
The Status and Ecological Impacts of *Carissa Edulis* in Oju Local Government Area of Benue State, Nigeria

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Abstract– *The classification of Carissa edulis as endangered plant species on the red list is not a good one for biodiversity and ecological sustainability. The abundance and ecological sustainability of Carissa edulis is highly necessary because it is not just of natural benefits but bountiful biological use and diverse ecological roles. The unique biological roles of C. edulis observed over the years triggered this study on the ascertainment of the abundance status of Carissa edulis among the Igede ethnic group in Oju Local Government Area of Benue State, Nigeria. The species data were collected from the indigenous people in April 2021 at the 2 major local markets; Onyike (Ihiejwo) and Obusa Markets in Oju LGA of the state. Cross sectional dataset were gathered by means of semi-structured questionnaires which were instantly administered arbitrarily to a large pool of knowledgeable subjects using the mother tongue. Pre-coded feedback of certainly or certainly not, open ended interview with each participant was carried out with allowance for possible additional information. Field information was obtained from 9 respondents from each of the 11 clans; 41 males and 58 females. The major demands captured in the questionnaire are; identification of the plant C. edulis called Utekwune in Igede dialect, its planting status, existence and abundance of the plant in the area before the study, existence and abundance of the plant in the area at the time of study, description of abundance with reference to time frame if ever in existence and diverse use of the plant. Data obtained were analyzed using descriptive statistics with the help of Microsoft Word 2010. Six clans reported rarity while five reported vary rare cases. Deliberate cultivation practice should be designed and implemented so as to increase its abundance out of the red List.*

Keywords; Abundance, *Carissa edulis*, Igede, rarity, red list, Oju Local Government Area

INTRODUCTION

Carissa edulis is a tree species in savannah woodland usually seen in Uganda on ant-hills and it serves as an application that relieves cough, rabies, headache, chest complains, gonorrhoea, rheumatism, syphilis, oedema, tooth-ache, worm infestation, fever, sickle cell anaemia and ulcer (Hanan and Wafaa, 2017). Traditionalists do use root brews as a remedy for aches and the treatment of malaria. *C.edulis* by-products treats dysentery mends indigestion, chest pain and lowers abnormal discomforts in expectant mothers. Root stocks of *C. edulis* consist of carissin which can be useful towards handling cancer. It has been efficacious in handling *Herpes simplex virus* (Thompson and Refilwe 2012). Orwa *et al.* (2009) recounted that roots of *C. edulis* involve an active constituent called cariss in which has been proved to be beneficial in the management of cancer. The twigs have cardioglycosides and quebrachytol and are capable of expelling tapeworm. Oldfeild *et al.* (1998) reported that the trees were massively brought down for the production of aromatic oils and fuel wood for copra dryers. The burning out of *C. edulis*'s fragrant wood has the capacity to repel mosquitoes thereby inducing peaceful sleep (Pagliarulo *et al.*, 2004).

Carissa edulis is a large shrub of Apocynaceae family (World Checklist, 2017). According to The Global Biodiversity Information Facility (GBIF 2022), *C. edulis* has an identification number 219679 in African plant data base, wf000107250 in the World Flora Online and GBIF Taxon identification number 7342789. Further detail of taxonomy is in Table 1. According to the International Union for Conservation of Nature and Natural Resources (IUCN, 2007) *Carissa edulis* are classified as endangered plant species on the red List. This plant was Threatened and pushed to extreme scarcity by clear-cutting for the purpose of producing aromatic by-products and woody fuel (Oldfeild *et al.*, 1998). Actually, the populations of mature *C. edulis* trees currently available are limited and restricted as they are considered to be at risk of extinction (Oldfeild *et al.*, 1998).

DESCRIPTION OF *CARISSA EDULIS* FROM DIRECT OBSERVATION

Carissa edulis is a shade tolerant plant with minimal water requirement. It is being used as a protective hedge and is an excellent attraction to birds and insects for foraging as well as for habitat. The thorns on it make the plant impenetrable and reduce the ability of livestock browsing through it. The thorny nature of this plant fits it into being a protective hedge. In addition to being a habitation to animals, the plant is known for the provision of fodder and food. It is useful for erosion control, industrial purposes, medicinal and pharmacological purposes as well as energy. The plants do form bunches of white tube-like flowers with fragrance around September with the appearance of the cherry-like fruits around November-December.

