

COMPARATIVE STUDY OF PHYTOCHEMICAL COMPOSITION OF METHANOL EXTRACT OF SCENT LEAVES (*Ocimum gratissimum*) AND BITTER LEAVES (*Vernonia amygdalina*) COLLECTED FROM IGBOORA IN OYO STATE, NIGERIA

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Abstract

The present study was carried out to compared the selected phytochemical composition of methanol extract of Scent leaf (*Ocimum gratissimum*) and Bitter leaf (*Vernonia amygdalina*). The extract of Scent leaf (*Ocimum gratissimum*) and Bitter leaf (*Vernonia amygdalina*) was analysed for Alkaloids, Flavonoids, Tannins, Saponins, Phenolics, Glycosides using standard laboratory procedure. The result showed that alkaloids content has the highest Percentage composition of 72.7% in *Vernonia amygdalina* and 62.7% in *Ocimum gratissimum*, followed by Phenolics with the percentage composition of 59.6% in *Vernonia amygdalina* and 49.6% in *Ocimum gratissimum*, Flavonoids has the percentage composition of 30.8% in *Vernonia amygdalina* and 20.8% in *Ocimum gratissimum*, Saponins has the percentage composition of 13.6% in *Vernonia amygdalina* and 12.6% in *Ocimum gratissimum*, Tannins has the percentage composition of 15.6% in *Vernonia amygdalina* and 5.6% in *Ocimum gratissimum*, Glycosides has the percentage composition of 1.62% in *Vernonia amygdalina* and 0.62% in *Ocimum gratissimum*, respectively. Comparing the phytochemical constituents with recommended dietary allowance (RDA) values, the result revealed that the leaves contain an appreciable amount of phytochemicals and low levels of toxicants. It was revealed that all phytochemical properties of *Vernonia amygdalina* values were higher compared to that of *Ocimum gratissimum*. It can be concluded that aqueous extract of *Vernonia amygdalina* and *Ocimum gratissimum* is safe for consumption as food or as herbal medicine without plausible toxicity to body organs and tissues.

Keywords: *Vernonia amygdalina* (Bitter leaf); *Ocimum gratissimum* (Scent leaf); Phytochemical; Nutritive; Antioxidant.

Introduction

Comparative phytochemical screening is a process of tracing the medicinal value of plant constituents in some chemical substance that produce a definite physiology action on the human body (Jigna *et al.*, 2006; Allero and Afolayan, 2006). The most important of these bioactive compound of plant are alkaloids, flavonoids, tannins, saponins, glycoside, cardenolides, and polyphenolic compounds (Erinle *et al.*, 2012). Knowledge of the chemical constituents of plants is desirable not only for the discovery of therapeutic agents but also because such information may be of value in disclosing new source of such economic materials as tannins, oils, gum, precursors for the synthesis of complex chemical substance (Erinle *et al.*, 2012). Bitter leaf (*Vernonia amygdalina*) is gotten from the leaves attached to the stalk of a small ever-green shrub found all over Africa belonging to the family Asteraceace. The leaves of *Vernonia amygdalina* are green with a characteristic

odour and bitter taste it is well known as medicinal plant for diabetic and fever (Adenuga *et al.*, 2010). *Vernonia amygdalina* (Del.) commonly called bitter leaf is the most widely cultivated species of the genus *Vernonia* which has about 1000 species of shrubs (Muanya, 2015). It is vegetatively propagated by stem cutting at an angel of 45° and popular in most of West Africa countries including Nigeria, Cameroon, Gabon and Congo Republic. Although most popularly use for food, it has also been traditionally used for its medicinal properties. True to its name, bitter leaf is called Omjunso in East Africa especially Tanzania, Onugbo in Igbo-Eastern Nigeria and Orugbo among the Itsekiri and Urhobo tribes in Nigeria, Ewuro (Yoruba), Etidot (Ibibio), Ityuna (Tiv), Oriwo (Edo), chusa-doki Shiwaka (Hausa). Scent leaf, *Ocimum gratissimum* is an aromatic perennial herb, with erect stem, much branched, glabrous and woody at the base often with epidermic peeling in strips. *Ocimum gratissimum* is grown for the essential oil in its leaves

