

Table 2: Contd..

Botanical name (family)	Local name	Voucher specimen n°	Used part	Mode of preparation/ Administration	Citation		Reference to similar ethnopharmacology use
					Fc	RFC	
<i>Ocimum canum</i> Sims (Lamiaceae)	Ahamè	Togo 04196	Le	Dec/Orl Kne/Bat	10	0.16	(Asase <i>et al.</i> , 2005) ^[36]
<i>Ocimum gratissimum</i> L. (Lamiaceae)	Djovetsi / Dogotsui	Togo 04225	Le	Dec;Kne/Orl	14	0.23	(Ancolio <i>et al.</i> , 2002) ^[27]
<i>Paullinia pinnata</i> L. (Sapindaceae)	Tegbekpasso / Ashiaton	Togo 08171	Le Rt	Dec/Orl Mac/Orl	13	0.21	(Asase <i>et al.</i> , 2005) ^[36]
<i>Pavetta corymbosa</i> (DC) F.N. Williams (Rubiaceae)	Tsifafan	Togo 07655	Le	Dec/Orl	13	0.21	(Koudouvo <i>et al.</i> , 2011) ^[53]
<i>Phyllanthus amarus</i> Schum et Thonn (Euphorbiaceae)	Kpavidetume	Togo 03349	Wp	Dec/Orl	12	0.19	(Tchacondo <i>et al.</i> , 2011)
<i>Physalis angulata</i> L. (Solanaceae)		Togo 08510	Le	Dec/Orl	06	0.097	(Ankrah <i>et al.</i> , 2003) ^[37]
<i>Piliostigma thonningii</i> (Schum.) Milne-Redh. (Caesalpiniaceae)	Klo / Agoemakpa	Togo 0024	Le	Dec/Orl	21	0.34	(Ganfon <i>et al.</i> , 2008)
<i>Pistia stratiotes</i> (Araceae)	Flavi	Togo 09566	Wp	Dec/Orl	03	0.049	(Koudouvo <i>et al.</i> , 2011)
<i>Psidium guajava</i> L. (Myrtaceae)	Gouatsi	-	Le Stb	Dec/Orl Inf/Orl	20	0.32	(Ajaijeoba <i>et al.</i> , 2007)
<i>Saccharum officinarum</i> (Poaceae)	Fofun	Togo 11350	St	Dec/Orl	03	0.049	(Asase <i>et al.</i> , 2005) ^[36]
<i>Sansevieria liberica</i> Hort. ex Gérôme et Labroy (Dracaenaceae)	Yobu	Togo 09465	Rh	Dec/Orl	07	0.11	(Koudouvo <i>et al.</i> 2011)
<i>Sarcocephalus latifolius</i> (Sm.) E.A. Bruce (Rubiaceae)	Nyimon	Togo 07535	Rt	Dec ; Mac/Orl	30	0.48	(Asase <i>et al.</i> , 2005) ^[36]
<i>Senna siamea</i> (Lam.) H.S. Irwin and Barneby (Caesalpiniaceae)	Zangaratsi	Togo 00121	Le	Dec/Orl	25	0.40	(Sanon <i>et al.</i> , 2003) ^[38]
<i>Sida acuta</i> L. Burm. F. (Caesalpiniaceae)	Afidemè	Togo 04446	Le	Dec/Orl	12	0.23	(Karou <i>et al.</i> , 2003)
<i>Spondias mombin</i> L. (Anacardiaceae)	Aklikotsi	Togo 01853	Le	Dec/Orl	22	0.36	(Diallo <i>et al.</i> , 2013)
<i>Tamarindus indica</i> L. (Caesalpiniaceae)		Togo 00235	Le Fr	Dec/Orl Jui/Orl	09	0.15	(Ganfon <i>et al.</i> , 2008)
<i>Tridax procumbens</i> L. (Asteraceae)	Abossangbe	Togo 01153	Le	Dec/Orl	10	0.16	(Tchacondo <i>et al.</i> , 2012)
<i>Uvaria chamae</i> P.Beauv. (Annonaceae)	Agbanletsi	Togo 01955	Le ; Rt	Dec/Orl	24	0.39	(Okokon <i>et al.</i> , 2006) ^[40]
<i>Vernonia amygdalina</i> Delile (Asteraceae)	Aluma/Gbondutsi	Togo 01204	Le	Dec/Orl	09	0.14	(Omoregie <i>et al.</i> 2011)

focused on *in vitro* antiparasitological activity of these species. For example, the aqueous extract of root of *S. latifolius* tested *in vitro* against the strains of *P. falciparum* FCB1 was active with IC₅₀ = 0.6 µg/ml.

