EVALUATING THE NUTRIENT AND PHYTOCHEMICAL CONTENT AND ACCEPTABILITY OF WIDE SCENT LEAVES (*PIPER UMBELLATUM-LINN*) FROM NIGERIA

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Abstract

This study on wide scent leaf (Piper umbellatum-Linn) was conducted to investigate the nutrient and phytochemical content and acceptability of the plant leaves in meal preparation. Piper umbelltum is a tropical shrub which is valued for its medicinal and nutritional effects in some parts of Nigeria (although not commonly known or consumed in Delta State). The leaves were purchased from new Benin market in Benin city, Edo State, (neigbouring state to Delta State), Nigeria. The leaves

were analyzed for nutrient and phytochemical content, and its acceptability by consumers, using standard analytical procedures and recipes/methods of food preparation. Forty test panelist were used (unskilled panelists).Proximate analysis showed the presence of moisture (15.26%), ash (7.16%), fat (21. 2%), fibre (10.10%), protein (17. 23%) and N.F.E (29.03%). Phytochemical analysis revealed alkaloid (0.306%), phenols (0.157 and Tannis (0.213%), flavounoid (0.087%), saponins (0.011%), cyanogenic glucoside (0.0259). The result of the qualitative analysis showed negative for all the analysis. Results of the acceptability using the 9-point hedonic scale rating showed that more of the consumers, (60.0%) liked the meal prepared with Piper umbellatum more, while (37.5%) liked the meal prepared with scent leaves (Ocimum gratisimum), which was used as control, and the rest (2.5%) liked both meals equally. Simple frequency percentages and hedonic rating was used for data analysis. The high acceptability of the leaves in his result implies that with good awareness programs carried out, the wide scent leaves can be readily accepted in menus of both homes and food service outfits, so that its benefits can be extended to all.

Key words: Wide scent leaves, Nutrients and phytochemical content, acceptability, meal preparation, consumers, *Piper umbellatum.*

Right from time immemorial, man has always included shrubs, herbs, etc as vegetables in their menus. Some of these vegetables are valued for their nutritional quality while others in addition to this, have additional medicinal qualities, wide scent leaves is one of such vegetables with such qualities, others such as bush buk commonly called "Utazi" (*Gongronema latifolium*), and false cubbed leaves commonly called "Usira or Uziza (*Piper guineensis*) are in this group. The inclusion of these vegetables in our meals, serve to fulfill God's divine approval of them to us for our nourishment (Genesis 1:29). The genus Piper is made up of about 1000 to 2000 species of shrubs, herbs and lianas that has economic and ecological values, of which wide scent leaves is one (Dyer and Palmer, 2004).

Wide scent leaves (*Piper umbellatum*) is called different names such as: "cow-foot leaf, wide pepper, pepper plant, and "Ebe-urumehen" in ishan dialect of Edo State. The fruit of this plant is known as "pepper corn" usually eaten by birds and fruit-eating mammals. (Nwauzoma, *et al*., 2013). *Piper umbellatum* originated tropical American but now it can be found in tropical rain forest in Africa, Japan and Indian Ocean islands (Numez, *et al*, 2005). The plant also tolerates light winter forest, and they occur as dorminant vegetation wherever they are found, however, they are scarce in the dry season (Dyer and Palma, 2004). It usually thrives as undergrowth in evergreen rain

forest, and in river banks or where you have water but not much in water log environments. Propagation is by the aid of its seed which is planted by man either in gardens or farms scattered by explosive mechanism when dried, especially by sunlight on maturity.

