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Phytodermological Studies of Some Indigenous Leafy Vegetables of the Benin Speaking People of Edo State

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ABSTRACT: Thirty (30) taxa distributed in 28 species, 2 varieties, 23 genera and 18 dicotyledonous families have been compiled, documented and studied phytodermologicaliy as the traditional leafy vegetables (TLV) of the Benin speaking people of Edo State. Majority of the taxa studied were amphistomatic (30), three (03) were hypostomatic (*Vernonia amvgdalina, Trytochiton scleroxylon* and *Plumbago zylanica*,) and one species was epistomatic (*Ficus hymenlops*). Three (03) types of stomata were observed. Anomocytic stomata (18) were more, five (05) were paracytic- ("ebe ododonebo"- *Basella alba*, "ebeiyanebo" - *Ipomea batatas*, "ebebgahi" - *Manihot esculenta*, "okpun" - *F. hymenlops* and "ebeodondondon"-*Talinum fruticosum*) and six were diacytic ("scent leaf" - *Basilium polystachyon*, "ebehi"- *Hyptis sauveolens* "ebehihi"- *Ocimum basilicum*, "ebeamwonkhio"- *O. gratissumum*, "ebe ighalo"- *Brillantaisia owareinsis* and "ebeakghodor"). Twenty-nine taxa had large stomata while only *B. owariensis* had small stomata. No correlation could be drawn between the growth habit and the type of stomata. Eglandular unicellular trichomes were observed in 2 species *Myrianthus arboreus* and *B. owariensis*. Majority of the epidermal walls were wavy with only 8 species straight walled on both surfaces. Three (03) species had both straight and sinuous surfaces-alba *Corchrous olitorius* and *C. trident*s.

Keywords: Phytodermological, indigenous leafy vegetable, Benin speaking people, Edo State.

Introduction

Okigbo (1977) and Rubaihayo (1994) coined the word vegetable to mean the succulent plant part that maybe eaten as supplementary foods or side dishes or sauce accompanying the staple foods such as maize, cassava, sweet potatoes, banana, millet, sorghum and yams. Rubaihayo defined local vegetables as indigenous vegetables that are found in evidence of when, where and who introduced them. Majority of these local vegetables have been grown by generations of farmers and propagated as land races (Grubben and Almekindus. 1997) and in Uganda for example Goode (1998) has identified over 160 species of such local vegetables. The staple foods provide calories needed for body energy but are low in other nutrients while the indigenous leafy vegetables have high nutritive value and contain health promoting compounds such as vitamins, minerals, antioxidants and anticancer factors in varying amounts adequate for normal growth and health thus making a substantial contribution to food security Indigenous vegetables therefore meet the major protein demand and leafy vegetables are a valuable source of roughages, which promote digestion and prevent constipation through their effects (Oguntona, 1988). Many people depend on these indigenous vegetables hence their potential as sustainable foods have not been identified and exploited (Rubaihayo, 2002).
Many of these leafy vegetables are consumed for their nutritional value without much consideration for their medicinal importance. Gbile and Adesina (1986) listed 28 medically important traditional leafy vegetables (TLV). They are those plant whose leaves have been shown to have medicinal properties that are beneficial to humans and have been integrated into the community culture (Kemka *et al.*, 2014), and have been known to

make food more palatable and digestible.
Vegetable from South western Nigeria e.g. *Ocimum gratissinum* is used for treating fever, diuretic and stomach problems.
Studies on the chemical composition of indigenous leafy vegetables have shown that they contain appreciable amount of crude protein, fats and oils, energy, vitamins and minerals (Adebooye, 1996; Adebooye and Bello, 1998). Traditional medicinal leafy vegetables are those plants whose leaves have been shown to have medicinal properties that are beneficial to man. However, these traditional vegetables have been neglected because they have not been cultivated on a large scale and thus the commercial value attached to them has been low. Knowledge about different species have been restricted to small communities and with increasing migration into towns and urban centers the preservation of this knowledge in danger.
Popular food crops from outside the region were introduced into Africa and these exotic crops soon started to dominate the traditional crops. This trend was enforced with the arrival of European settlers and has resulted in most Africa vegetables becoming minor crops (Schippers, 2000).
However, most of these exotic crops are not successful in either dry or humid regions. They do not do well in the warm parts of Africa and in these regions, indigenous vegetables are much in demand because many people no longer have enough money to buy the more expensive exotic crops. Consequently, there is now a reverse in the trend away from the crops toward the traditional vegetables. Thus these vegetables play important roles in the nutrition of the population of a community. Knowledge about the African indigenous vegetables (ALVs) contributes to a more balance diet for many people and a significant improvement on food security for the community.
Apart from plant systematics, epidermal characteristics of plants have proved to be very useful in paleobotany for the identification of fossil leaf impressions in Pharmacognosy, and for the identification of plants used in herbal medicine. Epidermal parameters are now being used in peat strata graph and animals food research (Gill and Nyawuame, 1990). Fedes, (1970) has demonstrated the importance of cuticuler features as indicators of environmental pollution.
The importance of morphological types of stomata have been studied by various authors such as Metcalfe and Chalk (1950), Ekundayo (1972, 1974), Olatunji (1980), Isawumi (1984, 1986), Ogbe and Osawaru (1988), Gill and Karatela (1982), Gill *et al.* (1982), Gill and Nyawuame (1990), Nyawuame (1988), Gill and Mensah (1993), Karatela and Gill (1984, 1985), Abdulalhaman and Oladele (2003, 2005) Obembe (2003), Omoigui and Aromose (2014). The aim of this study is to compile and provide an epidermal database on these plants and expose them to other tribes in the country so as to improve the food security base of the Benin speaking people of Edo State.

