NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 54 Number 2, December 2023 Pg. 62-68
Available online at: http://www.ajol.info/index.php/naj
https://www.naj.asn.org.ng

Nutritional Evaluation of Eight Accessions of *Ocimum gratissimum* (Scent Leaf) Collected from Abia State, Southeast Nigeria

Okoronkwo, C. M., Kalu, F. A., Chinatu, L. N. and Harriman, C. J.

Department of Crop and Horticultural Sciences, Michael Okpara University of Agriculture, Umudike
Corresponding author's email: nonomaduchris@gmail.com

Abstract
Knowledge of the chemical constituents of the plant is necessary for disclosing new sources of economic materials and this cannot be achieved without much information on the phytochemicals, proximate, vitamins and mineral constituents, hence the study focused on the evaluation of nutritional constituents of accessions of *Ocimum gratissimum* collected from different Local Government Areas of Abia state. The experiment was laid out in a completely randomization design replicated three times and data collected were subjected to analysis of variance. Results showed that vitamins, minerals, proximate and phytochemicals varied significantly ($p<0.01$) among the accessions. They had high amounts of Vitamin C (169.610 (AB/06/OBIKABI) – 185.170 (AB/08/AHABA) mg/100g) and were rich in carotene (18.390-23.560 mg/100g) and Vitamin E (17.640-22.660) respectively. All the accessions contained high amount of minerals but the most abundant was potassium (387.37 (AB/02/NGWAROAD) – 512.59 (AB/08/AHABA) mg/100g), followed by calcium (277.62 (AB/06/OBIKABI) – 319.56 (AB/05/UMUDIKE) mg/100g), sodium (156.77 (AB/08/AHABA) – 179.75 (AB/02/NGWAROAD) mg/100g), phosphorus (119.48-132.76 mg/100g) and magnesium (96.77-108.21 mg/100g) respectively. Dry matter content ranged from 85.24% (AB/06/OBIKABI) to 89.4 2% (AB/15/NDUME) while carbohydrate ranged from 45.49% (AB/06/OBIKABI) to 50.67% (AB/10/ELU). Protein contents varied from 16.71% (AB/11/OSISIOMA) to 19.61% (AB/02/NGWAROAD) while moisture levels were low, ranging from 10.58% (AB/15/NDUME) to 14.76% (AB/06/OBIKABI). Ash ranged from 10.35% (AB/11/OSISIOMA) to 8.43% (AB/10/ELU). Crude fibre varied from 9.27% (AB/11/OSISIOMA) to 7.17% (AB/15/NDUME). Fat content varied from 2.86% (AB/04/AMAMBA) to 4.17% (AB/15/NDUME). Flavonoids varied from 3.44 (AB/02/NGWAROAD) to 4.87 (AB/04/AMAMBA); glycoside ranged from 1.47% (AB/08/AHABA) to 1.90% (AB/10/ELU) while Alkaloid ranged from 2.87 (AB/11/OSISIOMAI) to 3.88% (AB/04/AMAMBA). Phytochemicals (especially flavonoid, alkaloid, glycoside and saponin) were slightly higher when compared to most plants.
Keywords: Scent leaf, accessions, evaluation, nutrition, proximate, minerals, vitamins, and phytochemicals

Introduction

The genus *Ocimum* belongs to the family of *Lamiaceae* and consists of about 30-35 species indigenous to tropical regions of Asia, Africa, and Central and South America. Many factors such as the method of propagation, species type, as well as growing conditions may influence the growth pattern and phytochemical constituents of *Ocimum* plants. The nutritional value of the genus *Ocimum* may vary with species, growing location, and processing method (Okunlola *et al.,* 2017). *Ocimum* species are generally propagated using both seeds and stem cuttings, but farmers have problems with cultivating *O. gratissimum* from seeds due to their low viability. Recent studies on growth and nutritional qualities of *Ocimum basilicum*, *Ocimum gratissimum*, and *Ocimum americanum*, propagated by stem cutting and seed showed that *Ocimum* species propagated by stem cutting performed better in terms of morphometric attributes than those propagated through the seed (Okunlola *et al*., 2017). It prefers moist and fertile soils during growth but can tolerate drought after flowering.