Leaves were the most used part of the plant (60%). The same result was found by Lakouetene in 2008 with 60%;^[25] 68% by Yetein *et al.* in 2013.^[24] Therefore, it was noted an intense collection of leaves, levy that did not have at all an important danger to the plant, according to Poffenberger *et al.*^[56] According to these authors, the levy of 50% of the leaves of a plant does not significantly affect its survival, while uprooting and debarking participate in the destruction of the plant. In addition, to the preference of leaves is that they are the main photosynthetic organs and, therefore, tanks and photosynthesizes exudates containing secondary bioactive compounds that protect against external aggressions. These compounds have medicinal values for human body.^[24,57]

Samples were collected in forests, fields, and home gardens that grow rare species.

Most recipes used were prepared by decoction (77%) followed distantly by infusion and maceration. In general, plant material amount and the volume of water used and preparation duration were not precisely defined. The oral route of administration was the most used in the Plateau region for taking antimalarial traditional recipes (97%). Koudouvo *et al.* also had obtained in the Maritime region in Togo this mode as the principal (82.05%).^[11]

The drugs were taken with gourds, glass (beer or liquor), spoon, or cup. In general, the amount administered to the patient is not very accurately measured, and the dosage is very difficult to estimate. In all cases, there

was a wide variation depending on the experience of each traditional therapist. These inaccuracies make difficult the standardization of the use of these plants. The direct consequence is the development of resistance of *Plasmodium* toward drug use.

Traditional medicine of the Plateau region sometimes had used combinations of plants to increase the efficiency of the recipe in the treatment of malaria and its symptoms such as fever, headache, vomiting, and anemia. These plants associations, mismatched, are sometimes dangerous. In Africa, for example, about 30% of the fatal accidents were caused because of mixtures that were complex remedies.^[58] These products create in the long-term complications such as kidney and liver failure.

Only 7/62 respondents had used parasitological diagnostic of malaria (thick blood film, blood smear, and rapid diagnostic test) before treatment. The rest had used signs such as fever, headache, vomiting, conjunctival pallor, diarrhea, chills, and generalized tiredness. This raised the problem of definitive diagnosis before treatment because other diseases had almost same clinical signs as malaria.

Informants ranged from 29 to 75 years old. Younger informants were less represented than old ones. From 62 traditional herbalists, 1.61% was aged <30 years while 29.03% were from 30 to 40 years, and 69.36% were more than 50 years old. This is in agreement with previous results described by Traore.^[30] Consequently, there is an urgent need for documentation of this invaluable knowledge since there is a persistent gap in knowledge of herbal practice between the younger and older generations. The educational level of the interviewees was low: 32.26% had some primary schooling, and 24.19% had some secondary schooling. Only 4.84%

Table 3: Bibliographic record of ethnopharmacological work done on some of the most cited species during the ethnobotanical survey