Carissa edulis is a plant with a main stem of about 2 feet in between the ground level and the point which semi-main stems grow. It can be as high as 3.5 or meters or more with multiple small branches on the semi-main and much more multifarious smaller stems and twigs on the small stems. The leaves are paired at a node and borne opposite to each other, ovate to lanceolate shape, lustrous green, and about 1-6cm in length. It has a mass of dense-foliage crown with some of the roots seen not completely under the soil. This could be as a result of the soil type.

It is a much branched ever-green plant with a dense, leathery canopy or foliage and a soft spine-like tip along-side fixed straight thorns of about 1-4cm on the branch. It has a mass of sweet-smelling, gray to pink star fashioned flower of about 1cm transversely borne on the terminals (buds). The flowers precede the appearance of edible fruits. The fruits are berries,

roundish or ovate in shape, greenish in color at the unripe stage but later turn brown and finally black or dark purple when ripe. It is a very good hedging plant. *Carissa edulis* plant parts give out non-toxic, gray or milky sap. The old stems are light brown with hollow cracks.

The quality of soil, climate and many other factors can bring about variation of any of the described qualities elsewhere. The unique ecological roles of *C. edulis* observed over the years triggered this study so as to ascertain its status. Consequently, this contemporary study had the exact objective of ascertaining the abundance and ecological roles of *Carissa edulis* plant species in Oju Local Government Area of Benue State.

Table I: Taxonomy

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Magnoliopsida	Gentianales	Apocynaceae

(Source: Nature Protection Trust of Seychelles 1998)

Materials and Methods

Study Area

In north central part of Nigeria and southern part of Benue State to be precise is located one of the biggest and pioneer Local Government called Oju. It was created in 1976 with a land mass of about 100,000 km², a land area coverage of about 1,168 km² and a population density of 208.3/ km². It has an average population of 168,491 people according to 2006 National census and 243, 300 people according to 2022 estimated figures (NNPC, 2022). The Local Government is geographically positioned at 6.845 degree latitude, 8.419 degree longitude with about 518ft (158m) altitude above the sea level. The landscape within 2 miles (3,219m) in Oju covers actual significant variations in elevation, with highest extreme elevation of 883ft (269m) and an average of 558ft (170m) within 10 miles (1,6093m) aside from the very high mountainous locations within. It has an average temperature between 29 and 31°C (OSM, 2016). Fig I shows the map of Benue state with an arrow on Oju Local Government area. Oju LGA shares boundary with Obi LGA of Benue State to the North, Ado, Konsisha and Gwer LGA of Benue State to the west, Izzi LGA of Ebonyi State to the East, and Yala LGA of Cross River State to the South. It is partly mountainous, with conspicuous rocky and hilly creations spread across several places like Andibilla and Uchenyim, among others. It is a transition point between the rainforest and guinea savannah. The people speak Igede dialect and their dominant occupation in the area is about 80% farming while others include hunting, trading, civil and co-operate services. The main crops they cultivate include; palm trees, cassava, maize, millet, varieties of beans, rice, sweet potatoes, yam, beni seed, guinea corn Bambara nuts, groundnut and many more. The major clans in the Local Government include AINU, Ibilla, Idelle, Iyeche, Oboru, Oju, Owo, Ukpa and Uwokwu. The people have five market days; Ihigile, Ihio, Ihiobila, Ihiejwo (Onyike) and Ihiokwu.