Scent leaf is an aromatic perennial herb, with an erect stem, much branched, glabrous and woody at the base often with epidermic peeling in strips. It is grown for the essential oil in its leaves and stems (eugenol and thymol) which are substitutes for clove and thyme oils. The essential oil possesses antibacterial properties and is an important insect repellent, so also are the leaves when left dry and burnt (Oladosu-Ajayi *et al*., 2017; Health Facts, 2015). It is naturally and traditionally used for relief of pains and in the treatment of rheumatism, high fever, convulsions, diabetes, eczema, piles, skin infections, gastroenteritis, stomachache, cuts, wounds,

inflammation, diuretic and as a repellant (Chitwood, 2003). The leaves have been used as a general tonic and antidiarrhea agent and for the treatment of conjunctivitis by instilling directly into the eyes. The leaf oil when mixed with alcohol is applied as a lotion for skin infections and taken internally for bronchitis. The dried leaves are snuffed to alleviate headaches and fever among other uses (Iwu, 1993). *Ocimum gratissimum* are used as vegetables, and as spice due to their aromatic nature to spice various kinds of soup (e.g., pepper soup) and other delicious meals like porridge (Health Facts, 2015).

Hidden hunger, malnutrition and food insecurity remain a vital problem in most developing nations, hence, the need to revalue nutrient levels in *Ocimum gratissimum* which is one of the under-utilized vegetables can never be over-emphasized. Knowledge of the chemical constituents of plants is necessary for the discovery of therapeutic agents and to disclose new sources of economic materials like essential oils, gums, precursors etc for the synthesis of complex chemical substances (Mgbemena and Amako, 2020; Erinle, 2012). This cannot be achieved without much information on the phytochemicals, proximate, vitamins and mineral constituents. Hence, the study focused on the evaluation of the nutritional value of eight accessions of *O. gratissimum* (Scent leaf) collected from Abia State.

Materials and Methods

Sample Collection, Preparation and Extraction

The leaves of *O. gratissimum* were collected from eight (8) selected sampled communities in different local governments of Abia State (Table 1.). *O. gratissimum* leaves were washed with distilled water, dried and about 500 g of each of the dry samples was broken into about 2 cm in size and finely ground into powder using a Thomas Willey milling machine and sieved through a 2mm mesh sieve. (Mgbemena and Amako, 2020) and stored in dry air-tight bottles until needed for analysis. Dried ground scent leaf samples of about 100 g were put in a 1000 ml beaker and 500 ml of deionised water was added and stirred vigorously after which the plant residue was filtered through a muslin cloth and the obtained filtrate was further filtered using Whatman No 1. Filter paper. The filtrate was evaporated to dryness using a rotatory evaporator (Kolawole *et al.,* 2018; Audu *et al*., 2018).

Proximate Analysis of Ocimum gratissimum

Ground samples of *Ocimum gratissimum* were analyzed for percent moisture, ash, protein, carbohydrate, fibre, and fat using standard methods (Mgbemena *et al*., 2019; AOAC, 2016).

Mineral Analysis of Ocimum gratissimum

Phosphorus was determined by Vanado-molybdate (yellow) Spectrometry, calcium was determined by the Versanate- EDTA Complexometric Titration, potassium, magnesium and sodium were determined by flame photometry, all described by Association of Official Analytical Chemists (AOAC, 2016).

Vitamin Analysis of Ocimum gratissimum

Vitamin A and E were estimated by the method described by Pearson (1976) and Chinatu *et al*., (2017). Thiamin (B1), niacin (B3), and riboflavin content (B2) were done using the spectrophotometric method described by James (1995). Vitamin C (Ascorbic Acid) was determined by Kirk and Sawyer (1998).

Phytochemical Analysis of Ocimum gratissimum

Phytochemical screening of the extracts of *O. gratissimum* for secondary metabolites such as tannins, sterol, saponins, phenols, flavonoids, glycosides and alkaloids, was carried out following the standard procedures according to the methods described by (Mgbemena and Amako, 2020; Agholor, 2018; AOAC, 2016).

Experimental Design and Data Analysis

A single-factor experiment laid out in a complete randomization design (CRD) replicated three times was used. Data collected from an average of triplicate readings were subjected to analysis of variance using Genstat Discovery Edition 4 (Genstat, 2007) software. The least significant difference test was used to identify significant differences among treatment means ($p<0.05$).

Results and Discussion

Vitamins (mg/100g)

Vitamin (mg/100g) evaluation of 8 accessions of *O. gratissimum* collected from Abia State is shown in Table 2. A highly significant difference ($p<0.01$) was observed among the accessions. Vitamin C had the highest value, followed by carotene (vitamin A) and vitamin E. High vitamin C was obtained by the accessions of AB/04/AMAMBA (185.170), AB/05/UMUDIKE (183.370), AB/11/OSISIOMA (183.070), and AB/02/NGWAROAD (180.560) while low Vitamin C were obtained by accessions of AB/06/OBIKABI (169.610) and AB/08/AHABA (173.780). Similar results of high Vitamin C levels were obtained by Efiong (2014) and Bob *et al.* (2019).

