American Journal of Food and Nutrition, 2017, Vol. 5, No. 3, 95-98
Available online at http://pubs.sciepub.com/ajfn/5/3/3

DOI:10.12691/ajfn-5-3-3

Comparative Study of *Condiment* Vegetable Basil Leaf (*Ocimum gratissimum)* and Bitter Leaf (*Vernonia Amygdalina)*

Ibironke Samson Ishola[1,*], Akinola Emmanuel Adegoke[2], Adepeju Adefisola Bola[3]

[1]Department of Food Science and Technology,Obafemi Awolowo University, Ile-Ife, Nigeria
[2]Central Science Laboratory Obafemi Awolowo University, Ile-Ife, Nigeria
[3]Department of Food Science and Technology, College of Agriculture, Joseph Ayo Babalola University, Ikeji Arakeji Osun State, Nigeria
*Corresponding author: isolaibironke@yahoo.com

Abstract A *condiment* vegetable is a spice, sauce, or preparation that is added to food to impart a particular flavor or to enhance its flavour, pickled or preserved foods and to complement dishes. Basil leaf (*Ocimum gratissimum) and* Bitter Leaf (*Vernonia Amygdalina)* and are classified as a condiment vegetable. The objective of this study is to compare bitter leaf (*vernonia amygdalina)* and basil leaf (*ocimum gratissimum) condiment* vegetable. Chemical composition, phytochemical, mineral composition, energy value and functional properties of bitter leaf (*Vernonia Amygdalina)* and basil leaf (*Ocimum gratissimum* were determined according to AOAC 2010 method. The results revealed that Basil leaf (*Ocimum gratissimum) and* Bitter Leaf (*Vernonia Amygdalina)* phytochemical are below minimal acceptable level, proximate composition composed of protein% 14.48, 44.86 moisture% 5.88, 5.66 fat% 6.34, 6.56 ash% 4.54, 4.38 fibre% 5.44, 6.88 CHO% 63.32,31.66 dry matter %94.12,94.34 content, mineral composition Cu mg/100g, 0.770, 590, Mn mg/100g 4.62, 36.6, Zn mg/100g, 5.23, 8.09, Mg mg/100g,413,323, Fe mg/100g,23.4, 18.03, Ca mg/100g, 4523,4005. K mg/100g, 5425, 975, and Na mg/100g49.8, 21respectively Energy value had 1557.18, 2309.56 EnergykJ/100g respectively. In conclusion basil leaf (*Ocimum gratissimum) and* bitter leaf (*Vernonia Amygdalina)* is flavour enhance *condiment* vegetable. When added to dish, it complements the dish. has medicinal value, home available, has health benefits, chemical composition meet daily nutrient requirement intake and mineral content is adequate to complement human diet and phytochemical present are below the minimal and acceptable level.

Keywords: *Ocimum gratissimum, Vernonia Amygdalina, phytochemical*

Cite This Article: Ibironke Samson Ishola, Akinola Emmanuel Adegoke, and Adepeju Adefisola Bola, "Comparative Study of *Condiment* Vegetable Basil Leaf (*Ocimum gratissimum)* and Bitter Leaf (*Vernonia Amygdalina).*" *American Journal of Food and Nutrition*, vol. 5, no. 3 (2017): 95-98. doi: 10.12691/ajfn-5-3-3.