and stems while engenol and to a lesser extent thymol extracted from the oil which are substitutes of clove oil and thyme oil. The essential oil possesses antibacterial properties and is also an important insect repellent so also are the leaves when left dry and burnt (Health Fact, 2015). They are used as vegetables (Sulistiarini, 1999), as spice due to its aromatic nature to spice various kinds of soup (e.g pepper soup) and other delicious meal like porridge (Health Facts, 2015). The whole plant has many applications in traditional medicine especially in African and India. The application include in the treatment of ringworms, gout and fungal infections, malarial, catarrh, aches, colon pain. The juice gotten from squeezing its leaf can be used to cure several stomach related illnesses like cholera, diarrhea dysentery, vomiting and convulsion (Health Fact, 2015). *Ocimum gratissimum* and *vernonia amygdalina* plants are known to have common phytochemical compounds which are used in tradition medicine for the treatment of several ailments and the extracts have been evaluated for there ability to stall the activities of organisms responsible for spoilage of fresh catfish (*Clarias gariepinus*) by extending it shelf life (Oladosu-Ajayi *et al.*, 2016). It is against this background this study was carried out determine the quantity of phytochemical compounds present in the extract of scent leaf (*Ocimum gratissimum*) and bitter leaf (*Vernonia amygdalina*) and also to compare the phytochemicals present in the two.

Materials and methods

Description of study area: The *Ocimum gratissimum* and *Vernonia amygdalina* leaves were purchased at Towobowo market Igboora in Ibarapa. Ibarapa comprises of three Local Government areas (Ibarapa East, North and Central) in which Igboora is one of them and it is the Headquarter of Ibarapa Cenral Local Government. It has an area of 440 km³ and a population of 102,979 as at 2006 census and the population of people increased to 322,189 in 2018. Igboora lies on 7°15 N and 3°30 E of the equator with annual rainfall of 150mm and temperature of 27°C Oyo State (Sanusi, 2011). This research work was carried out at Research Laboratory of Oyo State College of Agriculture and Technology, Igboora.

Sample preparation and extraction: The leaves of *Ocimum gratissimum* and *Vernonia amygdalina* samples were separately washed with distilled water, spread at room temperature. The samples were air-dried for two weeks and were pulverized using mortar and pestle. The dried ground samples were separately stored in two different airtight containers at room temperature. 100 grams each of the dried ground

Vernonia amygdalina (bitter leaf) and *Ocimum gratissimum* (scent leaf) samples were put in a 1000ml beaker and 500ml of methanol was added stir vigorously after which the plant residues were filtered through a muslin cloth and the obtained filtrate was further filtered using whatman No1. filter paper. The filtrate was evaporated to dryness using a rotatory evaporator. All were done following the procedure of Azu and Onyeagba (2007)

Phytochemical analysis of *Vernonia amygdalina* and *Ocimum gratissimum*

The methanol extract of *Vernonia amygdalina* and *Ocimum gratissimum* were subjected to various phytochemical tests, to identify the secondary metabolites like saponins, tannins, Alkaloid, flavonoid, phenol, glycoside Present in the leaf. The method described by Odebiyi and Sofowora (1979) was adopted.

Test of alkaloids; About 0.5g of the extract was stirred with 5ml of 1% of Ferric chloride on the steam bath at 50°C. The solution obtained was filtered and treated with a few drop of Meyer's reagent. The turbidity of the extract filtrate on addition of Meyer's reagent was an indication of the presence of alkaloids in the extracts according the procedure of Odebiyi and Sofowora (1979). Phenolics was also determined using this procedure but its absorbance was measured at 450 nm.

Test for saponin: About 2g of powdered sample of the plant was baled together with 20ml of distilled water in a water bath and filtered, 10ml of the filtered sample was mixed with 5ml of distilled water in a tube and was shaken vigorously to obtain a stable persistent froth. The frothing was then mixed with 3 drops of olive oil and for the formation of emulsion which indicate the presence of saponins according to the methods of Odebiyi and Sofowora (1979).

Test for flavonoids: About 0.5g of the extract was separately added with 5drop of Acetic anhydride and a drop of concentrated H₂SO₄. The mixture was steamed for about 1 hour and neutralized with Sodium Hydroxide (NaOH) solution followed by the addition of chloroform. The appearance of a blue green colour indicated the presence of flavonoids as prescribed by Odebiyi and Sofowora (1979). Glycosides was also determined using similar procedure but its absorbance was measured at 625 nm.