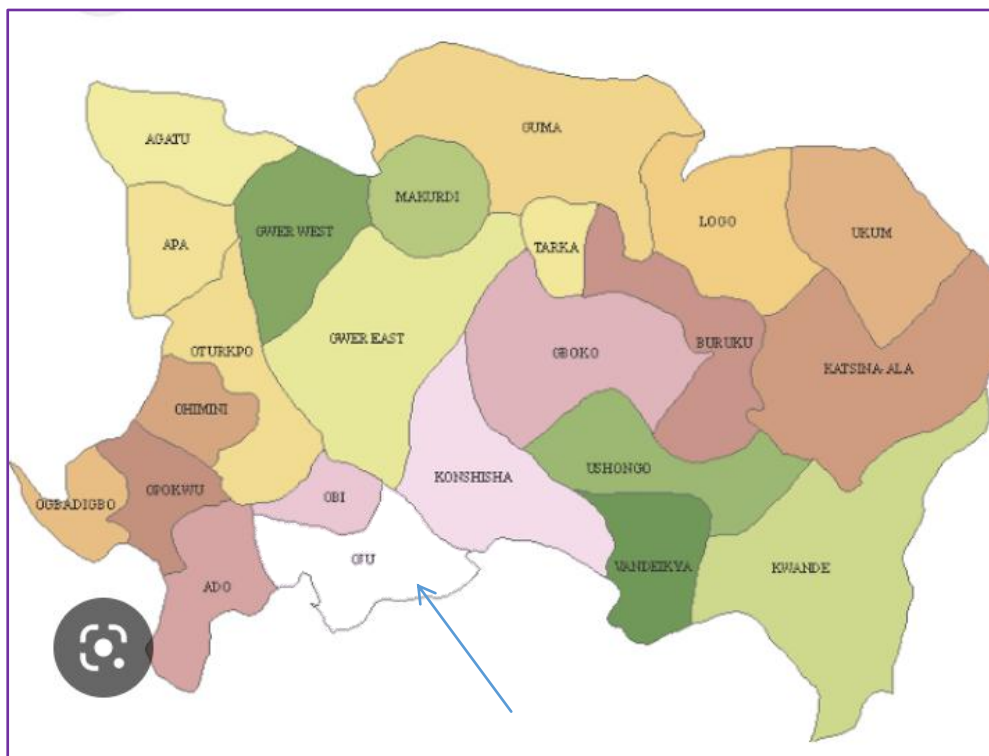


Fig. I: Map of Benue State showing Oju L.G.A. Source: Soluap Technologies

Selection of Study Sites

The markets were chosen purposely for the fact that it is a place within the LGA where there is high representation and effective coverage of the various indigenous clans.

Data Collection

The species data were collected from the indigenous people of Igede in April 2021 at the 2 major local markets; Onyike (Ihiejwo) and Obusa Markets in Oju LGA of the state. Cross sectional dataset were gathered by means of semi-structured questionnaires which were instantly administered arbitrarily to a large pool of knowledgeable subjects within the study area using the mother tongue. Pre-coded feedback of *certainly or certainly not*, open ended interview with each participant was carried out with allowance for possible additional information. Field information was obtained from farmers/hunters/herbalists, civil servants/teachers a total of 99 respondents (9 respondents from each of the 11 clans); 41 males and 58 females. The major questions the questionnaires captured are; identification knowledge of the life sample of the plant *C. edulis* which is *Utekwune* in Igede dialect, its planting status, existence of the plant in the area only before the study time or till present, description of abundance with reference to time frame if ever in existence and diverse use of the plant.

Data Analysis

The obtained data were compressed using descriptive statistical techniques particularly; graphs, frequencies, tables and percentages with the help of Microsoft Word 2010.

Results

Records of the Participants

Fig. 2 shows the Age group data of the interviewees. The age range of the participants is from 21 to 100. The greater number of the participants was within 61 to 80 years (37.4%). See Table 2 for counts per occupation, percentage identification per occupation. Fig. 1 shows

gender based record and report of participants. Table 3 displays the record of study outcome per clan in terms of their identification knowledge of the plant species, cultivation status, pre-date abundance, and current abundance in each clan.