Carotene value was lowest in AB/10/ELU (18.390) and highest in AB/06/OBIKABI (23.560). The carotene value obtained was higher than those reported by Bob *et al.* (2019) who compared the proximate, vitamin and mineral composition of leaves of *O. gratissimum*, *Piper guineense*, *Gongronema latifolium* and *Vernonia amygdalina.* Similarly, Effiong (2014) in the study of the phytochemical, proximate, vitamins and minerals composition of *O. gratissimum* leaves obtained much higher levels of carotene levels when compared to this report. The variations in levels of vitamins obtained from the different accessions hence further explained in the variations reported by Effiong (2014) and Bob *et al*. (2019).

Values for vitamin E ranged from 17.640 (AB/11/OSISIOMA) to 22.660 (AB/06/OBIKABI) while Nicin ranged from 0.845 (AB/15/NDUME) to 1.135 (AB/06/OBIKABI). AB/11/OSISIOMA (1.380), AB/05/UMUDIKE (1.375), and AB/02/NGWAROAD (1.370) had a high amount of thiamin while AB/10/ELU (1.190) had a low amount of thiamin. Riboflavin varied from 0.665 (AB/10/ELU and AB/15/NDUME) to 0.950

(AB/04/AMAMBA. The mean values for thiamin (vitamin B1), riboflavin (vitamin) B2, and niacin (B3) were relative to those reported by Pachkore and Dhale (2012) who studied Phytochemicals, vitamins, and minerals content of three *Ocimum* species. In this report, riboflavin had the least of the B vitamins and this contrasted with a report by Effiong (2014), who observed that levels flowed from B3 > B2 > B1.

Minerals (mg/100g)

The mineral (mg/100g) evaluation of the eight accessions of *Ocimum gratissimum* from Abia State is shown in Table 3. A highly significant difference ($p<0.01$) was observed among the eight accessions studied. High content of Potassium was obtained from AB/08/AHABA (512.59), AB/04/AMAMBA (483.53) and AB/10/ELU (470.72) while low content of potassium was obtained from AB/02/NGWAROAD (387.37) and AB/15/NDUME (414.76) respectively. AB/08/AHABA (96.77) and AB/02/NGWAROAD (102.53) were found to contain the least amount of magnesium while AB/04/AMAMBA (108.21), AB/15/NDUME (105.78) and AB/11/OSISIOMA (105.72) had the largest amount.

AB/02/NGWAROAD, AB/15/NDUME and AB/04/AMAMBA (179.75, 178.73 and 178.48 respectively) had the highest sodium content While AB/08/AHABA and AB/06/OBIKABI (156.77 and 165.57) were lowest respectively. In Phosphorus, AB/10/ELU (132.76) had the highest quantity, followed by AB/15/NDUME (129.56) while the lowest was AB/11/OSISIOMA (119.48), followed by AB/08/AHABA (124.56) accessions. High amount of calcium was observed by AB/05/UMUDIKE, AB/15/NDUME, AB/04/AMAMBA and AB/08/AHABA (319.56, 314.79, 310.84 and 308.82 respectively) while low amount was obtained by AB/06/OBIKABI, AB/02/NGWAROAD, AB/10/ELU (277.62, 285.67 and 287.07 respectively).

Potassium is the most abundant, followed by calcium, sodium, phosphorus and magnesium respectively. This was similar to the report by Nwofia and Adikibe (2012) and in contrast with the study of Pachkore and Dhale (2012) who reported Phosphorus as the highest mineral in *O. gratissinum* followed by Sodium and Potassium. Also, Adeniyi *et al*. (2012) in the evaluation of the chemical composition of the leaves of *Ocimum gratissimum* and *Vernonia amygdalina* reported dissimilar results where potassium was largely low as compared to this report. The result showed significant variation in mineral levels of the different accessions.

Proximate (%) analysis

The proximate (%) evaluation of the accessions of *O. gratissimum* collected from Abia State is shown in Table 4. A significant difference ($p<0.01$) was observed among the accessions. Lower moisture contents (10.58-14.76 %) observed in this report are an indication that preservation of leaves of the *O. gratissimum* after harvest will be easy. It is in line with the work of Mgbemena *et al.* (2019) on moisture contents of leaves of *O. gratissinum* (10.80 %) and *Irvingia gabonensis* (12.28 %), Chinatu *et al*. (2017) on *Tetrapluera tetraptera* fruits (11.77-15.37 %) but lower than the work of Shuaib *et* al. (2015) on *O. gratissinum* (6.93 %) and *Ocimum basilicum* (5.72 %) and Okoronkwo and Okoli (2021) on pumpkin seeds.