Plant species	Used part	Extract	In vitro activity (IC50 µg/ml)	Authors
<i>Acanthosermum hispidum</i> D.C	Leaves	Lactone	2.33 (3D ₇)	(Tardio and Pardo-De-Santayana, 2008) (Bero <i>et al.</i> , 2009) ^[42]
		Dichloromethane	4.8 (W ₂)	
		Methanol	9.02 (3D7)	
			2.82 (Dd2)	
<i>Annona muricata</i>	Leaves	Aqueous extract	20 (F32)	(Bilda <i>et al.</i> , 2004) ^[43]
<i>Azadirachta indica</i> A. Jus	Leaves	Aqueous extract	2.50 (D6)	(Isah <i>et al.</i> , 2003) ^[32]
<i>Carica papaya</i> L.	Leaves	Aqueous extract	15.19-18.09 (strain FCK2)	(Bhat <i>et al.</i> , 2001) ^[44]
<i>Citrus aurantifolia</i>	Leaves	Methanol	40.0±2.1	(Messia <i>et al.</i> , 2008) ^[45]
<i>Combretum micranthum</i>	Leaves	Aqueous extract	0.8 (W2)	(Ancolio <i>et al.</i> , 2002)
<i>Cymbopogon citratus</i> (DC.) Stapf	Leaves	Methanol	42.2	(Messia <i>et al.</i> , 2008)
		chloroform/ethanol (1:1)	20 (F32)	
		Chloroform/methanol (1:1)	20 (F32)	
<i>Mangifera indica</i>	Leaves		>50 (FcB1)	(Zirih <i>et al.</i> , 2005) ^[46]
			0.6 (FCB1)	
<i>Sarcocephalus latifolius</i>	Root	Aqueous extract	(8.9)Columbian CQRPF strain	(Zirih <i>et al.</i> , 2005) ^[46]
		Ethanol		
		Aqueous extract	0.6 (Resistant Pf CQRPF FcB1)	
<i>Ocimum gratissimum</i> L.	Leaves	Aqueous extract	29.5 (F32)	(Benoit-Vical <i>et al.</i> , 1998) ^[48]
<i>Psidium guajava</i>	Stem bark	Aqueous extract	10-20 (D10 stain)	(Ngemenya <i>et al.</i> , 2005) ^[49]
<i>Securinega virosa</i>	Leaves	Aqueous extract	7.81	(Willcox <i>et al.</i> , 2011) ^[51]
	Root	Aqueous extract (decoction)	8.69	
<i>Sida acuta</i>	Leaves	Aqueous extract (maceration)	9.68	(Banzouzi <i>et al.</i> , 2004) ^[52]
		Ethanol extract	3.9-5.4 (FcM29-Cameroon)	
		Aqueous extract	0.92 (F _c M ₂₉)	
<i>Spondias mombin</i> L.	Leaves	Aqueous extract (decoction)	7.89	(Willcox <i>et al.</i> , 2011) ^[51]
		Aqueux (maceration)	7.66	
<i>Tamarinus indica</i>	Fruit	Aqueous extract	4.786 (fresh isolates of Pf)	(Koudouvo <i>et al.</i> , 2011) ^[53]
	Leaves	Methanol	55.544 (fresh isolates of Pf)	
<i>Veronia amygdalina</i> Delile	Leaves	Ethanol	11.2 (fresh isolates of Pf)	(Sha'a <i>et al.</i> , 2011) ^[54]
		Aqueous extract	13.6 (Fresh isolates of Pf)	
		Ethanol extract	9.82 (3D7)	
		Aqueous extract	41.69 (3D7)	
		Hydroalcohol	44.03 (3D7)	

had attended a higher education institution. Many traditional medical practitioners (38.71%) were illiterate and consequently could not document their practice. Inheritance (88.70%) was the major source of knowledge acquisition. It is advocated that knowledge of treatment of the disease acquired by inheritance and training must be documented for future generation.^[30]

CONCLUSION

Investigations results had identified 61 species commonly used in Togolese traditional medicine to treat malaria. Given the high prevalence of malaria and the widespread use of traditional medicine, it is capital to rationalize the use of these medicinal plants. These medicinal plants may probably contain yet undiscovered antimalarial properties, which can serve as a template for the production of cheap antimalaria drug from indigenous plants in Togo. There is a need for a multidisciplinary approach to develop potentially effective drugs while noting dangerous drugs and practices that should be discarded.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Singh S. Current scenario of control of malaria. *Trop Parasitol* 2011;1:52-3.
- World Health Organization. World Malaria Report: 2014. Geneva, Switzerland: WHO Press; 2014.
- Programme National de Lutte Contre le Paludisme: Plan Stratégique National du Togo «faire reculer le paludisme» 2006-2010.
- World Health Organization. Declaration of Alma-Ata International Conference on Primary Health Care, Alma-Ata, USSR; 6-12 September, 1978.
- World Health Organization. Factsheet No. 134. Traditional Medicine. Geneva, Switzerland: WHO Press; 2008.
- Gbeassor M, Kossou Y, Amegbo K, de Souza C, Koumaglo K, Denke A. Antimalarial effects of eight African medicinal plants. *J Ethnopharmacol* 1989;25:115-8.
- Gbeassor M, Kedjagni AY, Koumaglo K, De Souza C, Agbo K, Aklikokou K, *et al.* *In vitro* antimalarial activity of six medicinal plants. *Phytother Res* 1990;4:115-7.
- Koumaglo K, Gbeassor M, Nikabu O, de Souza C, Werner W. Effects of three compounds extracted from *Morinda lucida* on *Plasmodium falciparum*. *Planta Med* 1992;58:533-4.
- Koumaglo K, Gbéassor M, Nikabou O, de Souza C. Activité de la Guedunine extraite de l'écorce du fruit de *Azadirachta indica* (Linn.) sur *Plasmodium falciparum* *in vitro*. *Phytother J* 2004;4:622-36.
- Koudouvo K, Karou DS, Kokou K, Essien K, Aklikokou K, Glitho IA, *et al.* An ethnobotanical study of antimalarial plants in Togo Maritime Region. *J Ethnopharmacol* 2011;134:183-90.
- Koudouvo K, Karou SD, Ilboudo DP, Kokou K, Essien K, Aklikokou K, *et al.* *In vitro*