Different parts of the *Piper umbellatum* have been used in food preparations as vegetables for more than 9, 000 years (Nwanzoma and Dawari, 2013). The leaves are used as an emouient and have been shown to be effective in the treatment of many ailments such as Oodema, malaria, urinary and kidney problems, veneral infections, menstrual and stomach problems. It is useful in the treatment of wounds and inflamed tumers. The leaves especially in Edo State is cooked as black soup and eaten with swallow foods like pounded yam, "Eba" or "Akpu". They are also parboiled and taken as a medicinal drink, etc and found to be effective in the treatment of GIT disorders like diarrhea and hemmerhoids. It has been found also to be useful in treating wound and inflamed tumors. The root has diuretic properties, a stimulant and found to promote the flow of bile (Nwanzoma and Dawari, 2013).

The aerial part of the wide scent leaves have been reported to contain high amounts of essential oils such as B-pinene (27%), O^C -pinene (18%), E-nerodiol (12%) and B-caryophellene (10%) (Perazzo *et al*., 2005). The same aerial part contains an anti-oxidant, 4-nerolidylcatechol, an this may be the reason why it is used in skin cancer therapy. Nunez et al., (2005) reported its effectiveness in inhibiting the action of the mycotoxic phospholipase venoms of vipers (Bothrops spp).

The leaves have been shown to contain in addition to nutrients, natural bio-active non nutrient compounds called phytochemical (Nwauzoma, and Dawari, 2013). These substances fight against diseases in the body. Their functions include: antioxidant effects, antibacterial and antiviral effects, stimulation of immune system, modulation of detoxification enzymes and hormone metabolism (Nam, 2012). Other functions are: reducing cancer risks and affecting organs like heart and lungs for improve performance. Examples of phytochemicals are; flavonoids, cardiac glycosides, saponins, terpenes and alkaloids other include deoxy-sugars, anthraquinons carotenoids, hydroxycinamic acid, steroids, phenols, inulin and philobatanin. Phytochemicals are known to carryout specific actions e.g Saponins have hypocholesterolemic effect, while terpenoids and flavonoids appear to be anti cancer and heart diseases, due to their antioxidant properties (Nam, 2012.).

Piper umbellatum has both nutritional and medicinal properties and has been utilized in both meals and herbal preparations for treating different diseases. However, effort can be made to introduce the plant to places in the country where its benefits is yet to be harnessed. Only in few places in the country is the plant known and utilized. According to Ejei-Okeke (2017), "those who are not from a particular culture where certain dishes are native but want to eat such foods can prepare them by following the recipes and methods outlined for the food." It is in trying to achieve this (popularizing this nutritious and medicinal vegetable) that this work was carried out in Delta State,

Nigeria, so that its benefits can be enjoyed in the place where the authors live, and beyond.

Materials and Method

Due to the fact that *Piper umbellatum* was neither known nor sold in Delta State, it was then purchased from the new Benin market, Benin-city, a neighbouring state to Delta (the state of origin of the correspondence author). The leaves were sold on the stem (the form it is sold in the market). They were divided into two parts, one part for meal preparation and the second part for the nutrient and phytochemical content analysis. Other food ingredients used for the study were bought at Afor market in Ogwashi-uku. The food preparation and administration to test panelist were done at the food laboratory (kitchen) and food service section (restaurant) of the hospitality and Tourism management department of Delta State polytechnic, Ogwashi-uku respectively. The proximate and phytochemical contents were done in the food analysis laboratory at the University of Benin (UNIBEN), Benin-city Edo State, Nigeria.

Proximate Analysis

This was done following the methods recognized by the association of official analytical chemists (AOAC 1999). The presence of carbohydrate, protein, lipids, fibre, ash and moisture were tested for.