1. Introduction

Basil leaf (*Ocimum gratissimum)* and bitter leaf (*Vernonia Amygdalina)* vegetable are very common vegetable that is abundantly grown almost everywhere in the country. Basil leaf (*Ocimum gratissimum)* and bitter leaf (*Vernonia Amygdalina)* are classified as condiment vegetable because of particular flavour, preservative nature, taste, aroma and complement to the dishes [1]. Both vegetable condiments are homegrown shrub used mainly as spices for cooking delicacies due to its unique aromatic taste. Bitter leaf (*Vernonia Amygdalina)* is popularly known as Ewuro amongst the Yoruba, Onugbu by the Igbo and called shiwaka by the Hausa vegetables as part of their daily diet have a reduced risk of many chronic diseases [2]. Vegetables *condiment* dietaries are important part of healthy eating, a source of many nutrients, including mineral such as potassium, fiber, folate (folic acid) and vitamins A, E and C. Vegetable like broccoli, spinach, tomatoes bitter leave, basil leave and garlic provide unique benefits, making them a super-food vegetable [3]. Dietary fiber derived from vegetables helps reduce blood cholesterol levels and may lower risk of heart disease [4]. Vegetables contained folate (folic acid) that helps the body form healthy red blood cells. Daily intake of vegetable condiments for women of childbearing age may become pregnant and those in the first trimester of pregnancy need adequate folate to reduce the risk of neural tube defects and spinal bifida during fetal development [5]. Researchers have agreed that *condiment* vegetables have several medicinal values that depend on certain bioactive chemical substances and these bio active chemical substances are believed to have physiological impact on the human body [5]. Bitter leaf and basil leave is one of the widely use as cooking *condiment* vegetables in Africa and it can grow in any part of the world. These vegetable condiments is highly medicinal and can be used to prevent diseases as well as help to keep our body in

good shape and health condition [6]. The important thing this leaf does is to purify the blood, hence prevent sickness [7,8]. The Vernonia Amygdalina juice reported prevents malaria sickness due to the presence of natural quinine. Bitter leave and basil reduces adverse health conditions as breast cancer, type II diabetics, and decreased bad (LDL) cholesterol by half. When experimental with animals, they are found to be source of linolenic and linoleic acid, people consuming vegetable condiments in large quantities of linolenic and linoleic acid, previous reported that they were at the lowest risk for cardiovascular disease [10]. Hence it is our objective to compare and study the condiment vegetables such as basil leaf (*ocimum gratissimum)* and bitter leaf (*vernonia amygdalina).*

Figure 1. Ocimum gratissimum

Figure 2. Vernonia Amygdalina

2. Materials and Method

The scent leaf and bitter leaf was obtained form home garden and was sun dried at for 8 hours and grounded into fine powder and sieved with mesh of size 0.50mm

2.1. Chemical Analysis

Chemical analysis such as protein (nitrogen 6.25) moisture, fat, crude fat, carbohydrate, and vitamin of the diets were determined according to AOAC methodology [11].

2.2. Energy Value

Caloric value was calculated (kJ/100 g) using the equation:

$$\text{Energy value} = (37 \times \text{fat}) + (17 \times \text{carbohydrate}) + (17 \times \text{protein}).$$

2.3. Digestion of Sample of Food Sample

2.3.1. Reagents

Hydrochloric acid (6NHCL) 587ml of con HCL was added to 400ml distilled water and was made up to one liter with distilled water.

Digestion mixture: 500ml of perchloric acid (CHLO4) was added to 1liter of nitric acid and then mixed

2.3.2. Procedure

0.5 of food sample was transferred into a 75ml digestion tube. Five milliters of digestion mixture was added swirled and placed in a fume cupboard digestion was made for hours at 150°C.

These were removed from the digester cooler for 10 minutes then 3ml of 6NHCL was added to each tube. These mixtures were digested for another 1.5 hours. These were removed from the digester cooled and 30ml of distilled was added to each tube. Each tube was stirred vigorously using the vortex mixer.

2.4. Mineral Analysis

The sample was analyzed for mineral contents using the atomic absorption spectrophotometer

3. Results and Discussion

Table 1 reflected the proximate composition of basil leaf (*Ocimum gratissimum) and* bitter Leaf (*Vernonia Amygdalina* Basil leaf (*Ocimum gratissimum) and* Biter Leaf (*Vernonia Amygdalina)* had proximate composition composed of protein%, 14.48, 44.86 moisture%5.88, 5.66 fat%6.34, 6.56 ash%4.54, 4.38 fibre% 5.44, 6.88 CHO% 63.32, 31.66 dry matter% 94.12, 94.34 chemical composition present meet daily nutrient requirement intake and mineral content is suitable to complement human diet [4,12,13].