Materials and methods

Matured plants of the vegetables were collected from home gardens in Ugomoson, Ugonoba and Okhuiahe villages and others were from markets in Benin and its environs. The plants were then transplanted into ridges in the Departmental garden. The matured plants were identified at the Forestry Research Institute, Ibadan and the National Horticultural institute Ibadan. The identified plants have been deposited at the University of Benin Herbarium. The method used during this study was that of Gill *et al*. (1982). Matured leaves were fixed in formalin aceto alcohol (F.A.A.) for 24 hours and washed in 70% ethanol. Epidermal peels were stripped off and stained with 50% aqueous ethanol Safranin and temporarily mounted in glycerine. Permanent slides were made following Paliwal (1967). The stomatal measurement was based on averages of 20-25 stomata and statistical analysis was done on each set of the result. The terminologies used for describing the mature stomata are that of Rasmussen (1981) and Van Cotthem (1970).

Results and discussion

Thirty four taxa belonging to 32 species and 2 varieties distribute in 18 families have been compiled as the traditional vegetables of the Benin speaking people of Edo state. The locality of the taxa and their local names have been summarized in Table 1.

Of the 34 leafy vegetables studied, 31 were herbs while 3 species were shrubs and trees (*Vernonia amygdalina*, *Triplochiton scleroxylon* and *Myrianthus arboreus*). This agrees with the work of Ogbe and Osawaru (1988) and Obembe (2003) who observed that there were more than shrubs and trees. In all these cases, there was no direct relationship with stomata complex and habit.

Table 1: Summary of the indigenous vegetables of Benin speaking people of Edo State

Taxon	Voucher No.	Family	Local Name	Locality
Brillantaisia owariensis Be	OGA01	Acanthaceae	Hagolo	Triangle Avenue Off, Wire Road, Benin City.
Amaranthus biitum L.	OGA02	Amarathaceae	Ebelete	Botanical Garden, Faculty of Life Sciences, UNIBEN
Amarathus hybridus L.	OGA03	Amarathaceae	Ebe green	BGFL UNIBEN
Amaranthus cruentus L.	OGA04	Amarathaceae	Ebe green (red)	BGFL UNIBEN
Celosia argentea L	OGA05	Amarathaceae	Ebeshoko	BGFL UNIBEN
C. *argentea* L. (white)	OGA06	Amarathaceae	Eben enshinshin	BGFL UNIBEN
C. *argentea* L. (pink)	OGA07	Amarathaceae	Ebeneshoko	BGFL UNIBEN
Gongronema latifolium Decne	OGA08	Amarathaceae	Iitcze	Ekiuwan Street, Off TV Road, Benin City
Vernonia amygdalina Del	OGA09	Asteraceae.	Ebeohiwo	Home Garden, J.S.Q. UNIBEN
Crassocepphalum rubens (Juss ex Jacq) S Moore	OGA10	Asteniccae	Ebe ebulubule	Uwelu Spare Parts Market, Igbama Junction, Benin City
Launaea taraxacifolia (Willd.)Amin ex C. Jeffery.	OGA11	Asteniccae		Efehi Street, New Benin, Benin City
Basella alba L.	OGA12	Baseliaceae	Ebe odondonebo	BGFL UNIBEN
Ipomea batatas L.	OGA13	Convolulaceae	Ebe-iyanebo	Home Garden JSQ, UNIBEN
Telfairia occidentalis Hook. F.	OGA14	Cucurbitaceae	Ebe-uvbekhen,	S&T Barracks and Isiohor Village, Benin City.
Cnidscolus acuitopholis Pohl.	OGA15	Euporbiaceaae	"Hospital too Far"	BGFT UNIBEN
Manihot esculenta Crantz.	OGA16	Euporbiaceaae	E'be-igahi	I.C.E. Road, St. Augustine Junction, Benin City.
Bascilicum polystachyon (L.) Moench.	OGA17	Lamiaceae	Red Scent Leaf	Uwa Street, Off Wire Road, Benin, Benin City
Hyptis sauveolens Poit	OGA18	Lamiaceae	Ebehihi	Ugomoson Village, Benin-Agbor Road, Benin City
Ocimum gratissimum L.	OGA19	Lamiuceae	Ebe amwonkhio	Home Garden, J.S.Q., UNIBEN
Ocimum basilium L.	OGA20	Lamiaceae	Ebehihi	Uwa Street, Off TV Road, Benin City
Abelmoschus esculentus (L.) Monench	OGA21	Malvaceae	Ebeikhawe	BGFL UNIBEN
Ficus hymenlops	OGA22	Maivacaae	Okpan	Uwa Street, Off Wire Road, Benin City
Piper Guineenesis L.	OGA23	Piperacea.	Oziza	New Benin Market, Benin City
Piper Umbellatum L.	OGA24	Piperaceae	Ebewiewa	Ekiuwa Market, Off TV Road. Benin City
Plumbago zylanica L.	OGA25	Plumbaginaceae	Ebe Olazo	Iheya Street of 5-Junction, Wire Road. Benin City
Talinum fruticossum (L.) Juss	OGA26	Portulacae	Ebe Ododondon	BGFL UNIBEN
Capsicum annum L.	OGA27	Solanaceae	Ebe-ehien	Home Garden J.S.Q., UNIBEN
Triplochriton scleroxvlon L.	OGA28	Sterculiaceae	Ebe-obech	Ugomoson Village, Benin-Agbor Road, Benin City
Corchorus olitorius L.	OGA29	Tiliaceae	Ewedu (Bini)	BGFL UNIBEN
Corchorus tridens L.	OGA30	Tiliaceae	Eweclu (Yoruba)	I.C.E. Road, Off Wire Road, Benin City