Ash: The percentage composition of ash was determined by furnace method. 20g of the sample was weighed into a pre-heated and weighed porcelain crucible. The crucible was inserted into a furnace and regulated to a temperature off 630°c and heated for 3hours. The set up was then allowed to cool to room temperature and weighed again. Percentages composition of ash was then obtained as follows; %Ash = (weight of crucible + Ash-weight of crucible)/ weight of sample x 100/1

Carbohydrates: the percentage composition of carbohydrates was obtained by weighing 0.Ig of the sample into 25m1 volumentric flask 1.3m1. 62% perchloric acid was added and the mixture shaken for 20mm to allow for complete homogenization. The mixture was made up to 25ml with distilled water. The resulting solution was filtered through a glass filter paper and l ml of the filtrate was transferred into a 10ml flask and dilinted with distilled water. 1 ml of the working solution was pipetted into a clean test tube and 5m1 Anthione reagent was added and mixed thoroughly. The whole mixture was read at 630mm wave length using the distilled water as blank. A standard glucose of 0. l mg/ml was also prepared and treated as the sample with Anthoine reagent. Absorbance of the standard glucose was read and the value of carbohydrate (CHO) calculated as follows: % CHO as glucose=25x Abs of sample/Abs of Std glucose x 100/1.

Lipids: This was determined by soxhlet machine 200g of sample was put into filter paper and was placed into a soxhiet extractor. The extractor was placed into a pre-weight dried distillation flask and acetone was introduced into the distillation flask via the condenser end attached to the solvent extractor. The setup was held in place with a retort stand clamp. Cold water jet was allowed to flow into the condenser and heated solvent was extracted In the process continuous refluxing. After the lipids was extracted, the condenser and extractor were disconnected and the solvent evaporated to concentrate the lipid. The lipid in flask was then over-dried to constant weight and re-weighed to obtain the weight of the liquid Lipid content was calculated as; %lipid (weight of flask +extract) - (weight of flask) / weight of sample x 100/1

Moisture: This was determined by the ignition method. I g of sample was weighed into a clean dried porcelain evaporating dish. This was placed in an oven and the temperature maintained at 150°c for 6hours. The evaporating dish was cooled in a desiccator to room temperature then re-weighed and recorded. Weight of moisture was calculated by subtracting the weight of dried sample from the fresh as follows; % moisture = fresh weight- dried weight/weight of fresh sample x 100/1

Protein: Kjedahl (Digestion) Method
This method was employed to test the protein presence. 0. lg of sample was weighed and added to a clean 250m1 conical flask. 3g digestion catalyst was added into the conical flask and 20m1 concentrated H_2So_4 added. The set was then allowed to cool to room temperature with distilled water. Then, 20m1 of' the digest was measured into a distillation flask held in place on an electro-themal heater. The distillation flask was attached to Liebig condenser connected to a l0ml 2% boric acid as indicator. 40% Na OH was injected into the digest with a syringe to make the digest alkaline. The mixture was heated to boil and ammonium gas was distilled off through the condenser to the receiver beaker. The boric acid changed color from purple to greenish as ammonia distillate was introduced. The distillate was titrated with 0. 1 Ml hydrochloric acid back to purple from green. The volume of hydrochloric acid added to effect the change was recorded as titre value and calculations made to obtain percentage nitrogen as an indicator to the presence of protein.

Quantitative Phytochemical Analysis

1. *Cyanogenic glucoside* by alkaline picrate method (Onwuka 2005): 2g of the sample extract was weighed and 5ml of alkaline picrate was added and incubated in a water bath for 5mins and the absorbance was read at 490nm against a blank.
2. *Saponins* by Naredra Devanboyina (2013 method): 5g of the sample extract was dissolve in 1:1 methanol/water, filtered and re-dissolved in 80% methanol, 2m1 of vanillin in ethanol was added, mixed well and heated on a water bath at 60 degree for l0mins and filtered. The absorbance was measure at 544nm against a blank.