Table 1. Proximate composition of basil leaf (*Ocimum gratissimum) and* bitter Leaf (*Vernonia Amygdalina (*Key: A = Ocimum gratissimum)

Sample Code	Protein%	Moisture%	Fat%	Ash%	Fibre%	CHO%	Dry matter%
Ocimum gratissimum	14.48^{a}±01	5.88^{a}±07	6.34^{a}±07	4.54^{a}±1	5.44^{a}00	63.32^{b}±6	94.12^{a}±07
Bitter leave *Vernonia Amygdalina*	44.86^{b}±00	5.66^{a}±7	6.56^{a}±05	4.38^{a}±01	6.88^{b}±05	31.66^{a}±6	94.34^{a}±7

The data are mean ±SD values of three determinations with different superscript in a column are significantly different ($P < 0.05$).

Table 2 has shown the phytochemical parameter of basil *ocimum gratissimum* and bitter leave *vernonia Amygdalina*. Phytin phosphorus (mg/g) for both *Ocimum gratissimum* and Bitter leave *Vernonia Amygdalina* ranged from 1.80-2.30 Saponin (%)3-5.64, Oxalate content (mg/g *et al*) ranged from 0.70-3.30, Tannic acid (%) ranged from 5.88-8.72, Alkaloid (%) 2.56-6.45, Flavonoid (%Oxalate content) ranged from 0.68-4.66 and Polyphenol (%) ranged from 2.32-3.28. Phytin phosphorus, Tannic acid, Saponin, Flavonoid, Polyphenol in Bitter leave (*Vernonia Amygdalina) is higher than Basil (Ocimum gratissimum)* but alkanoid in *Basil (Ocimum gratissimum* is higher than Bitter leave (*Vernonia Amygdalina)*, which may be due to the attribute like bitterness taste natural quinine content found in Bitter leave (*Vernonia Amygdalina)* [4,10,14].

Table 3 revealed the mineral composition of basil *ocimum gratissimum* and bitter leave *vernonia amygdalina* mineral composition of basil leave *ocimum gratissimum* and bitter leave *Vernonia Amygdalina* had Cu/mg100g, 0.770, 590, Mnmg/100g 4.62, 36.6, Zn mg/100g,5.23, 8.09, Mg mg/100g,413,323, Fe mg/100g,23.4, 18.03, Ca mg/100g, 4523,4005, K, and Na, mg/100g, 5425, 975, and 49.8, 21 respectively. Basil leave *ocimum gratissimum and* bitter leave *vernonia amygdalina could* provide adequate major and minor mineral element for human consumption that meet daily recommended requirement for human dietary [15,16]. Basil leaves *ocimum gratissimum* has higher Ca,K and Na that have confirmed earlier to lower blood pressure but bitter leave *vernonia amygdalina* is higher in Mn and Zn. Confirmed early report taken vegetable dietary may trigger potassium in the diet and help to maintain healthy blood pressure. Studies indicated that magnesium helps to stabilize blood sugar levels by regulating insulin secretion from the pancreas, lowers inflammation in the body. Vegetable Diet rich in magnesium lowers one's risk of developing diabetes. Foods rich in magnesium are green leafy vegetables, Zinc present in vegetable helps to lower blood sugar levels and improve cholesterol levels. People with diabetes tend to excrete more zinc in their urine than in their bloodstream [15].

Table 4 showed the functional properties and energy level of Basil *Ocimum gratissimum* and Bitter leave *Vernonia Amygdalina.* Bulk density of basil leave *Ocimum gratissimum* and Bitter leave *Vernonia Amygdalina* ranged from 2.63-3.20g/ml respectively. The bulk density is a reflection of the load weight per volume the sample can carry if allowed to rest directly on one another is desirable for packing, since it allows determine the weight to be contained in a limited volume. Basil *Ocimum gratissimum* could occupy more space than Bitter leave Vernonia Amygdalina [16,17].

Water *Absorption Capacity of basil leaves ocimum gratissimum* and bitter leave *vernonia Amygdalina* ranged from 2.30-4g/ml respectively. Bitter leave vernonia Amygdalina had higher Water *Absorption Capacity* value than basil leaves ocimum gratissimum which may be due to the size and thickness of vernonia Amygdalina that may require more water to form gel and higher protein content present. Swelling Capacity *of* Basil leaves *ocimum gratissimum* and bitter leave *vernonia Amygdalina* ranged from 40-60% respectively. Bitter leave vernonia Amygdalina had higher swelling capacity which may be due to presence of soluble higher protein content. Gelation power of Basil leaves *ocimum gratissimum* and Bitter leave *vernonia Amygdalina* ranged 10-12 gelation power. Bitter leave vernonia Amygdalina had higher basil leaves *ocimum gratissimum* which may be due to presence of soluble higher protein content [16,17].