Test for tannins: About 0.5g of extract was separately stirred with 10ml of distilled water and then filtered, few drop of 5% feel reagent was added to the filtrate, blue black or blue green colouration or precipitation indicated the presence of tannin according to Odebiyi and Sofowora (1979).

Results

Table 1: Phytochemical screening of methanol extracts of *Ocimum gratissimum* and *Vernonia amygdalina*.

Phytochemical Parameters	Composition in %	
	<i>Ocimum gratissimum</i>	<i>Vernonia amygdalina</i>
Saponins	12.6	13.6
Tannins	5.6	15.6
Flavonoids	20.8	30.8
Phenolics	49.6	59.6
Alkaloids	62.7	72.7
Glycosides	0.62	30.8

The Comparative Study of Selected Phytochemical Composition of Methanol Extract of Scent Leaf (*Ocimum gratissimum*) and Bitter leaf (*Vernonia amygdalina*). The extract of Scent leaf (*Ocimum gratissimum*) and Bitter leaf (*Vernonia amygdalina*) was analysed for Alkaloids, Flavonoids, Tannins, Saponins, Phenolics, Glycosides. The result showed that Alkaloids content has the highest Percentage composition of 72.7% in *Vernonia amygdalina* and 62.7% in *Ocimum gratissimum*, follow by Phenolics with the percentage composition of 59.6% in *Vernonia amygdalina* and 49.6% in *Ocimum gratissimum*, Flavonoids has the percentage composition of 30.8% in *Vernonia amygdalina* and 20.8% in *Ocimum gratissimum*, Saponins has the percentage composition of 13.6% in *Vernonia amygdalina* and 12.6% in *Ocimum gratissimum*, Tannins has the percentage composition of 15.6% in *Vernonia amygdalina* and 5.6% in *Ocimum gratissimum*, Glycosides has the percentage composition of 1.62% in *Vernonia amygdalina* and 0.62% in *Ocimum gratissimum*.

Discussion

In this study, the phytochemical composition examined in *Vernonia amygdalina* and *Ocimum gratissimum* leaves extracts are Alkaloids, Tannins, Flavonoids, Saponins, Phenolics, and Glycoside. In *Vernonia amygdalina* extract Alkaloid have higher percentage than that of Alkaloids in *Ocimum gratissimum* extract, probably due to the effect of dehydration by air drying of the leafs during the extraction processing. This result is in line with the report of Lyimo *et al.* (1991) who also observed higher percentage of Alkaloids in *Moringa oleifera* leaves and pods studied in Tanzanian. This is supported by Erukainure *et al.* (2011) who observed the higher percentage of Alkaloids in fresh peppermint (*Mentha piperita*) leaves than the dried peppermint (*Mentha piperita*) leaves. This result deviated from the report of Rao *et al.* (1978), who observed the low percentage composition of Alkaloids in the analysis conducted on *Ocimum gratissimum* and *Telfaria occidentalis*

leaves. This present result deviated from the report of Oloyede (2005), who observed low percentage composition of Alkaloids in the analysis conducted on *Talinum triangulare* leaf.

Flavonoids in *Vernonia amygdalina* extracts have higher percentage than that of the flavonoids in *Ocimum gratissimum* extract probably due to differences in species variation and climatic condition may contribute to the compositional variations. Higher percentage of flavonoids was also reported by kittakoop *et al.* (2014), on *Ocimum gratissimum* (scent leaf) and *Ocimum camum* (Curry leaf) studied in Sokoto, it was also reported to have vasodilatory, analgelsic and antibacterial properties (Russo. *et al.*, 2013 and Raymond *et al.*, 2010). This agrees with Parekh and Chanda (2007) who also observed higher percentage of flavonoids in pawpaw leaf (*Carica papaya*) than in moringa leaf (*Moringa olifera*) studied in Lafia. The presence of flavonoids in the sample has also been reported to possess anti-oxidant and anti-radical properties (Parekh and Chanda, 2007). This deviated from the report of Tapas *et al.* (2008), who observed low percentage composition of Flavonoids in the analysis conducted on *Ocimum gratissimum* and *Telfaria occidentalis* leaves. This present result deviated from the report of Anjorin *et al.* (2013), who observed low percentage composition of Flavonoids in the analysis conducted on *Telfaria occidentalis* leaf

Saponins in *Vernonia amygdalina* extracts have higher percentage than that of the *Ocimum gratissimum* extract probably due to soil type, environment and climatic condition may contribute to the compositional variations. This result is in line with Ogukwe *et al.* (2004) who reported higher percentage of saponins in *Vernonia amygdalina* than that of the saponins in *Ocimum gratissimum* studied in Kogi. This result was also very close to the findings of Sodipo and Awe (2001), who observed higher percentage of saponins in Bush okro (*Corchorus olitorius*) than Bush mallow (*Corchorus capsularis*). High saponins level has been associated with gastroenteritis manifested by diarrhea and dysentery.