Carbohydrates varied from 45.49 % (AB/06/OBIKABI) to 50.67 % (AB/10/ELU) and were higher than protein contents (16.71-19.61%). Mgbemena *et al.* (2019), Chinatu *et al* (2017) and Nwofia and Adikibe (2012) had the same trend, but Asaolu *et al*. (2012) had a contrary view, whereby protein content was higher than carbohydrate content. The results showed similarity to the report of Effiong (2014) and Bob *et al.* (2019). Differences shown in the composition may be because of variations in environmental conditions, different collection areas, age, and stages of a plant at harvest, method of cultivation, time of harvesting and procedures in extraction and preparation (Nwofia and Adikibe, 2012; Mgbemena *et al.*, 2019).

Crude protein (16.71-19.61%) obtained was more than the amount obtained by Oluwole *et al*., 2019 for *O gratissinum* and Chinatu *et al*., 2017 (8.47- 9.18 %) for *Tetrapluera tetraptera* but lower than the amount reported by Shuaib *et al*., 2015 (28.88 and 30.00%) for *O gratissinum* and *O basilicum* respectively and Mgbemena and Amako (2020) for *O gratissinum* (22.20%) and bitter leaf (35.37%). Differences in the protein content (7 and 25%) (Dry weight basis) of these species have been reported in different parts of the world including Nigeria (Okunlola *et al.,* 2017). Protein is important to produce hormones, enzymes, and blood plasma in the body. They are immune boosters and aid in cell division and growth (Bouttwell, 1998).

The quantity of dry matter (85.24-89.42%) is very high and had the same trend as Chinatu *et al.* (2017) *Tetrapluera tetraptera* even though it is less than that observed by Okoronkwo and Okoli (2021) in pumpkin seeds (90.82-94.23%). Dry matter aids in digestion. Crude fat, crude fibre and ash contents depict the lowest abundance of proximate evaluation respectively. Crude fat (2.86-4.17%) showed similar results with Oluwole *et al*., 2019 (3.40-4.00%) in *O. gratissinum.* Higher results were observed by Mgbeje *et al*., 2019 (19.14 %) and Shuaib *et al*., 2015 (16.25%) for Sent leaf; Mgbeje *et al*., 2019 (15.56%) for *Gongronema latifolium* and Shuaib *et al*., 2015 (14.5%) for *O. gratissinum.*

AB/11/OSISIOMA (9.27 %) had the highest crude fibre contents, followed by AB/06/OBIKABI (8.61 %) and the lowest was AB/15/NDUME (7.17 %) followed by AB/02/NGWAROAD (7.27 %) and AB/04/AMAMBA (7.44 %) accessions. Crude fibre is slightly higher than Mgbemena and Amako (2020) in *O. gratissinum* (6.00%) and bitter leaf (7.21 %). Shuaib *et al.* (2015) had 14.96% and 11.32 % in *O. gratissinum* and *O. basilicum* respectively which showed higher contents. Dietary fibre aids in digestion and slows down the rate of glucose

absorption into the bloodstream thereby reducing the risk of hyperglycemia, and the levels of plasma cholesterol and hence preventing colon cancer and cardiovascular diseases (Ilodibia *et al*., 2014). Ash obtained ranged from 8.43 (AB/10/ELU) to 10.35 % (AB/11/OSISIOMA). Ash content was highest in AB/11/OSISIOMA which indicated high minerals reserved in it (Awe *et al*., 2018). The report of Shuaib *et al*. (2015) showed a greater amount (12.18%) in scent leaf as well as *O. basilicum* (15.73%) but Okoronkwo and Okoli, 2021 (3.47-4.26 %) in pumpkin seeds and Chinatu *et al.*, 2017 (2.74-3.25 %) in *Tetrapluera tetraptera* showed lower amount of ash.

Phytochemical (mg/100g)

The phytochemical (mg/100g) evaluation of the eight accessions of *Ocimum gratissimum* from Abia State is shown in Table 5. Significant variations were observed among the eight accessions. Phenol content ranged from 0.74 (AB/11/OSISIOMA and AB/08/AHABA) to 0.89 (AB/04/AMAMBA) which was higher than what Chinatu *et al.,* 2017 reported (0.175-0.250) for *Tetrapluera tetraptera*. Alkaloids ranged from 2.87 (AB/11/OSISIOMA) to 3.88 (AB/04/AMAMBA). The presence of alkaloids in *Ocimum gratissimum* showed that the plant can be used as a basic medicinal agent for analgesic, antispasmodic and bactericidal effects (Okwu, 2004). Flavonoids varied from 3.44 (AB/02/NGWAROAD) to 4.87 (AB/04/AMAMBA). They are potent water-soluble antioxidants and free radical scavengers which prevent oxidative cell damage and have strong anticancer activity (Del-Rio *et al*., 1997). Flavonoids were highly enriched and the highest phytochemical among alkaloids, glycosides, saponin, phenol, sterol and tannin. This contrasted with the reports of Adeniyi *et al.* (2012) who noted that *Ocimum* Specie was richer in alkaloids than flavonoids. Tannin varied from 0.48 in AB/06/OBIKABI to 0.70 in AB/15/NDUME. The least phytochemical recorded was tannin, this was similar to the reports of Adeniyi *et al*. (2012) and Okoronkwo and Okoli (2021) who reported lower levels of tannin among the other phytochemicals studied. Aluko *et al*., (2012) studied phytochemical and nutrient compositions of the leaves of *Ocimum canum* Sims and reported a higher level of tannin than the level reported in this study.