- antiplasmodial activity of crude extracts from Togolese medicinal plants. *Asian Pac J Trop Med* 2011;4:129-32.
12. Tardío J, Pardo-de-Santayana M. Cultural importance indices: A comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain)1. *Econ Bot* 2008;62:24-39.
 13. Ganfon H. *In vitro* evaluation of antiplasmodial activity of plant samples used in traditional medicine in Benin. *Planta Med* 2008;74:1140.
 14. Moshi MJ, Otieno DF, Weisheit A. Ethnomedicine of the Kagera Region, North Western Tanzania. Part 3: Plants used in traditional medicine in Kikuku village, Muleba District. *J Ethnobiol Ethnomed* 2012;8:14.
 15. Soejarto DD, Gyllenhaal C, Kadushin MR, Southavong B, Sydara K, Bouamanivong S, *et al.* An ethnobotanical survey of medicinal plants of Laos toward the discovery of bioactive compounds as potential candidates for pharmaceutical development. *Pharm Biol* 2012;50:42-60.
 16. Uzodimma D. Medico-ethnobotanical inventory of Ogi, Okiigwe Imo State, South Eastern Nigeria-I. *Glob Adv Res J Med Plants* 2013;2:30-44.
 17. N'Guessan K, Tra BF, Koné MW. Étude ethnopharmacologique des plantes antipaludiques utilisées en médecine traditionnelle chez les Abbey et Krobou d'Agboville (Côte-d'Ivoire). *Ethnopharmacologia* 2009;44:42-50.
 18. Kayode J. Conservation of indigenous medicinal botanicals in Ekiti State, Nigeria. *J Zhejiang Univ Sci B* 2006;7:713-8.
 19. Ajibesin KK, Ekpo BA, Bala DN, Essien EE, Adesanya SA. Ethnobotanical survey of Akwa Ibom State of Nigeria. *J Ethnopharmacol* 2008;115:387-408.
 20. Tchacondo T, Karou SD, Batawila K, Agban A, Ouro-Bang'na K, Anani KT, *et al.* Herbal remedies and their adverse effects in Tem tribe traditional medicine in Togo. *Afr J Tradit Complement Altern Med* 2011;8:45-60.
 21. Ajaiyeoba EO, Abiodun OO, Falade MO, Ogbale NO, Ashidi JS, Happi CT, *et al.* *In vitro* cytotoxicity studies of 20 plants used in Nigerian antimalarial ethnomedicine. *Phytomedicine* 2006;13:295-8.
 22. Odugbemi TO, Akinsulire OR, Aibinu IE, Fabeku PO. Medicinal plants useful for malaria therapy in Okeigbo, Ondo State, Southwest Nigeria. *Afr J Tradit Complement Altern Med* 2006;4:191-8.
 23. Tchacondo T, Karou SD, Agban A, Bako M, Batawila K, Bawa ML, *et al.* Medicinal plants use in central Togo (Africa) with an emphasis on the timing. *Pharmacognosy Res* 2012;4:92-103.
 24. Yetein MH, Houessou LG, Loughbégnon TO, Teko O, Tente B. Ethnobotanical study of medicinal plants used for the treatment of malaria in plateau of Allada, Benin (West Africa). *J Ethnopharmacol* 2013;146:154-63.
 25. Lakouéténé D, Ndongar G, Berké B, Moyen L, KoshKomba E, Zinga I, *et al.* Enquête ethnobotanique des plantes utilisées dans le traitement du paludisme à Bangui. *Bull Soc Pharm Bord* 2009;148:123-38.
 26. Adebayo JO, Santana AE, Krettli AU. Evaluation of the antiplasmodial and cytotoxicity potentials of husk fiber extracts from *Cocos nucifera*, a medicinal plant used in Nigeria to treat human malaria. *Hum Exp Toxicol* 2012;31:244-9.
 27. Ancolio C, Azas N, Mahiou V, Ollivier E, Di Giorgio C, Keita A, *et al.* Antimalarial activity of extracts and alkaloids isolated from six plants used in traditional medicine in Mali and Sao Tome. *Phytother Res* 2002;16:646-9.