Energy value of basil leaves *ocimum gratissimum* and bitter leave *vernonia amygdalina* ranged from 1557.18-2309.56 respectively, Bitter leave vernonia Amygdalina had higher basil leaves *ocimum gratissimum* could supply enough nutrient for human cosumption and also the presence of soluble higher protein content [16,17].

Table 2. Phytochemical parameter of basil *ocimum gratissimum* and bitter leave *vernonia Amygdalina*

Sample Code	Phytin phosphorus (mg/g)	Oxalate content (mg/g)	Tannic acid (%)	Saponin (%)	Alkaloid (%)	Flavonoid (%)	Polyphenol (%)
Basil(Ocimum gratissimum)	1.80^{a}±01	0.70^{a}±03	5.88^{a}±01	3.00^{a}±03	6.45^{b}±02	0.68^{a}01	2.32^{a}±01
Bitter leave **(***Vernonia Amygdalina)*	2.30^{b}±01	3.30^{b}±00	8.72^{b}±01	5.64^{b}±01	2.56^{a}±01	4.66^{b}± 02	3.28^{b}± 01

The data are mean ±SD values of three determinations with different superscript in a column are significantly different (P < 0.05).

Table 3. Mineral composition of Basil *Ocimum gratissimum* and Bitter leave *Vernonia Amygdalina*

Sample Code	Cu mg/100g	Mn mg/100g	Zn mg/100g	Mg mg/100g	Fe mg/100g	Ca mg/100g	k mg/100g	Na mg/100g
Basil leave *Ocimum gratissimum*	0.770 ^{a}±00	4.62^{a} ±00	5.23^{a} ±0.5	413.6^{b} ±02	23.4^{b} ±1.9	4523^{b} ±20	5425^{b} ±77	49.8^{b} ±2
Bitter leave *Vernonia Amygdalina*	0.590^{a} ±00	36.6^{b} ±1.5	8.09 ^{b}±0.2	323.4^{a} ±	18.03^{a} ±0.4	4005^{a} ±39	975^{a} ±86	21^{a} ±20

The data are mean ±SD values of three determinations with different superscript in a column are significantly different (P < 0.05).

Table 4. Functional Properties and energy level of Basil *Ocimum gratissimum* and Bitter leave *Vernonia Amygdalina.*

Sample Code	Bulk Density g/ml	Water Absorption Capacity	Swelling capacity%	EnergykJ/100 g	Gelation Capacity
Basil leave Ocimum gratissimum	3.20^{b}	2.3^{a}	40^{a}	1557.18^{a}	10.34^{a}
Bitter leave *Vernonia Amygdalina*	2.63^{a}	4^{b}	60^{b}	2309.56^{b}	12.56^{b}

The data are mean ±SD values of three determinations with different superscript in a column are significantly different (P < 0.05).

4. Conclusion

Condiment vegetable such as basil *ocimum gratissimum* and bitter leave *vernonia amygdalina* could give adequate energy that meet daily requirement. Basil and bitter *Condiment* vegetable acts as spice that could impart a particular flavor that enhance its flavor, colour to food. *Condiment* vegetables have unique better aromatic taste to diet, easy access grown almost everywhere and has medicinal for promoting health. *Ocimum gratissimum* and bitter leave *vernonia amygdalina* supply mineral element to the body. The mineral content such as potassium available helps to maintain healthy blood pressure; magnesium present helps to stabilize blood sugar levels by regulating insulin that secret from the pancreas in turn lowers inflammation in the body. People with diabetes tend to have more zinc in their urine than in their bloodstream which could be however replace by taken *Condiment* vegetable Zinc present in vegetable will however help to reduce blood sugar levels and improves cholesterol levels.

Acknowledgements

The authors are very grateful to staff of Central Science Laboratory Obafemi Awolowo University, Ile-Ife, Nigeria for conducting the research in their domain.

