Central

Item	Percentage of respondents (%)
Unavailability of land	100
Lack of improved planting material	100
Inadequate supply of hired labour	100
Inaccessibility of credit facilities	100
Unavailability of fertilizers	30
Unavailability of agro chemicals	44
Transportation problems	21
Marketing problems	10
Marketing problems	68

In Nigeria, *I. gabonensis* has long been cultivated for its edible seeds used for soup making as food. Also the edible pulp of the fruits is very nutritious and consumed throughout West Africa. Women are involved in the marketing of the species edible pulp in many parts of Nigeria where the species are endemic. Population explosion and increase in commercial value of the species seeds has made the cultivation of the tree more important than ever before to the people of Edo Central. The species is one of the

most useful forest fruit trees in the study area. It forms of integral part in the livelihood of the people.

In the last 15 years, the trend in marketing of *I. gabonensis* in the study area has expanded through bulk buyers and retailers from different parts of Nigeria. The survey of people involved in the species market profile established the fact that many people are involved from farm gate to urban centres. A substantial amount of revenue is being realized from farm gate to village as well as urban settlements. Fresh or partially fermented fruits of *I. gabonensis* are sold to bulk buyers. The bulk buyers depulp, sundry and process the dry fruits which are then sold as dry cotyledons to retailers. At the farm gate level one fruit if mature *I. gabonensis* sells for ₦5.00. In the open market, 50g of dry cotyledons of the species sells for ₦170.00.

The species contribution to the rural economy of Edo central is based primarily in the income it generates from the sale of fruits and seeds. The species provide material for household and construction purposes. In addition, the presence of the species in compound farms and others agro forestry systems provide ecological services such as improvement in air quality, wind break and play significant role in soil protection and formation. The socio-economic importance of several fruit trees in Nigeria has been reported by some investigators (Aiyelaaybe *et al* 1996; Falconer, 1990; Isawumi, 1993; Ndoye, 1995; Ndoye, *et al* 1998; Ojo, 1999; Okafor 1998; Townson 1995)

The income accruing to households from the business of *I. gabonensis* may continue to increase due to increasing demand. The average farmers' income from the production of the species seeds per household is about ₦3, 675.00. With this economic returns, the people of Edo central can expect nothing less than an improved standard of living, if medium to large scale cultivation of the species is embarked upon,

CONCLUSION

This work has provided some information on yields of *I. gabonensis* fruit and seeds per tree and per hectare. In addition, the study has helped to raise awareness of the contributions of the species to households' economies, wealth creation and food security. The species business has enjoyed increasing local, national and international importance for the past decades. However, the species has not been fully developed to its maximum market potentials like oil palm products. There is need to adopt measures that can fully capture the species local and international potentials. To achieve this, the Federal Government of Nigeria should establish *lrvingia* Research Institute for research and development of the species, *Irvingia* farmers Co-operative society should also be encouraged to improve produce marketing. There should be provision of improved farm inputs such as grafted seedlings, fertilizers and agrochemicals and the incoperation of the species into modern agroforestry development.

REFERENCES

Aiyelaagbe, I.O., Labode Popoola, Adeola, A.O. Obusesan, K.O. and ladipo, D.O. (1996) *Garcinia kola:*its prevalence, farmer valuation and strategies for its conservation in the rainforest of southeastern Nigerian. Paper

Ayuk, E.T., Duguma, B., Franzel, S., Kengue, J., Mollet, M., Tiki-Manga, T. and Zenkeng, P. (1999) Uses, management and economic potential of Irvingia

gabonensis in the humid lowlands of Cameroon. *Forest Ecology and Management*, 113, 1-9.

Ejiofor, M.A.N. and Okaofor, J.C. (1997). Prospects for commercial exploitation of Nigeria. Indigenous trees, vegetables, fruits and seeds through food and industrial products formulation. *International Tree Crops Journal* 9 (2): 119-129.

Falconer, J. (1990). The major significance of 'minor' forest products: The local use and value of forests in the West African humid forest zone . Forest, Trees and People. FAO Community Forestry Note 6. FAO, Rome. 232p.

Isawumi, A.M. (1993) The common edible fruits of Nigeria, part II. The Nigerian Field 58: 1-2.

Keay, R.W. (1989) Trees of Nigeria.Clarendon Press, Oxford. 476p.

Ladipo, D. (2003) Harvesting of *Irvingia gabonensis* and *Irvingia wombulu* in Nigerian forests; potentials for the development of sustainable systems. Centre for Environment, Renewable Natural Resources Management, Research and Development (CENRAD) Ibadan, Nigeria.*Seminar Proceedings on Harvesting of non-wood forest products.* Food and Agriculture Organization of the United Nations, Rome. 10pp

Ndoye O. (1995) The markets for non-timber forest products (NTFP's) in the humid forest zone of Cameroon and its borders: structure, conduct, performance and policy implication.CIFOR.

Ndoye, O., Ruiz-Perez, M. and Eyebe, A. (1998) NTFP's markets and potential forest resources degradation in Central Africa: the role of research for a balance between welfare improvement and forest conservation. Paper presented at the International Export Workshop on Non-wood Forest Products (NWFPs) for Central Africa, Limbe Botanic Garden, 10-15 May 1998.

Ngondi, J.L., Oben, J.E. and Minka, S.R (2005) The effect of *Irvingia gabonensis* seeds on body weight and blood lipids of obese subjects in Cameroon. *Lipids in Health and Disease.* 4 (12), 10.1186/1476-511X-4-12.

Nkwatoh, A.F., Labode, P., Iyassa, S.M. and Nkwatoh, F.W. (2010) Evaluation of Irvingia (I. gabonensis and I. wombulu .Bail) Trade; a major Non-Timber Forest Product in the Ejagham Forest Reserve of South West Cameroon. 3(1), 70-77

Okafor, J.C. (1998). Mass propagation of species for immediate utilization. Paper presented at the meeting of underutilized crops of Nigeria. 4-8 May NACGRAB Moor Plantation, Ibadan, Nigeria.

Okafor, J.C. (1990). Development and selection of commercially viable cultivars from forest species for fruit. Proceedings of the Twelfth Plenary Meeting of aetfat Symposium, Hamburg. 4-10 September 1990.81-97.

Ojo, G.O.A (1999) Survey of non-timber forest products (NTFPs) in the Omo Forest Reserve, including their use and values. Consultant Report, FORMECU. Federal Department of Forestry, Abuja, Nigeria. 48p.

Townson, I.M. (1995) Incomes from non-timber forest products: patterns of enterprise activity in the forest zone of southern Ghana: summary report. Oxford Forestry Institute, United Kingdom. 40p.

Whiley, A.W.(1990) $C0_2$ assimilate of developing fruiting shoots of cv. Hass Avocado (*Persea americana* Mill.) .S.A. Avocado Grower's Assn. Yrbk. 13:28-30.

Whiley, A.W., .K.R. Chapman, and J.B. Saranah. (1988). Water loss by floral structures of avocado (*Persea americana* Mill.) during flowering. *Austral. J. Agr. Res.* 39:457-467.