3. *Phenols* by Edcoga, *et al*, (2005) method was used. 5g of the plant was boiled with 50m1 of ethanol for 5mins and filtered, 5ml of the filtrate was pipetted into a conical flasks, l0ml of distilled water was added, 2ml of ammonia hydroxide solution and 5ml of cone Amyl alcohol, was added and allowed to stand for 30mins for colour development at 505nm against a blank.
4. *Alkaloid* by Naredra Devanboyina, Et al., (2013) method. 2g of the plant extract, 5ml of PH 4.7 phosphate buffer solution was added and 5ml of BCG solution 4mI of chlorolorm was added and shaken and filtered. The absorbance was measured at 470nm against a blank....
5. *Flavounoids* 2g of the plant extract, 0.3m1 of 5%NaNo2 solution was added after 5mins 0.3ml of 10%AICI3 solution was added at the 6th mins 2ml of IM in NaoH was added and the volume was adjusted at lOml with distilled water and mixed well and then filtered. The absorbance was measured at 5l0nm against a blank.
6. *Tannis* by Van-burden Robinson (1981) method: 5g of the sample was weighed and 50m1 of distilled water was added. Then it was shaken in a mechanical shaker for lhour and filtered into some volumentric flask made up to mark. 5m1 of the filtrate was pipetted out into the test tube, and mixed with 2ml of 0.Lm $FeCL_3$ in 0.1NHcI and 0.008M k4fe(CN) 6 (potassium trocyanide,the absorbance was measured at l2Onm against a blank.

Note: The value in nanometer from the wavelength of the spactrophotometer is converted to micrometer i.e. the value from spectrophometer gotten is multiply by a factor of 0.001 to give micrometer.

Qualitative Phytochemical Analysis

The chemical test for the screening and identification of bioactive chemical constituents in the medicinal plants under the study was carried out in extract as well as powder. Specimen using the standard procedure as described by Sofawara (1993), Trease and Evans (1989), Harbone (1973) and Prashant Tiwari, Bimleish kumar, MandeepKaur, Gurpreet kaur, Harleen kaur. (2011).

1. Test for Alkaloids by mayers reagent method. O.5g of the plant extract was mixed in 8m1 of 1%Hcl, warmed and filtered, 2ml of the filtrate as treated with Wagner's reagent, formation of a yellow coloured precipitate indicates the presence of alkaloids.

With Wagner's test method:O.5g of the plant extract was mixes in 8m1 of 1%Hcl,warmed and filtered ,2m1 of the filtrate were treated with Wagner' reagent, formation brown /reddish ppt indicates the presence of alkoloids.

2. Test for flavonoid by Alkaline Reagent test method. 0.5g of the plant extract as treated with few drops of sodium hydroxide solution. Formation of intense yellow colour, which becomes colourless on addition of dilute acid indicate the presence of flavonoids with lead acetate test methods. Extract were treated with few drops of lead acetate solution formation of yellow colours precipate indicates the presence of flavonoids.

3. Test for phenol by Ferric chloride test method; 0.5g of extract were treated with 3-4 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols.
4. Test for saponins by foam test methods: 0.5g of extract was shaken with 2m1 of water if foam produced persists for 5.10mins, indicate the present of saponins.
5. Test for Tannins by gelatin test method of 0.5g of extract were treated with 1%gelatin solution containing sodium chloride formation of white PPT indicate the presence of tannins. With ferrichloride test method of 0.5g of plant extract was dissolve in l0ml distilled water and filtered. 1% aqueous iron chloride ($feCL_3$) solution was added to the filtrate the appearances of the present green, purple, blue or black colour indicates the present of tannins.
6. Test for cardiac glycosides by keller-killani method: 5ml of each methalonic plant extract was mixed with 2m1 of glacial acetic acid containing one drop of ferric chloride ($feCL_3$) solution, followed by the addition of 1ml concentrated sulphuric acid. Brown ring was formed at the interface which indicates the presences of deoxysugar of cardioglycosides. A violet ring appears beneath the brown ring, while in the acetic acid layer, a greenish ring may also form just gradually through the layer.

Recipe and Method of Dishes Preparation

This was done using the traditional method of preparation in Edo State as given b y the lead author. Two soups were prepared using the grinded leaves paste of Piper umbellatum and Ocimum gratissimum ("Alanmokhor", "Ncheanwu" and "Effirin") as control. Nchanwu leaves were purposively chosen because it is well known by people in Delta State and it also has strong flavour.