 28. Jorim RY, Korape S, Legu W, Koch M, Barrows LR, Matainaho TK, *et al.* An ethnobotanical survey of medicinal plants used in the eastern highlands of Papua New Guinea. *J Ethnobiol Ethnomed* 2012;8:47.
 29. Zofou D, Tene M, Ngemenya MN, Tane P, Titanji VP. *In vitro* antiplasmodial activity and cytotoxicity of extracts of selected medicinal plants used by traditional healers of Western cameroon. *Malar Res Treat* 2011;2011:561342.
 30. Traore MS, Baldé MA, Diallo MS, Baldé ES, Diané S, Camara A, *et al.* Ethnobotanical survey on medicinal plants used by Guinean traditional healers in the treatment of malaria. *J Ethnopharmacol* 2013;150:1145-53.
 31. Thomas J, Govindan S, Kurup M. Isolation and characterisation of mosquito larvicidal compound from *Gliricidia sepium* Jacq 2014;2:173-8.
 32. Isah AB, Ibrahim YK, Iwalewa EO. Evaluation of the antimalarial properties and standardization of tablets of *Azadirachta indica* (Meliaceae) in mice. *Phytother Res* 2003;17:807-10.
 33. Tor-Anyiin TA, Sha'ato R, Oluma HO. Ethnobotanical survey of anti-malarial medicinal plants amongst the Tiv people of Nigeria. *J Herbs Spices Med Plants* 2003;10:61-74.
 34. Shuaibu MN, Wuyep PA, Yanagi T, Hirayama K, Tanaka T, Kouno I. The use of microfluorometric method for activity-guided isolation of antiplasmodial compound from plant extracts. *Parasitol Res* 2008;102:1119-27.
 35. Adodo A. *Nature Power: A Christian Approach to Herbal Medicine*: Generation Press; 2004. p. 304. ISBN: 978-1-4918-7834-7(sc) : https://books.google.tg/books?id=VQdnAQAAQBAJ&printsec=frontcover&hl=fr&source=gbs_ge_summa ry_r&cad=0#v=onepage&q&f=false
 36. Asase A, Oteng-Yeboah AA, Odamtten GT, Simmonds MS. Ethnobotanical study of some Ghanaian anti-malarial plants. *J Ethnopharmacol* 2005;99:273-9.
 37. Ankrah NA, Nyarko AK, Addo PG, Ofosuene M, Dzokoto C, Marley E, *et al.* Evaluation of efficacy and safety of a herbal medicine used for the treatment of malaria. *Phytother Res* 2003;17:697-701.
 38. Sanon S, Ollivier E, Azas N, Mahiou V, Gasquet M, Ouattara CT, *et al.* Ethnobotanical survey and *in vitro* antiplasmodial activity of plants used in traditional medicine in Burkina Faso. *J Ethnopharmacol* 2003;86:143-7.
 39. Karou D, Dicko MH, Sanon S, Simpore J, Traore AS. Antimalarial activity of *Sida acuta* Burm. f. (Malvaceae) and *Pterocarpus erinaceus* Poir. (Fabaceae). *J Ethnopharmacol* 2003;89:291-4.
 40. Okokon JE, Ita BN, Udokpoh AE. The *in-vivo* antimalarial activities of *Uvaria chamae* and *Hippocratea africana*. *Ann Trop Med Parasitol* 2006;100:585-90.
 41. Omoregie E, Pal A, Sisodia B. *In vitro* Antimalarial and Cytotoxic Activities of Leaf Extracts of *Vernonia amygdalina* (Del). *Nigerian Journal of Basic and Applied Science* 2011;19:121-6.
 42. Bero J, Ganfon H, Jonville MC, Frédéric M, Gbaguidi F, DeMol P, *et al.* *In vitro* antiplasmodial activity of plants used in Benin in traditional medicine to treat malaria. *J Ethnopharmacol* 2009;122:439-44.
 43. Bidla G, Titanji V, Joko B, Ghazali G, Bolad A, Berzins K. Antiplasmodial activity of seven plants used in African folk medicine. *Indian J Pharmacol* 2004;36:245.