Leaf surface and epidermal wall pattern: Majority of the taxa studied (23) had sinuous body surfaces while 8 species had both surfaces straight walled. They include *Lanuaea taraxacifolia, Plumbayo Zylanica, Ficus hymenlops, Piper guineensis. P. umbellaium* and *Myrianthus arboreus*. Three (03) species had both straight and sinuous wall on the lower surfaces (*Basella alba, Crochorus olitorius* and *C. tridens*). The result agrees with Obembe (2003) who observed that most of the hobs plantation had both out feed vary.

Stomatal distribution and stomatal type: From this study majority of the taxa studied were amphistomatic (30). Three (03) species were hypostomatic (*V. amygdalina, T. scleroxylon* and *P. zvlanica*) while only *Ficus*

hymenlops was epistomatic. Gill *et al.* (1982), Idu *et al*. (2000) observed a correlation of the tree habit with hypostomatic nature. This study does not establish the correlation as *Ficus hymenlops* is a tree and it is epistomatic. The results agree with Ogbe and Osawaru (1988) who observed only 2 hypostomatic species out of the 40 dicotyledonous weeds they studied. Majority of the taxa studies were anomocutic. Sixteen (16) species (*Amaranthus blitum, A. hybridus, A. creuntus, C. argentea* (Red) *C. argentea* (pink) *C. argentea* (white), *Gongronema latifolium, V. amygdalina, Crassocephallum rubens, Capsicum annum, Triplechiton scleroxylon, Launaea taraxacifora, Telfara occidentalis, Cinidoscolus deuitopholis, Piper guineensis, Myrianthus aboreus* while 5 species were paracytic - *Basella alba, Talinum Fruticosium, Ipomea batatas, Manihot esculenta* and *Ficus hymenlops*. Six (06) species were anisocytic namely *Basilicium polystachyon, Hyptis sauveolens, Ocimum gratissimum, O. basilicum, Brittaniaisia owariensis* and ebeakghodor while the remaining species were anisocytic: *Plumbago zylanica, Corchorus olitorius, C. tridens, Abelmoschus esculentus* and *Pipes umbellatum.*

The diacytic stomata type agrees with MetcaIfe and Chalk (1950) distribution for family Lamiaceene and Abdulrahaman and Oladele (2005) report for the genus Ocimum. The anomocytic stomata for the Amaranthaceae confirms the report of Inamada (1969), Gill and Karatela (1983) and Gill and Nyawuame (1900).

Trichomes: Eglandular unicellular trichomes were found in only 2 species namely *Brillantasia owaiensis* and *Myrianthus arboreus*. Abdulrahaman and Oladele (2005) had earlier reported eglandular unicellular trichomes for the northern variety of *Ocimun gratissimum* and *O. basilicum.* Meanwhile, Gill and Karatela (1983) did not observe any trichome in the 2 species studied from the former Bendel State (Southern Nigeria). The presence of trichomes in the northern variety must be a kind of structural adaptation to conserve water in that environment.

Stomatal size: The stomatal size of *Crassocephalum ruhens* was the largest 52.3 µm x 32.3 µm 38 µm x 8 µm while the least was *Ocimum gratissimum* 22 µm x 19.2 µm x 15 µm x 4 µm. Patak (1979), had reported earlier that stomata less than 15 µm long were designated as small while those that were more than 38 µm long were large.

Based on this classification majority of the traditional leafy vegetables had small stomata with only 5 species- *(Billanlaisia owarensis. Celosa argentea, Crassocephalum ruben, Basella alba* and *Launaea taraxacifola* had large stomata.

Abdulrahaman and Oladele (2003) have tried to draw a relationship between stomata anatomy and water economy of the plants. This correlation cannot be inferred in these plants, since most of the stomata of the traditional leafy vegetable of Benin speaking people are small since they live in the rainforest zone of the country.

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