Recipe:

Beef	½ kg each
Offals	½ kg each
Onions	1 big bull each
Smoked fish	2 medium each
Fresh pepper	6 seeds each
Crayfish (grinded)	3 table spoons each
Palm fruit juice (extract)	1 ½ litres each
Magi cubes (star)	2 cubes each
Salt	To taste
Fermented locust bean	1 wrap each
Fermented melon seed	1 wrap each
Leaves paste (Piper. U)	½ cup soup A
(Nchanwu)	½ cup soup B

Method

1. The "banga" (palm fruits) were washed, put in a clean pot. Water was added to a level above the banga, boiled until the fibrous part easily detached from the seed. Water was added and squeezed to get the juice.
2. The meat was seasoned and cooked until tender and the fish debond and clean, both were set aside.
3. The leaves (A and B) were plucked from the stem, washed and grinded in a mill stone (blender can be used) until smooth.
4. The banga juice was then added to the meat stock pot and the content allowed to simmer for about 10-15 minutes.
5. Other ingredients were then added and the mixture was allowed to cook for about 15 minutes and the pot was removed from the fire source, the soup was kept for service with the pounded yam.

Recipe (pounded yam)

Yam (for pounding) 1 big tuber
Water (enough to cover the yam To boil the yam

Method

1. The yam tuber was peeled and cut into small pieces and boiled until soft.
2. It was then pounded with mortar and pestle until smooth and form ed
3. It was cut into small wraps and served together with the soups for the acceptability evaluation.

Results

The results from the data are presented under three headings of: Proximate analysis, phytochemical analysis and acceptability test.

Proximate Analysis

Table 1: **Proximate Composition Analysis of the Wide Scent Leaves (*Piper umbellatum*).**

Sample %	Moisture %	Ash %	Fibre %	Fat %	Protein %	N.F.E
Rep 1	15.0	7.0	21.1	10.8	17.0	29.1
Rep 2	15.3	21.5	21.5	9.7	17.5	28.9
Rep 3	15.5	21.0	21.0	9.8	17.2	29.1
Mean	**15.26**	**21.2**	**21.2**	**10.10**	**17.23**	**29.03**

Nitrogen free extract- The portion that contains the sugars and starches plus small amount of other materials in food analysis.

Table 1 show the proximate content values of *Piper umbellatum* leaves as follows: Moisture (15. 26%), Ash (7.16%), Fibre (21. 2%), fat (10.10), Protein (17. 23 %), and N.F.E (29. 03%).

Table 2: **Quantitative Phytochemical Analysis of Wide Scent Leaves (*Piper umbellatum***

Sample %	Alkaloid %	Flavounoid %	Tannis %	Saponins %	Phenols %	C. glycocoides
Rep 1	0.310	7.0	21.1	10.8	17.0	29.1
Rep 2	0.300	21.5	21.5	9.7	17.5	28.9
Rep 3	0.310	21.0	21.0	9.8	17.2	29.1
Mean	**0.306**	**21.2**	**21.2**	**10.10**	**17.23**	**29.03**

Table 2 revealed that the wide scent leaves contained the phytochemicals in the proportions as follows: Alkaloids (0.306%), Flavonoid (0.087%), Tannins (0.213%), Saponins (0.011%), Phenols (0.157%), C. glycoside (0.283%), respectively.

Table 3: Qualitative Phytochemical Analysis of the Wide Scent Leaves (*Piper umbellatum*)

Sample %	Moisture %	Ash %	Fibre %	Fat %	Protein %	N.F.E
Rep 1	-Ve	-Ve	-Ve	-Ve	-Ve	-Ve
Rep 2	-Ve	-Ve	-Ve	-Ve	-Ve	-Ve
Rep 3	-Ve	-Ve	-Ve	-Ve	-Ve	-Ve
Mean	**-Ve**	**-Ve**	**-Ve**	**-Ve**	**-Ve**	**-Ve**

From table 3, all the factors (phytochemicals) tested were -ve.