AB/08/AHABA (1.47) had the least glycoside, followed by AB/15/NDUME (1.53) while AB/10/ELU (1.90) had the largest glycoside followed by AB/04/AMAMBA (1.75). This result reported an appreciable amount of glycoside and sterols, however, this contrasted with the report of Aluko *et al*. (2012) who reported that glycoside, steroids, and terpenoids were not detected. Sterol ranged from 0.55 (AB/11/OSISIOMA) to 0.76 (AB/15/NDUME). Saponin had the lowest in AB/11/OSISIOMA and AB/15/NDUME (1.61) followed by AB/08/AHABA (1.77) while the highest was obtained in AB/06/OBIKABI (2.08) followed by AB/10/ELU (1.91). Saponin levels observed were relatively high as compared with other phytochemicals. The levels of saponin levels were like those reported by Effiong (2014).

Accessions

AB/06/OBIKABI had the highest amount of carotene (23.560 mg/100g), vitamin E (22.660 mg/100g), niacin (1.135 mg/100g), moisture content (14.76 %), fibre (8.61 %) and saponin (2.08 mg/100g). AB/04/AMAMBA produced the richest vitamin C (185.170 mg/100g), riboflavin (0.950 mg/100g), magnesium (108.21 AB/04/AMAMBA), phenol (0.89 mg/100g), flavonoid (4.87 mg/100g), alkaloid (3.88 mg/100g), and lowest fat (2.86 %).

AB/10/ELU had the highest phosphorus content (132.76 mg/100g), carbohydrate (50.67 %) and glycoside (1.90%) while AB/15/NDUME had the highest dry matter content (89.42 %), fat (4.17 5%) tannin (0.70 mg/100g) and sterol (0.76 mg/100g). AB/11/OSISIOMA produce the largest amount of thiamin (1.380 mg/100g) and ash (10.36 %) while AB/02/NGWAROAD produce the largest amount of sodium (179.75 mg/100g). AB/05/UMUDIKE had the highest calcium (319.56 mg/100g) while AB/08/AHABA had the largest amount of potassium (512.59 mg/100g).

The amount of all the minerals, vitamins, proximate and phytochemicals from all the accessions differed ($p<0.05$) from each other. This may be because of environmental or genetic factors that may have been caused by mutational sources from climate change. This result is similar to the report of Nwofia and Adikibe (2012). Accessions of *O. gratissimum* evaluated had appreciable amounts of Vitamin, Proximate, Mineral and Phytochemical. The result is in line with reports of Vierra and Simon (2000) who studied the chemical characterization of *O. gratissimum* found in the market and used in Traditional medicine in Brazil, and Barua *et al*. (2015) who studied quantitative analysis of proximate and mineral composition of a few important medicinal plants of northeast region and Siti *et al*. (2018) who studied effects of different drying methods on the proximate composition and antioxidant activities of *O. basilicum* leaves.

Conclusion

The observation made from this report confirms that *Ocimum gratissimum* is rich in vitamins, proximate, minerals and phytochemical properties. Hence, it is a huge source of nutrients and these nutrients vary among the accessions. Accessions of *Ocimum gratissimum* studied had an abundant concentration of potassium, calcium, sodium, phosphorus, and magnesium respectively. They had high amounts of vitamins C, A and E respectively. Dry matter, carbohydrate and crude protein contents were highest in the proximate evaluated while moisture levels were low in all the *Ocimum g ratissimum* accessions. It had slightly higher phytochemicals (especially flavonoid, alkaloid, glycoside and saponin) compared with most plants. All the phytochemicals tested were present indicating that *Ocimum gratissimum* can serve as a source for further

tests for medical efficacy. Given the nutrient richness of this plant, continuous growing of this plant as a vegetable should be encouraged.