This result also agrees with Airaodion *et al.* (2019) who observed that the percentage of saponins was significantly higher in *Thuja occidentalis* when compared with that of *O. gratissimum*. It has been reported by Rahal *et al.* (2014), that saponins has a range of biological actives and potential health benefits such as hypocholestrolemic, anti-coagulant, anti-oxidant and platelet aggregation. They might also be used in the treatment of hypercalciuria and have been found to significantly affect growth positively, feed intake and reproduction in animals. This implies that *Thuja occidentalis* (white cedar) might have high potentiality in fighting against microorganisms such as fungi and viruses, as wells as exhibits greater antioxidant activity and prevent liver damage than that of *Ocimum. Gratissimum* (scent leaf). This result deviated from the report of Airaodion *et al.*, (2019), who observed low percentage composition of saponins in the analysis conducted on *Ocimum gratissimum* and *Telfaria occidentalis* leaves. This is deviated from the report of Schneider and Woliling (2004), who observed low percentage composition of saponins in the analysis conducted on *Talinum triangulare* leaf.

Tannins in *Ocimum grasittimum* extracts revealed lower percentage than that of the tannins in *Vernonia amygdalina* extracts, the reason may be due to environmental factors of the area where the plant was grown. This present result is in line with the report of Eleazu (2013), who observed higher percentage of saponins in giant garden egg leaf (*Solanum macrocarpon*) and African spinach (*Amaranthus hybridus*). This result also agrees with the report of (Edeoga *et al.*, 2005) who reported higher percentage of tannins in African spinach (*Amaranthus hybridus*) leaves. This report is also similar to the observation of Dolara *et al.* (2005), who observed low percentage composition of Tannins in *Ocimum gratissimum* and *Telfaria occidentalis* leaves and Adebayo *et al.* (2000), who observed low percentage composition of Tannins in *Talinum triangulare* leaf examined.

Phenolics in *Vernonia amygdalina* extracts have higher percentage than that of the phenolics in *Ocimum gratissimum* extracts. This result agrees with Ogukwe (2004), who observed the higher percentage of phenolics in bitter leaf (*Vernonia amygdalina*) than that of scent leaf (*Ocimum gratissimum*). This result is also is also supported by the observation of Shehata *et al.* (2014), who reported the higher percentage of phenolics in Bush okro (*Corchorus olitorius*) than in African spinach (*Amaranthus hybridus*). Phenol inhibited basic physiological processes in plant. This result is also similar to the observation of Silva *et al.* (2007), and Cragg and David (2011), who observed

low percentage composition of Phenolics in *Ocimum gratissimum* and *Telfaria occidentalis* leaves. Glycosides in *Ocimum gratissimum* extracts have lower percentage than that of the glycosides in *Vernonia amygdalina* extracts. This present result is in line with Ogukwe (2004), who also observed lower percentage of glycosides in *Ocimum gratissimum* than in *Vernonia amygdalina*. This result is also similar to the report of Akharaiyi and Boboye (2010), and Anjorin *et al.* (2013), who observed low percentage composition of Glycoside in the analysis conducted on *Telfaria occidentalis* Leaves.

Conclusion

It was revealed from this study that aqueous extract of *Vernonia amygdalina* and *Ocimum gratissimum* contain reasonable amount of phytochemicals necessary for body growth and development. The leave extracts of the two plants are also safe for consumption as food or as herbal medicine without plausible toxicity to body organs and tissues. It was revealed that *Vernonia amygdalina* may be more effective in treating ailment than *Ocimum gratissimum* since all the phytochemical properties found in it were higher in values compared to that of *Ocimum gratissimum*.

Recommendation

It can be recommended that further work should be carried out on the extraction of their leaves, stems and roots using ethanol to ascertain which of the plant part are more effective as medicine.

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