References

[1] Baritaux O Richard H Derbesy (1992): "Effects of drying and storage of herbs and spices on the essential oil. Part I. Basil, Ocimum basilicum L.". *Flavour and Fragrance Journal*. 7 (5): 267-271.

[2] Jeffrey B. Harborne; Herbert Baxter *(30 August 2001): Chemical Dictionary of Economic Plants. John Wiley & Sons. pp. 68.. Retrieved 2 August 2013.*

[3] Brophy, J.J.; M.K. Jogia (1986): "Essential oils from Fijian Ocimum basilicum *L.". Flavour and Fragrance Journal. 1 (2): 53-55.*

[4] Fagbohun E. D., Lawal, O. U. and Ore, M. E.(2012): The Proximate, Mineral And Phytochemical Analysis Of The Leaves Of *Ocimum gratissimum* L., *Melanthera scandens* A. and *Leea guineensis* L. and their medicinal value *International Journal of Applied Biology and Pharmaceutical Technology3: Issue-1: Jan*

[5] Isong, E., & Idiong. (1997): Nutrient content of the edible leaves of seven wild plants from Nigerian. *Plant foods for human nutrition, 51*, 79-84.

[6] Mephba, H. D., Eboh, L., & Banigo, E. B. (2007). Effect of processing treatments on the nutritive composition and consumer acceptance of some Nigerian edible leafy vegetables. *African Journal of Food Agriculture Nutrition and Development, 7*(1), 23-26.

[7] Oloyede F.M, Oloyede F.A, Obuotor E.M Ibironke, S.I (2011): Antioxidant Activities and Food value of Five Underutilized Green Leave Vegetables in South Western Nigeria. *The Nigerian Journal of Nutritional Science*, 32, 13-18.

[8] Klimánková, Eva; Holadová, Kateřina; Hajšlová, Jana; Čajka, Tomáš; Poustka, *Jan; Koudela, Martin; et al. (2008). "Aroma profiles of five basil (Ocimum basilicum L.) cultivars grown under conventional and organic conditions". Food Chemistry. 107 (1): 464-472.*

[9] Ibironke S. I, Ige M. M Bejide,R.A (2016): Histopathological And In-Vivo Study Of *Moringa Oleifera* Seed: *Annals. Food Science and Technology*: 17 (1)102-108.

[10] Drewnowski Adam and Gomez-Carneros *Carmen* (2000): Bitter taste, phytonutrients, and the consumer: a review1–3 *Am J Clin Nutr* 2000; 72:1424-35.

[11] AOAC: Official Methods of Analysis of the Association of Official: *Analytical Chemists,* 17th Edition: Washington DC.2000.

[12] Miele, Mariangela; Dondero, R; Ciarallo, G; Mazzei, *M; et al. (2001): "Methyleugenol in Ocimum basilicum L. Cv. 'Genovese Gigante'". Journal of Agricultural and Food Chemistry. 49 (1): 517-52*

[13] Kadiri Oseni, Olawoye Babatunde (2012): Underutilized Indigenous Vegetable (Uiv) In Nigeria: A Rich Source of Nutrient and Antioxidants- A Review :*Annals. Food Science and Technology:* 16(2) 307-318

[14] Udochukwu U. Omeje F.I. Uloma, I. S. Oseiwe F. D. (2015): Phytochemical Analysis of *Vernonia Amygdalina* and *Ocimum Gratissimum* Extracts And Their Antibacterial Activity On Some Drug Resistant Bacteria American Journal Of Research Communication: 3(5) 225-235.

[15] Mohammed, M. I., & Sharif, N. (2011). Mineral composition of some leafy vegetables consumed in Kano, Nigeria. *Nigerian Journal of Basic and Applied Science, 19*(2), 208-211.

[16] Asaolu. S.S, Adefemi O.S, Oyakilome I. G., Ajibulu K. E. &. Asaolu M. F (2012): proximate and mineral composition of nigerian leafy vegetables *Journal of Food Research*; Vol. 1(3).

[17] Adeniyi MA, Fashakin,JB, Ibironke SI(2014): Determination of Mineral Contents, Proximate Composition and Functional Properties of Complementary Diets Prepared From Maize, Soybean and Pigeon Pea: AJNFS, 1(3):53-56.