References

Adeniyi, S. A., Orjiekwe, C. L., Ehiagbonare, J. E., and Arimah, B. D. (2012). Evaluation of Chemical Composition of the Leaves of *Ocimum gratissimum* and *Vernonia amygdalina*. *Int. J. Biol. Chem. Sci.*, 6(3): 1316-1323.

Agholor, K., Yaki, L. M., Abubakar, I., Olusola, L. F., Zubairu, R. (2018). Antibacterial activity of *Ocimum gratissimum* (scent leaf) on some Pathogenic Gastrointestinal Bacteria. *African Journal of Microbiology Research,* 12(40): 923-929.

Aluko, B. T., Oloyede, O. I. and Afolayan, A. J. (2012). Phytochemical and nutrient compositions of the leaves of *Ocimum canum* Sims. *African Journal of Biotechnology*, 11(63): 12697 – 12701.

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*, 1(3): 214-218.

Association of Official Analytical Chemists (AOAC) (2016). Official methods of analysis, 20th Ed. Washington DC, USA. 120.

Audu, I., Shuaibu, B. S., Alona, C. L., Murtala, M. M. and Jiya, J. A. (2018). Phytochemical analysis and antimicrobial activity of bitter leaf (*Vernonia amygdalina*) collected from Lapai, Niger State, Nigeria on some selected pathogenic microorganisms. *Science World Journal,* 13: 15-18.

Awe, S., Okeke, O. L. and Usman, A. A. (2018). Comparative proximate and mineral composition of selected fruits and vegetables. *Futa Journal of Research in Sciences,* 14(1): 67-74.

Barua, C. C., Bora, M., Saikia, B. N., Hazarika, M., and Barua, I. (2015). Quantitative analysis of proximate and mineral composition of a few important medicinal plants of the Northeast region. *International Journal of Applied Biology and Pharmaceutical Technology*, 6: 188-193.

Bob, I. A. M., Umoh, E. U. and Ekpe, O. (2019). Comparative Proximate, Vitamin and Mineral Composition of Leaves of Four Selected Tropical Vegetable Plants Namely: *Ocimum gratissimum, Piper guineense, Gongronema latifolium* and *Vernonia amygdalina*. *European Journal of Nutrition and Food Safety*, 10(1): 84 – 93.

Bouttwell, R. K. (1998). An overview of the role of Nutrition in carcinogenesis. In Nutrition Growth and Cancer, Harms, C. C. and P. A. Cerutti (Eds) Alan. R. LIss London. 387-418.

Chinatu, L. N., Okoronkwo, C. M. and Davids, E. C. M. (2017). Assessment of Chemical Composition, Variability, Heritability and Genetic Advance in *Tetrapluera Tetraptera* Fruits. *Journal of Biology and Genetic Research*, 3 (1): 27-37. ISSN: 2545 – 5710.

Chitwood, D. J. (2003) Phytochemical-based strategies for nematode control. *Annual Review of Phytopathology,* 40: 221 - 249.

Del-Rio, A., Obdulio, B. G., Castillo, J., Marin, R. R. and Ortuno, A. (1997). Uses and properties of Citrus flavonoids. *Journal of Agric. Food Chem.* 45: 4505-4515.

Efiong, E. E (2014). Phytochemical, Proximate, Vitamins and Minerals Composition of *Ocimum gratissimum* leaves. *Journal of Physical and Chemical Sciences*, 1(4): 1 – 5.

Erinle O. D. (2012). Phytochemical screening of scent leaf (*Ocimum gratissimum*) and bitter leaf (*Vernonia amygdalina*) extracts. N. D. Project, FCFFT, New Bussa, Niger State. Pp 1-5.

Genstat, (2007). Genstat for Windows, Discovery (3rd Edn.). Lawes Agricultural Trust, Rothamsted Experimental Station, UK.

Health Facts NG (2015). Health Facts. Designed by iQube Labs.www.healthfacts.ng

Ilodibia, C. V., Ugwu, U. R., Okeke, C. U., Ezeabara, C. A., Okeke, N. F., Akachukwu, E. E., Aziagba, B. O. (2014). Determination of proximate composition of various parts of two Dracaena species. *Int. J. Bot.* 10(1): 37-41.

Iwu, M. M. (1993). Handbook of African Medicinal Plants. CRC Press, London. Pp. 183-184.

James, P. (1995). Analytical Chemistry of Foods. London: Blackie Academic and Professional. 6th edition. Pp. 15- 38.

Kirk, R. S. and Sawyer. R. (1998). Pearson'scomposition and composition analysis of foods. 9th edition. Churchill Livingstone, Edinburgh. Pp. 615-616.

Kolawole, S., Obueh, H. and Ukachi, A. (2018). Antibacterial effect of Vernonia amygdalina and Ocimum gratissimum on some bacteria that cause opportunistic infections in HIV/AIDS patients. *Journal of Nutritional Health Food Science,* 6(2):1-5.