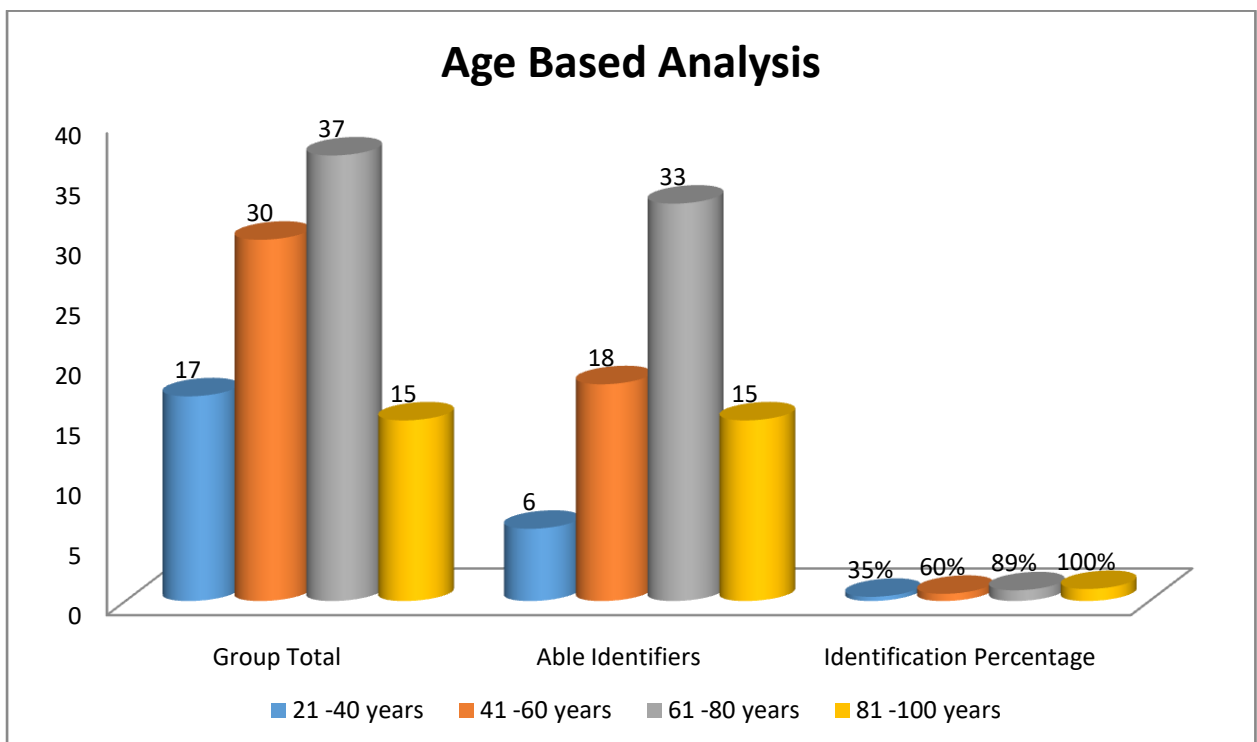
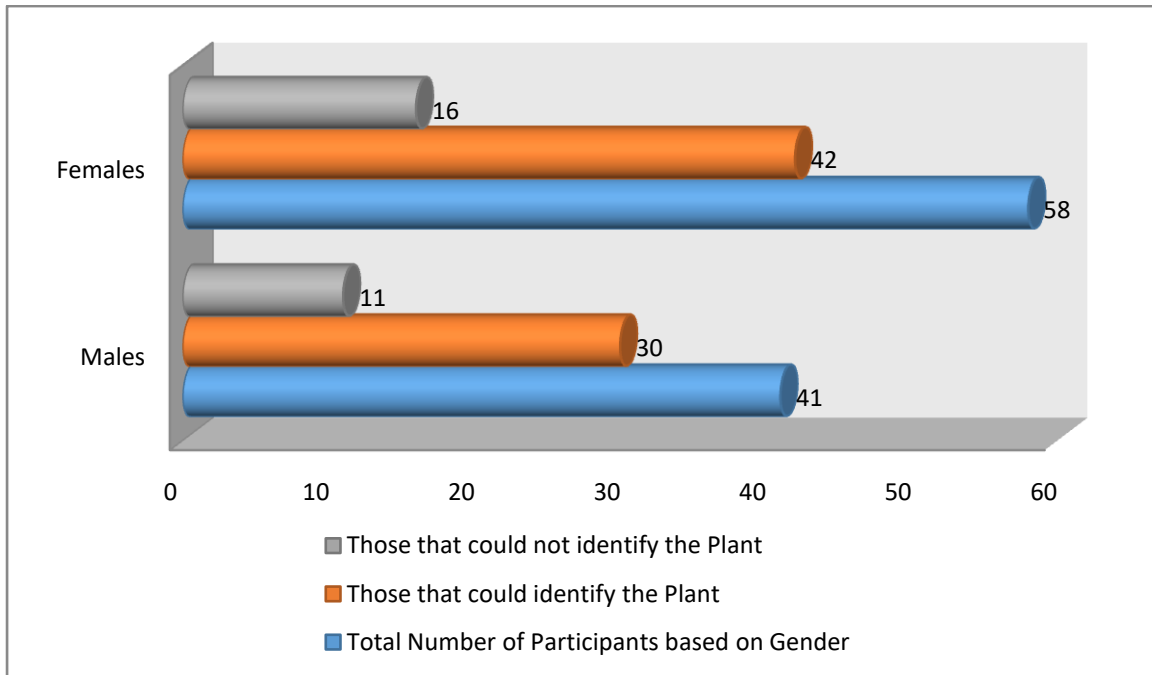


Table II

Occupation	Number	Able identifiers	Percentage Identification
Farmers	59	56	95%
Hunters	05	04	80%
Herbalists	08	00	100%
Civil/Cooperate Workers	27	04	15%

Table III

S/N	Clans	Informants	Identifiers	Planting Status	Pre-date Abundance	2015-2022 Abundance
1.	Ada	9	6	N	AV	R
2.	Anchim	9	7	N	AV	V
3.	Oye	9	8	2	AV	R
4.	Oboru	9	9	1	AV	R
5.	Ukpa	9	5	N	AV	V
6.	Owo	9	6	N	AV	V
7.	Ibilla	9	7	2	AV	R
8.	Ainu	9	8	N	AV	R
9.	Uwokwu	9	3	N	AV	V
10.	Idelle	9	8	N	AV	R
11.	Oju	9	5	N	AV	V

Discussion

4.1. Demographic Data

In general, this study discovered that the indigenes of the study area are sufficiently knowledgeable of *C. edulis* and its diverse use. The signal received from the interrogated respondents shows that a huge part (72%) of the inhabitants is cognizant of the plant and its use.