 44. Bhat GP, Suroliana N. *In vitro* antimalarial activity of extracts of three plants used in the traditional medicine of India. *Am J Trop Med Hyg* 2001;65:304-8.
 45. Mesia GK, Tona GL, Nanga TH, Cimanga RK, Apers S, Cos P, *et al.* Antiprotozoal and cytotoxic screening of 45 plant extracts from Democratic Republic of Congo. *J Ethnopharmacol* 2008;115:409-15.
 46. Zirih GN, Mambu L, Guédé-Guina F, Bodo B, Grellier P. *In vitro* antiplasmodial activity and cytotoxicity of 33 West African plants used for treatment of malaria. *J Ethnopharmacol* 2005;98:281-5.
 47. Ménan H, Banzouzi JT, Hocquette A, Pélissier Y, Blache Y, Koné M, *et al.* Antiplasmodial activity and cytotoxicity of plants used in West African traditional medicine for the treatment of malaria. *J Ethnopharmacol* 2006;105:131-6.
 48. Benoit-Vical F, Valentin A, Courmac V, Pélissier Y, Mallié M, Bastide JM. *In vitro* antiplasmodial activity of stem and root extracts of *Nauclea latifolia* S.M. (Rubiaceae). *J Ethnopharmacol* 1998;61:173-8.
 49. Titanji VP, Zofou D, Ngemenya MN. The antimalarial potential of medicinal plants used for the treatment of malaria in Cameroonian folk medicine. *Afr J Tradit Complement Altern Med* 2008;5:302-21.
 50. Nundkumar N, Ojewole JA. Studies on the antiplasmodial properties of some South African medicinal plants used as antimalarial remedies in Zulu folk medicine. *Methods Find Exp Clin Pharmacol* 2002;24:397-401.
 51. Willcox ML, Graz B, Falquet J, Diakite C, Giani S, Diallo D. A "reverse pharmacology" approach for developing an anti-malarial phytomedicine. *Malar J* 2011;10 Suppl 1:S8.
 52. Banzouzi JT, Prado R, Menan H, Valentin A, Roumestan C, Mallié M, *et al.* Studies on medicinal plants of Ivory Coast: Investigation of *Sida acuta* for *in vitro* antiplasmodial activities and identification of an active constituent. *Phytomedicine* 2004;11:338-41.
 53. Koudouvo K, Karou SD, Ilboudo DP, Kokou K, Essien K, Aklikokou K, *et al.* *In vitro* antiplasmodial activity of crude extracts from Togolese medicinal plants. *Asian Pac J Trop Med* 2011;4:129-32.
 54. Sha'a KK, Oguche S, Watila IM, Ikpa TF. *In vitro* antimalarial activity of the extracts of *Vernonia amygdalina* commonly used in traditional medicine in Nigeria. *Sci World J* 2011;6:5-9.
 55. Amoa Onguéné P, Ntie-Kang F, Lifongo LL, Ndom JC, Sippl W, Mbaze LM. The potential of anti-malarial compounds derived from African medicinal plants, part I: A pharmacological evaluation of alkaloids and terpenoids. *Malar J* 2013;12:449.
 56. Poffenberger M, McGean B, Khare S, Campbell J. *Field Method Manual, Community Forest Economy and Use Pattern: Participatory and Rural Appraisal (PRA) Methods in South Gujarat India*. Vol II. New Delhi: Society for Promotion of Wastelands Development; 1992.
 57. Balick MJ, Cox PA. *Plants, People, and Culture: The Science of Ethnobotany*. New York: WH Freeman & Co.; 1996. p. 228.
 58. el-Said F, Sofowara EA, Malcolm SA, Hofer A. An investigation into the efficacy of *Ocimum gratissimum* as used in Nigerian native medicine. *Planta Med* 1969;17:195-200.
 59. Karou SD, Tchacondo T, Ilboudo DP, Simpore J. Sub-Saharan *Rubiaceae*: A review of their traditional uses, phytochemistry and biological activities. *Pak J Biol Sci* 2011;14:149-69.