Mgbeje, B. I. A., Umoh, E. U. and Ekpe, O. (2019). Comparative Proximate, Vitamin and Mineral Composition of Leaves of Four Selected Tropical Vegetable Plants Namely: *Ocimum gratissimum, Piper guineense, Gongronema latifolium and Vernonia amygdalina. Eur. J. Nutr. Food Safety*, 10(1): 84-93.

Mgbemena, N. M. and Amako, N. F. (2020). Comparative Analysis of the Phytochemicals, Proximate and Mineral Compositions of Scent Leaf (*Ocimum gratissimum*) and Bitter Leaf (*Vernonia amygdalina*) Leaves. *International Journal of Biochemistry Research and Review,* 29(7): 1-9.

Mgbemena, N. M., Ilechukwu, I., Okwunodulu, F. U., Chukwurah, J. O. and Lucky, J. B. (2019). Chemical composition, proximate and phytochemical analysis of *Irvingia gabonensis* and *Irvingia wombulu* peels, seed coat, leaves and seeds. *Ovidius University of Anals of Chemistry Science do*, 30(1): 65-69.

Nwofia, G. E. and Adikibe, C. (2012). Chemical composition and variability among some *Ocimum gratissinum* accessions. *International Journal*

Medical Arom. Plants, 2(3): 460-467.
Okoronkwo, C. M. and Okoli, E. E. (2021). Nutritional composition of some accessions of pumpkin (*Cucurbita* spp.) seeds from Abia State, Nigeria. *International Journal of Science, and Technology,* 9 (1): 26-31.
Okunlola, A., Ogungbite, O., and Hassan, G. (2017). Growth and nutritional qualities of three *Ocimum species* as affected by methods of propagation. *East African Agricultural and Forestry Journal*, 82: 36-46.
Okwu, D. E. (2004). Phytochemical and Vitamin Content of Indigenous Species of South-Eastern Nigeria. *Journal of Sustainable Agriculture and the Environment*, 6: 30-37.
Oladosu-Ajayi, R.N., Dienye, H. E., Ajayi, C. T. and Erinle, O.D. (2017). Comparative Screening of Phytochemical Compounds in Scent Leaf *Ocimum gratissimum* Linn. (Family: *Lamiaceae*) and Bitter Leaf Vernonia amygdalina Del. (Family*: Asteraceae*) Extracts. *Advances in Zoology and Botany,* 5(4): 50-54.
Oluwole, S. O., Fajana, O. O., Ogun, M. L., Ogbe, A. A., Ademola, O. A. (2019). Proximate and Mineral Composition Analysis of the Leaves of *Amaranthus cruentus* and *Ocimum gratissimum* in Some Selected Areas of Lagos State, Nigeria. *International Journal of Ecosystem,* 9(1): 6-11.
Pachkore, G. L. and Dhale, D. A. (2012). Phytochemicals, vitamins and minerals content of three *ocimum* species. *International Journal of Science Innovations and Discoveries*, 2(1): 20–207.
Pearson, D. (1976). Chemical Analysis of Foods. Churchill Livingstone, Edinburgh.
Shuaib, O. R., Adeniran, O. I., Musah, M., Yerima, H., Sani, H. and Amusat, K. (2015). Comparative Nutritional and Anti-Nutritional Analysis of *Ocimum grattissimum and Ocimum basilicum Academia Arena*, 7(7): 77-81.
Siti, M. Y., Rabeta, M., and Antora, R. (2018). Effects of different drying methods on the proximate composition and antioxidant activities of *Ocimum basilicum* leaves. *Food Research*, 2: 421-428.
Vierra, R. F. and Simon, J. E. (2000). Chemical characterization of *Ocimum gratissimum* found in the market and used in Traditional medicine in Brazil. *Journal of Economic Botany*, 20:5-6.

Table 1. Sources of sample collection within Abia State

LGA	Accessions	GPS Location	
		Latitude	Longitude
Osisioma Ngwa	AB/11/OSISIOMA	5.1508316	7.3292168
Aba South	AB/02/NEW ROAD	5.113881	7.3803167
Umuahia North	AB/15/NDUME	5.514615	7.5358133
Ikwuano	AB/05/UMUDIKE	5.4877283	7.5402117
Isiala Ngwa North	AB/06/OBIKABI	5.3493363	7.3610124
Ohafia	AB/10/ELU	5.7208643	7.5587469
Isiukwuato	AB/08/AHABA	5.7243017	7.5584067
Bende	AB/04/AMAMBA	5.61971	7.5617217