In terms of age, though more people of the age range 61 – 80 participated in the study but all those between 81 and 100 years category had a clean sheet in species identification which qualified participants for further questioning. This is owing to the fact that they are more experienced in activities and history that relates to land, farm, trees, plants and other things. The percentage species identification increased with age. It appears as that younger people had little knowledge of this plant.

This suggests that *C. edulis* was once popular due to its reasonable abundance but is now getting unpopular and rare due to lack of deliberate, proper planting practice in place, ineffective seed distribution by animals as means of propagation and their removal from the ground to create more space for diverse building, constructions, farmland and other developments.

Similar to this field observation is the remarkable notation of Nampewo (2013), who noted that numerous *Carissa edulis* are endangered and scarce for the reason of inappropriate methods of harvesting, worst management tactics, and general high rates of deforestation that fails to sustain normal restoration of natural forests. When harvested for medicine, the whole *Carissa edulis* plant is rooted up and this is a threat to its existence (field observation). Additionally, the normal habitation of *Carissa edulis*, primarily the forest plantations are diminishing at a disturbing rate of 2.0% annually. These led to the disappearance of these plant species. Saffari and Saffari (2012) discovered that breeding through stem cuttings is more rapidly and economical than seed, if each slicing is set in

appropriate media and accurate rooting hormone. Anand *et al.* (2014) added that in plant breeding, cuttings are immersed in a rooting hormone for the stimulation of root development. This present study sees the general upsurge in demand for flora without the corresponding cultivation as an adversity against biodiversity and sustainability of recourses.

In terms of occupation, farmers represented 59.6% of participants and only 56 out of 59 participants representing 95% were able to identify and answer questions regarding *C. Edulis* species. Similarly, all the eight herbalists identified the species perfectly and provided answers to the questions.

The percentage (72%) of this species identifiers revealed that the plant was well known.

All the clans reported a total of five *C. edulis* being cultivated as far back as 1960s but none in the last 60 years. Pre-date abundance of this species was reported to be fair but the best of the current abundance reported is rarity. Six of eleven clans reported rarity while the report of the remaining five clans even put the abundance status of *C. edulis* at extreme rarity. Previous studies by Abigaba *et al.*(2020) confirmed this and added; the implication of these is that the populations of *Carissa edulis* plant species which are diminishing may be incapable of meeting the necessities of the community soon. Hence, there is an urgent demand for the domestication of the plant under a preserved condition and the conservation of same in the wild. Pagliarulo *et al.* (2004) stated that it is imperative to establish successful methods of propagation for the productive farming of these essential therapeutic plants, which will eventually result in their conservation and continuous availability for commercial purposes.

From field observation, *C. edulis* has been an effective woody, multipurpose plant whose barriers exclude free ranged livestock (restricting livestock) from invading farm-field or garden of interest. It was found near the border line of a fence where its massive dense shrubs, branches with impenetrable barriers of thorns were allowed into the fence line thereby restricting the compound from human and livestock invasion. It is an effective wind breaker and maintains the privacy of the house from the nearby house towards where it exists. This finding agrees with an earlier report by Wild Food Plants in Ethiopia (WFPE, 2001) stating that agroecology-wise, *Carissa edulis* can be found growing at the boundaries or inside the forests and woodlands where Croton, Acacia and Euphorbia commonly occur in either dry or moist, low or midlands particularly on stony hillsides, clay soils, and mainly dark cotton lands

Conclusively, this study discovered that the indigenes of the study area are sufficiently knowledgeable about *C. edulis* and its diverse use. Younger people had little knowledge of this plant. *C. edulis* was once popular but is now getting unpopular and rare due to lack of deliberate, proper planting practice in place, ineffective seed distribution by animals as means of propagation and their removal from the ground to create more space for diverse building, constructions, farmland and other developments. The general upsurge in demand for flora without the corresponding cultivation is an adversity against biodiversity and sustainability of recourses.

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