Table 4: **Acceptability of the Wide Scent Leaves (preferred meal). Frequency and Percentages**

Specimen (Meal)	Frequency	Percentage
Piper ubelatum (A)	24	60.0
Ocimum gratsismum (B)	15	37.5
Both specimens A & B	1	2.5
Total	**40**	**100.0**

Result in table 4 showed that more than half (60 %) of the consumers of the meal preferred the *Piper umbellatum*, some (37.5%) preferred *ocimum gratissium* (the control), while very few (1.0 %) liked both meals equally.

Table 5: **Hedonic Rating of How Much the Consumers Liked the Preferred Meal**

Extent	Frequency	Percentage	Hedonic rating
Like extremely	14	58.33	9 x 14 = 126
Like very much	8	33.33	8 x 8 = 64
Like moderately	-	-	-
Like slightly	2	8.33	6 x 2 = 12
Neigher liked or dished	-	-	-
Disliked likely	-	-	-
Disliked moderately	-	-	-
Disliked very much	-	-	-
Disliked very much	-	-	-
Disliked extremely	-	-	-
Total	**24**	**100**	**202**

Hedonic rating = $^{202}/_{24}$ = 8.42.

Table 5 shows the hedonic rating of the preferred meal (*Piper umbellatum*). About fifty-eight percent (58.3%) of those who preferred the *Piper umbellatum* meal, liked it extremely, 33.3 % liked it very much, while a few (8.33%) liked it slightly. There was no one that disliked the *Piper umbellatum* meal.

Discussion

Proximate Analysis

Proximate composition analysis showed Piper umbellatum to contain moisture (15.26 %) ash (7. 16 %), Fibre (21.2%), Fat (10.10), protein (17. 23%), and Nitrogen free extract (carbohydrate-29. 03 %. The fibre content of this work (although high, is far less than values from other work by Nwauzomal, te al. (2013). They featured fibre value as high as 55.6% fibre is very useful in the prevention of someone-communicable diseases that are diet-related such as diverticular diseases and hemorrhoids as rightly observed by Belewu et al; (2009). The ash content of value with the result from the work by Nwauzoma et al; (2013) that reported about 17% as against the value (7.16%)

found in this work. This could be explained as a result of the place where the vegetables grew. It is a known nutrition fact that the mineral content of vegetables are a true reflection of the mineral content of the soil in which they are planted. Those planted close to the sea (in portharcourt) usually have a higher mineral content than the ones planted in the uplands (Benin-city). The presence of protein may explain partly, its participation in healing process. Protein is a nutrient that is known for body building and repairs.

Phytochemical Content Analysis

Quantitative-The quantitative phytochemical analysis revealed that the wide scent leaves (Piper umbellatum) has alkaloids (0.306%), flavounoids (0.087%), Tannins (0.213%), Saponins (0.011%), phenols (0.157%), and C.glycocides (0.0283%). These are bioactive substances which have been found to be useful in prevention against several diseases. According to Nnam (2012) their functions in human systems include antioxidant effects, antibacterial and antiviral effects, as well as stimulation of immune system, modulation of detoxification enzymes etc. these must have be responsible for the actions, and traditional uses of this vegetable. The qualitative analysis of leaf showed negative for all the samples. The leaves are therefore safe for use.

Acceptability Analysis

Meals from the acceptability analysis revealed that the wide scent leaves was well accepted in meal preparation by respondents. The meal was preferred (60%) to that prepared with the scent leaf (37.5%) (*Ocimum gratissimum*) which was used as the control. The hedonic rating was high (8.20). This agrees with Ejei-Okeke (2017) that meals which are not native to a people can be introduced by following the method of preparation in recipes, and such may be accepted by them. Our finding shows that *Piper umbellatum* contains nutrients, phytochemicals, is acceptable and can be introduced in meals, in areas where it is not yet known. In doing this, the benefit will be harnessed by all.

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