LGA – Local Government Area

Table 2. Vitamins (mg/100g) evaluation of some accessions of *Ocimum gratissimum* collected from Abia State

Accessions	Thiamin	Riboflavin	Niacin	Vitamin C	Carotene	Vitamin E
AB/04/AMAMBA	1.250	0.950	1.050	185.170	19.580	19.660
AB/08/AHABA	1.350	0.840	1.105	173.780	22.670	20.425
AB/10/ELU	1.190	0.665	0.910	178.850	18.390	18.660
AB/06/OBIKABI	1.265	0.710	1.135	169.610	23.560	22.660
AB/11/OSISIOMA	1.380	0.810	1.095	183.070	21.560	17.640
AB/02/NGWAROAD	1.370	0.760	0.910	180.560	20.525	18.610
AB/15/NDUME	1.265	0.665	0.845	176.790	19.790	19.670
AB/05/UMUDIKE	1.375	0.740	1.025	183.370	22.670	18.270
Mean	1.3056	0.7675	1.0094	178.900	21.093	19.449
$LSD_{0.01}$	0.0265	0.0089	0.02228	0.4321	0.1032	0.6421

LSD – Least significant difference

Table 3. Mineral (mg/100g) evaluation of some accessions of *Ocimum gratissimum* collected from Abia State

Accessions	Potassium	Magnesium	Sodium	Phosphorus	Calcium
AB/04/AMAMBA	483.53	108.21	178.48	128.67	310.84
AB/08/AHABA	512.59	96.77	156.77	124.56	308.82
AB/10/ELU	470.72	104.77	173.22	132.76	287.07
AB/06/OBIKABI	458.57	103.77	165.57	125.80	277.62
AB/11/OSISIOMA	464.79	105.72	169.36	119.48	307.36
AB/02/NGWAROAD	387.37	102.53	179.75	126.64	285.67
AB/15/NDUME	416.76	105.78	178.73	129.56	314.79
AB/05/UMUDIKE	423.77	103.81	169.54	124.77	319.56
Mean	452.26	103.92	171.43	126.53	301.47
$LSD_{0.01}$	0.7000	0.6741	0.4304	0.1049	1.4600

LSD – Least significant difference

Table 4. Proximate (%) evaluation of some accessions of *Ocimum gratissimum* collected from Abia State

Accessions	Ash	Carbohydrate	Crude Fibre	Crude Protein	Dry matter	Fat	Moisture Content
AB/04/AMAMBA	8.84	48.52	7.44	18.66	86.34	2.86	13.69
AB/08/AHABA	9.83	49.38	7.91	16.87	87.45	3.15	12.86
AB/10/ELU	8.43	50.67	8.36	17.27	87.63	2.91	12.37
AB/06/OBIKABI	9.32	45.49	8.61	18.41	85.24	3.41	14.76
AB/11/OSISIOMA	10.36	47.61	9.27	16.71	87.21	3.27	12.79
AB/02/NGWAROAD	8.61	49.27	7.27	19.61	88.38	3.62	11.63
AB/15/NDUME	9.27	50.04	7.17	18.78	89.42	4.17	10.58
AB/05/UMUDIKE	8.77	49.55	8.33	18.31	89.21	3.77	11.29
Mean	9.178	48.814	8.043	18.077	87.609	3.394	12.495
$LSD_{0.01}$	0.0712	0.2376	0.0381	0.0369	0.4004	0.0302	0.1365

LSD – Least significant difference

Table 5. Phytochemicals (mg/100g) evaluation of some accessions of *Ocimum gratissimum* collected from Abia State

Accessions	Tannin	Sterol	Saponin	Phenol	Glycoside	Flavonoid	Alkaloid
AB/04/AMAMBA	0.62	0.64	1.86	0.89	1.75	4.87	3.88
AB/08/AHABA	0.61	0.61	1.77	0.74	1.47	4.73	2.91
AB/10/ELU	0.59	0.73	1.91	0.78	1.90	3.87	3.17
AB/06/OBIKABI	0.48	0.65	2.08	0.83	1.69	4.28	3.27
AB/11/OSISIOMA	0.65	0.55	1.61	0.74	1.72	3.54	2.87
AB/02/NGWAROAD	0.62	0.58	1.78	0.82	1.68	3.44	2.79
AB/15/NDUME	0.70	0.76	1.61	0.77	1.53	3.91	3.16
AB/05/UMUDIKE	0.65	0.64	1.82	0.84	1.66	4.16	2.91
Mean	0.62	0.64	1.81	0.80	1.67	4.10	3.12
$LSD_{0.01}$	0.007	0.016	0.031	0.011	0.011	0.031	0.053

LSD – Least significant difference